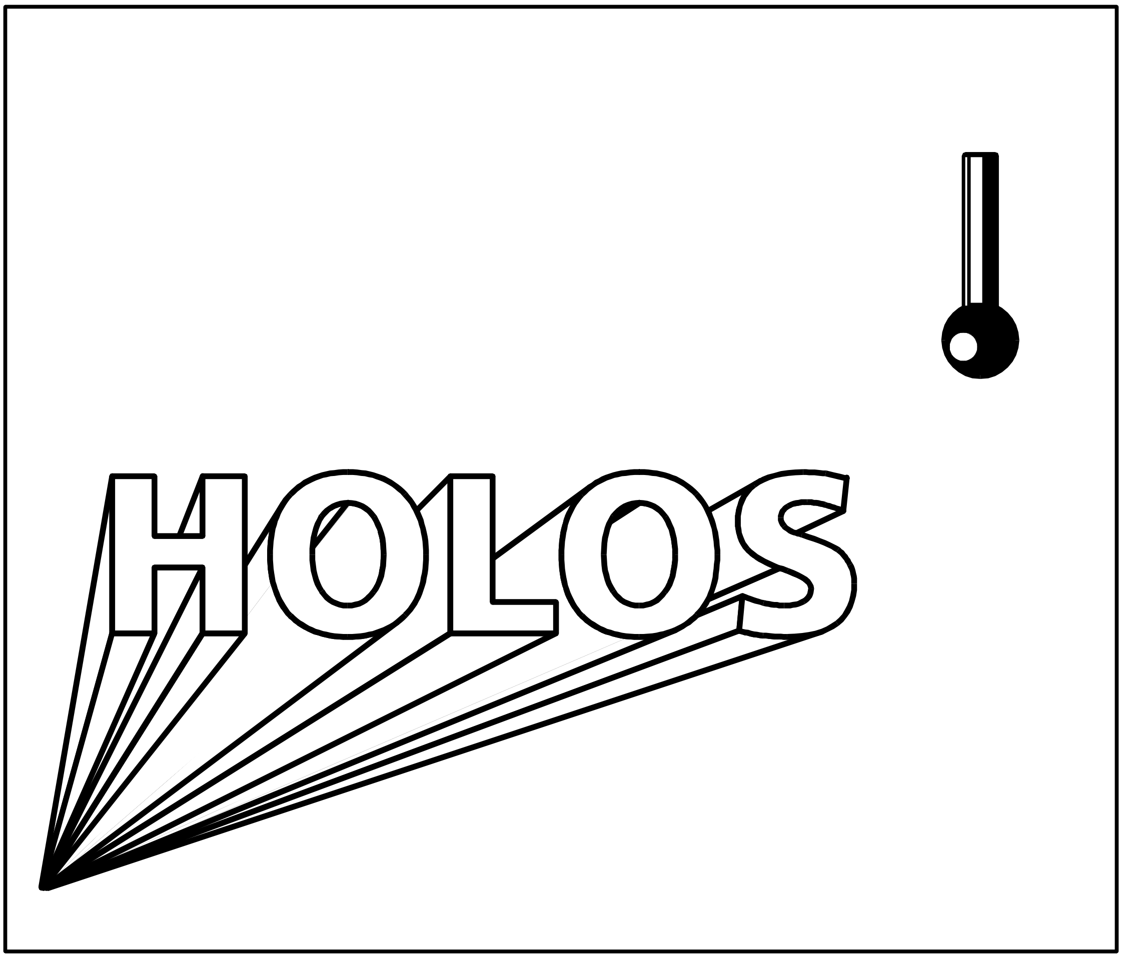
HOLOS-UX



Instruction Manual

Order No. 000000-1020-925

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1 General information about the HOLOS-UX 1.6 program

1.1 About this Operating Manual

This current edition of the Operating Manual describes the HOLOS-UX Version 1.6. program.

The structure of the Operating Manual is oriented towards the main functions of the program.

The chapters and sections are subdivided into

- general information on each function
- step-by-step operating instructions.

In the appendix you will find both an index and a glossary of technical concepts.

Symbols

The following symbols will be used to simplify the description of the operating sequences:

< ...> Function designation

Necessary action

Result of an action

Message on the computer

Cross-reference to chapter, page or diagram

Key on the computer keyboard
(example: input key)

1.2 HOLOS-UX Revision 1.60 - Innovations since Revision 1.50

- All CAD processors are included in the standard scope of supply. The following processors are available:

VDA post-processor	for the conversion of VDA files
VDA pre-processor	for the generation of VDA files
VDA analyzer	for the analysis of VDA files
IGES post-processor	for the conversion of IGES files
IGES pre-processor	for the generation of IGES files
IGES analyzer	for the analysis of IGES files

- Freely definable color for rendering, tolerances and offset correction, for surface element (surface, face) evaluation.
- Compare modified status of models with color marking of the modified surface areas.
- Define and select different model directories.
- When scanning areas using CNC-capable digitizing, defined runs can be stored and processed later.
- Regular geometry analysis for the identification and generation of regular geometries in free form surfaces.
- Join Bezier points or Bezier curves of adjacent areas, in order to close gaps or overlaps that have occurred during digitization.
- Simulate measuring runs with the parameters set on screen, displaying the travel paths between the scanning points.
- Freely arrange graphic symbols for the representation of deviations and store their position with the measuring run .
- There are two protocol formats to choose from: Standard or in line with the UMESS protocol, with selection of the components to be output.
- Calculate the center of gravity of the evaluated measuring points and output in the protocol.
- Define the offset of each clearance plane.
- Display tool bars.
- Store preview of a model’s graphic representation.
- Printer set up via a selection list

System requirements (subject to technical modifications)

- UNIX measuring and evaluation software, UMESS Revision 7.9 under HP UNIX V. 9.07, or Revision 8.0 under HP UNIX V. 10.2, for utilization of the full system functionality.

- HP9000 computer model 715/33/64/Mhz or 712/60 Mhz (as KMG computer but with LAN connection) with at least 64 MB RAM and 1 GB hard disk with HP-UX 9.05 operating system.

1.3 Extent of the program's capabilities

The program has two main objectives:

- Measuring a known surface, which is currently stored in HOLOS internal format.
- Digitizing an unknown surface and subsequent generation of a VDA surface description (Option).

Capability characteristics in detail:

- Link to the UMESS measuring software via the CADLINK module
- Multi-column operation
- Surfaces are digitized using the digitizing functions in CADLINK.
- Digitized points and curves can be joined to surfaces in HOLOS.
- The surfaces generated can be measured in a number of different ways. The actual points obtained can then be used to recalculate the surface.
- To measure a known surface, measuring runs are defined on the screen and then processed in CNC mode.
- The surface can be probed manually at any time and the resulting probed points can be processed at a later time.
- Scanning according to nominal values in conjunction with UMESS-UX.

General information about the HOLOS program

- For a roughly aligned surface, a 3D best fit is performed to improve the alignment.
- All data obtained are stored automatically.
- Milling with specially equipped co-ordinate measuring devices and the HOLOS-DIGITIZE and HOLOS-MILLING software options.
- Display, measure and evaluate regular geometry elements.
- User-friendly graphics functions simplify the processing of the surface model.
- VDA data can be read in and generated using the VDA processor.
- IGES files can be read in and generated using the IGES processor (option).
- The measurement results can be evaluated in a number of ways: as a numeric record or as a graphic record with vectorial, numeric or chromatic representation of the deviations.
- Surface transitions can be closed and smoothed out by means of simple CAD functions.
- An on line help system supplies rapid access to relevant information about each function.

The following program components are available as options in addition to the basic program and are described in separate operating manuals:

1. Functions for digitizing free form surfaces
2. Milling

1.4 Hardware and software environments

The HOLOS-UX program is designed to run on workstations under the UNIX operating system. A mouse is essential for operating HOLOS.

HOLOS-UX is designed for both CNC-controlled and manual co-ordinate measuring devices.

The interface between HOLOS-UX and the co-ordinate measuring device is the CADLINK communication module. CADLINK is a UMESS measuring software option.

UMESS measuring software is a general prerequisite for measuring (search for reference, alignment). In particular, UMESS-UX is a prerequisite for scanning functions in HOLOS-UX.

1.5 Starting and ending HOLOS-UX

Program start

Enter the **start** command in the console window or, if available, press the **<start HOLOS>** function key in the console window's menu bar.

After you have started the program, the following steps are executed:

1) The system is initialized and after a few seconds the operator environment for HOLOS is constructed.

2) The link to the co-ordinate measuring device is set up via the CADLINK interface.

3) If a surface model already exists on the computer, the user is asked whether this model is to be loaded.

Program end

Click on the <End> function in the <File> menu.

1.6 Link-up with the measuring software

HOLOS-UX can be linked up to a number of different measuring software packages. The communication link-up with the various software packages is carried out using a variety of mechanisms.

1.6.1 Link-up with UMESS-UX

The following configurations are possible for link-up with UMESS-UX:

Configuration 1

Both software packages run on the same computer, with the output being directed to the same screen.

Configuration 2

Both software packages run on the same computer, the output from the first software is effected on the system console, and the output from the second software is effected on the screen of an X terminal.

Configuration 3

Each software package runs on a different computer with its own different screen, which are connected together in a network.

In all configurations, HOLOS communicates with the UMESS-UX measuring software via the UNIX network services. A direct consequence of this is that, even if both software packages are being run on the same computer, the network services must be activated. This still applies even if there is no "real" network.

For communication with UMESS-UX measuring software, you are not required to define any parameters, since this task is carried out by the installation tools included in the delivery. You simply need to define the name of the HOLOS computer as a parameter in the CADLINK module on the UMESS side.

1.6.2 Link-up with UMESS 300 and UMESS 1000

Only one configuration is possible for link-up with UMESS 300 and UMESS 1000 measuring software. In this case, both HOLOS-UX and the measuring software are each run on separate computers.

Communication with UMESS 300 and UMESS 1000 takes place via a serial line (RS232). For this you need to define various parameters which are dependent upon the physical conditions of the conductor network (line length, possible sources of interference).

You define the parameters for the serial interface with the <Serial interface> function in the <Parameters> menu
🕮 see also Chap. 12.18

Standard parameter settings

Bits/characters	8
Stop bits	1
Baud rate	19200
Time-out	2

Define the parameters of the CADLINK option in the measuring software on the coordinate measuring device's computer in a similar manner!

1.7 Double column operation with HOLOS-UX

With double column systems (multi-column systems) you can measure on different measuring columns with HOLOS-UX.

Prerequisite

The computers are networked with each other by the UMESS-UX measuring software from the respective columns.

1.7.1 Setting up multi-column operation

The INSTALL installation tool is used to set up multi-column operation.

To activate multi-column operation, select <**multicantilever mode**>.

Then activate all columns on which you wish to measure. HOLOS can only access the columns which you activate at this point.

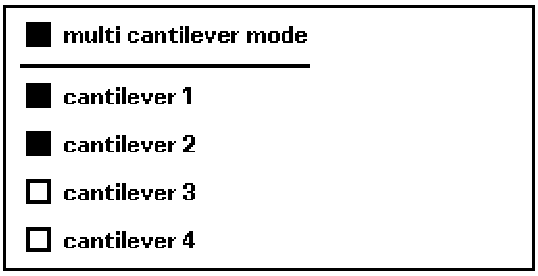


Figure 1-1

After activation of multi-column operation for HOLOS you must initialize the UMESS-UX program package on each column for communication with the HOLOS computer.

To do this, start the CADLINK option (DAW 2000). Select the <HOST> function (TAB-F7) and then the <PARAM> function (F5) to define the parameters for connection with HOLOS-UX.

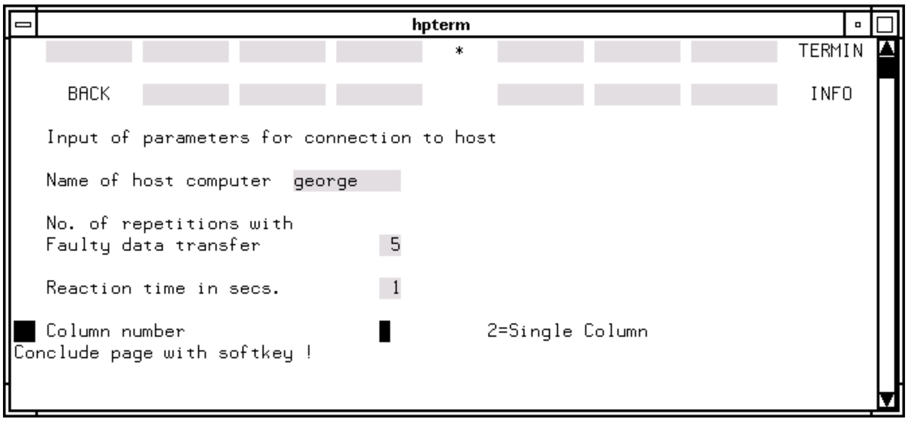


Figure 1-2

Name of host computer

In this field enter the name of the computer on which you have started HOLOS-UX.

If you do not know the name, on the computer on which you have started HOLOS enter the command: uname -n.

The operating system then displays the name of the computer.

Number of repetitions in the case of defective data transmission

You should not change this entry

Reaction time in sec.

You should not change this entry

Column number

Enter the number of the respective column (Column 1 ... Column 4).

Conclude the entry by confirming with the <READY> key (F8).

The UMESS-UX measuring software of the respective column is now ready for communication with HOLOS-UX.

1.7.2 Measuring in multi-column mode

In order to start a measurement on a particular column, you must define in HOLOS-UX on which column a measuring run is to be started.

To do this, select the <Receiving terminal (CADLINK)> function in the <Parameters> menu. Define the number of the column on which the subsequent measuring runs are to be started.

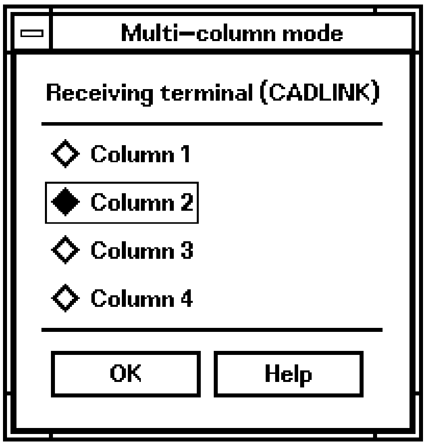


Figure 1-3

Then start the measuring runs for the selected column.

NOTE

When programming macros the respective column number is linked to a measuring run, i.e. measuring runs are always performed on the column which you have defined in the program for the respective measuring run.

Manual measuring runs selected in HOLOS

If measuring runs are to be started manually, before starting you must always define on which column the measuring run is to be performed.

1.8 Screen layout and operator control

1.8.1 Screen layout

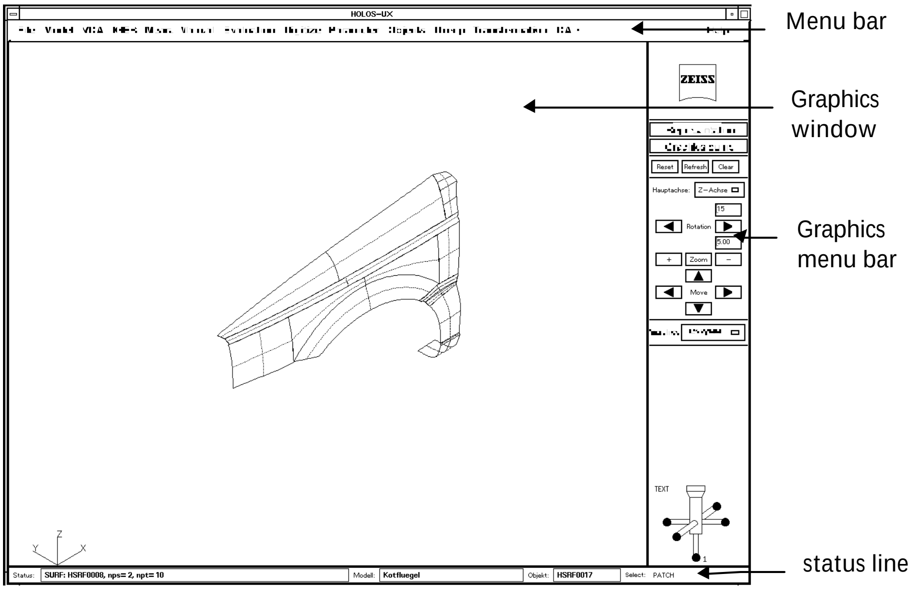


Figure 1-4

Menu bar
The menu bar contains a summarized list of all the main program functions. Each main function is divided into a menu that contains subfunctions.

Graphics menu bar
The graphics menu bar contains the complete set of functions that you use to change the graphic display of the model.

Graphics window
The graphics window is where the model is displayed in its current state of processing. The schematic coordinate axes at the bottom left shows in what position the observer is viewing the model. In the graphics window measuring runs are defined interactively.

Status line
Important information will be overlaid in the status line.

Status:	Last action carried out by the program, e.g. that data have been stored under a particular name.
Model:	Name of the active model.

General information about the HOLOS program

Object: Name of the last selected object. Objects are e.g. curves, surfaces, faces etc.

Select: Selection status, e.g. individual or group. The selection status is modified via the functions <Define group>, <Objects - Analysis> and <Select - Measuring points>.

Over and above the screen elements already described, dialog windows are opened to assist in operator control of the functions. You can shift these windows around and treat them just as you would normally in the "X-Windows“ user environment.

1.8.2 Invoking functions

A function is invoked by clicking the left mouse button.

If you click on a main function in the menu bar, a menu will be opened listing all the subfunctions. Any subfunctions that have an arrow on the right, then branch off into further subfunctions.

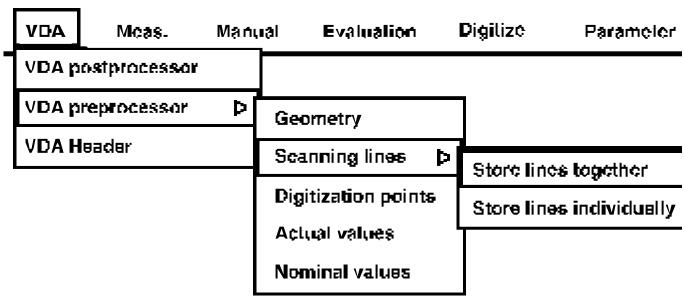


Figure 1-5

1.8.3 Selecting options

Numerous functions are controlled via dialog windows, in which you need to select or deselect various options.

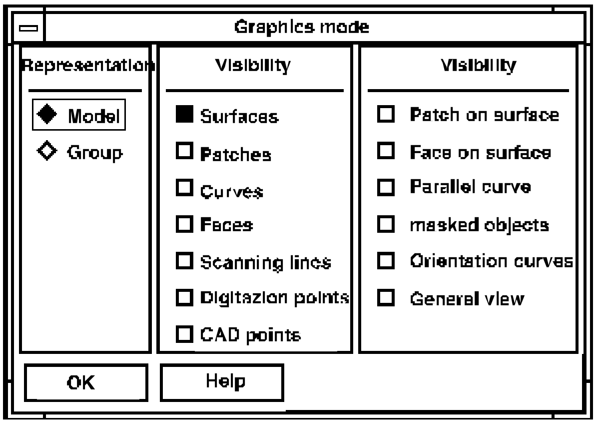


Figure 1-6

An option is selected by clicking on the display field with the left mouse button.

Light display field	=	Option selected
Dark display field	=	Option deselected.

1.8.4 Text entry

Numerous functions are controlled via dialog windows, in which text needs to be entered.

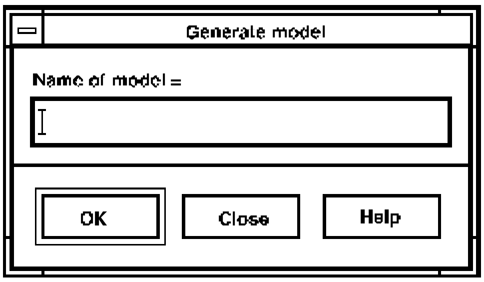


Figure 1-7

Click on the entry field with the left mouse button, so that the cursor then flashes in the entry field.

If you want to overwrite an existing entry, with the left mouse button pressed down drag the cursor over the text until it is completely highlighted. Now you can simply enter the new text.

Confirm your entry by clicking on <OK> in the dialog window.

The <Close> key cancels the function and closes the window.

1.8.5 Selecting elements

Numerous functions are controlled via dialog windows in which you need to make a selection (files, objects, models etc.).

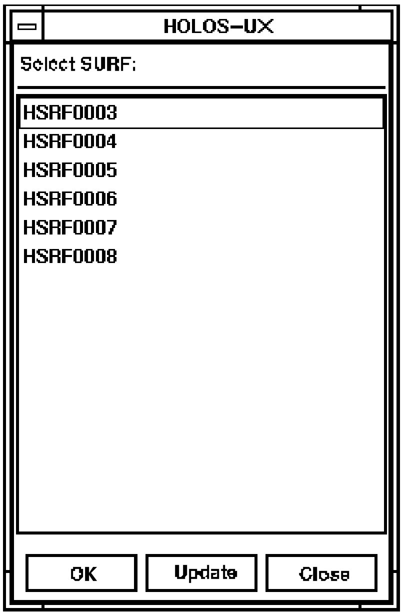


Figure 1-8

You can select the elements as follows:

- Click on the element with the left mouse button and then click on <OK> in the dialog window.
- Click on the element twice with the left mouse button, very quickly (double-click). The element will be adopted immediately.
- To select a number of elements, press the SHIFT key and click on each element once, or alternatively drag across the elements whilst keeping the left mouse button pressed down. Then finally click on <OK>.

- To select several elements which are not positioned directly next to each another, first press CTRL and then click on the individual elements.

By clicking on <Update> you update the contents of the dialog window.

By clicking on <Close> you close the dialog window.

1.8.6 File manager functions

In order to select data from the list more quickly, you can restrict the selection by presetting filters.

Example

A* lists all files which begin with “A“

Figure 1-9

*A lists all files which end with “A“

A lists all files which contain “A“

If no filter is specified or if only a star “*“ is specified as the filter, all files are displayed.

For all lists available in HOLOS (models, actual values, nominal values etc.) their own filters can be allocated, so that an entry is not repeated in the event of the list changing.

1.9 Administration

The ”Administration“ menu provides various options for the design of the interface and for data management.

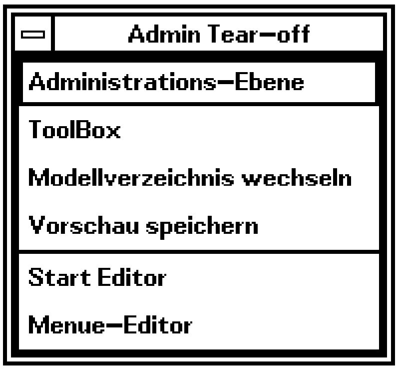


Figure 1-10

1.9.1 Administration level

The administration levels range from zero to four. The standard level is zero. You can only activate another administration level under instruction from Customer Support.

1.9.2 Toolbox

You can activate various symbol bars below the menu bar using the Toolbox function.

Figure 1-11

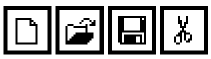
Click on the options for which you wish to activate a symbol bar. Then click on <Ok>.

The symbol bars for the selected options are displayed.

You can now call up the respective function by clicking on a symbol.

Model functions

Opens the symbol bar for model functions:



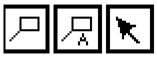
- Generate new model
- Load model
- Store model
- Delete model

Editor

Opens the symbol bar for the HOLOS editor, which is used to display measuring protocols, for example:

Graphic functions

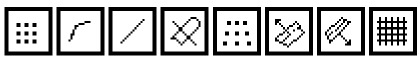
Opens the symbol bar for graphic functions:



- Move graphic symbols
- Arrange graphic symbols automatically
- Select elements by dragging a window: All visible elements within the window are selected.

Measuring procedure

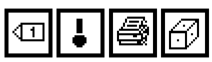
Opens the symbol bar for measuring procedures:



- Measure grid
- Measure curve
- Measure line
- Plane/workpiece section
- Measure raster
- Select measuring points
- Select edge points
- Net point/net section

Parameters

Opens the symbol bar for parameter functions:



- Define parameter for graphic symbols
- Define parameter for stylus
- Printer setup
- Define parameter for clearance planes

1.9.3 Change model directory

This function allows you to manage your data in different project-related directories.

Click on the <Change model directory> function.

The directory menu is displayed.

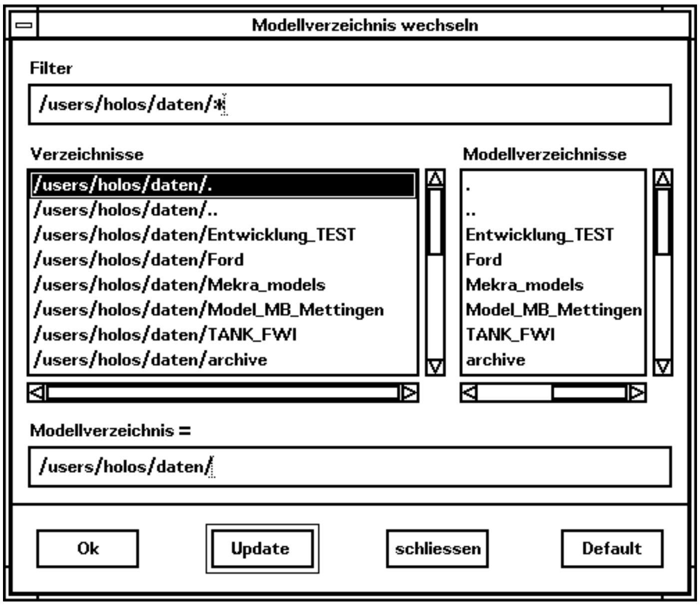


Figure 1-12

Selecting a directory:

Select a model directory and click on <Ok>.
Use <Default> to activate the standard directory.

Setting up a new directory:

Enter the name of the new directory in the <Model directory=> input field.
Then click on <Ok>.

The model directory is set up.

1.9.4 Save preview

This function allows you to save a preview of the graphic representation. This is displayed in the model catalog, so that you can specifically access saved models.

Click on the <Save preview> function.

A window for displaying the preview opens.

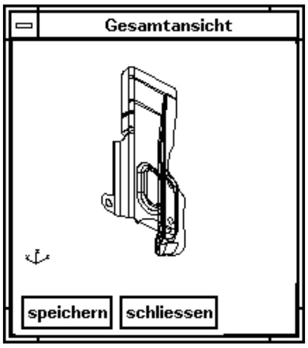


Figure 1-13

Alter the graphics, until you obtain the desired representation.
Click on <Save> in order to save the preview.

The preview is accepted and can be displayed when the model catalog is next opened:

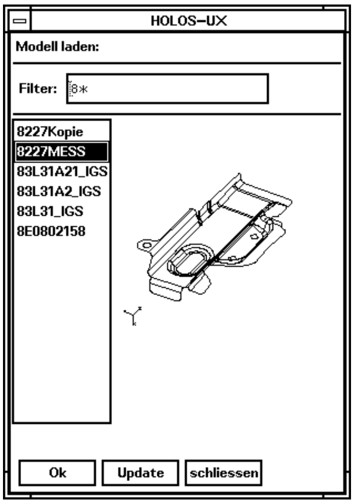


Figure 1-14

1.9.5 Editor

The editor that is used to generate and change files at the operating system level is started.

1.9.6 Menu editor

The <Menu editor> function in the <Admin> menu allows you to place frequently required functions in a user-defined menu.

This user-defined menu is activated by simultaneously pressing the <Ctrl> key on the keyboard and the left mouse button.

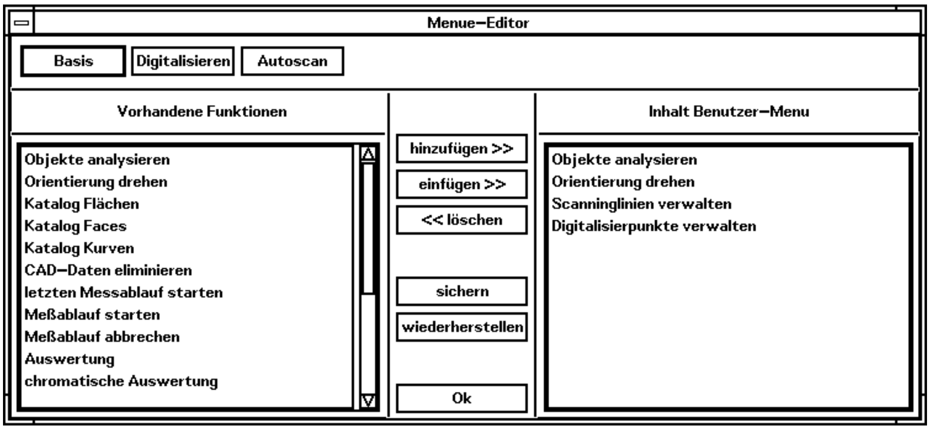


Figure 1-15, Menu editor

Basic

This key displays all the basic functions in the “Available functions” list, which can be transferred to a user-defined menu.

Digitize

This key displays all functions for the “Digitize” option in the “Available functions” list, which can be transferred to a user-defined menu .

Autoscan

This key displays all functions for the “Autoscan” option in the “Available functions” list, which can be transferred to a user-defined menu.

Add

Add a function from the “Available functions” list to the “User menu contents” list:

Select a function from the “Available functions” list and click on <Add>.

The function is transferred to the “User menu contents” list.

Insert

Insert a function from the “Available functions” list at a defined point in the “User menu contents” list:

Select a function from the “Available functions” list.

Select a function from the “User menu contents” list and click on <Insert>.

The function is transferred to the “User menu contents” list in front of the selected position.
If no function is selected in the user menu, then the new function is added at the end.

Delete

Delete a function from the user menu:

Select a function from the “User menu contents” list and click on <Delete>.

The function is removed from the list.

Save

Save the defined menu on the hard disk.
Your menu will then reappear when HOLOS is restarted. If you do not save a newly defined menu, it is only held locally and will not be available when HOLOS is next started.

Restore

Restore a saved menu and reject the changes made:

After making changes, click on <Restore>.

The last saved menu is restored.

OK

Quit the menu editor.

1.10 Help function

For virtually every function there is a help text, which you can read by clicking on <Help>. You can shift the help window around, and treat it just as you would normally in the "X-Windows“ user environment.

1.11 Revision level

When making inquiries to the Hotline you should know the revision level with which you are working. To obtain this information click on the Zeiss logo in the graphics menu bar with the left mouse button.

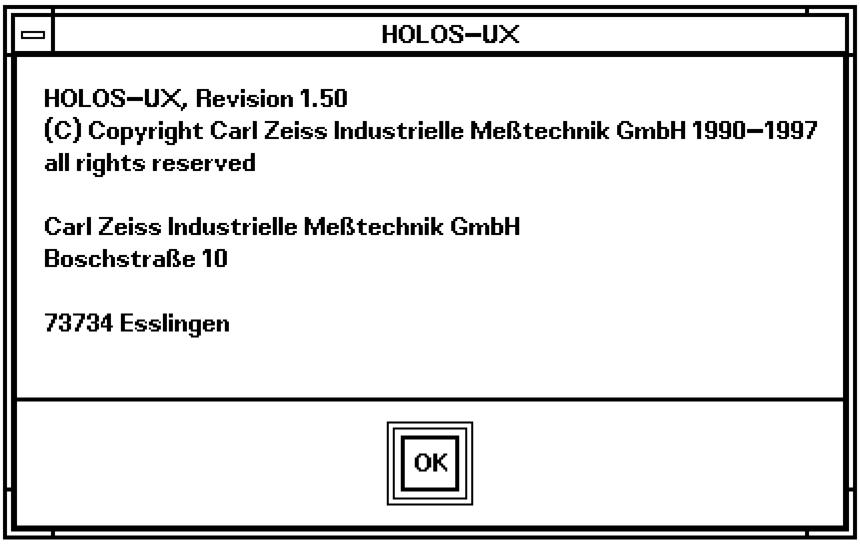


Figure 1-16

2 Surface models

2.1 Measuring surface models

This chapter gives a concise account of some of the operating steps that you would typically carry out to measure with models described as free form surfaces.

As a prerequisite, the appropriate probes must already have been mounted and calibrated.

1. Read the VDA data record for the model to be processed into your HOLOS workstation and convert it into the HOLOS internal data format.

   Functions: <VDA>-<VDA postprocessor>

2. After conversion from VDA format – HOLOS format, load the model into the HOLOS main memory.

   Functions: <Model>-<Load model>

   The model is displayed on the screen with the relevant settings. If necessary, modify the graphic display as required (zoom, position on the co-ordinate measuring device's work plate, position of the co-ordinate system etc.).

3. Clamp the workpiece to the work plate of the co-ordinate measuring device and align it.

   To carry out the alignment, use the alignment function in your current measuring software (see the UMESS Operating Manual). When using UMESS 1000 or UMESS-UX measuring software, ensure that the workpiece and the workpiece positioning system are identical, as otherwise it is possible for collisions to occur in automatic measuring runs.

   For the alignment, use existing regular geometry elements whose position in space is known. The alignment is then correspondingly accurate as a rule.
   If this is not possible because the workpiece does not have any regular geometry elements, align the workpiece as precisely as possible by means of the appropriate UMESS meausuring software

functions. A precise alignment can then be carried out by a best fit of manually probed points. However, the first alignment must be known to be at least sufficiently precise for probings on the workpiece surface to be detectable by HOLOS.

4. In your measuring software change into the CADLINK software option
   ADR PROG 369 (UMESS 300)
   Direct selection 2000 (UMESS-1000)
   Direct selection 2000 (UMESS-UX)
5. You can now probe points on the surface of the workpiece. If you wish to perform probings in manual mode (patch identification), you can start immediately in the UMESS-UX and UMESS-1000 measuring software.

   For UMESS 300 measuring software you must define the mode for manual probing (Softkey <PATCH-IDENT>).
6. When the alignment is correct, HOLOS-UX recognizes the probing points and projects them onto the loaded workpiece. Deviations are shown on the screen or in the relevant window.
7. If the alignment was not sufficiently precise, you can achieve an improvement in the alignment by a best fit of the measurement results (3D-best fit).

   Functions: <Manual>-<Patch identification>
   -<3D-best fit>
   or
   <Evaluation>-<3D-best fit>, if you have already saved the probed measurement results.
8. In CNC mode you can define and execute measuring runs.

   Functions: <Measure>-<Define measuring run>-
   <Grid>
   <Line>
   <Meas. points>
   <CAD points>

   Before starting the measuring runs, check the parameters for the measuring runs (both in the parameter menu of HOLOS-UX and also in the CADLINK measuring software option). Previous definitions for backaway paths or clearance planes can, with a new workpiece, result in collisions.

Functions: <Parameters>-<Measuring run>

The measurement results will be displayed on the screen after the measurement together with the defined parameters.

9. Subsequent evaluations can be obtained via the <Evaluation> menu.

   Functions: <Evaluation>-
   <Actual data >
   <chromatic co-ordinates >
   <Sections>

10. Print the graphic measuring record on the plotter <Plotter> or on the graphics printer <Graphics dump>. A numeric measuring record can be obtained via the <Measuring record> function in the evaluation menu.

2.2 Generating surface models

This chapter gives a concise account of certain operating steps that you would carry out to digitize models whose mathematical description was previously unknown, and how you obtain the description of the workpiece surface.

A prerequisite is that the appropriate probes must already have been mounted and calibrated.

Generally, you determine the quality of the digitizing surface data even before the actual digitizing process, during the preparation and division of the surfaces or surface segments on the workpiece surface.

To carry out this preparatory work, knowledge is required in terms of the theory and the fundamental mathematical background. These topics form an integral part of the training course for the HOLOS-UX software package, and will therefore not be expanded upon at this point.

1. Divide the workpiece surface into surfaces or surface segments. If possible, mark the division with a marker pen. This will make it easier to probe the boundaries of the surface or to obtain reproducible results at a later time.
2. Clamp the workpiece to the work-plate of the co-ordinate measuring device and align it. The simplest method is to orientate the position of the workpiece in terms of already existing constructive solid geometry elements, since it will then be possible to reproduce the position of the workpiece at any time without difficulty.

   To carry out the alignment, use the alignment function in your respective measuring software (see the UMESS Operating Manual). When using UMESS 1000 or UMESS-UX measuring software ensure that the workpiece and the W position system are identical, as otherwise it is possible for collisions to occur in automatic measuring runs.
3. You can now obtain the first approximations of your surfaces or surface segments by manually probing the previously defined boundaries of the surface segments.

   For this, make use of the available functions in the respective

CADLINK measuring software:

DIGIT POINT	to digitize individual points
DIGIT CURVE	to digitize curves
DIGIT GRID	to digitize surfaces

The explanation of these functions forms an integral part of the training course for the HOLOS-UX software package, and will therefore not be expanded upon at this point.
Since the recording of further points to determine the precise mathematical description of the surface segments can for the most part take place automatically, in principle the following statement applies when manually probing the surface boundaries:

As few points as possible, but at least as many points as are actually needed!

4. Depending on the digitizing function used in CADLINK you must define the surface segments using the interactive-graphics:

Digitizing function	**Action in HOLOS**
DIGIT POINT	Definition of the points of a curve Generation of the curves Definition of the curves of a surface Generation of the surface
DIGIT CURVE	Definition of the curves of a surface Generation of the surface
DIGIT GRID	No further actions required

Each of the possible digitizing functions has advantages and disadvantages in terms of the resulting surface transitions and the manual work before and afterwards. These topics form an integral part of the training course for the HOLOS-UX software package, and will therefore not be expanded upon at this point.

5. Following definition of the first approximations of the surface segments, you can improve the accuracy of the mathematical

description by recording further points.

Functions: <Digitize> - <Digitize surface>

Define the number of points for the points grid to be recorded in the relevant dialog window. Following confirmation the points will be displayed on the screen and automatically measured. After processing of the points grid the surface will be re-calculated.

Experience has shown that with correct application of the digitizing function (sensible division of the workpiece surface) a points grid of 6 x 6 points, (but a maximum of 7 x 7 points), is quite sufficient to give a satisfactory description of the surface segment. If you find that you cannot achieve sufficient accuracy even with the higher points density, then you must break open the relevant surface segment (further sub-division) and digitize once again.

6. Each time you will receive a message in the status window giving the standard deviation of the probed points for the calculated surface.

   If you need further information concerning the accuracy of the calculated surface segments, then use the functions for measuring free form geometries. The quickest method of checking is via manual probing of the generated surface on the surface of the workpiece (patch identification).

7. Depending upon the result of this check, you can then obtain further information on the surface geometry by increasing the points density (repetition of steps 5-6).

8. Via the CAD functions <Patches-> Surface> you can close transitions between the individual surface segments and define the degree of continuity for the surface transition.
   During the digitizing process with CADLINK, surfaces that only have one surface segment always occur. Since with the <Patches-> Surface> function surfaces with a number of segments can be defined from single-segment surfaces, this function is also designated as re-parametrisation.

9. The quality of the generated workpiece surface is to be graphically displayed as explained in Chapter 2.1. The best statement in the

graphic display is obtained via an evaluation with markings or by displaying the chromatic co-ordinates of the probed points grid.

The workpiece descriptions generated with the functions described above can also be transferred to higher level systems as a VDA-FS file.

Functions: <VDA preprocessor>-<Geometry>

For a number of functions copies of surfaces are generated and the original surfaces are masked (e.g. in the re-parametrisation). If the masked surfaces are not to be transferred to the CAD system then they must be deleted before generation of a VDA-FS file in HOLOS.

- Delete masked object
- Define VDA header
- Generate VDA file

3 Graphic representation

This chapter describes the functions on the graphics menu bar. These are used to change the graphic representation of the model.

The graphic representation of the model in its existing state of processing fulfills important objectives in HOLOS-UX. On the one hand, you are able to judge the quality of the generated surface with the aid of the graphics (e.g. with a chromatic evaluation), and on the other, you are able to define measuring runs using the interactive graphics on the screen. The projection of the model on the screen is particularly important for the second of the above-mentioned tasks.

As well as the functions on the graphic bar, the graphics parameters are also crucial for the graphic representation of the model.

📖 see Chap. 12.1

General information about the HOLOS program

The graphics menu bar contains the following functions:

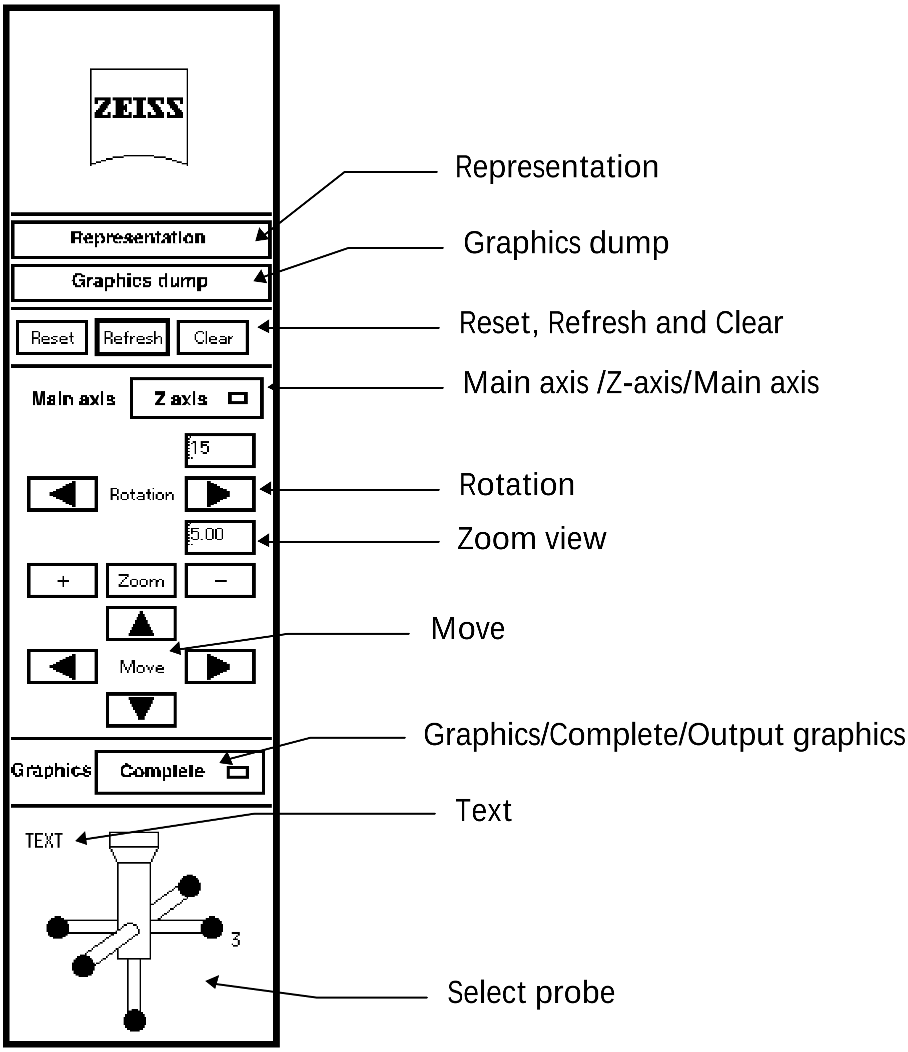


Figure 3-1

3.1 Representation

The <Representation> function allows you to define which objects are visible on the screen.

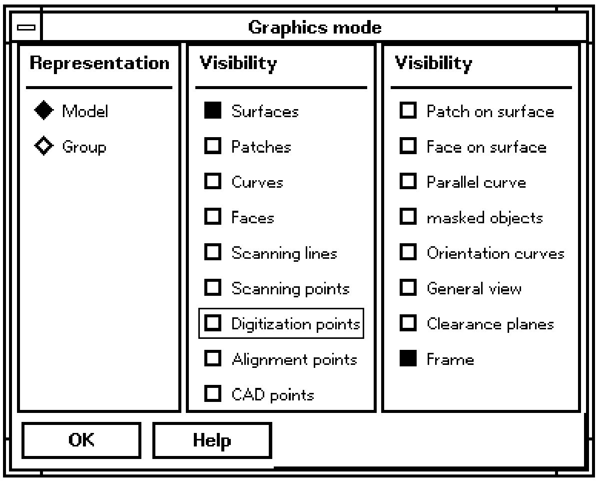


Figure 3-2

Option	**Meaning**
Model	shows complete model
Group	shows only the definedgroup
Surfaces	displays all surfaces
Patches	displays all patches
Curves	displays all curves
Faces	displays all faces
Scanning lines	displays all scanning lines (generated by laser or measuring probe)
Scanning points	displays only the points of a scanning line
Digitizing points	shows all points that have been generated by the DIGIT POINT function in CADLINK
Alignment points	displays manually probed alignment points
CAD points	displays points adopted from CAD description (VDA/IGES)

General information about the HOLOS program

Patch on surface	shows all patches of the surface by clicking on this surface
Face on surface	shows all faces on the surface by clicking on this surface
Parallel curves	displays all parallel curves
Masked objects	masked objects are always displayed in brown
Curves orientation	shows the orientation of the curves
Clearance	displays the clearance around the workpiece. The distance from the clearance planes to the workpiece can be defined in the parameter page <Clearance planes>. Clearance planes can be directly selected using interactive graphics and adopted by the measuring run parameters.
Frame	When outputting to the plotter, a frame is drawn around the graphical representation. If you wish to display this frame permanently on the screen, activate the <Frame> function in the graphic representation dialog window.

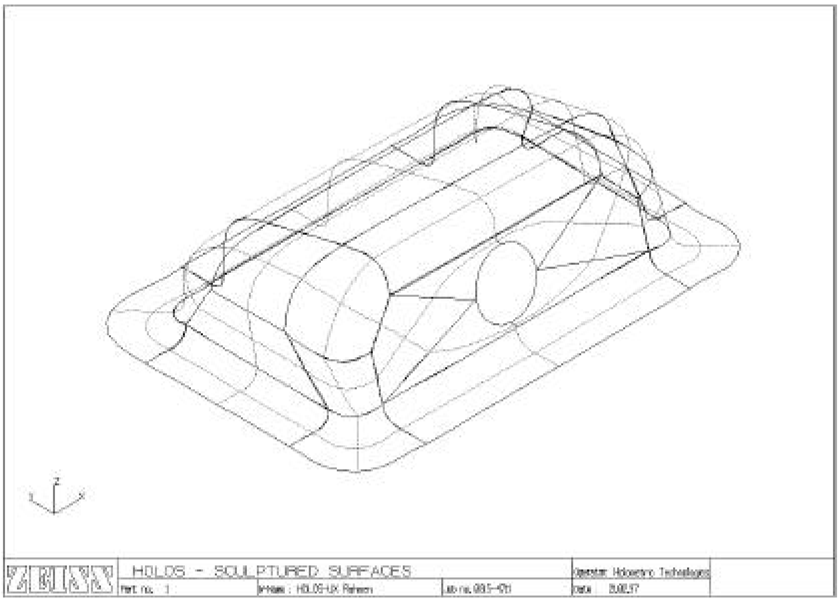


Figure 3-3

The definitions for representation are saved for each model and for each group of a model, and are in the formerly defined state after the model or group has been loaded.

NOTE:

Only displayed objects can be processed. In other words: if there is no response to a particular function, check first of all that display is switched on for the object.

3.2 Graphics dump

The <Graphics dump> function is used to output the contents of the graphics window to the graphics printer.

In a dialog window adjust the settings as required:

- Paper format: A3 or A4
- Display colors in inverse form: representation on a white background (an inverse display saves time and color).
- Send graphic to the printer: a file, "GDUMP_0“, is created in the directory /users/holos/data/tmp in PCL format and deleted after printing.

3.3 Rendering

This switch is used to activate the <Rendering> function. In Rendering mode the workpiece surface is displayed in color, illuminated and without concealed edges.

For very large amounts of data, or complex workpiece geometries, the construction of the graphic representation can be considerably slower.

see Chaps. 12.2, 12.3.

3.4 Reset, refresh and clear

These three functions are used to re-create the graphics window in a number of different ways.

Reset	All values for Move, Zoom and Rotation are reset to their initial state
Refresh	The contents of the graphics window is re-created in its latest state.
Clear	Various displays with measured values and deviations are deleted.

3.5 Definition of the main axis

This function is used to define the main axis. The definition of the main axis is carried out in a manner similar to that for defining the co-ordinate system on the co-ordinate measuring device, when a different choice of axis is selected.

Example

X-Axis upwards, instead of Z-Axis = rotation of the co-ordinate system

After "Reset“ the main axis is always positioned upwards.

3.6 Image rotation

There are two ways of rotating the image in the graphics window:

Rotate using the <Rotation> function in the graphics menu bar.

Enter the step width for the rotation in the text field.

Text entry see Chap. 1.8. 4

Click on the arrow.

With each successive click the image will be rotated by the specified angle about the axis of rotation that was clicked on.

Rotate using the right mouse button (possible at any time).

Position the mouse in the graphics window.

Keep the right mouse button pressed down and move the mouse downwards or to the left.

Image rotates clockwise.

Move the mouse upwards or to the right.

The image rotates counter-clockwise.

In the second procedure you can immediately follow the rotation of the image on the screen. For large volumes of data, however, the constant re-creation of the graphics window can be quite a time-consuming process.

To avoid this, you can make an adjustment via the <Parameter - Graphics> function, so that only the axis intersection will be rotated simultaneously with the mouse movement.

see Chap. 12.1

The image will only be displayed in its final position when you release the right mouse button again.

Axis of rotation

The axis of rotation for both procedures is the selected co-ordinate axis. The axis of rotation is color-highlighted in the axis intersection at the bottom left. You can easily change the axis of rotation by clicking on the desired axis in the axis intersection.

3.7 Image magnification or reduction

There are three ways to magnify or reduce (using zoom) the size of the image in the graphics window.

By using the <+> and <-> keys with the Zoom function.

Enter the step width for zooming in the text field.

Click on <+> or <->.

The image is magnified or reduced step-by-step.

Using the <Zoom> key with the Zoom function.

Click on <Zoom>.

Keeping the left mouse button pressed, draw a rectangle over the area that you want to magnify within the graphics window.

As soon as you release the mouse button the area enclosed by the rectangle will be displayed in magnified form.

Using the middle mouse button (possible any time).

Keep the middle mouse button pressed and move the mouse to the left or downwards.

The image will be reduced.

Move the mouse to the right or upwards.

The image will be magnified.

3.8 Move image

There are two ways in which you can move the image in the graphics window.

Move the arrow buttons of the function <Move>.

Click on an arrow button.

The image will be moved in the direction that was clicked on.

Move using the left mouse button (possible any time).

Position the mouse in the graphics window.

Keeping the left mouse button pressed, pull up a translation vector that specifies where the image is to be shifted to.

As soon as you release the mouse button the image will be moved.

3.9 Graphic display options

With the function <Graphics> you are able to choose from a number of possible ways in which the graphic can be output: Complete, Sub-image, Screen and Plotter.

Complete

The image is output to the graphics window as a single view. In Complete you can change the view using the functions described above.

Sub-image

The image is output to the graphics window in four different views (in the three main planes and spatially).

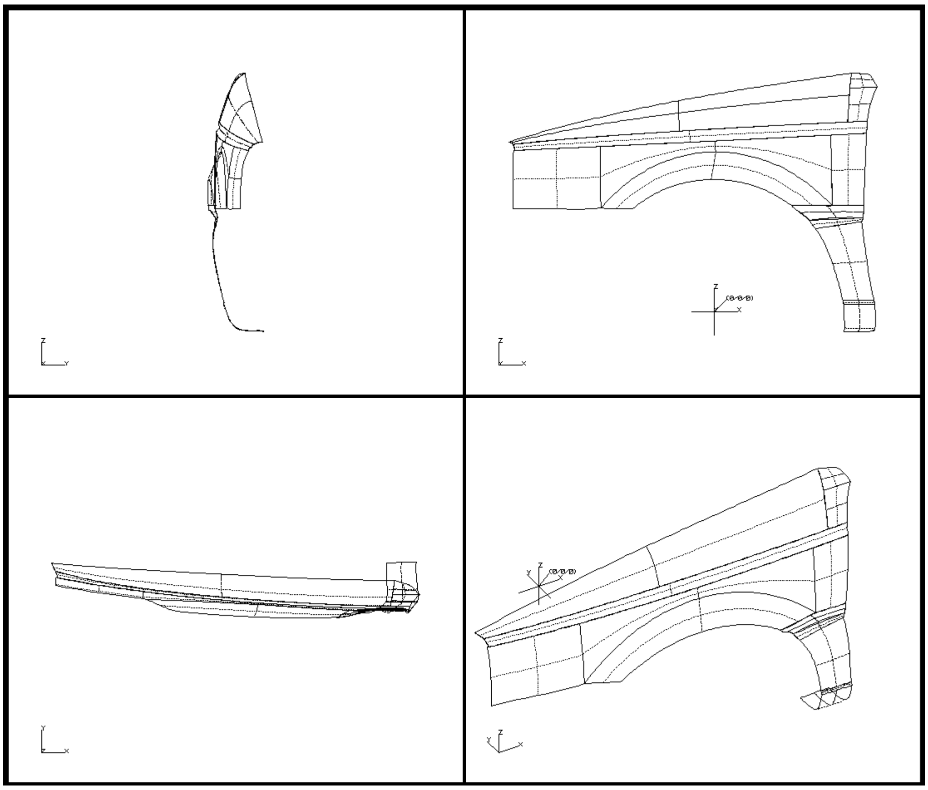


Figure 3-4

Each of these four views can be displayed in full again by clicking in the view itself with the right mouse button. In this complete representation, a coordinate counter also runs at the top left for projections showing the position of the mouse.

If you defined a raster with the function <Parameter - Graphics>, this will be displayed in the views for the main planes.

see Chap 12.1

Screen

The function <Screen> is used to display on the screen how the contents of the graphics window will appear on the plotter. You lay out the record head shown with the function <Record head> in menu <Parameter>.

For the definition of a variable logo in the record head see Appendix A

Plotter

With this function you output the contents of the graphics window to the plotter.
If during the installation you defined an ink-jet printer for plotter output, you are asked to specify the format.

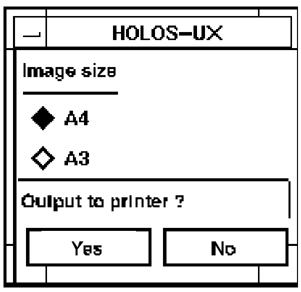


Figure 3-5

3.10 Storing and retrieving graphic views

For quick definition of a specific view of the workpiece you can store the graphic display setting and retrieve it when required.

Any number of settings can be stored. The settings are stored with a name in the appropriate workpiece directory.

General information about the HOLOS program

For quick definition of specific views , you can define six so-called “Quick positions”,. In the basic setting these six positions are pre-assigned with the six projection levels of a cube.

Operation

Call up a specific setting for the graphic display , by clicking with the mouse on the buttons of the dialog window below:

Figure 3-6

Buttons 1... 6

Use buttons 1... 6 to define the settings for the views of the basic setting or the “Quick positions”.

Button <N>

After clicking the <N> button, a catalog is displayed with the list of all named settings.

Define the change of the graphic setting with one of these settings.

Store view

To store a specific view, select the <Store view> function.

A dialog window opens, which you can use to store the setting in question:

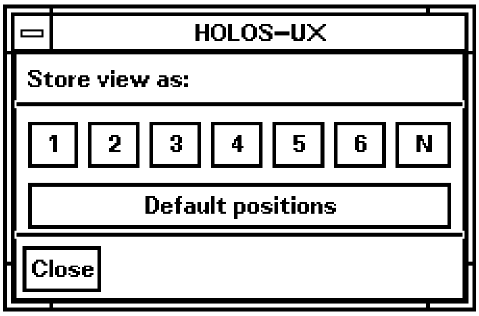


Figure 3-7

Buttons 1... 6

If you want to assign the “Quick positions”, select one of the buttons 1... 6.

The temporary setting for the graphic display is then stored under this position number.

Button <N>

If you want to store the graphic view setting under a particular name, select the button <N>.

A dialog window appears in which you can enter the name under which the temporary setting for the graphic view is to be stored.

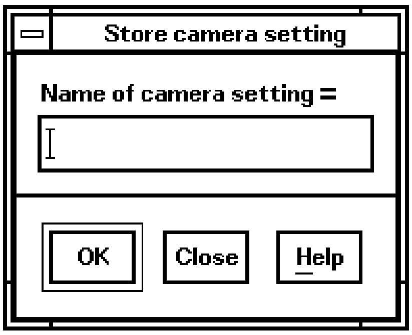


Figure 3-8

General information about the HOLOS program

Store the view in question with <OK>.

If you close the dialog window using the <Close> button, the setting in question will not be stored.

Default positions

Using this function re-assigns the basic setting to the “Quick positions”.

In the basic setting these six positions are pre-assigned with the six projection levels of a cube.

3.11 Graphic editor

With the <EDIT> function in the graphic menu bar you start the graphic editor for configuring the graphic test records.

Using the graphic editor, you can create, edit and delete graphic elements on the screen.
The graphic elements are:

- Text
- Lines
- Rectangles
- Circles

Another function offered by the graphic editor is the facility to relocate on the screen deviations which are displayed in deviation icons.

Graphic elements can be stored and loaded again later. So, for example, you have the facility to create your own frame layouts for the configuration of graphic test records.

Operation

Click on <EDIT> in the state graphic menu.

A window opens with the functions for configuring graphic test records:

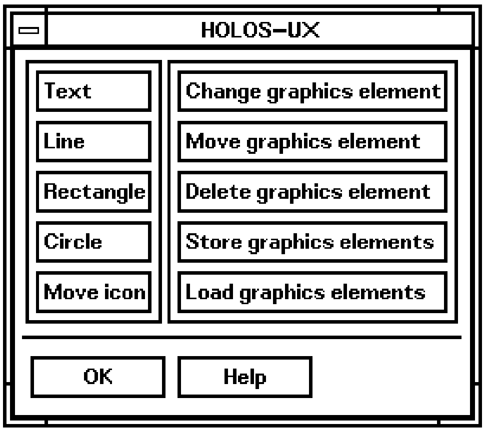


Figure 3-9

3.11.1 Text

With the <Text> function any text can be fetched on screen for display.

Click on the <Text> function.

In the status line the prompt appears to define the text position with the left mouse button.

Click the text position on the screen with the left mouse button.

The text entry window opens.

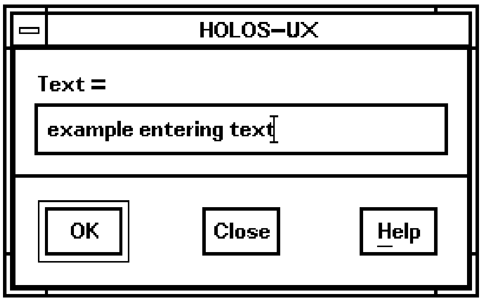


Figure 3-10

Enter the desired text and confirm with the <OK> button.

The entered text is positioned on the screen.

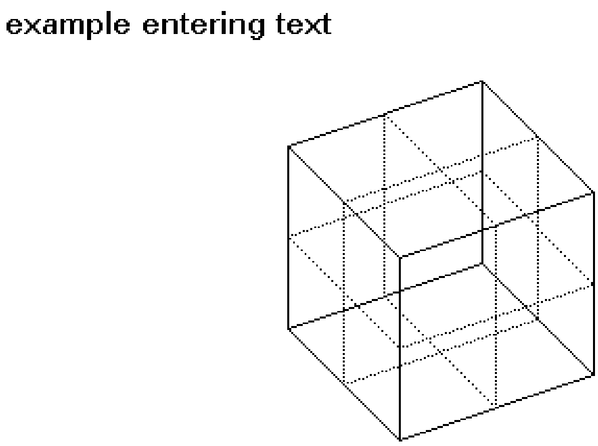


Figure 3-11

3.11.2 Line

You use the <Line> function to display a line on the screen.

Click on the <Line> function.

The message “Select: DRAW LINE” appears in the status line.

Click the first line point on screen with the left mouse button.

Drag out the line to the line end point with the mouse button held down.

Release the mouse button.

The line is positioned on the screen.

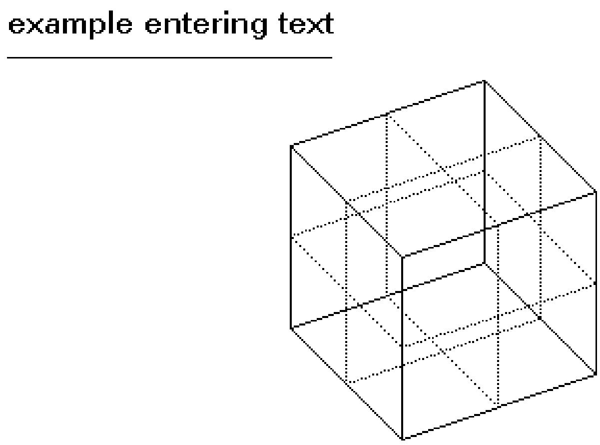


Figure 3-12

3.11.3 Rectangle

You use the <Rectangle> function to display a rectangle on the screen.

Click on the <Rectangle> function.

The message “Select: DRAW RECTANGLE” appears in the status line.

Click the first corner point of the rectangle on screen with the left mouse button.

Drag out the rectangle to the second corner point with the mouse button held down.

Release the mouse button.

The rectangle is positioned on the screen.

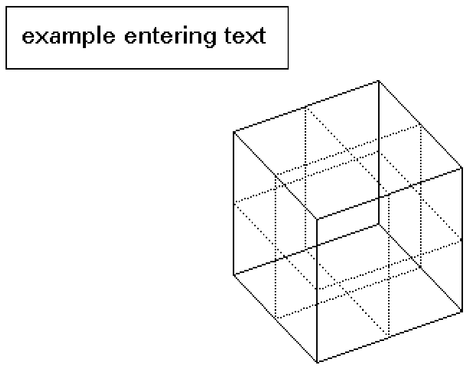


Figure 3-13

3.11.4 Circle

You use the <Circle> function to display a circle on the screen.

Click on the <Circle> function.

The message “Select: DRAW CIRCLE” appears in the status line.

Click the centre point of the circle on the screen with the left mouse button.

Drag out the circle to the required size with the mouse button held down.

Release the mouse button.

The circle is positioned on the screen.

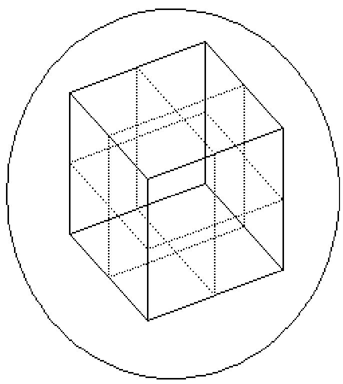


Figure 3-14

3.11.5 Move icon

You use the <Move icon> function to move overlapping deviation symbols anywhere on the screen.

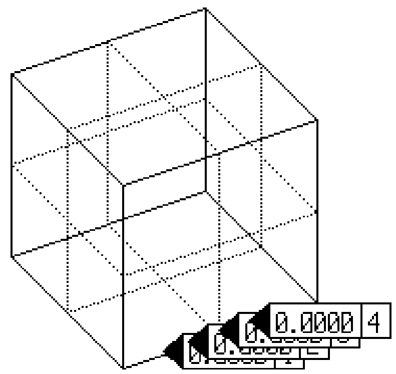


Figure 3-15

Click on the <Move icon> function.

Using the left mouse button, click on the arrow point of an icon.

With the mouse buton held down, move the icon to the required position.

Release the mouse button.

The icon is positioned at the new location.

Icons which have already been moved have no arrow point. To move them, they can be selected at a tag.

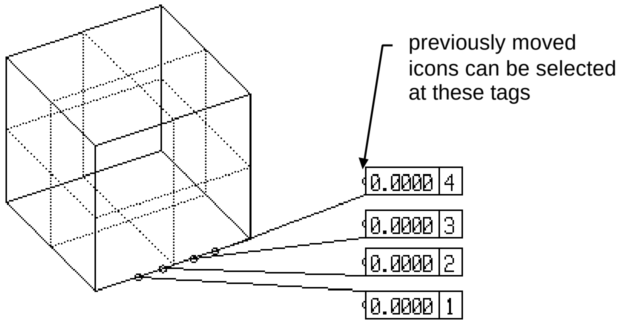


Figure 3-16

Clear

Clicking the <Clear> function removes all icons from the graphic display.

Reset

Use the <Reset> function to move all icons to their original position.

For the functions described below, you have to select the graphic elements by clicking with the left mouse button. Each element has a specific position on which it can be selected.

Text:	Select texts at the bottom left-hand edge of the first character.
Line:	Select lines at the “first” line point.
Rectangle:	Select rectangles at the “first” corner point.
Circle:	Select circles at the centre point

(The “first” point is the point you first specified when creating the graphic element.)

3.11.6 Edit graphic element

Use the <Edit graphic element> function to edit existing onscreen graphic elements.

Click on the <Edit graphic element> function.

Click on the graphic element to be edited with the left mouse button.

The selected graphic element is displayed red on the screen.
If you have selected a text, the window for entering or editing text opens.

Enter the new text.

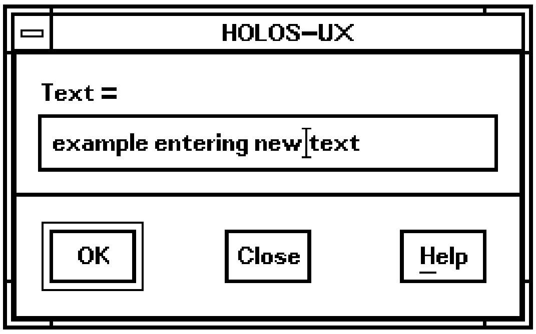


Figure 3-17

After confirming with <OK> the edited text is positioned on the screen.

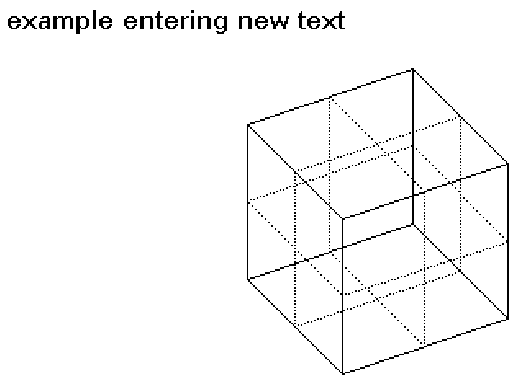


Figure 3-18

If you have selected a line, a rectangle or a circle:

With the mouse button held down, move the mouse until the graphic element to be edited has reached the required new size or location.

Release the mouse button.

The edited graphic element is positioned on the screen.
If you don't want to edit the selected graphic element:

Release the mouse button without moving it, or move the mouse pointer back to the start position with the mouse button held down. The graphic element will not then be altered.

3.11.7 Move graphic element

Use the <Move graphic element> function to move text, lines, rectangles and circles.

Click on the element in question with the left mouse button.

The selected element is displayed in red.

With the mouse button held down, move the element to the desired position.

Release the mouse button.

The graphic element is positioned at the new location.

3.11.8 Delete graphic element

Use the <Delete graphic element> function to delete text, lines, rectangles and circles.

Click on the graphic element in question with the left mouse button.

The selected element is displayed in red.

Release the mouse button to delete the selected element.

If you don’t want to delete the selected element, move the mouse to a different location with the mouse button held down.

If you want to delete all graphic elements, click on the <Clear> function.

3.11.9 Store graphic elements

Using the <Store graphic elements> function, you can store the graphic elements displayed on the screen in a file.

Click on the <Store graphic elements> function.

A window opens for entering a filename.

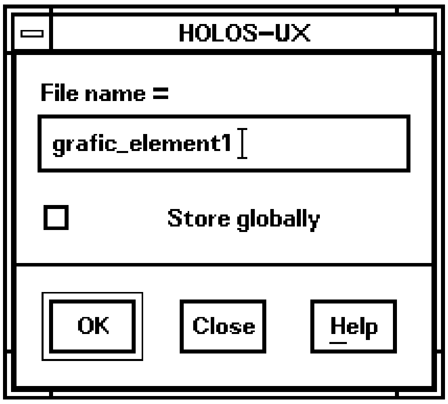


Figure 3-19

Enter a filename under which the graphic elements are to be stored.

Click on the <Store globally> switch if the file is to be stored globally.

> **NOTE:**
> ***Globally stored graphic elements can be loaded from any model, whereas locally stored ones can only be loaded from the model active at the time.***

Confirm the entry by clicking on the <OK> button.
The graphic elements displayed on the screen are stored.

General information about the HOLOS program

3.11.10 Load graphic elements

With the <Load graphic elements> function you can display stored graphic elements on the screen.

Click on the <Load graphic elements> function.

A window opens for selecting the data.

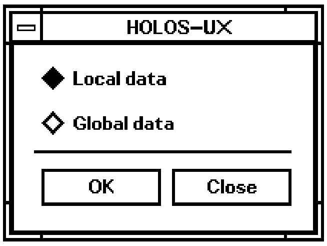


Figure 3-20

Click on the <Local data> switch to obtain a list of the graphic elements stored for the active model.

Click on the <Global data> switch to obtain a list of globally stored graphic elements.

Click on the <OK> button.

A window opens with a list of the elements found.

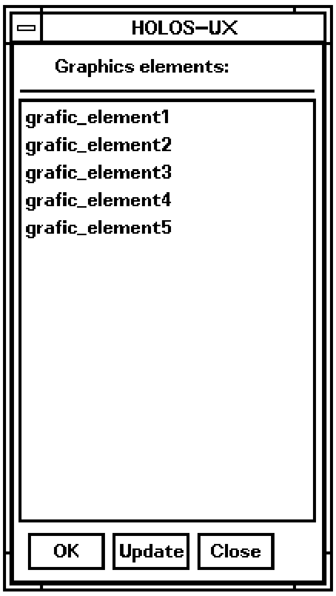


Figure 3-21

Select a file by clicking on it with the left mouse button and confirm with <OK>.

The stored graphic elements will be displayed on the screen.

3.12 Select probe

With this function you select the probe for subsequent measured values. All measurements will be displayed on the screen in the color of the currently active probe.

A precondition for the selection of a probe is that the probe has been activated with the function <Parameter - Probe>.

see Chap. 12.8

If no specific probe has been assigned for a measuring run, you should still utilize the Parameter function. The probe that was defined at the control console will then be valid.

3.13 *Plotting to scale with HOLOS-UX*

From Revision 1.45 of HOLOS-UX you can output the 2D projection representations of your graphics to scale on a plotter.

Call up the <Scale> function in the <Graphics> menu on the grahics function bar on the left hand edge of the screen.

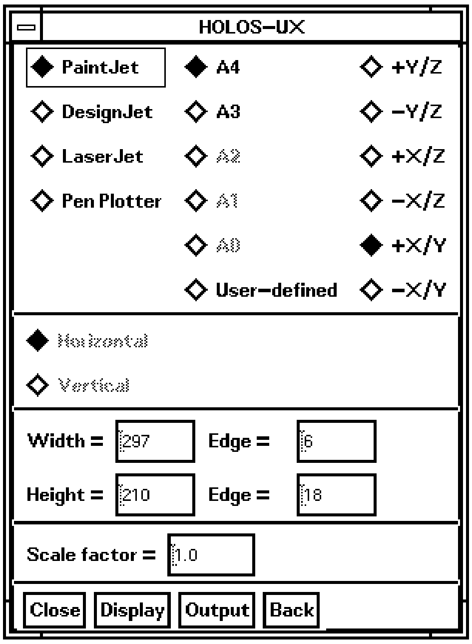


Figure 3-22

NOTE

The graphics are output to the output device which you have defined as the plotter in the HOLOS installation tool or when setting up the printer in the <Parameters> menu.

- First of all define the output device and the paper format loaded (see paper formats).
- Define the projection planes in which the graphics are to be represented.
- Define the scale factor for outputting the graphics (M1:1 = scale factor 1; M2:1 = scale factor 0.5; etc.)

Functions in the bottom bar

close	Closes the window which is currently open.
display	Displays the graphic representation with the set parameters on the screen.
output	The graphic representation is output with the set parameters to the plotter / graphics printer (see next figure).
back	This function reverts from scale representation back to the previously active representation.

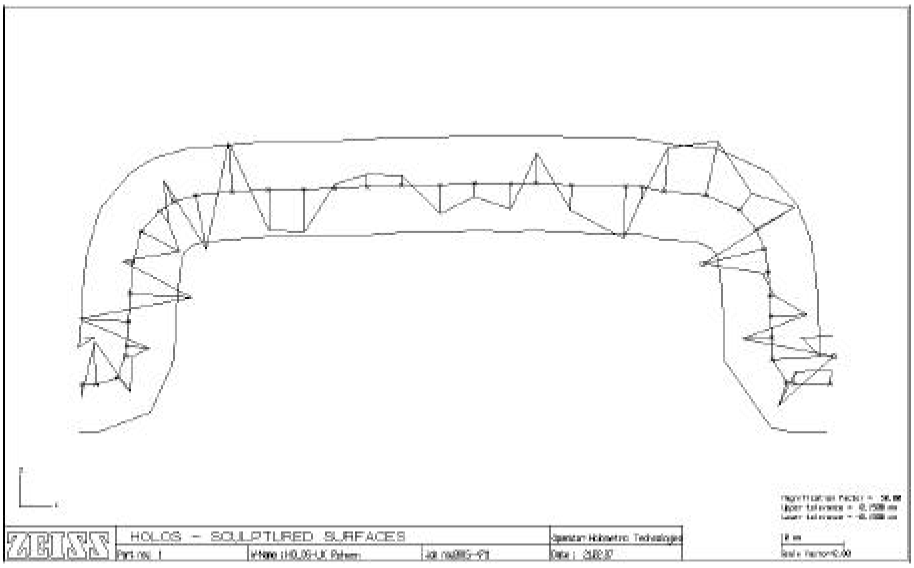


Figure 3-23

Paper formats

Output to scale is possible on all paper formats from DIN A4 to DIN A0. The size of the output format is dependent upon the output device used.

PaintJet XL300	
LaserJet	DIN A4 ... DIN A3
DesignJet	
Pen Plotter	DIN A4 ... DIN A0

The size of the set paper format is displayed in the width and height fields. These values cannot be changed when DIN formats are used.

If you wish to use another paper format, click on the <user defined> function. You can then define the values for the height and width of the paper format used and the respective margin setting in the relevant input fields.

With pen plotters or DesignJet the paper can be inserted horizontally or vertically. As in this case the margin settings must be changed, the position of the inserted sheet must be re-defined..

Margin settings

When outputting to a plotter/graphics printer, the total paper area cannot be printed. Therefore, margin settings must be effected for the various output devices.

Standard

The preset margins are **6 mm for horizontal margins** and **18 mm for vertical margins**. These values have been determined for different output devices and should therefore not be changed.

If, however, problems should arise with your output device (frame of the graphic representation not complete), you can redefine the preset values for the margin settings:

To do this, generate a file called border_values in the /users/holos/sys directory.

First of all enter the value for the horizontal margins, then the value for the vertical margins.

When the <Scale> function is next called up, the newly set values are activated.

Output

For correct scale representation as 2D output, the following output possibilites are supported by HOLOS-UX:

1. Output in the six available projection planes
2. Representation of
   - surfaces
   - curves
   - trimmed surfaces (faces)
   - points
   - scanning lines
3. Deviation representation
   - with numerical output
   - as an icon
   - as a marker
4. Representation of sections with
   - nominal contour
   - actual contour
   - max./min. values
   - tolerance band

- deviations

5. Configuration of the graphic test record
   - Inputting texts, lines, rectangles and circles
   - Changing, moving, deleting texts, lines, rectangles, circles
   - Moving deviation symbols
6. Representation of record headers (graphics frame)
7. Moving the displayed elements on the screen or output device. When defining the scale representation, all displayed elements are positioned on the screen or output device so that their 2D center of gravity is located in the center of the figure.
8. Outputting a screen grid.

NOTE

It is not possible to select objects in a scale representation!

4 Data management

This chapter describes the functions in the <File>.menu. They are used principally for the management of files.
The main <File> function subdivides into the following functions:
Display file
Delete file
Export
Import
Check VDA file
End

4.1 Data fundamentals

Almost all data generated during a work session in HOLOS-UX, will be saved automatically by the program. Typical of such data are e.g. measuring runs and single objects.

> ***NOTE:***
> *There are a number of ways in which measured points can be generated manually. These will not be save automatically, but you can save them afterwards by using the relevant function.*

Automatic storage of objects

All objects generated, i.e. curves, patches and surfaces will be saved automatically.

The objects are given fixed names with consecutive numbering:

Curves	HCUR0000
Patches and Surfaces	HSRF0000

These names are also entered into the generated VDA file.

> ***NOTE:***
> *The numbering does not always reflect the sequence of generation because the program looks for any available gaps when numbering.*

The names of the objects will be displayed on the graphics screen, if you set up the relevant parameter with the function <Parameter-Graphics>.

📖 see Chap. 12.1

Automatic storage of measuring runs

During the definition and execution of measuring runs nominal data and actual data will be generated. Basically nominal data are called "name.mess“ and actual data are called "name.ist“. The name for these files depends upon whether the data refers to one object or to a number of objects.

Reference to one object:	File bears the object name, e.g. HSRF0012_1.mess
Reference to several objects:	File bears the model name, e.g. holosmodell_0.ist.

storage In addition to the name the files will also still be numbered consecutively. The storage of data will be notified in the status line.

When required, you can also define the name yourself.

4.2 Display files

With the <Display file> function you can display the VDA Info file or the error file on the screen with the help of an editor (but editing is not possible!).

The VDA Info file will be created by the postprocessor during the conversion of the VDA files.

The VDA Info file contains information concerning

- the VDA header
- commentary lines
- which errors that have occurred
- entered number of available elements
- number of converted elements

Errors that possibly occur during the HOLOS run-time will be into the error file (e.g. if particular objects could not be generated due to lack of memory space).

4.3 Delete files

With the function <Delete files> you can delete VDA data, actual data, nominal data and record data. After selecting the data type the existing files will be overlayed.
As a precautionary measure against accidental file deletion, the window background is colored in red.

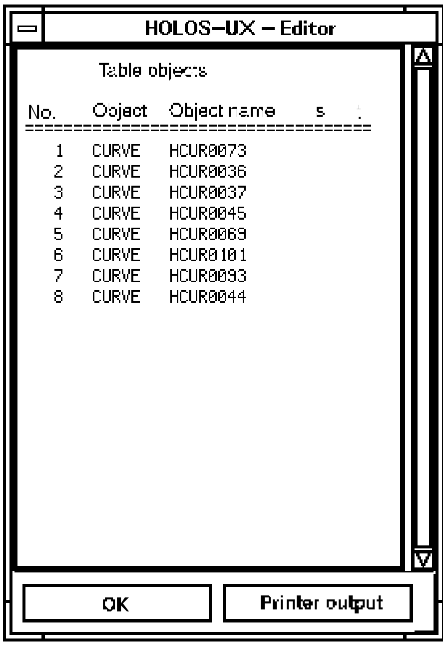


Figure 4-1

If you are deleting nominal data, the program also checks to see if actual data (= "measuring data") also exists. The program informs you about any files that are found, and queries whether these are also to be deleted.

> ***NOTE:***
> *Because measuring runs will automatically be saved as nominal and actual data, you should update the data stock from time to time by making deletions.*

Deleting unused objects

In many cases an “unclean” CAD model is obtained for further processing in HOLOS, i.e. the surface model contains geometrical objects are not processed in HOLOS or cannot be processed. Because these objects, in part, have references to other objects, it is potentially difficult to remove such objects using the existing delete functions.

Unused objects are identified and removed from the system by use of the <Delete unused objects> function.

4.4 Export

With this function you can export the nominal values of a workpiece. This can be useful, if e.g. you currently have a modified CAD description, in which surfaces with modified names were generated, but the mathematical description was not changed.

All of the nominal values defined for the workpiece and its groups will be exported to a temporary directory.

4.5 Import

With this function you are able to import again the nominal values for a workpiece, that were previously exported. This can be useful, if e.g. you currently have a modified CAD description, in which surfaces with modified names were generated, but the mathematical description was not changed. You can import nominal values and CAD points.

All of the nominal values defined for the workpiece and its groups will be imported from a temporary directory and projected onto the surfaces of the new workpiece.

> ***Note***
>
> *If you generate a model via the VDA processor with a name identical to that of the "old" model, the export and import of nominal values is carried out automatically (Auto-Update).*

> ***Precondition:***
>
> *For a nominal value that is to be imported it must be possible to identify a surface with a maximum distance, which you define under <Parameter><System>.*

4.5.1 Importing nominal data

Precondition:
The nominal values were previously exported by another model.

Operation

Select the function <Import>.

A selection window is opened.

Click on the <Nominal data>.

The new data is imported and displayed in the graphics window.

4.5.2 Importing CAD points

CAD points are points or point-vector sequences, which are stored in a VDA or IGES file and are saved for internal representation in HOLOS on the system's hard disk when the file is interpreted.

CAD points must be imported via the <File> menu, so that they can be represented and further processed in HOLOS.

In earlier versions CAD points had to be stored in the workpiece file. CAD points of other workpieces cannot be processed.
From HOLOS Revision 1.45 CAD points of any workpiece can be imported, as they are deposited in the HOLOS data base in a generally accessible directory.

HOLOS-UX distinguishes between local and global CAD points. Local CAD points are points which have been transferred together with the workpiece geometry in a VDA or IGES file. Global CAD points are points which have been transferred with the VDA or IGES file of another workpiece.

In order to import CAD points into HOLOS, you interpret the corresponding VDA or IGES file.
In principle HOLOS generates a new workpiece when interpreting a file.

CAD points can be utilized in HOLOS for a number of different tasks:

- for the definition of boundary areas when area scanning
- for the calculation of curves when digitizing (points -> curve)
- for measuring CAD points

Operation

If the geometrical description and the CAD points have been transferred in the same file, select the Import > CAD points (local) function in the <File> menu.

The CAD points are then graphically displayed.

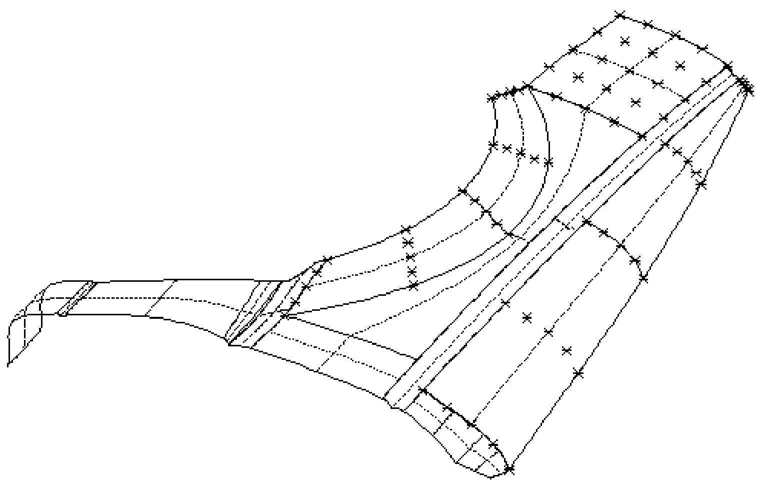


Figure. 4-2

If the CAD points were transferred with another file, select the Import > CAD points (global) function in the <File> menu.

A dialog window then appears which lists all available CAD points.

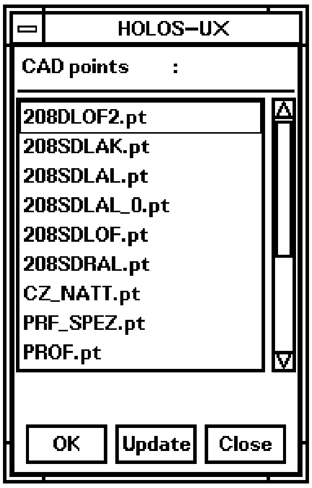


Figure 4-3

Select the corresponding CAD points by clicking with the left mouse button.

Confirm your choice by clicking on <OK>.

The CAD points are then graphically displayed in HOLOS.

Representing CAD points

Representation of CAD points can be deselected in the <Representation> dialog window.

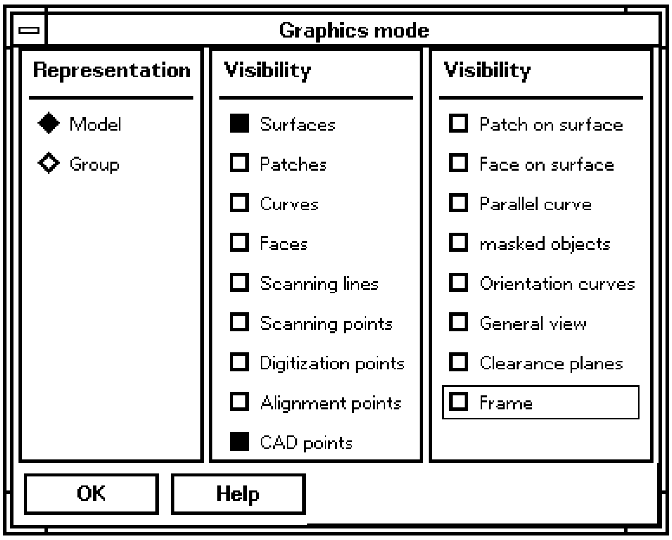


Figure 4-4

Removing CAD points

If you wish to remove CAD points from the current workpiece, select the Data > Remove CAD points function in the <File> menu. All CAD points will then be removed from the current workpiece.

4.6 Check VDA file

With the function <check VDA file> you can check out VDA files for conformity with the VDAFS 2.0 interface format. In the current version of the program however, checking is limited to just a validation that the line is 80 characters in length. The result is displayed in the status line.

A dialog window will be opened for the VDA file to be selected.

🕮 The operation of the selection window is described in detail in Chapter 1.8.5.

4.7 End - exit system

A current working session is ended by using this function.

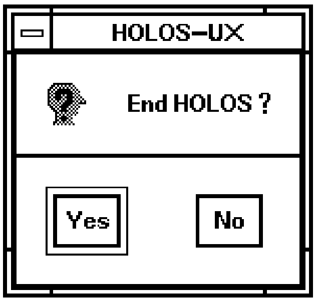


Figure 4-5

If not all internally stored data has been saved to the hard disk during a working session (manually probed measuring points), you must answer the query in one of the windows which appear on screen, whether you want to store the data or not.

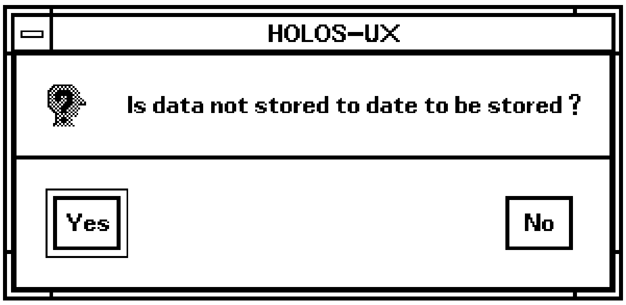


Figure 4-6

5 Model management

This chapter describes the functions in the <Model>.menu. The functions are concerned with the management of models. A model is understood to mean the description of a surface. A model can consist of a curves, surfaces, faces etc.

The main function <Model> is sub-divided into the following functions:

Load model

Close model

Generate model

Delete model

Copy model

Rename model

Add model

Compare model

Information on model

5.1 Load model

With the <Load model> function you load into the main memory and hence also into the graphic window, a model that has been stored on the hard disk. For the selection of the model, all of the currently existing models will be overlaid.

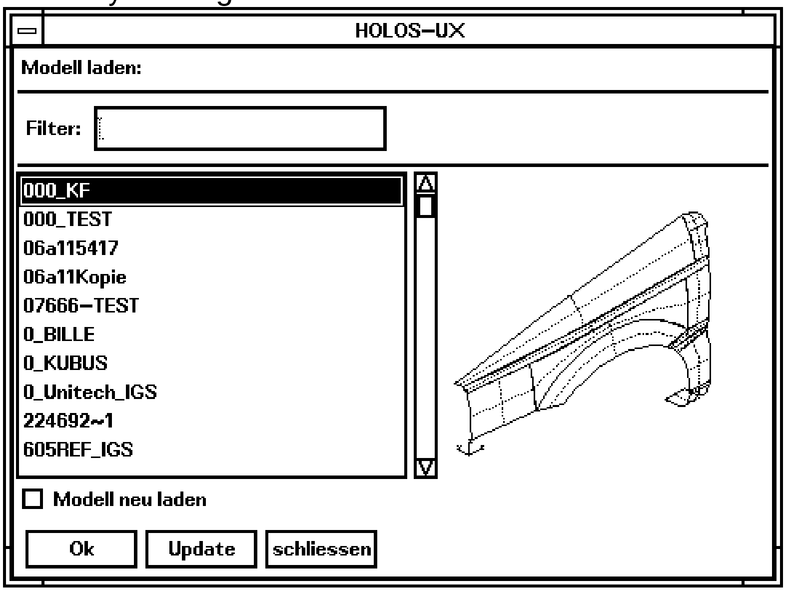


Figure 5-1

The selection window is described in Chap. 1.8.5.

The model will be loaded with the same graphic settings that it had when it was stored. When HOLOS is started the most recently processed model will be loaded automatically.

5.2 Close model

With the <Close model> function, the currently active model will be removed from the main memory and thus also from the graphic window.

5.3 Delete model

With the <Delete model> function you delete a model from the hard disk. For the selection of the model, all currently existing models will be overlaid into a window that is colored in red (see Diag. 5-1).

Selection of elements is described in Chap. 1.8.5. The selected model will not actually be deleted until after you have positively confirmed your action in a safety-check query put to you by the program.

5.4 Generate model

With the <Generate model> function you create a new model By means of this function the system will be initialized to receive a new model.

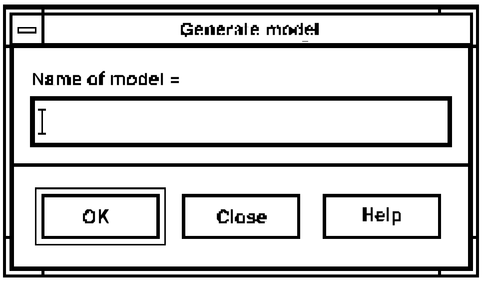


Figure 5-2

To create the model, enter a model name .

Text entry is described in Chap. 1.8.4.

5.5 Copy model

With the <Copy model> function you copy the model that is currently available in main memory and file it away on the hard disk under another name.

To file away the copied model, you need to enter a name for the model (see Diag. 5-2).

Text entry is described in Chap. 1.8.4.

Model management

5.6 Rename model

Use the <Rename model> function to assign a new name to a model and save it on the hard disk under this name.

In order to file the renamed model, you must enter a model name (see Fig. 5-2).

Text entry is described in Chapter 1.8.4.

5.7 Join models

The <Add model> function in the <Model> menu allows you to add further models to a model that has already been loaded.

Click on the <Add model> function with the mouse.

You will obtain a list of all available models:

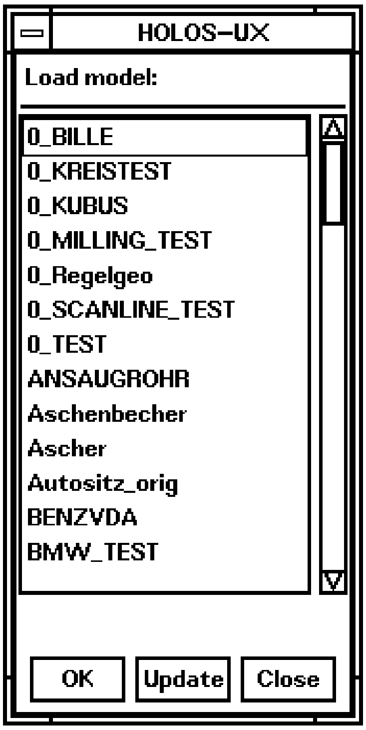


Figure 5-3

Select a model which you wish to add to the loaded model.

Confirm your selection with <OK>.

The selected model is loaded and added to the existing model.

If there is no model in the main memory during execution of the <Add model> function, operation is as for the <Load model> function.

When you add a model to an already existing model, it is loaded in HOLOS-UX and is then a constituent of the existing model.

The added model is saved as a group of the existing model and can be further processed using the group functions (load, select, delete).

5.8 Compare model

The <Compare model> function allows you to compare the modification status of different models that are stored for HOLOS-UX. If changes are made to the description of the surface, the corresponding areas are marked in color.

Select the relevant model by clicking on the name of the model with the left mouse button. Then click on <Ok>.

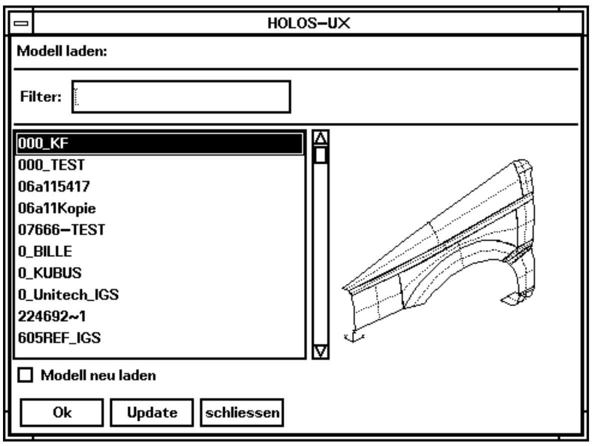


Figure 5-4

Model management

HOLOS performs the calculations required to compare the two models.

The result is displayed on the screen with the surface descriptions in different colors:

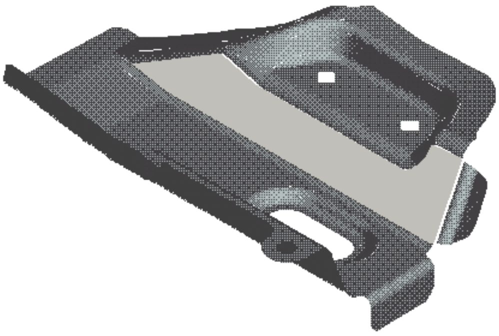


Figure 5-5

Model information

With the <Model information> function you can obtain various information about the model loaded in the main memory, e.g. the number of different objects and whether or not they are masked.

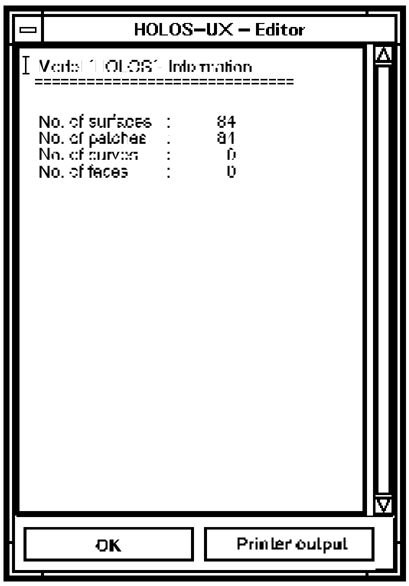


Figure 5-6

6 VDA Interface

This chapter describes the functions in the <VDA> menu. The functions are used for the conversion of data from VDA format to HOLOS internal format and vice versa.

With the VDAFS 2.0 interface format, data that has been generated using HOLOS-UX, can be exported to external systems. Conversely data from external systems can be imported to HOLOS-UX and then processed.

The main <VDA> function is subdivided into the following functions:

VDA postprocessor

VDA preprocessor

VDA Header

6.1 VDA postprocessor

The VDA postprocessor is used for the conversion of VDA files into the HOLOS-UX internal format. This conversion is a necessary precondition for the reading in of VDA data in HOLOS-UX.

The VDA postprocessor signals its presence with a window for the selection of the VDA file.

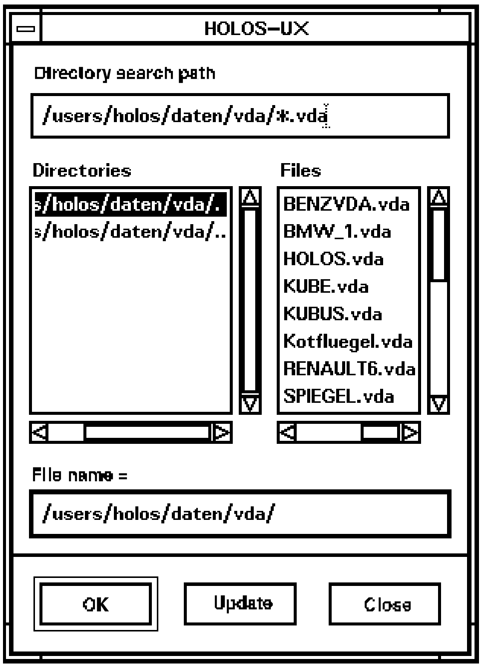


Figure 6-1

Operation

You can select files in a number of different ways:

Selection via a known path

Select the <VDA postprocessor> function.

A selection window is opened.

Enter the search path and the file extension *.vda in the field "Directory search path“. The search path is preset to "/users/holos/data/vda/*.vda“. You should therefore copy all VDA files to this directory!

Now update the settings with <Update>. This is necessary if e.g. you carry out other actions whilst keeping the selection window open.

The file lists will be overlayed in the selection mask in their up-to-date state.

Select the desired file by clicking on it.

Selection when search path unknown

Select the <VDA postprocessor> function.

A selection window is opened.

Select the search path in field "Directories“ step-by-step with a double-click:
Click on the sought-after file in field “Files” :

/.../.../**.**	lists the contents of the directory in field "Files“.
/.../.../**..**	jumps to higher-level directory and lists all its sub-directories.

Now update the settings with <Update>. This is necessary if e.g. you carry out other actions whilst keeping the selection window open.

The file lists will be overlayed in the selection mask in their up-to-date state.

Select the desired file by clicking on it.

Selection via known file name

Select the <VDA postprocessor> function.

A selection window is opened.

Enter the name of the file in the field "File name“ (here you can either accept or overwrite the path that is suggested).

The file list will be overlayed in the selection mask with the designated file shown highlighted.

Select the desired file by clicking on it.

Starting the conversion

Start the conversion with <OK> or cancel the function with <close>.

The file is converted; an info. window shows the status, e.g.:
xxx.vda: 1082 lines read

During the conversion from VDA files, various information about the conversion will be transferred to an info. file. In detail this comprises

- the VDA-Header
- comment lines
- errors that have occurred and information about the number of elements in existence and the number converted.

The info. file is located in the current model directory and can be displayed via the menu <Edit file>.

6.2 VDA preprocessor

The VDA preprocessor is used for converting from internal HOLOS format to VDA format. This allows models that have been generated in HOLOS-UX, to be transferred to other systems.
The VDA preprocessor converts all geometric objects that have been generated by HOLOS-UX into VDA elements.

> ***NOTE:***
> *The VDA file contains all geometric objects for the selected model.*

The VDA preprocessor signals its presence with a window for the selection of the model.

Selection window see Chap. 1.8.5

> ***NOTE:***
> *The selection window remains open even during the conversion. However you can see from the status line that the conversion has been started.*

6.2.1 Geometry

This function generates a VDA file for the probed workpiece. The VDA file contains the name of the workpiece. Where a file with this name already exists, a serial numbering will be appended.
Example:
Model: HOLOS
VDA file: HOLOS.vda

if already exists:
VDA file: HOLOS1.vda

In the same directory a file called "name_of_model.log“ will be created, containing information about the Header and the number of elements converted. At the present time you can only list it out externally of HOLOS.

Operation

Select the function <Geometry>

A window for the selection of a workpiece is opened.

Select the desired workpiece.

The message "VDA file stored“ is displayed.

6.2.2 Scanning lines

The scanning lines of a workpiece will be stored separately in a VDA file as PSET (every scanning-line defines a PSET) in the file /modellname/vda/scandat.vda, where they are then available for further processing.

Operation

Select the function <Scanning lines>.

A selection window is opened for line storage.

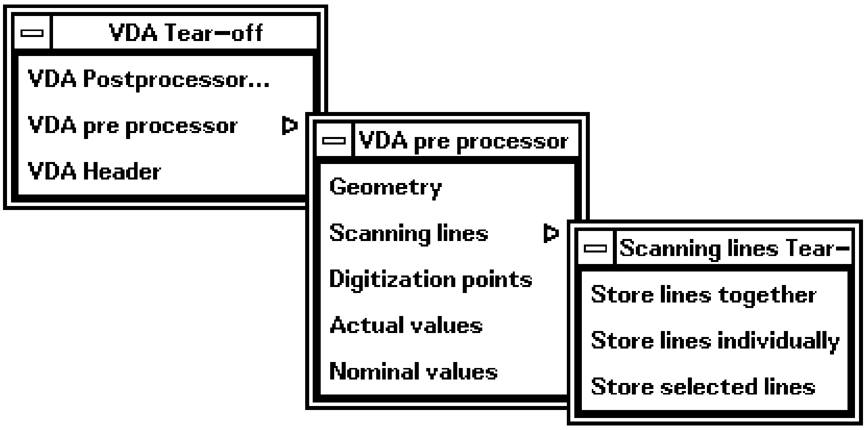


Figure 6-2

Select the desired option.
Store lines together:
All scanning lines are stored in a VDA file.

Store lines individually:
Each scanning line is stored in its own VDA file.

Store selected lines:
Only the scanning lines you select are stored in the VDA file.

The message "VDA file stored“ is displayed.

6.2.3 Digitization points

The digitization points of a workpiece will be stored in a VDA file as PSET in the file /modelname/vda/digpt_xx.vda where they are then available for further processing.

Operation

Select the <Digitization points> function.

The message "VDA file stored“ is displayed.

6.2.4 Actual values

Store available actual values in VDA format with this function.

Operation

Select the <Actual values> function.

A selection window appears displaying the available files of actual values.

Select the desired files.

The actual values will be stored in the file /modelname/vda/actual.vda where they are then available for further processing.

6.2.5 Nominal values

Store available nominal values in VDA format with this function.

Operation

Select the <Nominal values> function.

A selection window appears displaying the available files of nominal values.

Select the desired files.

The nominal values will be stored in the file /modelname/vda/nominal.vda where they are then available for further processing.

6.3 VDA Header

The Header is an element of the VDA file. Although the Header is specified in VDA format, the version of the program currently supplied also generates a VDA file if the Header does not exist. For this case, the VDA preprocessor generates the line "name=HEADER/0".

With <VDA Header> function you lay out the Header, which will then be used in every VDA file generated thereafter. In accordance with the VDA convention, the Header is not allowed to contain any special characters (below ASCII 32 / above ASCII 126).

According to VDAVS 2.0, the Header is only allowed to contain upper case letters. You can, however, enter lower case letters since the program will automatically convert them on input to the VDA file.

You lay out the Header using the following window:

Figure 6-3

The entries for the VDA Header will also be adopted for the Headers of generated IGES files (IGES = option).

Operation

Select the function <VDA Header>.

A screen form is opened.

Fill in the relevant fields.

Safeguard the new or modified Header with <store> or cancel the function with <close>.

The modified Header is then stored.

7 Measurement of freeform surfaces

This chapter describes the functions of the <Measurement> menu. The functions are used in CNC operation for the measurement and inspection of known freeform surfaces (i.e. surfaces for which a description is already available).

The measurement of freeform surfaces comprises the operating steps

- interactive definition of measuring runs on the screen
- execution of measuring run in CNC operation

The main <Measurement> function is sub-divided into the following functions:

Define measuring run

Start measuring run

Cancel measuring run

Display nominal values

Simulate measuring run

Precondition:

The functions of the <Measurement> menu are suitable ONLY for CNC operation!

A surface description must already exist, that is
- either an imported VDA file
- or surfaces generated in HOLOS-UX

7.1 Define measuring run

Using the subfunctions of the <Define measuring run> function, you can generate various types of measuring runs interactively on the screen.

The subfunctions and the corresponding measuring runs are

- Grid
- Line
- Intersection plane /workpiece
- Raster
- 0.5-points
- Parallel curve
- Regular geometry
- Measuring points
- Edge points
- CAD points
- Contour
- Corner point
- Net point / net section
- Manual entry
- Scan line (only with UMESS-UX)
- Scan area (only with UMESS-UX)
- Start last measuring run
- Scanning according to nominal values (only with UMESS-UX)

The nominal points of a measuring run will be displayed as arrows in the normal direction to the surface. They are shown in the color of the selected probe.

NOTE:

With imported VDA data it can happen that the surface normals point into the workpiece. If you define measuring runs on these surfaces, the probing direction will lead to a collision. Therefore, check the orientation of the surfaces beforehand and if *necessary invert them (with the functions <Objects - Analysis> and <Objects - Rotate orientation>).*

Storage of measuring runs

Basically, every measuring run that is defined will be stored automatically. The file name will be displayed in the status line.

NOTE:
When defining a measuring run it is essential to pay close attention to the status line!

In its designation of files, the program differentiates between two methods.

- The measuring run refers strictly to one surface, e.g. one grid on one surface. For this case the name of the surface will be used. The nominal file is then called, e.g. HSRF0022_0.mess. If several measuring runs refer to the same surface, the final numeral of the file name will be automatically incremented at the same time, e.g. HSRF0022_1.mess.
- The measuring run refers to several surfaces, e.g. raster on a group or 0.5-points on the entire model. For this case the name of the model will be used. The nominal file is then called, e.g. modell_0.mess.For a number of measuring runs, the program proceeds as described above.
  You can specify via the system parameters, whether or not you want to assign the file names yourself.
  🕮 see Chap. 12.13, System Parameters.

7.1.1 Grid

You can generate a points grid either on a single object (surface, face, patch) or on a group of objects. Before the generation of the points grid you must, in any case, select the objects either individually or combined together in a group.

The points grid will then be generated per surface and filed as a separate measuring run. The active probe with which the grid is to be measured will also be filed at the same time.

The points grid is regularly distributed in the U and V directions over each surface (boundary included).

Measurement of freeform surfaces

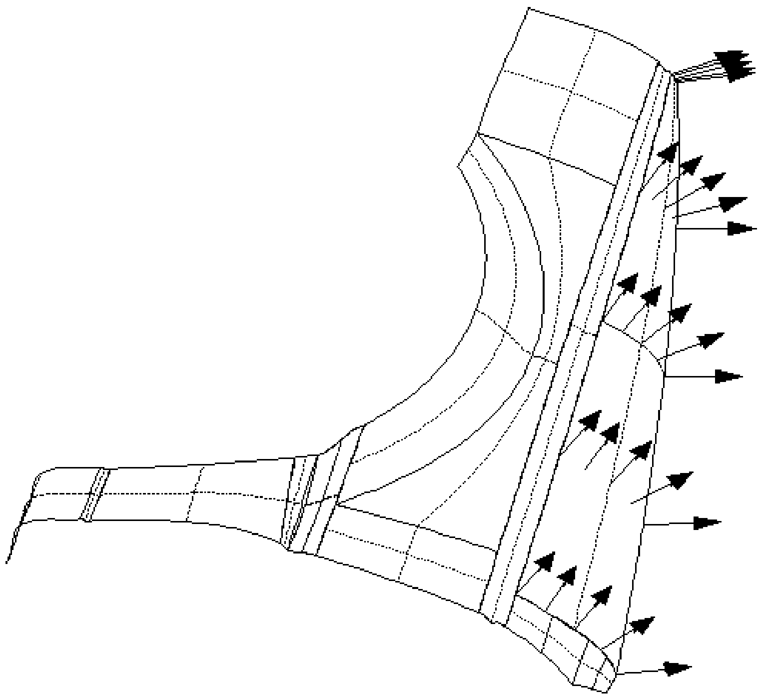


Figure 7-1

You can obtain a display of the U and V direction with the function <Objects - Analysis>.

📖 see also Chap. 13.7

> **NOTE:**
> *If a grid is generated on a surface that is bounded by a FACE element, only those measured points will be considered that lie within the FACE.*

Purpose of the function

With this function you can check a surface up to 100%.
A regular grid is an ideal basis, although not a precondition, for a chromatic evaluation of the surface.

Using the actual values of a grid you can calculate a new surface using the function <Grid -> Surface>.
(option, digitization).

Operation

First of all, combine into a group all the objects that are to be measured -> the objects are marked in color.

Click on the <Grid> function.

A window for the entry of grid points is opened.

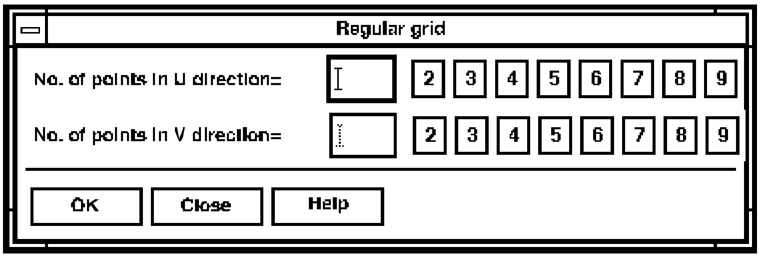


Figure 7-2

There are two ways in which you can enter the number of points:

Click on one of the numbers in the number field.

The number will be transferred to the input field.

Enter the number directly into the input field.

Confirm the entry with <OK>.

The defined grids will be displayed on the screen in the color of the active probe. The status line reports the names of the measuring runs.

7.1.2 Line

In the definition of a line, the workpiece will be intersected by a plane, that results from the projection of the line on the workpiece. Measured points will only be placed on those objects, that the observer sees as lying "in front". For highly-curved surfaces there is, under certain circumstances, no clearly-defined point of intersection with the surface. This results in measured points on surfaces that are located further "behind".

If measured points are required to lie only on specific objects, combine these objects together into a group. The line will then be projected solely on this group. Measured points that lie outside of the group will not be considered. On the screen, gaps will develop.

One measuring run will be generated per line. It will be displayed on the screen with arrows in the colors of the currently active probe. The measuring run will be stored automatically.

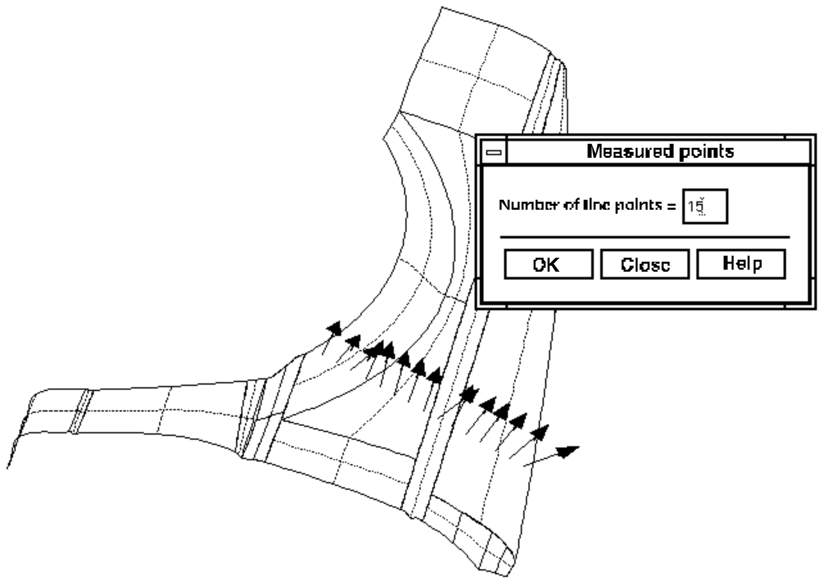


Figure 7-3

Points generation with a constant distance on a line

Operation

Click on the function <Line> - <Specification of number of points>.

A window for entering the number of line points is opened.

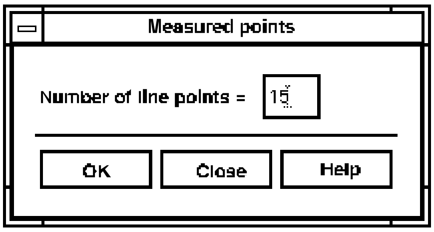


Figure 7-4

Enter the number directly into the entry field and confirm your entry with <OK>.

The window remains open (by repeating <OK> you can generate several lines one after another.

Position the mouse at the starting point.

Keeping the left mouse button pressed move the mouse onto the target point.

Release the mouse button.

The line is drawn, the measured points will be displayed as arrows in the color of the currently active probe.

The measuring run is stored.

If you do not wish to define any further lines:

Close the dialog window with <Close>.

Curvature-dependent points generation on a line

Operation

Click on the <Line> - <Curvature dependent> function.

Measurement of freeform surfaces

A window is opened for entering further parameters.

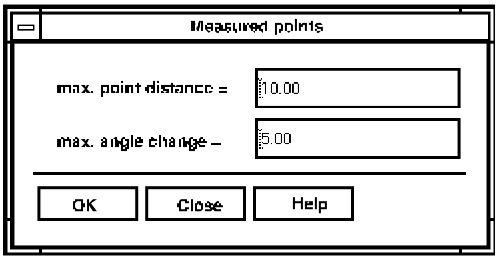


Figure 7-5

max. points distance

This parameter controls the maximum distance of the generated measured points, for the case where the criterion for the curvature dependent generation is not satisfied.

max. angular change

This parameter defines the value for the maximum angular change, after which a measured point should be generated.

Accept the parameter by clicking on <OK>.

To draw the line proceed as follows:

Position the mouse at the starting point..

Keeping the left mouse button pressed, move the mouse onto the target point.

Release the mouse button.

The line is drawn, the measured points will be displayed as arrows in the color of the currently active probe.

The measuring run is stored.

If you do not wish to define any further lines:

Close the dialog window with <Close>.

7.1.3 Plane / workpiece intersection

With the <Plane/workpiece intersection> function you can generate measured points on a plane which cuts the workpiece in a defined area.

The intersections can be generated with a defined number or with a curvature-dependent number of measured points.

Definition of a constant number of points

Click on the <Plane/workpiece intersection> - <Points number preselection> function.

A window opens for entering further parameters:

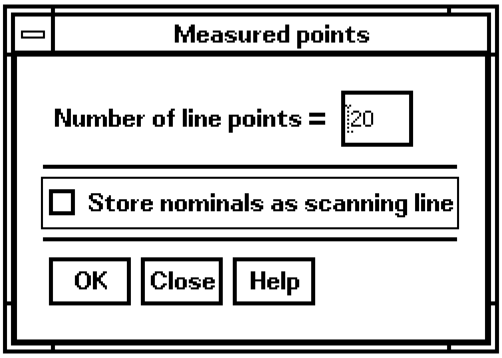


Figure 7-6

Enter the required number of points and confirm with <OK>.

Measurement of freeform surfaces

Definition of a curvature-dependent number of points

Click on the <Plane/workpiece intersection> - <curvature-dependent> function.

A window opens for entering further parameters:

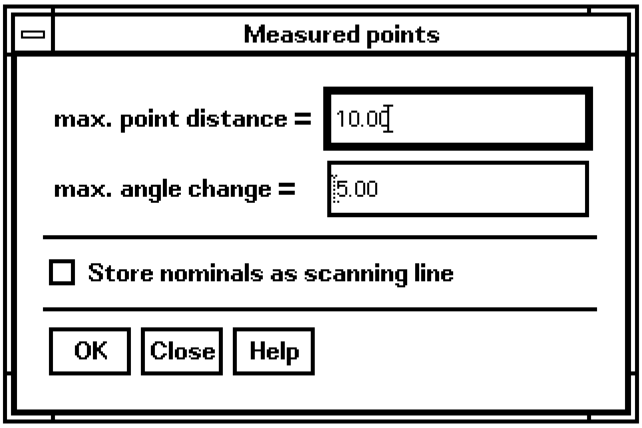


Figure 7-7

max. points distance	If the criterion for curvature-dependent generation of measured points is not met, this parameter controls the maximum distance of the generated measured points.
max. angular change	This parameter defines the value for the maximum angular change according to which a measured point is generated.

Click on “OK” to adopt the parameters.

Plane intersection definition

When the parameters for generating the measured points have been defined, you establish the plane intersection:

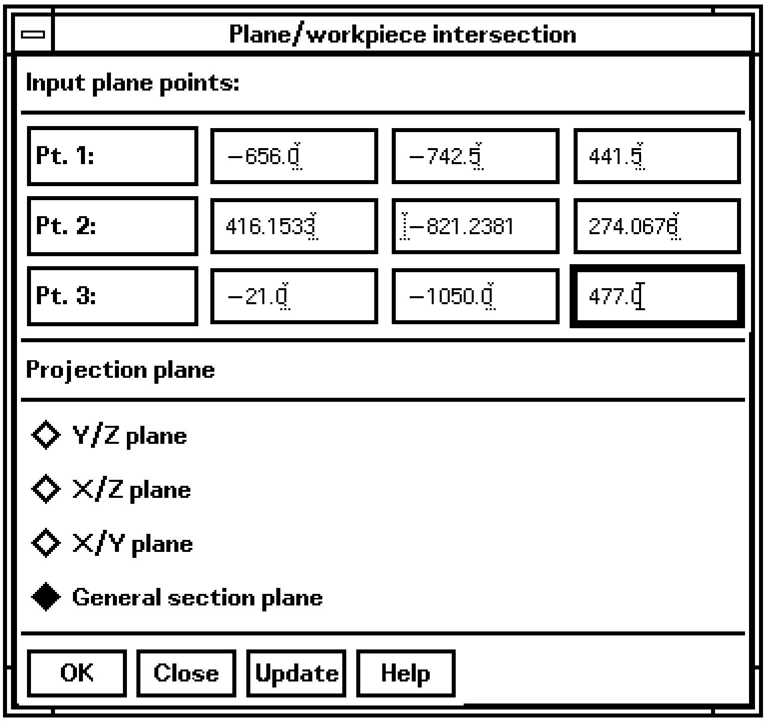


Figure 7-8

The intersection plane is determined by two plane vectors:

The first results from the direction from a preselected start point to a preselected end point on the intersection plane.
The second plane vector results either from the direction vector on the projection plane, in which both points lie, or from an auxiliary point, if a general plane is defined.

If the intersection is defined in one of the three possible projection displays, then the direction vector on the set projection plane is adopted, provided a general plane is not being used.
If the intersection is defined in the perspective display, then the plane into which the two points are to be projected must be preselected.

First of all define the projection plane for calculating the intersection or activate the <General intersection plane> switch, if you wish to define the second plane vector via an auxiliary point.

Graphically interactive definition of plane points

Measurement of freeform surfaces

In order to define the plane points in a graphically interactive manner, you can either click with the left mouse button on points on the workpiece surface or existing points which are graphically displayed (CAD points, DIGIT points or points on scanning lines):

Click on <Pt.1:>, in order to determine the start point for the intersection plane.

Then click on an existing point or a point on the workpiece surface.

Click on <Pt. 2:>, in order to determine the end point for the intersection plane.

Then click on an existing point or a point on the workpiece surface.

Click on <Pt. 3:>, in order to determine an auxiliary point for the plane definition, if you are defining a general plane.

Then click on an existing point or a point on the workpiece surface.

The start and end point, as well as the auxiliary point used to define the plane, are displayed on the screen. The co-ordinates of the selected points are displayed in the respective fields and can then subsequently be changed manually (see next section).

Click on <OK> to start calculation of the plane points.

The points on the intersection plane are calculated.

Manual entry

The start, end and auxiliary points can also be manually preselected and entered, if the relevant co-ordinates are known.

The points to be entered (start and end point) must lie on the workpiece surface. You can define the maximum permissible distance of the points to the workpiece surface in the parameter page <System parameters> as the “maximum distance during data import”.

Enter the co-ordinates of the points in the fields provided:

Pt. 1: Start point
Pt. 2: End point
Pt. 3: Auxiliary point

When you have entered the co-ordinates, click on <Update>.

The points are adopted and displayed on the screen.

Click on <OK> to start calculation of the plane points.

The points on the intersection plane are calculated.

The calculated measured points are displayed on the screen and stored in a file as a measuring run.

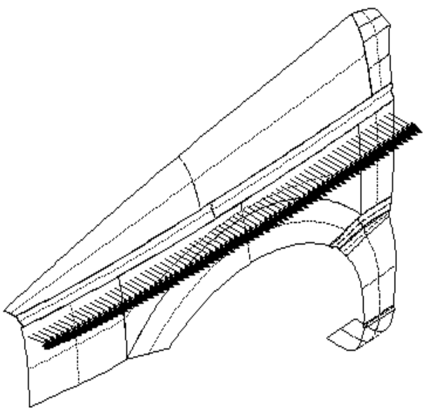


Figure 7-9

Measurement of freeform surfaces

Surface orientation correction

The orientation of measured points on incorrectly oriented surfaces can be corrected in the same manner as when generating measured points on a line.
Command: Correct the surface orientation in the system parameters.

The prerequisite for proper correction is that the orientation of the surface on which the start point for the plane (first measured point) is defined, is correct.

Plane/workpiece intersection with segmentation

The function for generating an intersection with segmentation can be used to generate an intersection for a particular evaluation method. Segments are formed on the calculated intersection and are divided into straight and curved pieces.

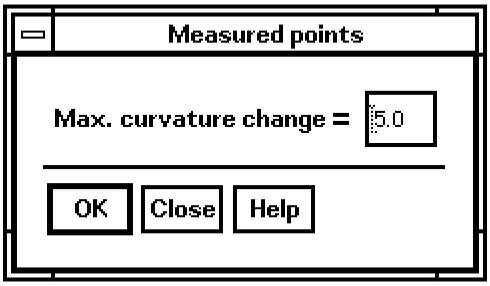


Figure 7-10

Enter a value for the maximum curvature change, after which a new segment is to be generated.
Then click on <OK> to define the intersection.

Define the intersection as described above.

The intersection is calculated.

After measuring, segmented intersections are evaluated explicitly as intersections (see Chapter 9.2 Evaluation of intersections).

Only the points at the center of the respective segment are evaluated and displayed:

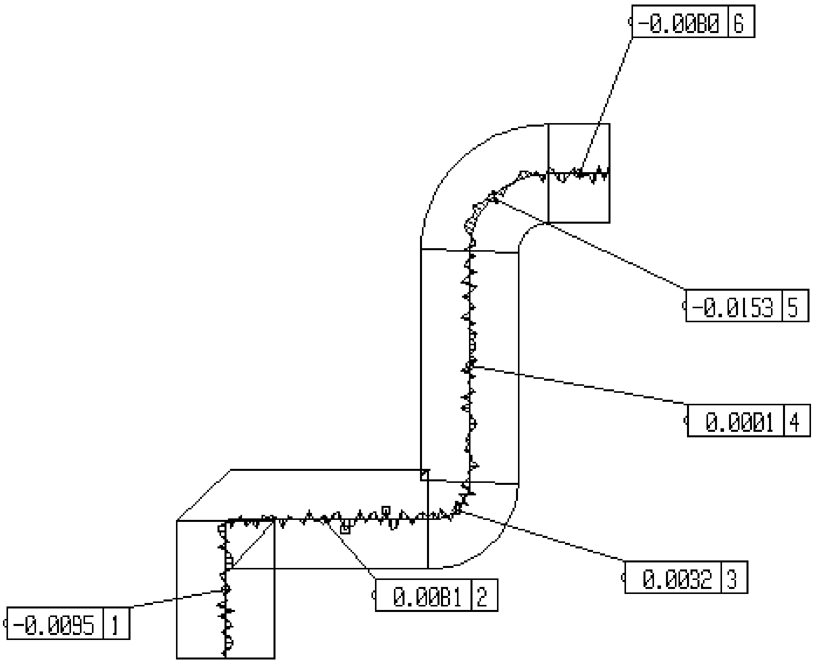


Figure 7-11

7.1.4 Raster

During the definition of a points raster the raster points will be projected onto the workpiece from the image plane. As a rule, measured points will only be placed on those objects, that the observer sees as lying "in front". For highly-curved surfaces there is, under certain circumstances, no clearly-defined point of intersection with the surface, which results in measured points on surfaces that lie further away.

If measured points are required to lie only on specific objects, these objects will be collected together in a group. The raster points will then be projected solely on these objects. Measured points that lie outside will not be considered.

By setting up a boundary rectangle you establish the area that is to be rasterized yourself. One measuring run will be generated per raster and displayed on the screen with arrows in the colors of the currently active probe. The measuring run will be stored automatically.

Measurement of freeform surfaces

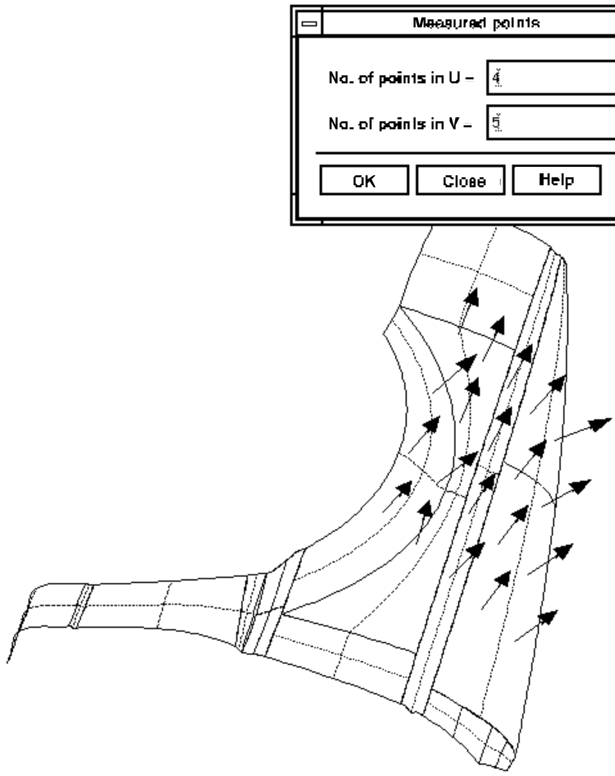


Figure 7-12

The number of raster points must be greater than 2 in each direction!

Purpose of the function

Since you determine the area for the raster yourself, it is therefore possible for you to measure very specific and critical areas. In comparison with the grid you can leave blank the border area of a surface.

A regular raster is an ideal basis, although not a precondition, for a chromatic evaluation of the surface.

With the actual values of a raster you can calculate a new surface via the <Grid -> Surface> function.

Operation

Click on the <Raster> function.

A window for the entry of raster pointsin the U and V directions is opened.

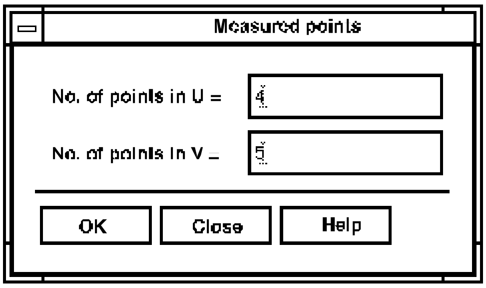


Figure 7-13

Enter the numbers directly into the input fields and confirm your entries with <OK>.

The window remains open (via repeated <OK> you can generate several rasters one after another).

Now you need to draw the border for the area that is to be rasterized. Proceed as follows:

Position the mouse on the first corner of the area.

Keeping the left mouse button pressed, move the mouse to the second corner.

Release the mouse button.

A line is drawn.

With the mouse at the second corner, press the left mouse button again and keeping it pressed, move the mouse to the third corner and then release the mouse button again.

The next line is drawn.

Repeat the procedure for the fourth corner.

Measurement of freeform surfaces

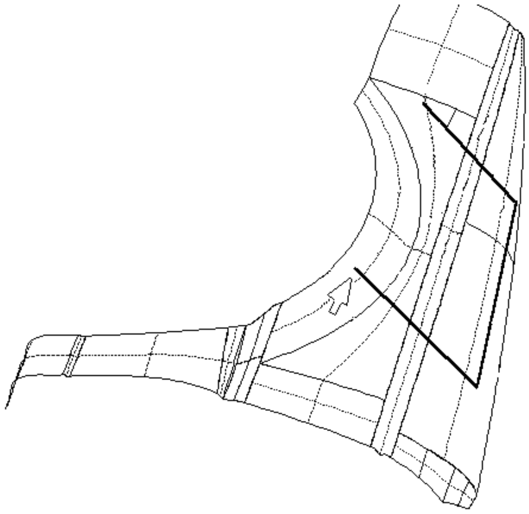


Figure 7-14

The fourth and first corners will be joined up automatically. The area will be rasterized immediately. The raster points will be displayed as arrows in the color of the currently active probe.

The measuring run is stored.

7.1.5 0.5-Points

0.5-points are the center points of individual patches or surfaces (in the parameters u = 0.5 and v = 0.5).

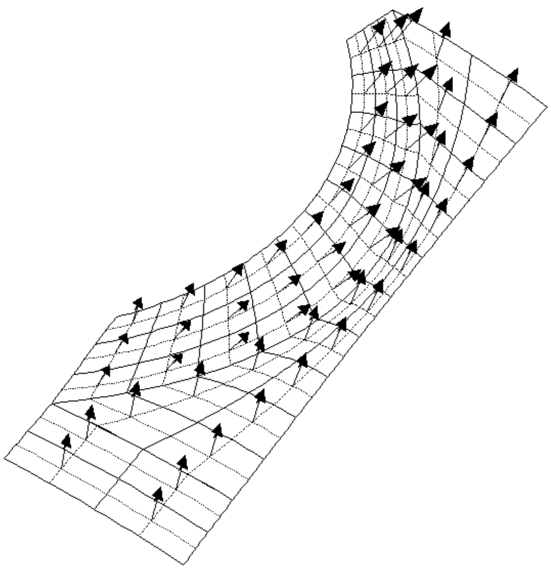


Figure 7-15

The function for generating the 0.5-points is divided into three subfunctions.

Function	Meaning
<Group>	Measured points will only be generated on the selected group.
<Surface>	Measured points will generated on all of the model's surfaces.
<Patches>	Measured points will be generated on all of the model's patches.

For surfaces that are bound by FACE elements, measured points will only be taken over when they lie within the FACE.

NOTE:

In going over the 0.5-points the coordinate inspection device does not travel in a meandering shape, as in e.g. the grid, but according to the sequence of the defined points
For highly-curved areas there exists, therefore, a danger of collision!
Select the areas therefore taking this into account or send the coordinate inspection device to the clearance plane after each point (setting in the measuring run parameters, Chap. 12.4).

Operation

Click on the function <0.5-Points> and then <Group>, <Surfaces> or <Patches>.

The measured points will be displayed as arrows in the color of the active probe.

The measuring run will be stored automatically.

7.1.6 Parallel curve

This function is used for measurement parallel to surface boundaries. Because of the possible risk of collision it is not always possible to directly measure on the surface boundaries. Therefore you need to generate measured points parallel to the surface boundaries (Offset curve).

Surface boundaries are the borders of surfaces and patches or the limiting curves of trimmed surfaces (FACES).
The generation of measured points can be carried out with a preset number of measured points or curvature dependent, according to choice.

Operation

Select the function <Define measuring run>-<Parallel curve> and then either <Preset number of points> or <Curvature dependent>.

After clicking on the function with the left mouse button an entry window is opened for the definition of the following parameter:

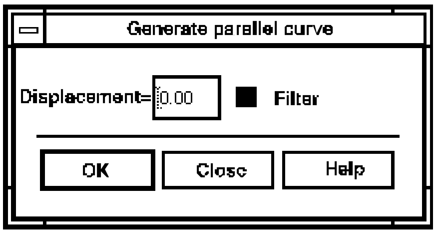


Figure 7-16

Displacement

The displacement denotes the distance of the parallel curves to the surface boundary.

Filter

The entire parallel curve will always be generated on a selected surface. When the filter is active the "inner“ points will be eliminated.

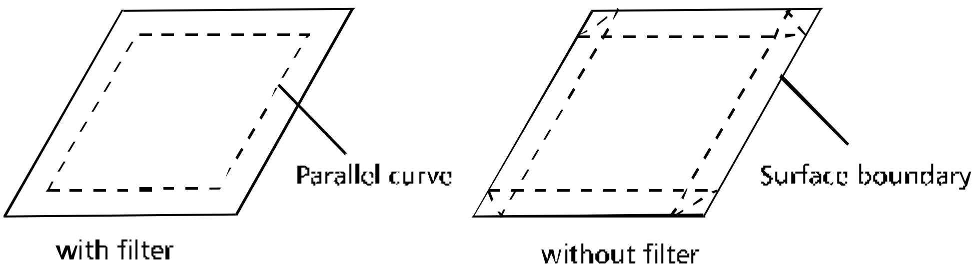


Figure 7-17

Accept the parameters by clicking on <OK>.

The parallel curve will be generated on the previously selected surface.

Define the area of the graphically represented parallel curve, on which measured points are to be generated by clicking on a start point and an end point on the parallel curve. If the start and end points are identical, measured points will be generated for the entire parallel curve.

The defined area will be identified by a contrast in color.

NOTE:

If you have inadvertently defined the "incorrect“ area, reverse the sequence of the start and end points.

As soon as the area is defined by its boundary points, a dialog window appears for the points generation.

Points generation with constant distance on a line

Select the function <Parallel curve> - <Input of number of points>

A window for the entry of the number of line points is opened.

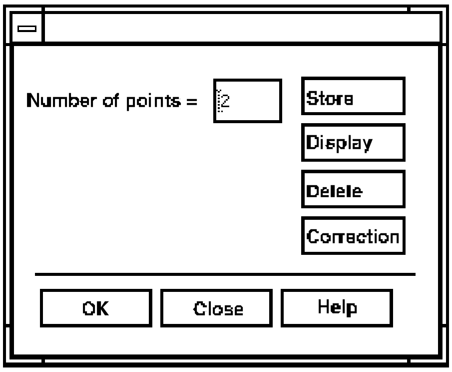


Figure 7-18

Enter the number of points and confirm with <OK>.

Curvature dependent points generation on a line

Select the function <Parallel curve>-<Curvature dependent>.

A window is opened for the parameter entry.

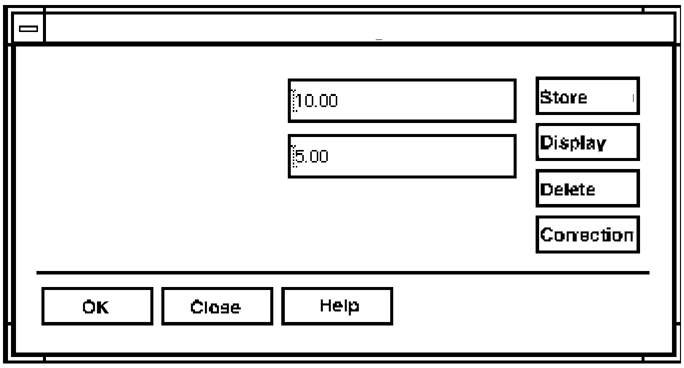


Figure 7-19

max. points distance

This parameter controls the maximum distance of the generated measured points, for the case where the criterion for the curvature dependent generation is not satisfied.

max. angle change

This parameter defines the value for the maximum angle change, after which a measured point should be generated.

store

The generated measured points will be stored internally in a table. With the function <store> these measured points will be stored in a file as a measuring run. With a renewed points generation a new measuring run will be defined.

display

If the contents of the graphic window has been cleared, you can, via this function, display all the points for parallel curves in the internal memory.

delete

All existing measured points on parallel curves will be eliminated from the internal memory.

Correction

You can delete individual measured points via the correction key. Each key depression will remove the measured point that is currently last.

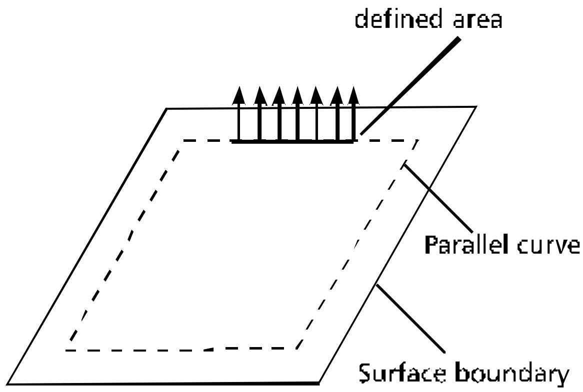


Figure 7-20

Enter the relevant values or select one of the functions.

Confirm your selection with <OK>.

The function for generating the measured points on the defined area boundary is activated.

Measurement of freeform surfaces

7.1.7 Regular geometry

All regular geometry functions are described in Chapter 11.

7.1.8 Measured points

You define measured points by the process of clicking on a point on the screen. The point that was clicked on will then be projected onto the workpiece.

During the definition of measured points, the points from the image plane will be projected onto the workpiece. As a rule, measured points will only be placed on those objects that the observer sees as lying "in front". For highly-curved surfaces there is, under certain circumstances, no clearly-defined point of intersection with the surface, which results in measured points on more distant surfaces.

If measured points are required to lie only on specific objects, collect these objects together in a group. The measured points will then be projected solely on these objects. Measured points that lie outside will not be considered.

You activate the mode for defining measured points with the <Measured points> function. When active, you can define measured points at any time by clicking on them (visible as "Select: Point" in the status line).

Operation

Click on the <Measured points> function.

A window containing further functions opens.

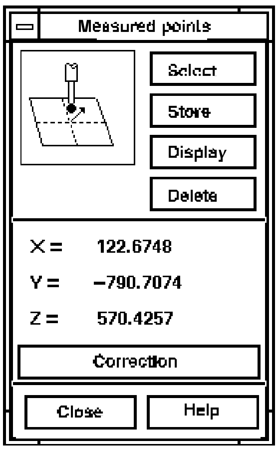


Figure 7-21

Function	**Meaning**
<Select>	Switches on the mode for defining measured points. This saves the route via the menu system, if for example the mode was exited to define a group.
<Store>	Writes all selected measured points as a measuring run into a file. Renewed selections after storing define a new measuring run.
<Delete>	Deletes all measured points from the buffer. The nominal values will not be deleted!

Click on the <Select> function.

Position the measured points on the screen.

For each point that is positioned, the co-ordinates will be overlayed.

The co-ordinate window's <Correction> function allows you to delete the last point from the buffer.

If you locate an incorrect surface orientation when generating measured points (normal vectors point towards the interior of the workpiece):

Click on the surface with the mouse.

Activate the <Rotate orientation> function in the <Object> menu.

This rotates the orientation of the surface. All measured points located on this surface are also automatically rotated.

7.1.9 Edge points

You define measurement points for edge measurement (trim measurement), by clicking on a point on the screen. The selected point is then projected onto the next edge of the workpiece.

If measured points only lie on particular objects, bring these objects together in a group. The measured points are then only projected onto the edges of these objects. Measured points which are selected on other objects, are not taken into account.

The mode for defining edge points is activated in the <Measure>-<Define measuring run> menu with the <Edge points> function. When this is active, you can define measured points at any time by clicking (visible as “Select: Point” in the status line).

Operation

Click on the <Edge points> function.

A window containing further functions opens.

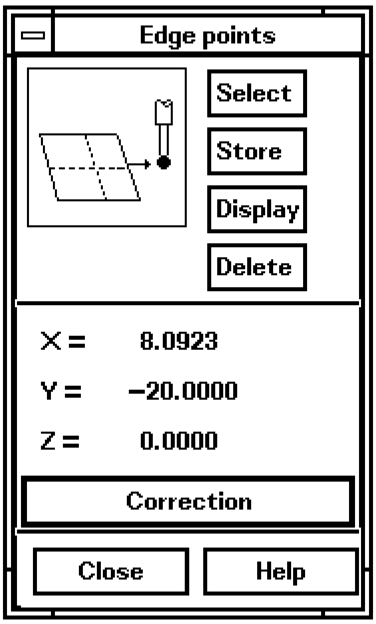


Figure 7-22

Function	Meaning
<select>	Switches on the mode for defining measured points. This saves the path via the menu system, if the mode has been exited, for example, to define a group.
<store>	Writes all selected measured points into a file as a measuring run. Selecting again after saving defines a new measuring run.
<display>	Re-displays all selected points if the screen content has been deleted by one of the graphic functions.
<delete>	Deletes all measured points from the buffer.

Click on the <Select> function.

Set the measured points by clicking on an edge on the screen.

The co-ordinates are displayed for each point selected, and the edge points are displayed on the screen with their scanning and normal direction in the color of the currently active probe.

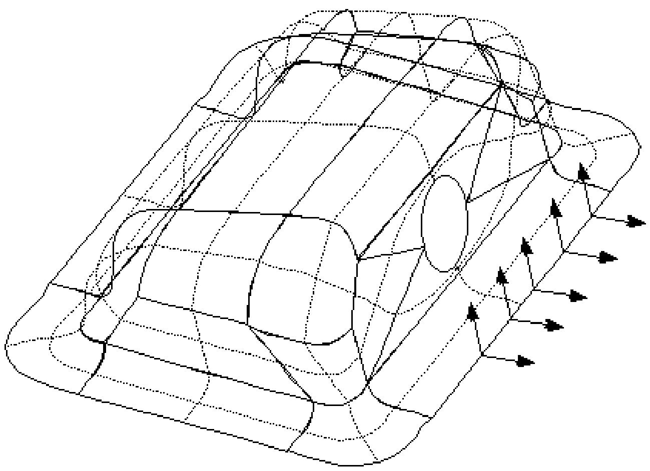


Figure 7-23

Measurement of freeform surfaces

The <Correction> function in the co-ordinate window deletes the last point from the buffer.

Before scanning, select the <Store> function.

A dialog window appears which allows you to define in which mode the edge points are scanned.

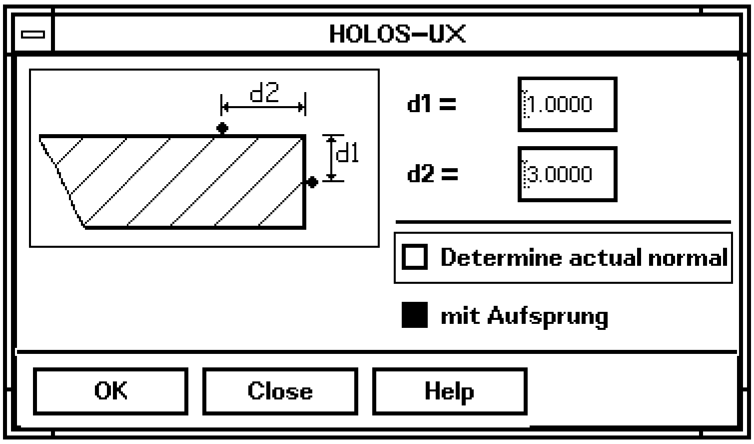


Figure 7-24

with bounce

Activate this switch if the edge is to be measured taking bounce into account in the case of sprung metal parts. When measuring, first of all a point on the surface is scanned. When scanning the edge point, the distance between the preselected nominal value and the determined actual position of the surface point is taken into account.

define actual normal

Activate this switch if a modified normal direction is to be taken into account in the case of bent metal parts. During measurement, the actual normal on the surface is determined with the help of the surface point. When scanning the edge point, the distance between the preselected nominal value and the determined actual position of the surface point is taken into account. Modified scanning directions are also taken into account.

d1

Enter a value here, by which the edge point is to be moved downwards.

d2

Enter a value here, by which the surface point is to be moved inwards.

NOTE:

Measuring runs that have been stored cannot subsequently be changed. Therefore, before storing you must decide in which mode the edge is to be measured. The relevant information is stored with the measuring run.

7.1.10 CAD points

Points defined in CAD (CAD points) can be used to define measuring runs once they have been imported.

see Chap 4.5.2 "Importing CAD points “.

Operation

Select the <Measurement>-<CAD points> function.

A dialog window opens.

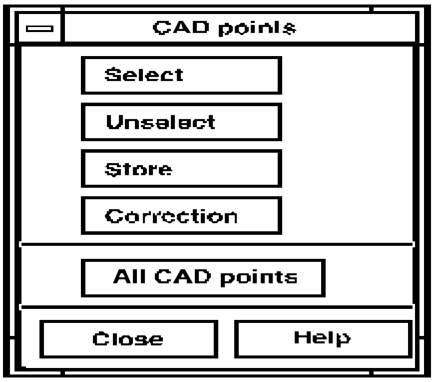


Figure 7-25

Select the required function.

select

Here you activate the mode for selecting individual CAD points. This is indicated by the display: **Select: POINT** at the lower right edge of the screen.

> **NOTE:**
> *CAD points will be adopted as measured points if a surface can be identified for a given point with a distance from it not exceeding 0.1 mm.*

The measured points adopted are shown on the screen as arrows in their normal direction to the surface and in the color of the selected probe, along with numbering.

deselect

With this function you can deselect all currently selected CAD points. You can now define a new measuring run.

store

All selected measured points are written to a file as a measuring run. Selecting again after saving allows the definition of a new measuring run.

correction

The correction key deletes the measuring point that was last adopted.

all CAD points

This function adopts all CAD points that satisfy the distance criterion, as measured points in a measuring run. The sequence will be determined by the position of the current point in the VDA file.

NOTE:

To avoid collisions during measurement you should define an appropriate clearance plane, to which the probe can travel after each probing.

The measuring runs defined using the above-mentioned methods will be saved as a file which can then be further processed by using the management functions available for measuring runs.

7.1.11 Contour line

When two surface pieces are connected to one another by a rounded edge, the theoretical line of intersection can be calculated by extrapolating both surface pieces (calculated extension).
This geometrical element is used particularly in body building, where it is called a contour line. The virtual points, i.e. points on a contour line which cannot be physically scanned, are called contour points.

As the contour line cannot be directly measured, the relevant contour points must be calculated.

Prerequisites:

To measure contour points with HOLOS-UX, nominal contour points from the CAD description (CAD points) must be available. In addition, the two edges must each be available as an independent surface description, whose intersection provides the contour line.

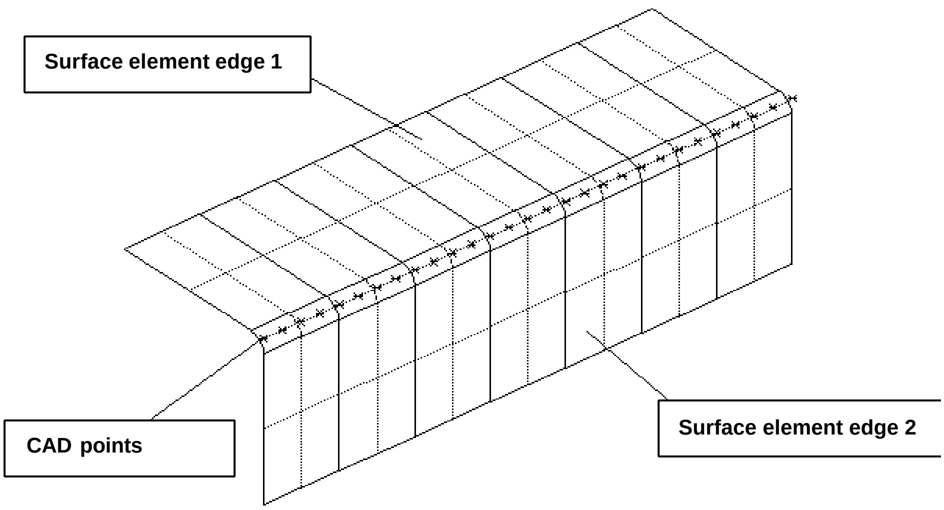


Figure 7-26

Definition of a measuring run

Measuring runs for measuring contour points can be defined using interactive graphics and stored in HOLOS-UX and are thus CNC-capable.

The measuring run is defined in several steps:

1. First define which contours points you wish to measure.

2. Define the surface elements which form the first edge.

3. Then define the surface elements which form the second edge.

4. Finally, define the parameters for the measuring run.

5. From the definitions entered, the scanning points of the program are calculated, in which the actual normal can be determined when scanning on the co-ordinate measuring device.

To define a measuring run, activate the <Contour line> function in the <Define measuring run> menu.

A dialog window appears for defining the various parameters for the contour point measurement:

Measurement of freeform surfaces

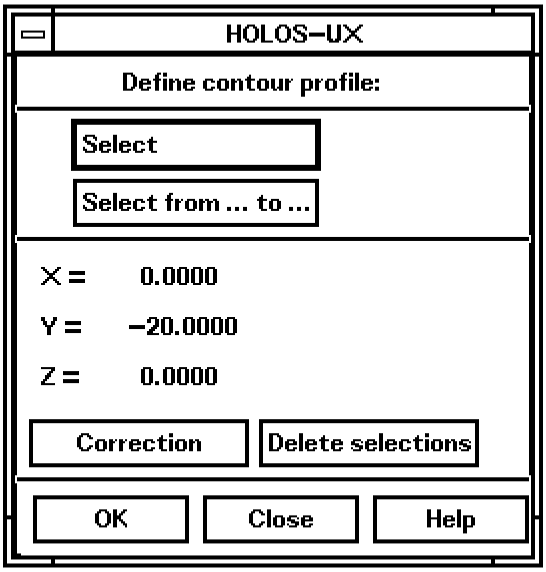


Figure 7-27

Function	**Meaning**
Select	Mode for selecting contour points: In this mode each contour point must be clicked on individually with the left mouse button.
Select from... to...	Mode for selecting a series of contour points: First click on the start point, then the end point of the contour line. All points located in between are taken into account during measurement.
Correction	Removes the last selected contour point.
Delete selections	Removes all selected elements (contour points, edge elements).
OK	Confirms the selected contour points. You then pass to the next stage for defining the edges.
Close	Terminates the definition of a measuring run.

When you have defined the parameters for the contour point measurement, click on “OK”.

A dialog window appears for defining the two edges, whose theoretical line of intersection forms the contour line:

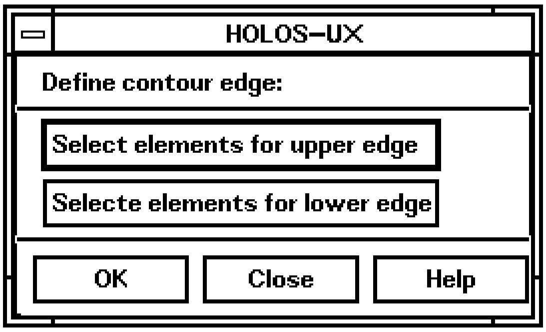


Figure 7-28

Function	**Meaning**
Select elements for upper edge	Mode for selecting the elements for the first edge: The selected elements are displayed on the screen in color.
Select elements for lower edge	Mode for selecting elements for the second edge: The selected elements are displayed on the screen in color.
OK	Confirms the definition of the two edges. You then pass to the next stage for defining the parameters for the calculation of the scanned points.
Close	Terminates the definition of a measuring run.

When you have defined the edges, click on “OK”.

A dialog window appears for defining the parameters for calculation of the probed points:

Measurement of freeform surfaces

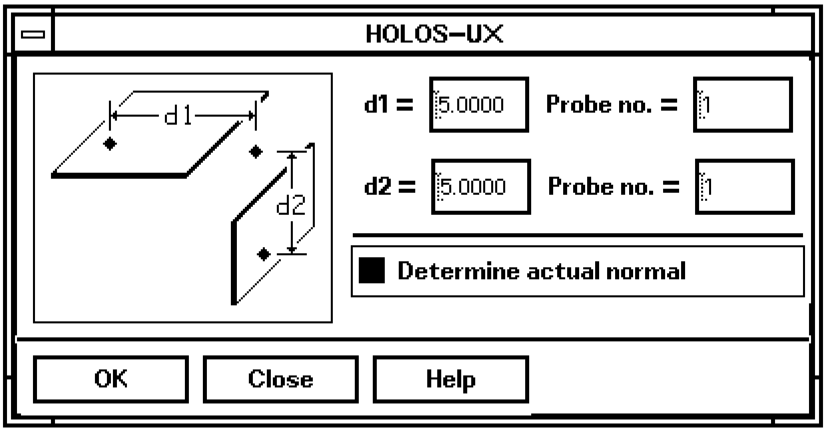


Figure 7-29

Function	**Meaning**
d1:	The d1 value defines the distance of the scan points on the **first** edge to the selected contour points.
d2:	The d2 value defines the distance of the scan points on the **second** edge to the selected contour points.
Probe no.:	The number of the probe which is used to scan the points.
Determine actual normal:	Switched on: During scanning on the co-ordinate measuring device, the actual normal on the surface in the preselected scan points is determined. Switched off: The normals in the preselected nominal contour points are used to determine the deviation of the actual contour points.
OK:	Starts the function for calculating the scan points.
Close:	Terminates the definition of the measuring run.

When you have defined the parameters for calculating the scan points, click on “OK”.

The scan points are calculated and graphically displayed on the screen.

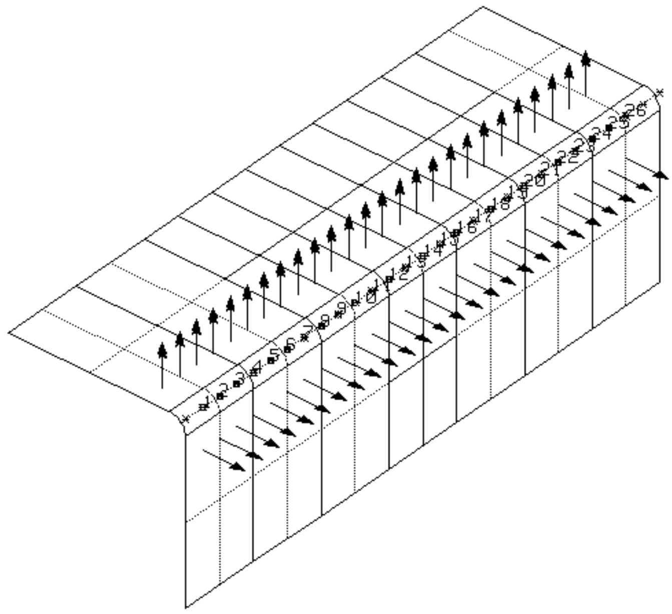


Figure 7-30

Cases with only one contour point

If you have selected only one contour point to define a measuring run, the projection plane must be preselected in which the contour point measurement is defined.

A dialog window appears for defining the projection plane:

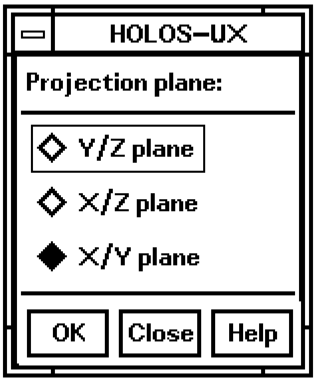


Figure 7-31

If, on the other hand, several contour points are selected for calculating the scan points, then the scan points are always calculated in the plane which lies vertically on the connecting vector of two contour points which follow one another.

Measurement of freeform surfaces

Start measuring run

To start the defined measuring run proceed as normal.

When measuring contour points, all points on the first edge are scanned, followed by those on the second edge.

Evaluation

In order to determine an actual contour point, both planes are brought to the intersection which results from the measurement of two scan points.

If the switch for determining the actual normals during the definition of a measuring run was switched off, the planes are used which are defined by the normal vectors of the calculated scan points.

The intersection line of the two planes is intersected by the plane in which a selected contour point is located. The resulting intersection point defines the actual contour point.

To calculate the deviations, the difference between the nominal and the actual contour point is determined and graphically displayed on the screen.

7.1.12 Corner points

Corner points are theoretical points which are defined by the intersection of three surface pieces, which form a corner:

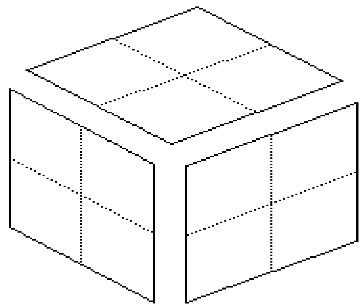


Figure 7-32

In order to determine a corner point, select three points on the respective surface segments. The **nominal corner point** then results from the intersection point of the three planes, which are extended through the selected measured points.

During measurement the actual normal on the scanned surface is determined for each of the scan points. The intersection of the three determined planes defines the **actual corner point**.

The difference between the preselected nominal point and the calculated actual point is calculated as the deviation and displayed on the screen.

Definition of a measuring run

Select the <Corner point> function in the <Measuring run> menu.

A dialog window appears for defining the points on the three surface segments, which form a corner:

Measurement of freeform surfaces

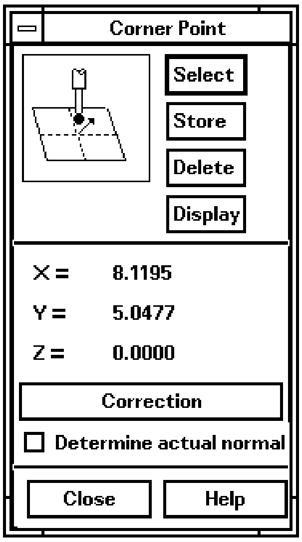


Figure 7-33

Function	**Meaning**
Select	Mode for selecting the three surface points which are used to calculate a nominal corner point.
Delete	Removes all selected surface points.
Display	Displays the surface points that have already been selected, if you have deleted the content of the graphic screen with another function.
Correction	Deletes the last selected surface point.
OK	Starts calculation of the nominal corner point. The corner point is stored as a measuring run and can be measured using the <Start measuring run> function.

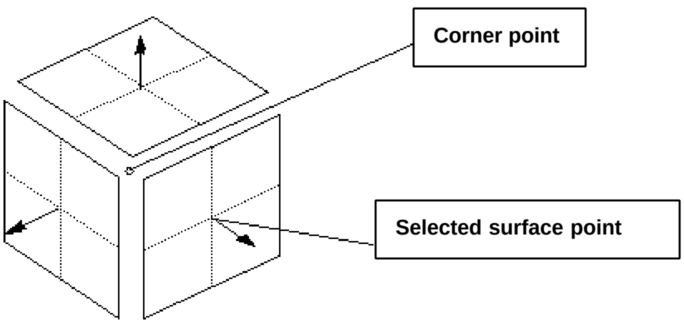


Figure 7-34

7.1.13 Net points / Net sections

Net points or net sections are measured points which are scanned on a defined grid on the workpiece.

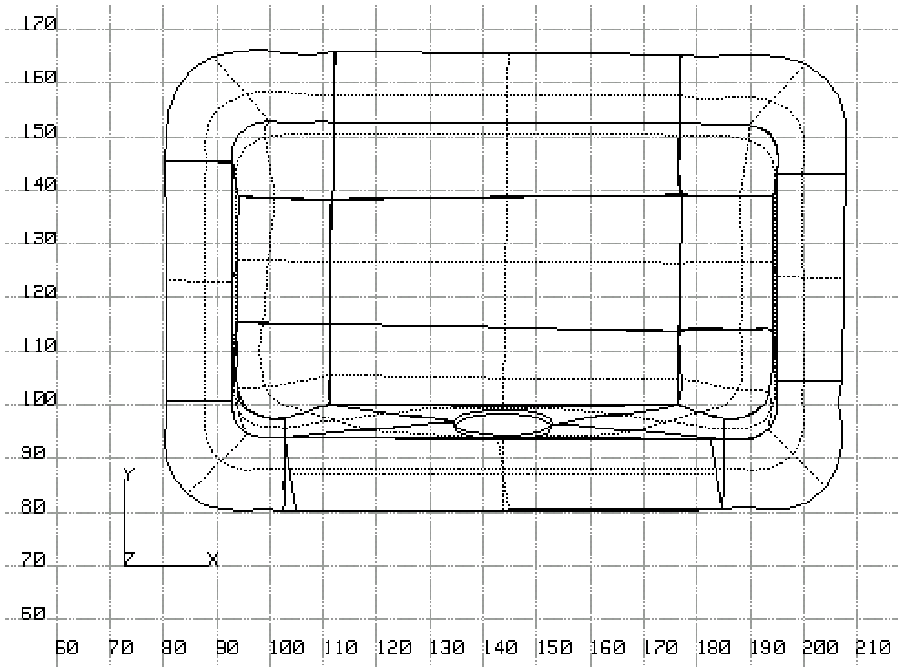


Figure 7-35

With HOLOS-UX you can define individual net points, net lines (net sections) or net rasters.

Start the <Net point/net section> function in the <Measure> - <Define measuring run> menu and define the parameters for generating a measuring run:

Measurement of freeform surfaces

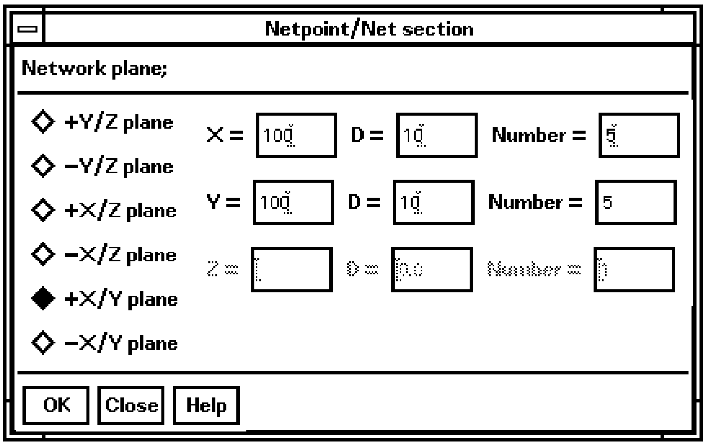


Figure 7-36

Net plane:

The net plane defines the projection plane of the grid as well as the projection direction on the workpiece.
Examples:

Net plane +X/Y — defines the X/Y plane as the projection plane of the grid (X/Y-net). The measured points are projected onto the workpiece as seen from the postive Z-axis (from above).

Net plane -X/Y — similarly defines the X/Y plane as the projection plane of the grid. However, the measured points are projected onto the workpiece as seen from the negative Z-axis (from below).

Net co-ordinates:

When the projection plane has been defined, the net co-ordinates are entered.
Net co-ordinates can only be defined for the respective projection plane (X/Y co-ordinates for the X/Y plane); the input mask for the third co-ordinate is blocked.

Definition of a net point

A net point is defined by the following parameters:

- Enter the net co-ordinates for the point.
- Enter the value 1 in the input mask for the number of points.
- The content of input mask D= is ignored.
- Click on <OK> with the left mouse button.

↳ The measured point in the input net co-ordinate is projected onto the workpiece and stored.

Definition of a net line (Net section)

A net line is defined by the following parameters:

- Enter the net co-ordinate of the start point for the net line.
- Enter the distance of the net co-ordinates for the required section direction (D =).
- Enter the number of points for the required section direction (Distance =).
  Enter the value 1 in the input mask for the number of points of the second section direction.
- Click on <OK> with the left mouse button.

↳ The measuring points for the net line are projected in the defined net co-ordinates onto the workpiece and stored.

Measurement of freeform surfaces

Definition of a net raster

A net raster is defined by the following parameters:

- Enter the net co-ordinate of the start point for the net raster.
- Enter the distance of the net co-ordinates for both section directions of the net raster (D =).
- Enter the number of points for both section directions of the net raster.
- The measured points for the net raster are projected in the defined net co-ordinates onto the workpiece and stored.

7.1.14 Manual co-ordinate entry

Using the <Manual entry XYZ> function, measuring runs with precisely defined co-ordinates can be generated.

- Start the <Manual entry XYZ> function in the <Measure>-<Define measuring run> menu.
- Enter the co-ordinates of the point for which you wish to generate a measured point.

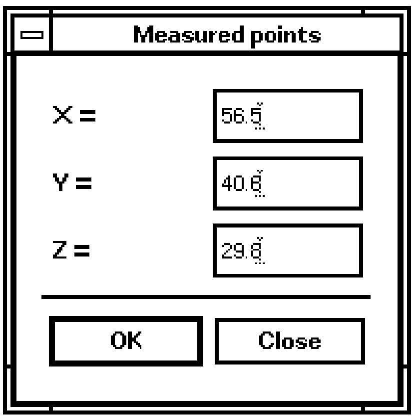


Figure 7-37

- Click on <OK> with the left mouse button.

If a measured point can be calculated on a surface for the preselected co-ordinate, the measured point is accepted.

Prerequisite for measured point acceptance

A measured point can only be accepted if a surface is defined on the preselected co-ordinate. The point on the input co-ordinate must not exceed a minimum distance from the defined surface. This minimum distance is defined via the system parameters (max. distance during data import, see HOLOS Operating Manual Chap.12.15).

If a measured point can be defined for the input co-ordinates, a window appears in which the exact co-ordinates of the calculated measured point are displayed.

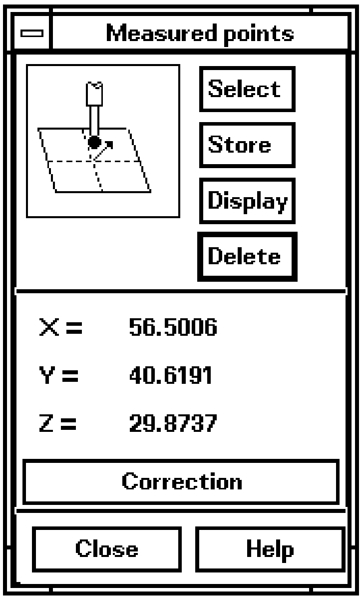


Figure 7-38

The window is used as described in the graphic interactive definition of measured points.

see HOLOS Operating Manual Chap. 7.1.8.

Measurement of freeform surfaces

7.1.15 Line scan

With this function you can scan points on a line that you have defined. This function is only available in conjunction with UMESS-UX.

Operation

Select the <Line scan> function.

Define a line with points A and B, by drawing the line from start point A using the mouse with the left button pressed down.

The line will be displayed on the screen whilst it is being drawn.

Release the mouse button.

A window opens for defining the scanning parameters.

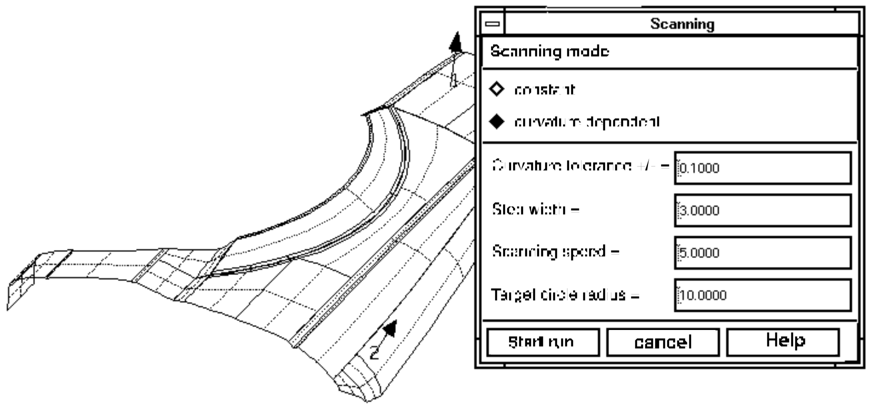


Figure 7-39

constant

Point recording during the scanning run takes place with a constant point distance.

curvature dependent

Point recording during the scanning run takes place dependent upon the curvature change of the contour to be scanned.

curvature tolerance

This parameter defines the curvature tolerance for the scanned contour during curvature dependent points recording. If the curvature tolerance is exceeded a new measured point will be taken over.
The curvature tolerance describes the maximum chord error between three recorded measured points in mm.

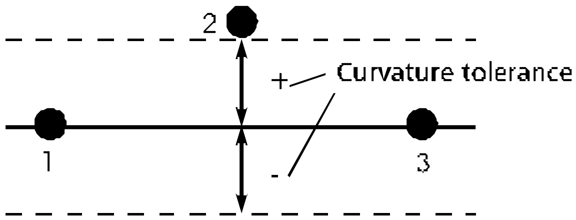


Figure 7-40

step width

This parameter defines the distance of the recorded points for points recording with constant distance.

For curvature dependent points recording, the maximum points distance will be defined as a result of this. If within the specified area no curvature change in the contour takes place, a new measured point will be taken over when the specified distance is reached..

scanning speed

This parameter specifies the traversing speed of the coordinate measuring device during the scanning run.

Measurement of freeform surfaces

target circle radius

The target circle radius defines the radius of a circle around the target point of a scanning line. After entering this target circle the coordinate measuring device reduces the traversing speed in order to terminate the scanning run on reaching the target point.

start run

With the function <Start run> you start the scanning run with the start and target points calculated beforehand, and the parameters that have been defined.

cancel

With this function you cancel the entire process.

Enter the relevant values and select one of the functions.

The corresponding function will be executed.

7.1.16 Area scan

With this function you can scan and manage any defined area. This function is only available in conjunction with UMESS-UX.

Operation

Select the function <Scanning area>.

A window is opened to establish the required area.

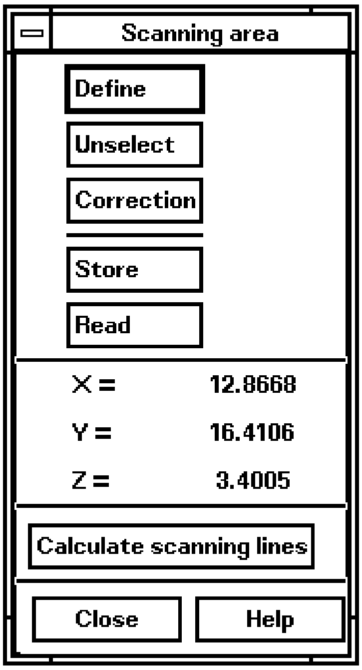


Figure 7-41

define

With the <Define> function you activate the mode for defining the area to be scanned. This is done by establishing the area’s boundary points. You can create any boundary points you wish for the area to be defined.

To define boundary points, click on the specific point in the graphic representation of the workpiece surface.

The boundary points are immediately accepted and joined together as a polygon. The boundary points polygon is displayed graphically on the screen, and the current coordinates of the last point to be selected are shown in the center of the displayed window as X, Y and Z values.

Using this window’s correction key you can delete the displayed point (i.e. the last one to be selected) from the boundary polygon.

The boundary points polygon can - but must not - be closed. If the first and last points are not identical, the area is automatically closed.

deselect

With the <Deselect> function you delete the last boundary area defined, and you can redefine an area.

calculate scanning lines

To calculate scanning lines you must define further parameters.

Select the function <Calculate scanning lines>.

A window for the input of further parameters is opened.

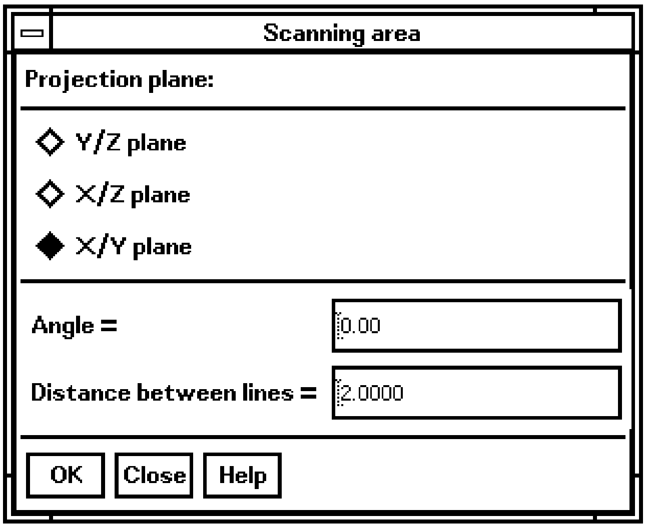


Figure 7-42

Projection plane

The cutting plane for the area to be scanned is defined by a projection plane and an angle in the projection plane. The scanning or probing in the current start/target points is determined by the normal vector of the corresponding point on the surface.

Angle

You use this parameter to define the location of the particular cutting planes in the projection plane.

Distance between lines

The distance between lines defines the distance between the individual scanning lines.

Enter the required parameter and confirm with <OK>.

Calculation and graphic display of the start/target points for the subsequent scanning run is carried out.

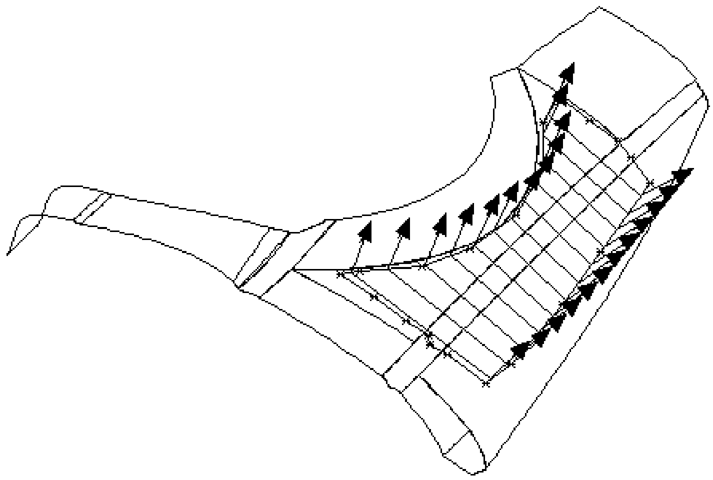


Figure 7-43

Measurement of freeform surfaces

> ***NOTE:***
> *Observe the direction of the normal vectors in the actual start/target points. If the orientation of a surface is not correctly defined, they point in the wrong direction, which leads to collisions when scanning or probing during the subsequent run.*

Then the dialog window for defining the parameters for the scanning run is displayed:

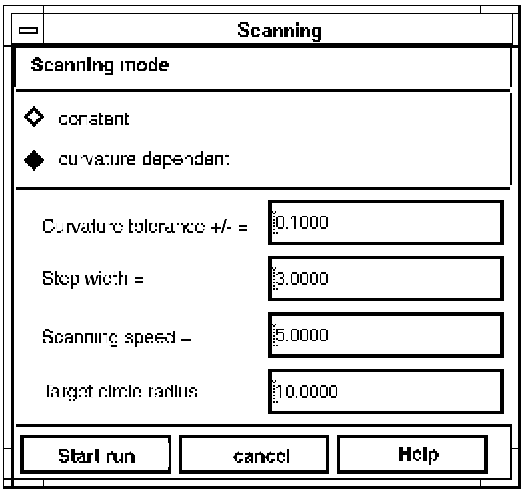


Figure 7-44

constant

Points recording during the scanning run takes place with a constant points distance.

curvature dependent

Points recording during the scanning run takes place dependent on the curvature change of the contour to be scanned.

curvature tolerance

This parameter defines the curvature tolerance for the scanned contour during curvature dependent points recording. If the curvature tolerance is exceeded a new measured point will be taken over.
The curvature tolerance describes the maximum chord error between three recorded measuring points in mm.

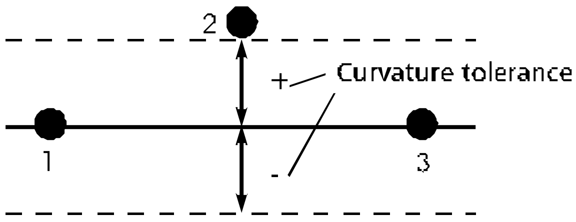


Figure 7-45

step width

This parameter defines the distance between the recorded points during points recording with a constant distance.

With curvature dependent points recording, the maximum points distance will be defined through this. If no curvature change in the contour takes place within the specified area, a new measured point will be taken over after reaching the specified distance.

scanningspeed

This parameter defines the traversing speed of the coordinate measuring device during the scanning run.

target circle radius

The target circle radius defines the radius of a circle around the target point of a scanning line. After entering this target circle the coordinate measuring device reduces the traversing speed in order to terminate the scanning run on reaching the target point.

start run

With the function <Start run> you start the scanning run with the start and target points calculated beforehand, and the parameters that have been defined.

cancel

With this function you cancel the entire process.

Enter the relevant values and select one of the functions.

The corresponding function will be executed.

7.1.17 Start last measuring run

With this function you start the last defined measuring run immediately without any user queries beforehand.

Operation

Select the function <Define measuring run>-<Start measuring run>.

The last defined measuring run will be started immediately without any further queries.

7.1.18 Scanning according to nominal values

Scanning according to nominal values is a measuring procedure which can only be used in conjunction with UMESS-UX and a measuring probe system (measuring probe, VAST, LTP).

In principle any defined measuring run can be performed in HOLOS-UX with the scanning according to nominal values method.

CAUTION

It should be noted that not all point distributions are suitable for this method.

Like a “normal” measuring procedure, scanning in accordance with nominal values can be started in two ways:

1. In the <Measurement>-<Define measuring run>-<Scanning according to nominal values> menu. In this case the **last** defined measuring run is started.
2. In the <Measurement>-<Scanning according to nominal values> menu. In this case a selection of all stored measuring runs appears.

When the function is called up, a dialog window appears for defining the scanning parameters.

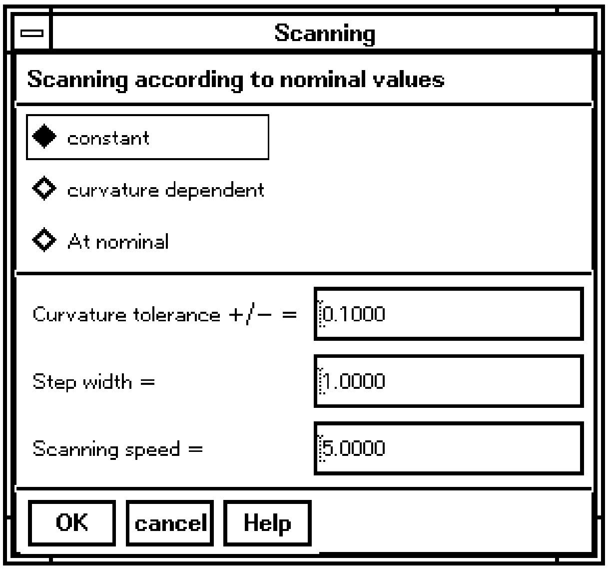


Figure 7-46

constant

The points are recorded during the scanning run with a constant points distance.

curvature dependent

The points are recorded during the scanning run dependent upon the curvature change of the contour to be scanned.

Measurement of freeform surfaces

at nominal value

The points are recorded during the scanning run at the nominal value, i.e. for each defined nominal value a measuring point is recorded. However, the measuring procedure can cause the measuring points to be misaligned, so that the measured values do not lie exactly in the position of the preselected nominal values.

curvature tolerance

The curvature tolerance for the scanned contour during curvature dependent points recording is defined. If the tolerance is exceeded, a new measured point is adopted.

🕮 see also Chap. 7.1.16.

step width

The distance of the recorded points during points recording with a constant distance is defined.

During curvature dependent points recording the maximum points distance is defined here. Provided that there is no curvature change in the contour within the specified range, a new measured point is adopted when the specified distance is reached.

scanning speed

The traversing speed of the co-ordinate measuring device during the scanning run is defined.

7.2 Start measuring run

With this function you select an already existing measuring run for the active model.

Operation

Select the <Measurement>-<Start measuring run> function.

A window opens for selecting existing measuring runs.

Select the desired measuring runs.

Selection window see Chap.1.8.5

The measuring runs will be started immediately, once you have selected them and confirmed them with <OK>.

NOTE:

The points or surfaces of a measuring run will be processed in the sequence in which they were selected!

In principle, you can start a number of measuring runs, since they will be buffered in a queue and processed in the background.

If you are no longer certain of the name of the desired measuring run, get a graphical display of the measuring run with the function <Display nominal values>.

NOTE:

Run the coordinate measuring device to a suitable starting position before the start of a measuring run!

7.3 Cancel measuring run

The <Cancel measuring run> function cancels the queue in which the measuring runs are buffered.

NOTE:
A measuring run which has already been processed with the measuring software is not cancelled with this function! It can be cancelled with the cancel functions in the measuring software or CADLINK.

Procedure when a collision occurs:
before you release the probe, first cancel all measuring runs with the <Cancel measuring run> function !

7.4 Display nominal values

The <Display nominal values> function displays the defined measuring runs graphically (each point as an arrow in the normal direction). The function overlays all the available measuring runs for the active model for selection.

📖 Selection window see Chap.1.8.5

With this function you can check before starting a measuring run that you have actually made the correct selection.

7.5 *Simulate measuring run*

You can simulate measuring runs on the screen using the <Simulate measuring run> function.

Select a measuring run that you wish to simulate on the screen. Click on <Ok>.

The parameter input window is displayed:

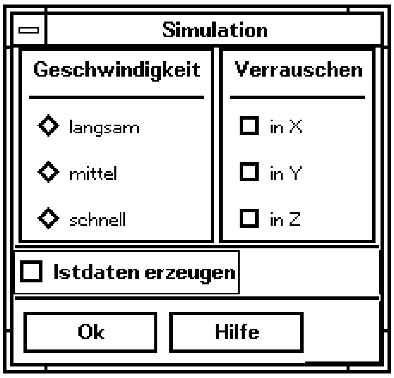


Figure 7-47

Define the parameters for the simulation.

Speed

You can use these options to control the traverse rate at which the probe moves on the screen.

Generate actual data

If you require actual values in order to define the positions of the graphic symbols for representing deviations on the screen, you can use this option to generate actual values during the simulation. This function is required for off line programming, for example..

Receding

Select the axial directions in which the actual values generated are to recede.

Start the run with <OK>.

The measuring run is simulated on the screen by a traversing probe. You can track the travel paths with the parameters set for scanning path, clearance planes, etc. .

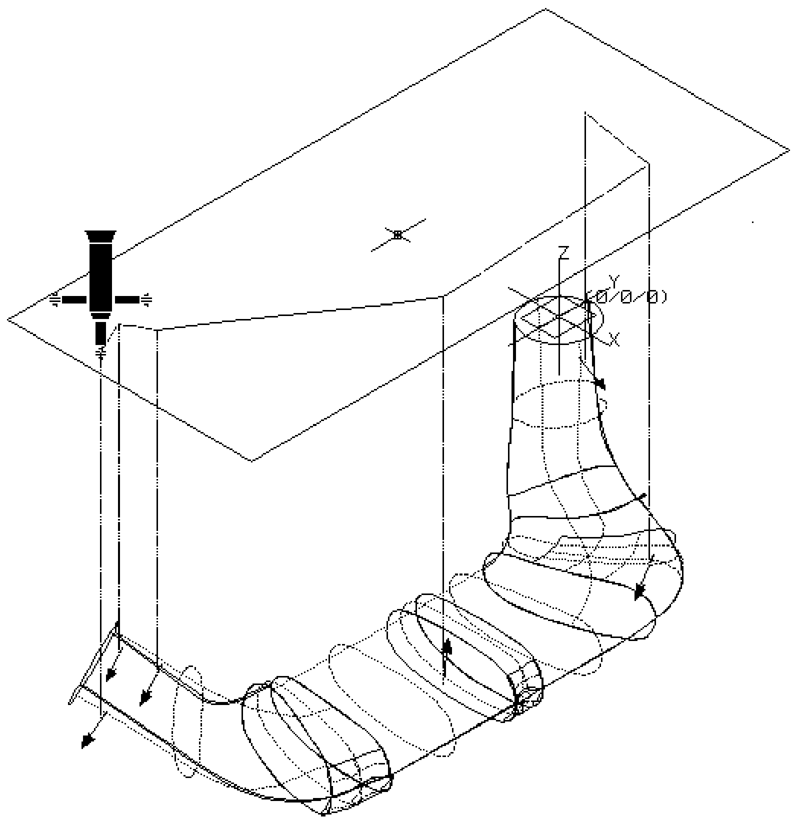


Figure 7-48

8 Manual Probing

This chapter describes manual probing and also the functions <Patch ident> and <Edge measurement>.
HOLOS branches, depending on the definition set up by program CADLINK, to either the <Patch-Ident> or the <Edge measurement> function. By means of the <Manual> function you can manage and further process measured points obtained by manual probing.

8.1 Patch identification

The main function <Patch ident> is sub-divided into the following functions:

- Store probing points
- Delete probing points
- Display probing points
- Display deviation window
- 3D best fit
- Measuring record
- Chromatic coordinates
- Display values large

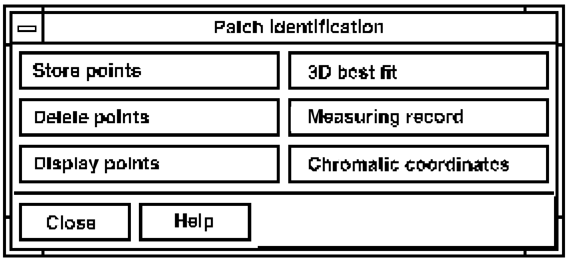


Figure 8-1

Manual probing

8.1.1 Manual probing

For a known model, it is possible to manually probe the workpiece at any time, and without the use of any special function.

A manual probing triggers a number of actions within the program:

- In a predetermined search area around the probing point a search will be carried out for a patch of this model, upon which the probing point is located ("Patch identification“). You make adjustments to the search area via the parameter function <Patch-Ident>.
- If a patch is found, the probing point will be graphically represented in the form of a probe. Its deviation from the nominal point will be overlayed immediately. You make adjustments to how the deviation is represented via the parameter function <Graphics>.

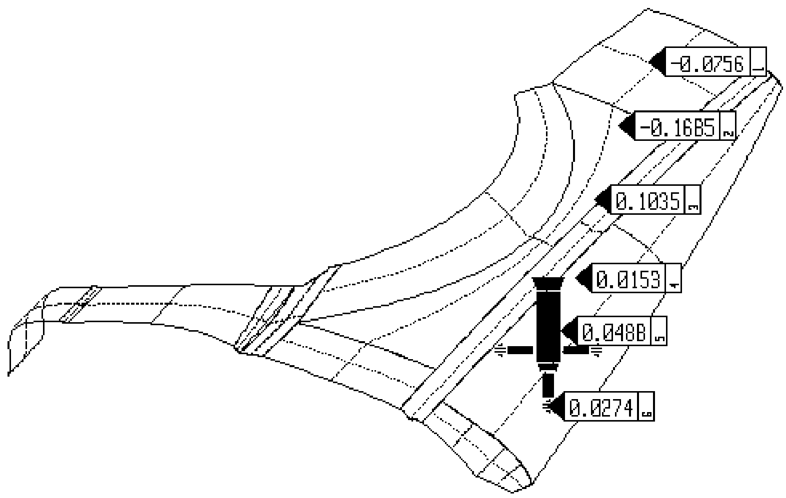


Figure 8-2

- In addition to the graphical representation of the deviation, a window will be overlayed displaying the coordinates of the points and its deviation relative to the tolerance range. If you manually probe further points, their deviation will be displayed in the same window and you will receive a complete deviation distribution. (see Fig. 8-2).

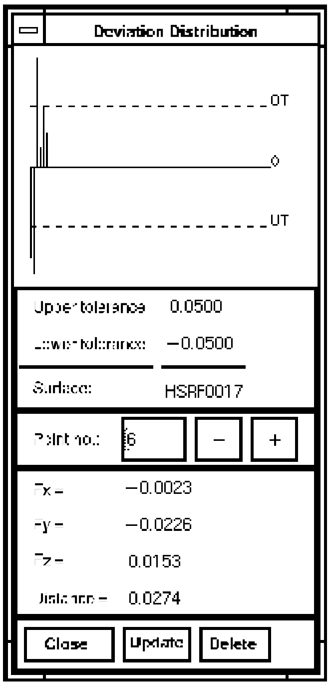


Figure 8-3

Function	Meaning
<Point no.>	jump to a point by entering its number
<+> and <->	move through points step-by-step
<Update>	graphic representation will be re-built
<Delete points>	current point will be deleted

NOTE:

If the number of measured points exceeds the width of the window, the display starts from its starting place again. If you really do need to display all of the values, you can however lengthen the window horizontally.

You can store manually probed points afterwards and then execute them as a CNC measuring run.

8.1.2 Store probing points

With the function <Store probing points> you store on the hard disk, all the points in the buffer that have been manually probed up until now. In the process two files will be created:

- Actual values file: contains the probing points
- Nominal values file: contains the surface points found as a result of a perpendicular projection of the probing points on the surface.

The file names will be assigned automatically. The stored probing points can be used for evaluation or utilized for a CNC measuring run. If after the storing you probe further points, these will begin again with point no.1 and they will, on being stored, be put in a new file.

8.1.3 Delete probing points

With the <Delete probing points> function you delete all probing points that are currently held in the buffer. Probing points that are stored in files will not de deleted.

8.1.4 Display measuring record

With the <Measuring record> function you create a measuring record that contains all manually probed points and their deviations. The output device for the measuring record, depends on the setting in the parameter function <Measuring record>.

see Chap. 12.11

The construction of the measuring record is identical to that in menu <Evaluation>.

see Chap. 9.4

8.1.5 3D best fit

The function <3D best fit> carries out a best fit of the workpiece using the manual probing points that are currently held in the buffer.

A precise description of this function can be found in Chap. 9.3.

8.1.6 Display deviation window

A window for the display of deviation distribution is automatically overlayed during the manual probing of measured points. If you have closed this window, you can re-diplay it by using this function key.

8.1.7 Display values large

If you have to work further away from your screen especially with larger coordinate measuring devices, it is relativley difficult to make out the measurement results on the screen.

By using the <Values large> switch, you can enlarge the function display of the measurement results output.

The <Value large> switch in the deviation distribution window has the same effect.

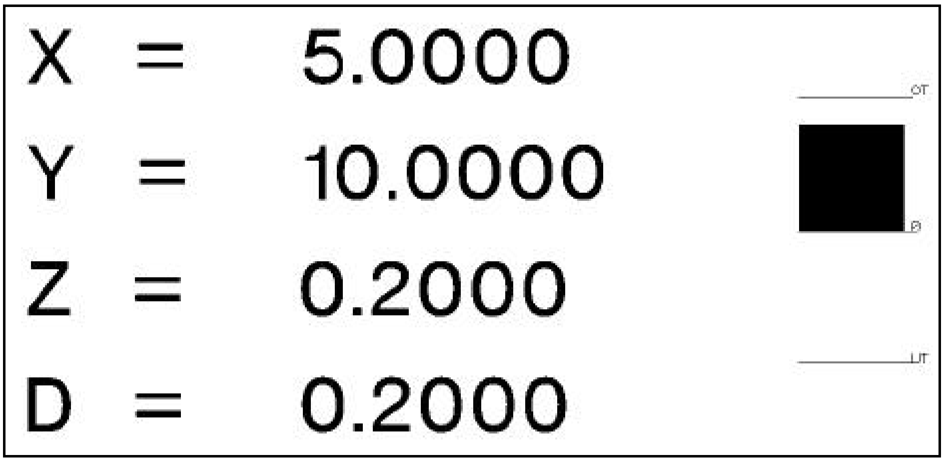
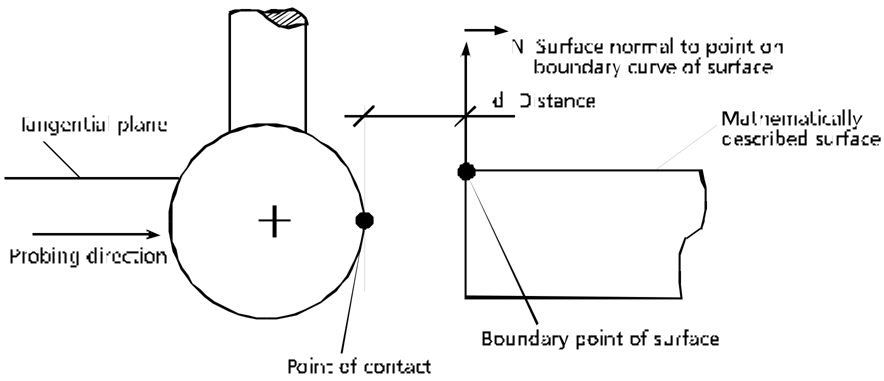


Figure 8-4

8.2 Edge measurement

The edge measurement is used for the measurement of deviations in the edges of a workpiece.

> ***NOTE:***
> *It is advisable to select the vectorial form of representation since in that form the directions will also be displayed.*



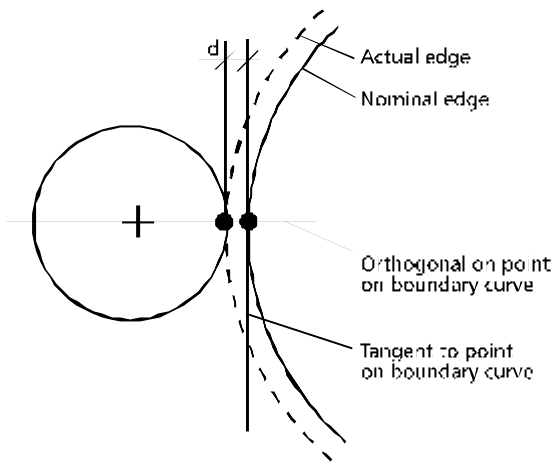


Figure 8-5

Measuring sequence

1. Probing on the edge
2. Ascertaining the point on the surface's boundary curve
3. Projection of the probe midpoint in the tangential plane of the point on the boundary curve
4. Probe radius correction in the direction of the perpendicular to the point on the boundary curve
5. Determination of the distance between the point of contact projected in the tangential plane, and the point on the boundary curve

Function and operation

All functions and forms of representation are identical to the function <Patch ident>.

see Chap. 8.1.

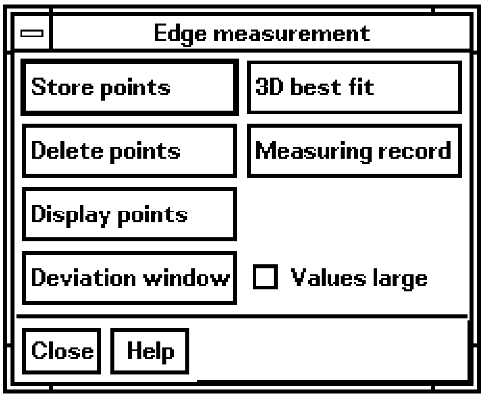


Figure 8-6

Store points

With this function you store on the hard disk all the points in the buffer that have been manually probed up until now. The stored probing points can be used for evaluation or utilized for a CNC measuring run. If after storing you probe further points, these will begin again with point no.1 and they will, on being stored, be put in a new file.

Delete points

With this function you delete all probed points that are currently held in the buffer.

Display points

With this function you can display all probed points on the screen, if the screen content has been deleted by one of the graphics functions.

Deviation window

During manual probing of edge points a window appears automatically for displaying the deviation distribution. If you have closed this window, you can display it again by using this function key.

Measuring record

With this function you create a measuring record that contains all manually probed points and their deviations that are currently held in the buffer.

Display values large

If you are working further away from your screen, you can display the measuring results in magnified form by using the <Values large> switch. This function is particularly useful with large co-ordinate measuring devices.

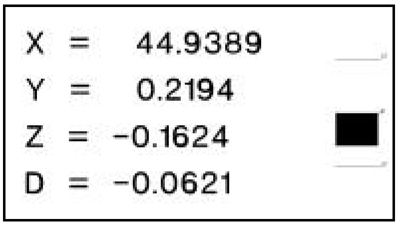


Figure 8-7

8.2.1 Manual probing

Prerequisite

Before you manually probe edge points, you must select the edge measurement mode in the UMESS CADLINK option (MAN-MES key).

If you use the HOLOS functions for aligning the workpiece (assignment of probing points), the corresponding axis selection must be defined in UMESS, if the co-ordinate axes of the workpiece co-ordinate system do not agree with the axes of the machine co-ordinate system.
If the position of the co-ordinate axes is not correctly defined, then HOLOS-UX will have an incorrect probing direction during manual probing and will not be able to define the workpiece edge correctly.
When the first point has been probed, the deviation distribution display window appears on the screen. The display and the functions are identical to the deviation distribution display window in the <Patch Ident> function.

see Chap. 8.1.

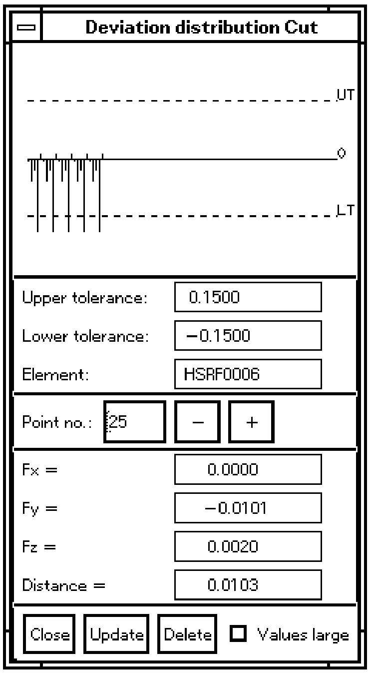


Figure 8-8

8.3 Alignment

With the <Alignment> function you can use manually probed alignment points to align your workpiece.

A precondition for this is that the manual measurement has been reset to <Alignment points> in the UMESS option CADLINK. You set this mode via the <MAN MES>function in the CADLINK menu bar.

The workpiece alignment functions are only available if you have previously probed alignment points. If there are no points, an error message is displayed.

When you probe alignment points on the workpiece, these are graphically displayed on screen in HOLOS with numbering in the order of their probing. You can switch the graphical display of the alignment points on or off in the display parameter page in the left-hand graphics menu bar.

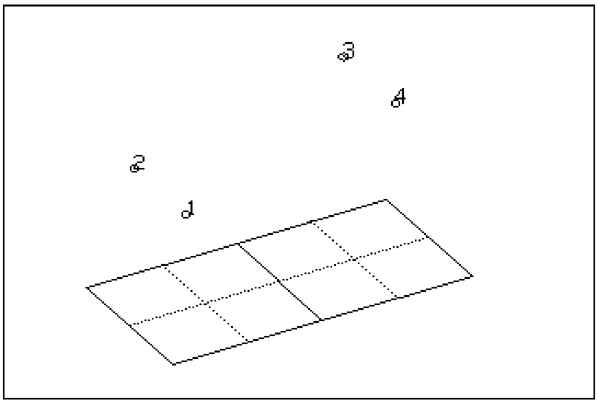


Figure 8-9

Operation:

Clamp the workpiece to the coordinates measuring device base plate so that the direction of its axes corresponds to the direction of the axes of the coordinates measuring device.

If this is not possible, you must define an appropriate axis selection case in UMESS.

Probe points on the workpiece whose positions you can identify on the workpiece.

Using the functions described below, you can assign these points defined positions on the workpiece, and determine the alignment of the workpiece on the coordinates measuring device.

After calculating the alignment, the transformation specification can be transferred to CADLINK. The manually probed points are transformed in this new coordinates system.

The newly defined coordinates system is now defined in UMESS. Subsequent probes define points in the new coordinates system.

In order to preserve the new workpiece coordinates system permanently, you must save it using the existing CADLINK or UMESS workpiece coordinates system storage functions.

The main <Alignment> branches into the following functions:

- Assign alignment points
- Correction
- Delete assignments
- Delete alignment points
- Calculate alignment

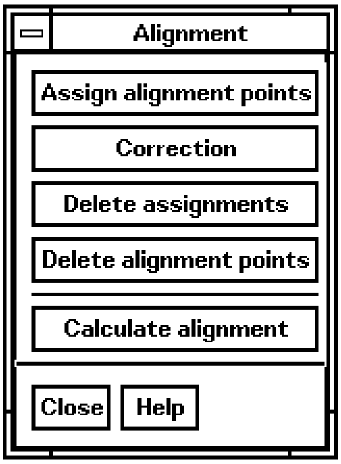


Figure 8-10

8.3.1 Assign alignment points

With the function<Assign Alignment points> you assign manually probed alignment points to a aposition on the workpiece. Therefore, probe the positions on the workpiece surface that you can easily identify in the graphic display in HOLOS.

Click on the function <Assign alignment points>.

The message “Select point” appears in the status line. You go into the mode for selecting an alignment point.

Select an alignment point.

The selected point is color-marked. The message “Assign surface” appears in the status line, and you go into the mode for defining the position on a surface of the workpiece.

Click with the left mouse button on the appropriate position on the workpiece surface.

The assignment to a position on the workpiece is graphically displayed by a connecting line between the selected alignment point and a point on the workpiece.

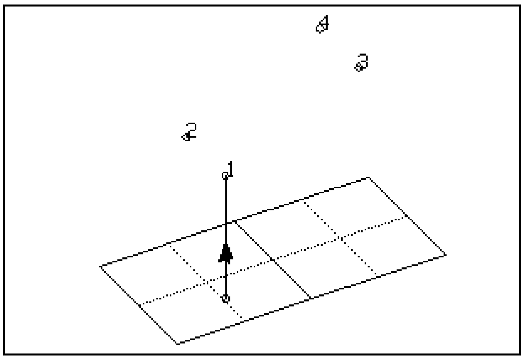


Figure 8-11

The display of the normal alignment is also displayed on the selected surface.

If the surface orientation is incorrectly defined, you must rotate the orientation so that the probe radius correction can be correctly calculated.

After the assignment to a position on the workpiece surface, you go again into the mode for selecting an alignment point and can proceed with the next assignment.

8.3.2 Correction

With the function <Correction>, you delete the most recently defined assignment of an alignment point to a position on the workpiece surface.

8.3.3 Delete assignment

With the function <Delete assignment>, you delete all alignment point assignments.

8.3.4 Delete alignment points

With the function <Delete alignment points>, you delete all manually probed alignment points.

NOTE:
With this function the alignment points are removed from the system and cannot be restored.

If you only want to remove alignment points from the graphic display, you can do this via the graphic display parameter page.

see Chapter 12.1, “Graphic display parameters”

8.3.5 Calculate alignment

After you have defined the necessary assignments, you can calculate the transformation specification for a new workpiece.

The definition of the degree of freedom for the coordinates system best fit can be carried out via the 3D best fit parameters.

see Chapter 8.1.5, “3D best fit”

For a complete best fit, in which all degrees of freedom (i.e. translatory and rotatory) are to be taken into account, you must define at least three alignment points.

Manual probing

However, a minimum of four points, not located on one plane or in a straight line, is recommended.

If you carry out the calculation with less than three points, only the translatory portions are taken into account for the calculation.

A message is displayed on screen, that the rotatory portion was not taken into account.

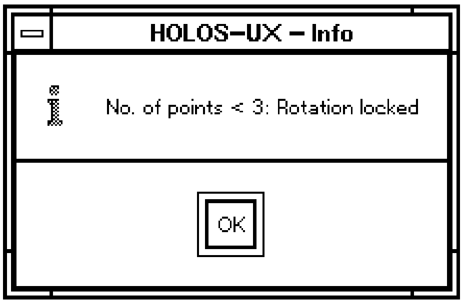


Figure 8-12

After the calculation, a window appears in which the results of the calculation are displayed.

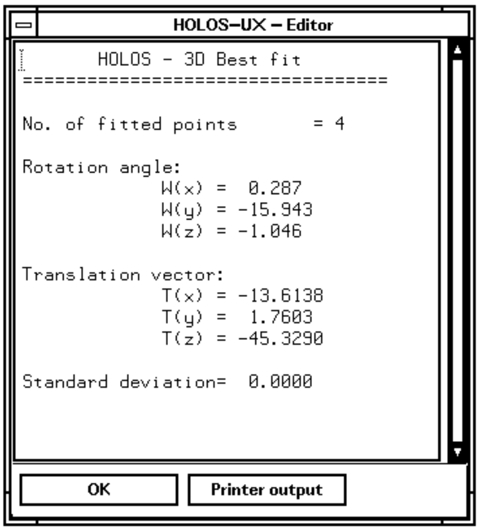


Figure 8-13

To transfer the transformation specification and the definition of the new workpiece coordinates system into UMESS, you must answer <YES> to the query about the transfer of the transformation matrix.

NOTE:
When doing this, ensure that the connection to the UMESS option CADLINK is active, since after sending the transformation matrix the alignment points are already transformed in the workpiece coordinates system.

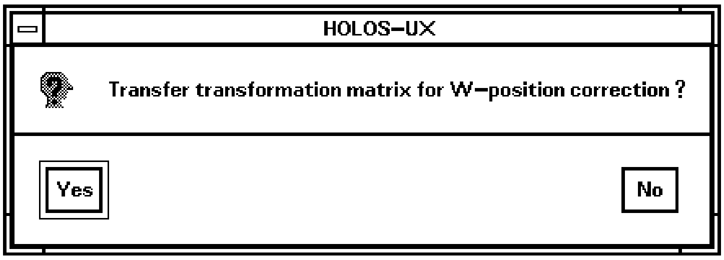


Figure 8-14

Manual probing

9 Evaluation of measuring runs

This chapter describes the functions of the <Evaluation> menu. The functions are used to evaluate existing actual data at a later point in time.

The main function <Evaluation> is sub-divided into the following functions:

Actual data

Sections

3D best fit

Measuring record

Distance calculation

9.1 Evaluate actual data

The function <Actual data> has one of its branches leading to the subfunction <Evaluation>. With the function <Evaluation> the deviations of the actual data on the nominal surfaces will be calculated and subsequently displayed on the screen.

The type of representation is dependent upon the settings that you have made for the parameters in the parameter function <Graphics>.
🕮 see Chap. 12.1

The following representations are possible:

- numerical
- vectorial
- with colored symbol
- with colored markings

In the evaluation the measuring record will be created.

Evaluation of measuring runs

Operation

First of all select the deviation representation via the parameter function <Graphics>.

Invoke the function <Evaluation> - <Actual data> - <Evaluation>.

A window is opened for the selection of existing actual data (= measuring runs).

Select the actual data.

Selection window, see Chap. 1.8.5

The data will be evaluated and the result then displayed on the screen.

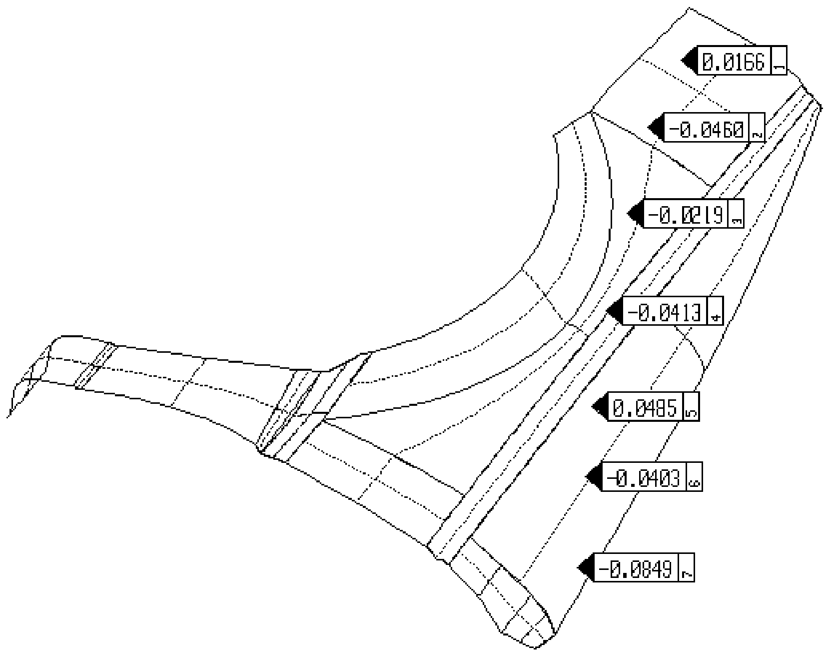


Figure 9-1: Deviation representation with symbols

9.1.1 Actual data as chromatic coordinates

For the representation in chromatic coordinates, areas with the same tolerance zone position, will be shown in the same color. In contrast to the deviation representation, here the entire surface will be colored with a colored "marking“.

This type of evaluation can be utilized

- in the raster and grid measuring runs (here the measured patches will be completely colored)
- for several manual probing points (here a convex envelope will be formed around the points and the enclosed surface then colored).

Background information

In order to color the entire surface, the program needs in addition to the information about the probing points, other information about the interspaces. From among the necessary calculations that are required for this matter, mention will only be made at this point of those aspects that are of interest to you, the user.

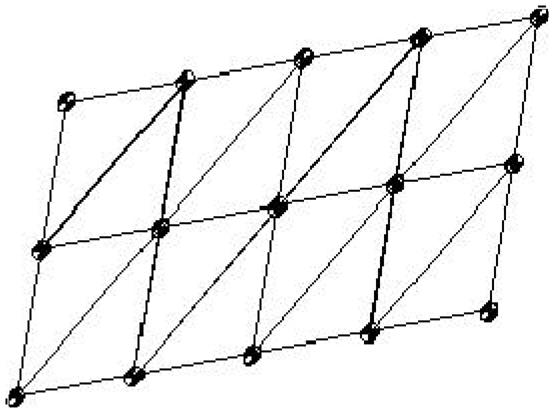


Figure 9-2

First of all the points will be joined by a so-called triangular meshing. The closeness of the triangular meshing depends on the nesting depth, which you can define yourself.

Nesting depth 1: a triangle will be subdivided into four further triangles.

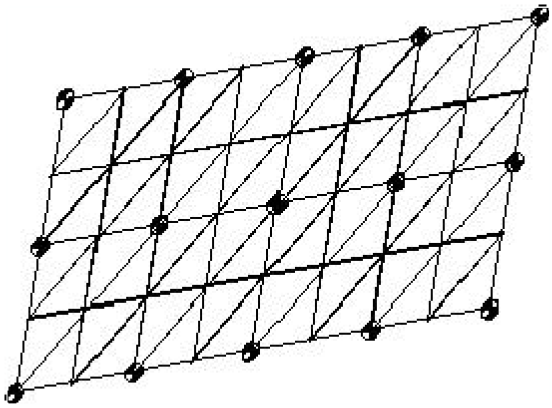


Figure 9-3

For nesting depths of 2 and higher: the subdivided triangles will be further subdivided in the same manner etc.

NOTE:

The greater the nesting depth, the finer the subdivision of the surface and resulting precision in the evaluation. The nesting depth should however not exceed 5, since the computer speed might not then be adequate.

- By means of various equalization calculations (Interpolations)the deviation of the probed points will now be extended to the interspaces. Because of the flowing transitions, however, outliers on the surface cannot be recorded and a false impression can result. For this type of evaluation the probed points should therefore lie relatively close to one another.

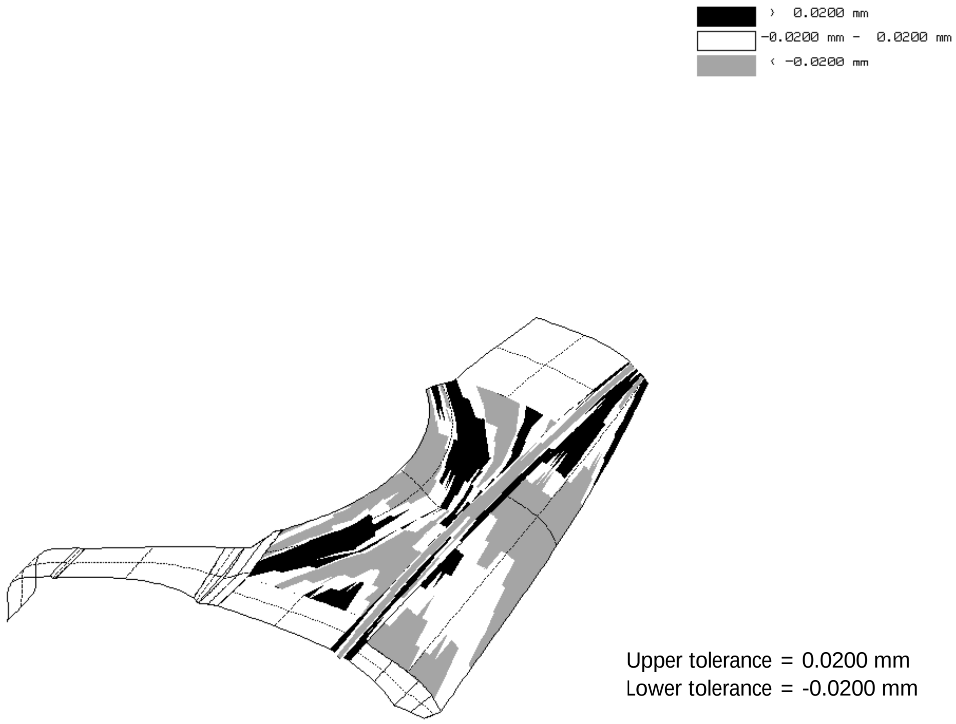

> 0.0200 mm
-0.0200 mm - 0.0200 mm
< -0.0200 mm
Upper tolerance = 0.0200 mm
Lower tolerance = -0.0200 mm

Figure 9-4

Evaluation of measuring runs

Operation

Using the parameter function <Graphics>, first of all select whether the chromatic representation is to be filled or not.

Invoke the function <Evaluation> - <Actual data> - <chromatic coordinates>.

A window is opened with the existing actual data(= measuring runs). Similarly, a window is opened for entry of the nesting depth.

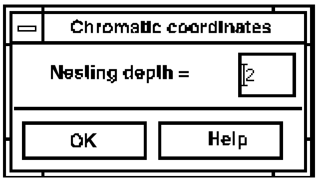


Figure 9-5

First of all enter the nesting depth (max. value of 5). The entry does not need to be confirmed. Because of this the window remains open, and you can quickly execute the function again with a different value.

Select the actual data.

Selection window, see Chap. 1.8.5

The data will be evaluated and displayed on the screen in color.

9.2 Evaluation of sections

HOLOS-UX supports the Zeiss curve measuring program KUM, by making available possibilities for the evaluation of sections.

In principle sections will be represented as the superimposition of a polyline of nominal values and the polyline of the respective actual values that belong to it.

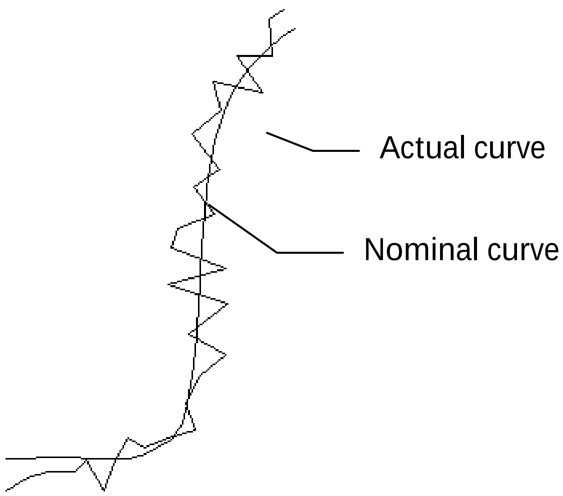


Figure 9-6

Since the generation of nominal values in HOLOS-UX is, in terms of design, not generally aimed at sections or curves, you must for the moment define sections via the measured actual values.

9.2.1 Definition of sections

A precondition for the definition of sections is a preceding evaluation of the actual values, i.e. evaluated actual values must be displayed on the screen. You define the section in an interactive-graphic way by selecting the actual values.

Evaluation of measuring runs

Operation

Select the function <Evaluation>-<Section>.

A window is opened.

Select <Define>.

A dialog window is opened for organizing the section.

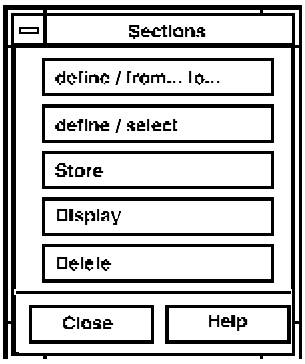


Figure 9-7

define / from... to...

Using this function you define sections from actual values that are positioned one behind the other. In the evaluation of measured values these will be filed away in an internal structure for the graphic representation. Consequently measured points that lie one behind the other on a line or a raster/grid, also lie one after another in this structure.

The selection of the first value defines the start point of a section, the next value defines the end point. All the values that lie in between will be taken over for the section. Values that have been taken over will be designated by a circle.

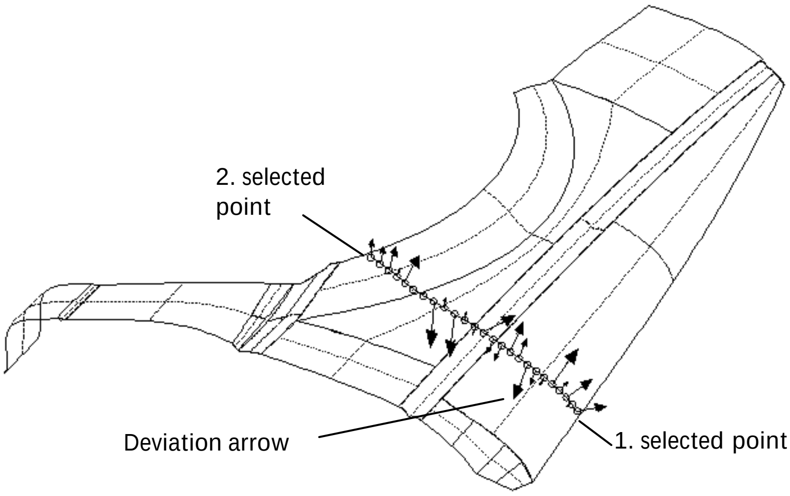


Figure 9-8

define / select

With this function you select individual points for the definition of a section. At the same time a counter will be initialized, i.e. After that you can begin with the definition of a new section at any given time.

store

The function <Store> takes care of the storage of sectionsin a file. The sections will be filed with consecutive numbering (section1, section2, ...) in the current workpiece directory.

display

With various this function the last defined section together with the parameters for section representation will be displayed on the screen. In contrast to the representation of sections described further on, here objects such as surfaces, curves and actual values etc. visible on the screen, will not be masked out. The representation of the section will be superimposed on the current graphical representation.

delete

After activating this function the dialog window appears for the deleting of existing sections from the current workpiece directory. The delete process is analogous to the other available delete functions.

see Chap. 4.3

9.2.2 *Evaluation and graphic representation of sections*

With this function you select existing sections and display them on the screen. The representation of the sectiontakes place with the parameters that were set up for the representation of the section.

Setting up the parameters see Chap. 12.15

Operation

Select the function <Evaluation>-<Section><Evaluate>.

A window is opened for the selection of existing sections.

Select the desired sections and confirm with <OK>.

The sections will be displayed on the screen.

9.3 Execute i3D best fit

The 3D best fit denotes a best fit of the workpiece on the basis of the actual values. By means of a computational rotation and translation of the workpiece the actual and nominal values will be made to coincide to such an extent that the sum of the error squares is a minimum. (Gauss criterion). From this best fit HOLOS-UX generates a transformation rule, that improves on the original alignment (= workpiece position, workpiece correction system).

The result of the best fit will be displayed in a window. Rotation angle, translation vector and standard deviation will be output. By means of the standard deviation you can decide whether you want to accept the best fit or execute another one using further actual values.

NOTE:

If the existing workpiece correction system is to be corrected on the basis of the transformation rule, then you must send it back to the measuring software without fail. HOLOS itself does not notice the transformation rule.

In the measuring software itself, the modified workpiece correction system must again be stored, since otherwise the information will be lost on exiting the measuring software.
Precondition for the 3D best fit: the workpiece must be coarsely aligned. It is not possible to best fit a workpiece, that is not aligned ahead, since it is not possible to carry out probings in this case.

Evaluation of measuring runs

Operation

Example: the actual values already exist.

Using the parameter function <3D best fit> first of all define the degree of freedom for the best fit.

see Chap. 12-11

Invoke the function <3D best fit> in menu <Evaluation> .

A selection window is opened with the existing actual data.

Select the actual values and click on <OK>.

The best fit will be carried out and the result displayed in a window.

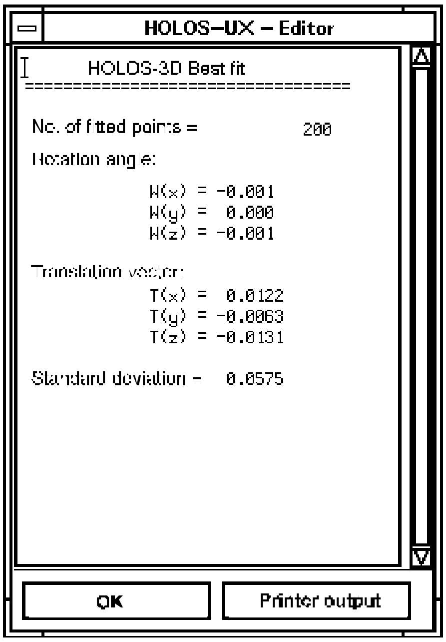


Figure 9-9

For checking purposes you can now probe points or decide on the basis of the standard deviations, whether the best fit should be improved upon again.

The program queries whether or not to "transfer transformation matrix for W-position correction?".

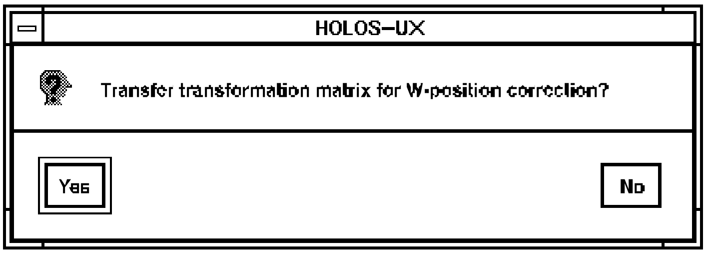


Figure 9-10

Only answer the question with <Yes>, if you want a correction to the stored workpiece positioning system.

When you reply with <Yes> a further question follows.

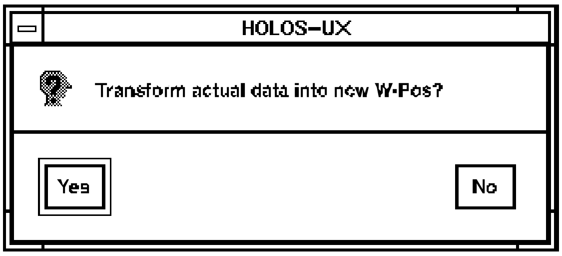


Figure 9-11

Only answer the question with <Yes>, if you want a correction to the actual data.

The data will be transformed.

9.3.1 3D best fit with weighting

For a 3D best fit with weighting of individual values, actual values that can be seen on the screen are selected.
Values which should be weighted more heavily during the 3D best fit can be selected several times and as a result provide greater influence on the best fit result.

Prerequisite

Before defining the points of a weighted 3D best fit, the actual values must be evaluated.

Evaluation of measuring runs

Operation

Evaluate the actual values.

The deviations are displayed on the screen.

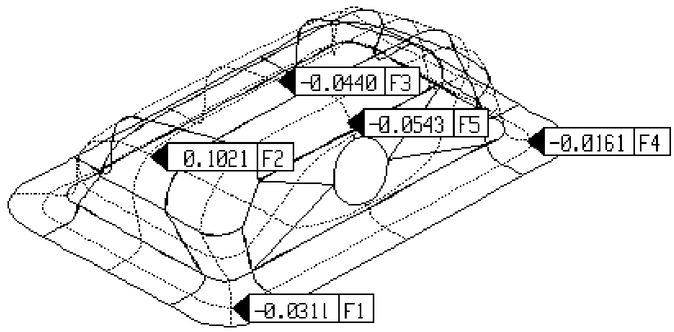


Figure 9-12

Select the function <3D best fit>-<3D best fit with selected actual values> in the <Evaluation> menu.

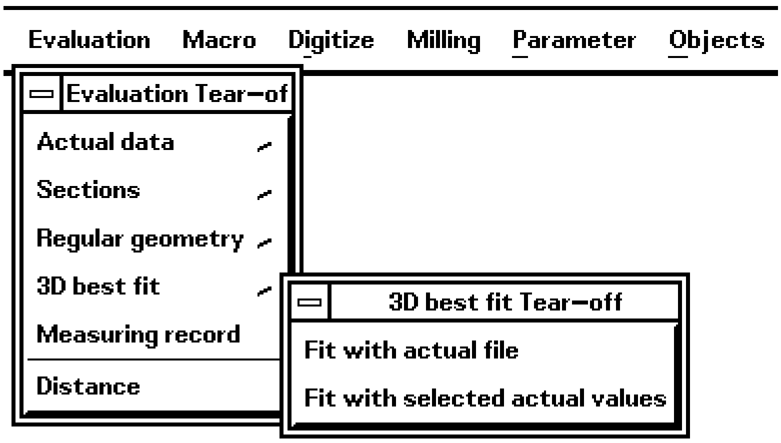


Figure 9-13

The request “Select actual values” appears in the status line at the bottom of the screen.
You are now in the mode for selecting the actual values which are to be used for the 3D best fit.

Select the required actual values by clicking on them with the left mouse button. Actual values which are to be taken more into consideration during the 3D best fit should be clicked on several times.

After the first value has been selected, a dialog window appears, in which you can obtain information about the selected points:

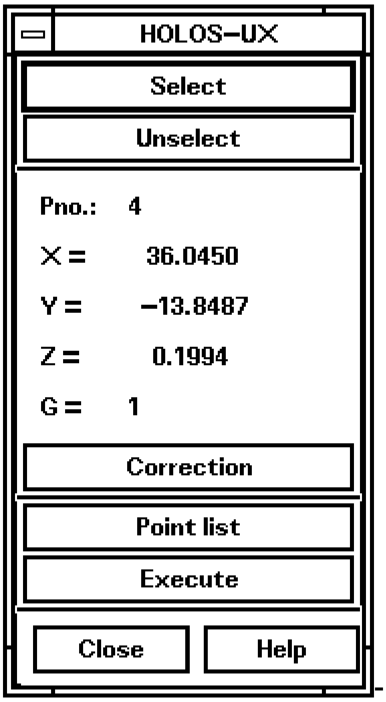
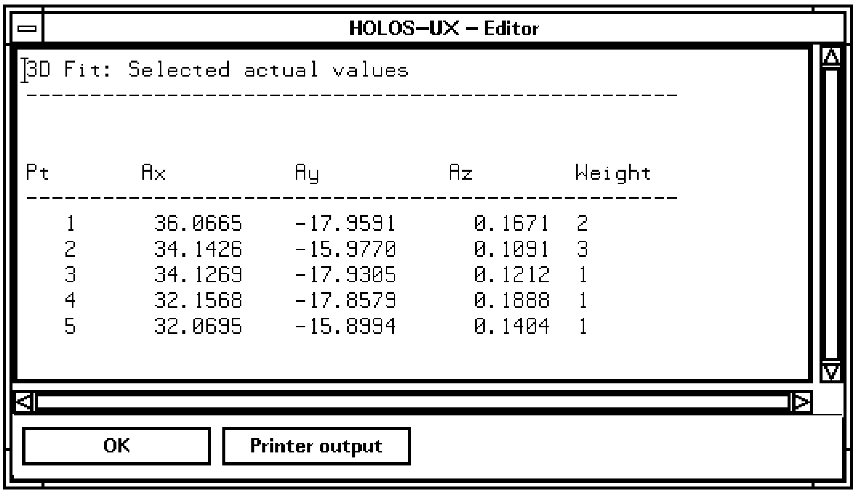


Figure 9-14

Function	**Meaning**
Select	Calls up the mode for selecting the actual values, if you have exited it by performing another action.
Deselect	Cancels the selection of all selected actual values.
Pno.	Number of the last selected point.
X, Y, Z	Co-ordinates of the last selected point.
W	Weighting of the last selected point.
Correction	Cancels the selection of the last selected point.
Points list	Displays list of all selected points:

Evaluation of measuring runs



3D Fit: Selected actual values

Pt	Ax	Ay	Az	Weight
1	36.0665	-17.9591	0.1671	2
2	34.1426	-15.9770	0.1091	3
3	34.1269	-17.9305	0.1212	1
4	32.1568	-17.8579	0.1888	1
5	32.0695	-15.8994	0.1404	1

Figure 9-15

Execute — Execute the 3D best fit with the selected values. To do this, **at least four different points** must be selected.

The result of the best fit is displayed on the screen:

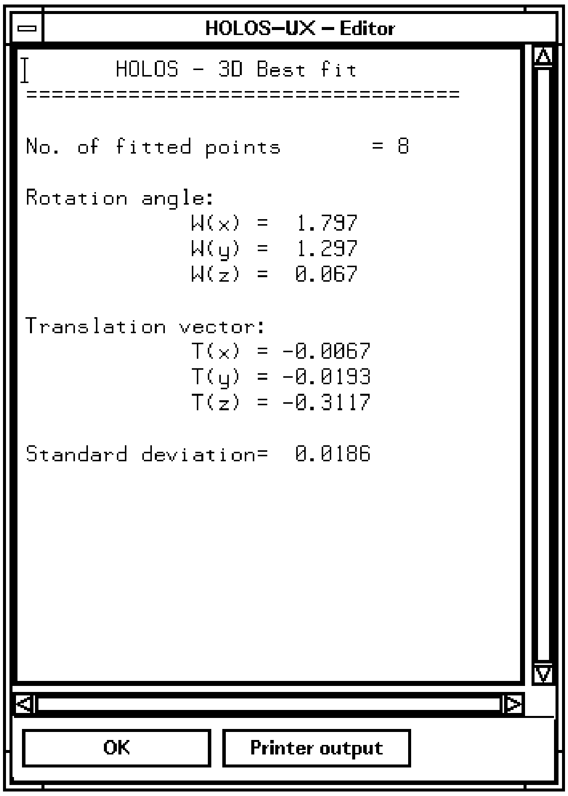


Figure 9-16

Confirm the result with “Ok”.

A query appears, asking whether the result of the 3D best fit is to be transferred to the UMESS measuring software:

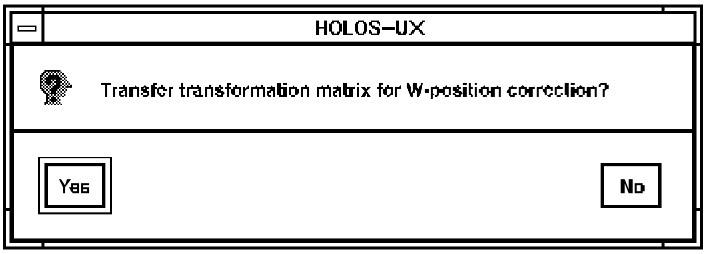


Figure 9-17

To do this, click on <YES>, in order to start the transfer.
If you do not wish to transfer the transformation matrix, click on <NO>.

After transfer of the transformation matrix to the UMESS measuring software, the current workpiece position system is corrected accordingly.

Note

It should be noted that this correction is only temporary.
You can use the functions for storing the W-position in UMESS and/or CADLINK to permanently store the new workpiece position system.

9.4 Display measuring record

In the evaluation of actual data a measuring record will be created. Depending on the setting in the parameter function <Measuring Record - Output> this will be output on the screen, the printer or to a file. If you have set up for the output to go to the screen, the record will be output via the function <Measuring record> described here.

> **NOTE:**
>
> *It is always the record of the actual data which you last evaluated that is displayed. A selection is not possible.*

Record layout

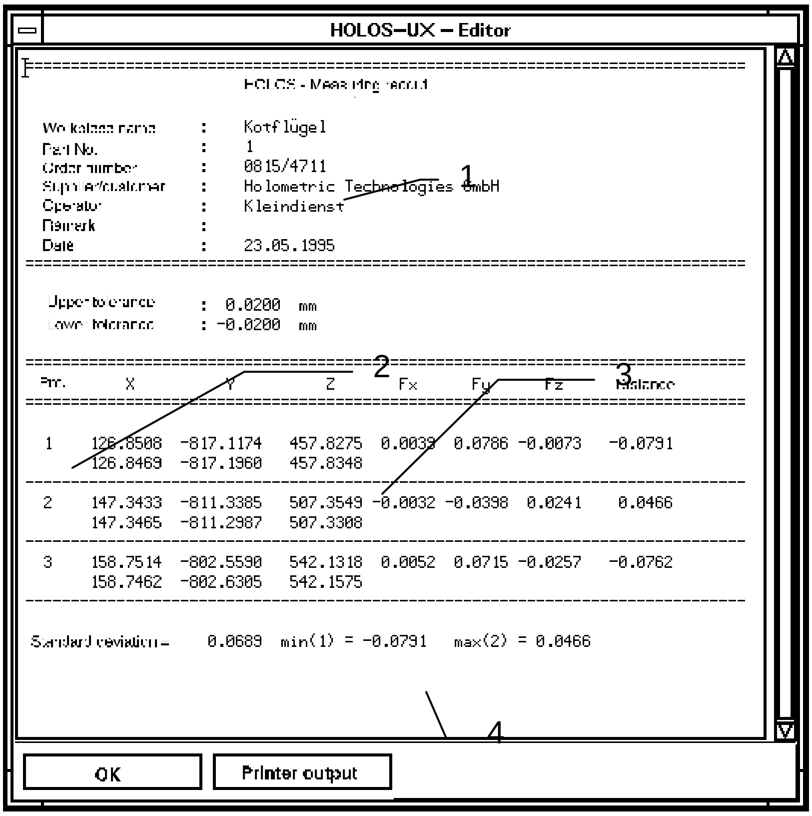


Figure 9-18

(1) Create the record head using the parameter function <Record head>.

(2) The first line contains point number, coordinates of the actual points, deviation vector in Cartesian coordinates and distance of the actual point to the nominal point. The sign of the distance relates to the normal direction of the surface:
positive sign = too much material,
negative sign = too little material.

(3) The second line contains the associated surface and the nominal point on the surface. The nominal point derives from the perpendicular projection of the actual point on the surface.

(4) At the end of the measuring record there is the standard deviation together with the greatest and smallest deviations.

Operation

First of all, with parameter function <Measuring Record - Output> select "Output to terminal".

Then evaluate the desired actual data using one of the evaluation functions.

Invoke the function <Measuring record>.

The record of the last evaluation will be overlayed. From this point on you can also output it to the printer.

9.5 Distance calculation

Select the <Distance> function in the <Evaluation> menu.

The selection window for the different distance calculations is displayed:

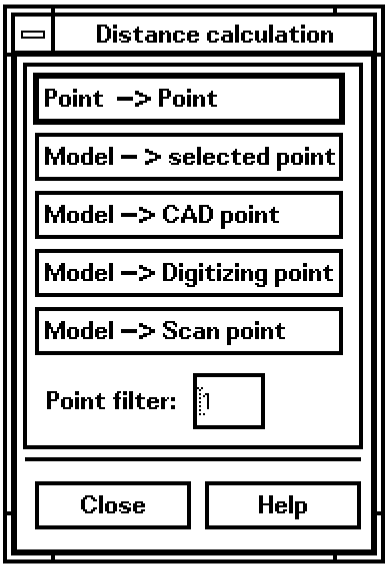


Figure 9-19

Point -> point

Distances between points are calculated.
All points that can be displayed in HOLOS-UX or points on the workpiece surface can be selected for this purpose.

Click on the function <Point -> point>

Click on the first point and then on the second.

The distance between the two points is calculated and then displayed on the screen.

Model -> selected point

The distance between a selected point and the workpiece surface is calculated.

Click on the function <Model -> selected point>.

Click on a point.

The distance between the point and the workpiece surface is calculated and displayed on the screen.

The results of the distance calculation are output in the measuring record.

Model -> CAD point

The distance between the imported CAD points and the workpiece surface is calculated.
If you do not wish to use all the points for the calculation, enter a value in the point filter input field.

Click on the function <Model -> CAD point>.

The distance between the CAD points and the workpiece surface is calculated and displayed on the screen.

The results of the distance calculation is output in the measuring record.

Model -> digitizing point

The distance between the digitizing point and the workpiece surface is calculated. If you do not wish to use all the points for the calculation, enter a value in the point filter input field.

Click on the function <Model -> digitizing point>.

The distance between the digitizing points and the workpiece surface is calculated and displayed on the screen.

The results of the distance calculation are output in the measuring record.

Evaluation of measuring runs

Model -> scan point

The distance between the points of scanning lines and the workpiece surface is calculated.
If you do not wish to use all the points for the calculation, enter a value in the point filter input field.

Click on the function <Model -> scan point>.

The distance between the points of the scanning lines and the workpiece surface is calculated and displayed on the screen.

The results of the distance calculation are output in the measuring record.

Point filter

If not all points are to be taken into consideration for distance calculation with CAD, digitizing or scan points, define a filter value in this field.

A value n means that only each n-th point is evaluated. In the case of scanning points the filter relates to the points of a scanning line.

10 Macro Programming

This chapter deals with the programming and management of macro sequences.

Basic principles

Until now you could define various actions in HOLOS-UX. For example:

- Generation of measuring runs
- Carrying out a 3D fit with measured data
- Evaluation of measured data
- Outputting graphical and numerical measuring records etc.

Macros can be run directly from the HOLOS-UX user interface.

In connection with the UMESS-UNIX measuring software HOLOS macros can accepted by the CNC programming in CNC runs and started directly from a CNC run.

The <Macro> function in the menu bar is divided into the following sub-functions:

- Macro recording
- Macro sequence
- Display macro
- Delete macro

10.1 Programming macros

In macro programming, certain specified actions, which you, as you did up to now, define interactively graphically via the HOLOS user interface, are combined together in macro runs.

In macro programming, however, not all actions are recorded, but only those which are relevant to the execution and the documentation of a measuring run.
In particular, these are:

- Starting measuring runs
- Carrying out a 3D fit
- Carrying out evaluations
- Outputting measuring records to a printer or record file
- Outputting graphical measuring records to a plotter or as a graphics dump
- Deletion of graphic content

You can program new macros or extend already existing macros. The facility for macro editing (changing, correcting, inserting and deleting programmed functions) is not contained in this version.

Macro programming is carried out using the functions in the <Macro recording> submenu:

- Program macro
- Program and run macro
- Extend macro
- Extend and run macro
- End macro recording

The <Program macro> and <Program and run macro> or <Extend macro> and <Extend and run macro> functions differ in that measuring runs, started during macro recording, are not sent to the measuring software, but are only accepted in the macro run.

Be aware, principally, that all parameters relevant to the execution of the function in question must be defined **before** a function is programmed, since they are stored with the function in question.

Which parameters are to be stored (i.e. the parameters which you must define) are documented with the particular function in this chapter.

If you have activated a function for macro programming, the macro function bar which you use for programming various functions will be displayed above the status line:

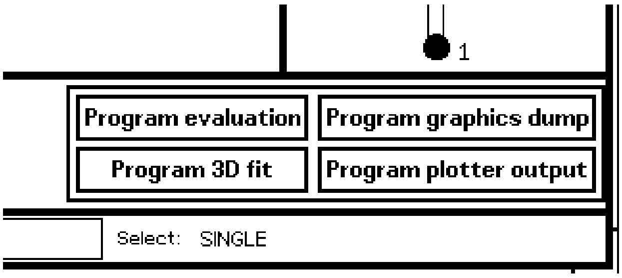


Figure 10-1

In addition, a message that you have switched on the macro programming is displayed:

Figure 10-2

So long as both these elements are visible in the user interface, the recording of macro functions is activated.

After the end of macro recording, the two elements are no longer displayed.

NOTE:
Various functions can only be carried out when macro recording is deactivated (start macro run, program macro).

Macro programming

10.1.1 Programming a new macro

Programming a new macro is carried out using the <Program macro> or <Program and run macro> function.

> **NOTE:**
> ***If you carry out the programming at a workplace where no coordinate measuring device is connected: select mainly the <Program macro> function, since measuring runs cannot be sent to the UMESS measuring software.***

Click on the <Program macro> function.

A dialog window opens for the entry of a filename under which your macro is to be stored on the hard disk.

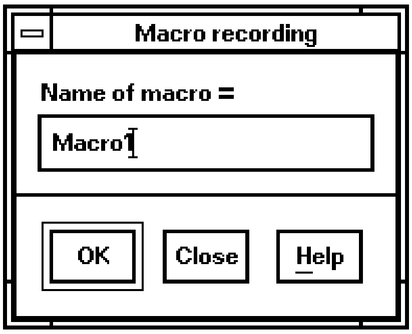


Figure 10-3

Enter the desired macro name in the text field supplied for this purpose and confirm the entry with <OK>.

If a macro file already exists with the entered name, you will be notified of this:

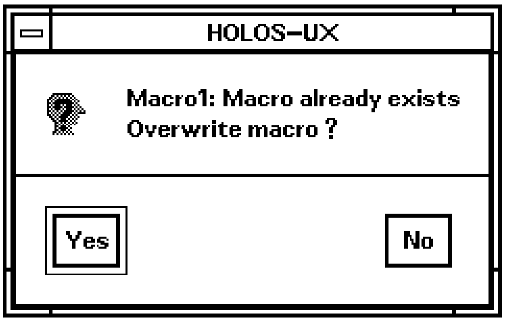


Figure 10-4

If you answer the query with <Yes>, the existing macro file will be overwritten. The contents of the old file is therefore deleted.

If you do not want to overwrite the existing macro file, cancel the action with <No>. You will then be prompted to enter a new filename.

After you have entered the filename for the macro to be programmed, you are prompted to enter a comment:

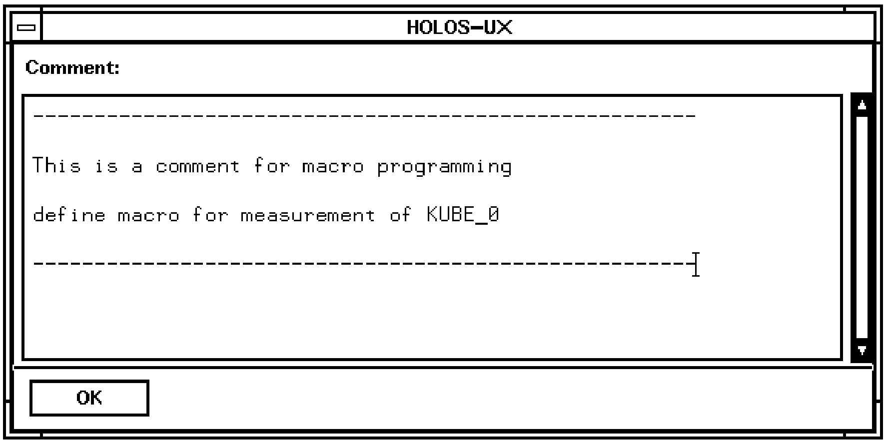


Figure 10-5

Enter the desired text and confirm with <OK>.

Comments are stored together with the programmed macro data and form the documentation of a macro. Any length of text can be entered as a comment.

The name of the macro does not need to be documented in the comment, since this is automatically inserted, together with the date and time of creation, when the macro file is output.

If you do not wish to enter a comment for your macro run, confirm the comment entry with <OK> with an empty comment field.

HOLOS-UX is now ready to record a macro. All actions relevant to the processing and documentation of a measuring run will be accepted in the macro.

10.1.2 Programming measuring runs

The programming of measuring runs is carried out by starting the appropriate measuring run.

Proceed as follows:

1. Define a measuring run: define measuring run ...
2. Store the measuring run (if it is not stored automatically)
3. Start the measuring run by selecting the appropriate measuring run or by clicking on the <Start measuring run> function in the <Define measuring run> submenu.

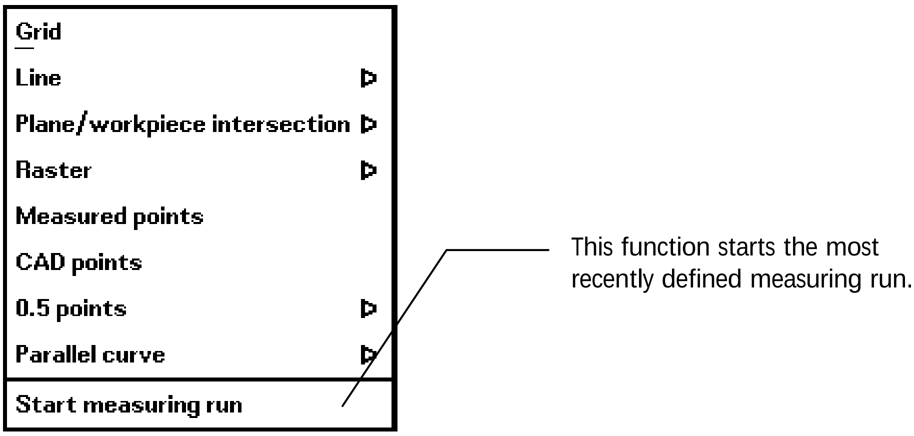


Figure 10-6

If you have started the macro recording with the <Program and run macro> function, the measuring run will be recorded and processed immediately.

10.1.3 Measuring run parameters

The values defined in the dialog page for the measuring run parameters are accepted for each programmed measuring run. These parameters **must** therefore be defined **before** the start of a measuring run.

> ***NOTE***:
> ***The definition of clearance planes for automatic detour generation cannot take place during the macro programming via the dialog page for the measuring run parameters.***

HOLOS-UX has been expanded by another function for this purpose.

If you define clearance planes using this dialog page, only one position before and after a measuring run is preset in the clearance plane in question.

If you want to work without clearance planes, you can activate the <No clearance planes> switch in the measuring run parameters dialog page.

🕮 see Chap. 12.4

10.1.4 Clearance planes

You can define clearance planes graphically interactively when macro programming. After clicking on the functions for recording a macro, the clearance planes defined for a workpiece are therefore displayed graphically on the screen.

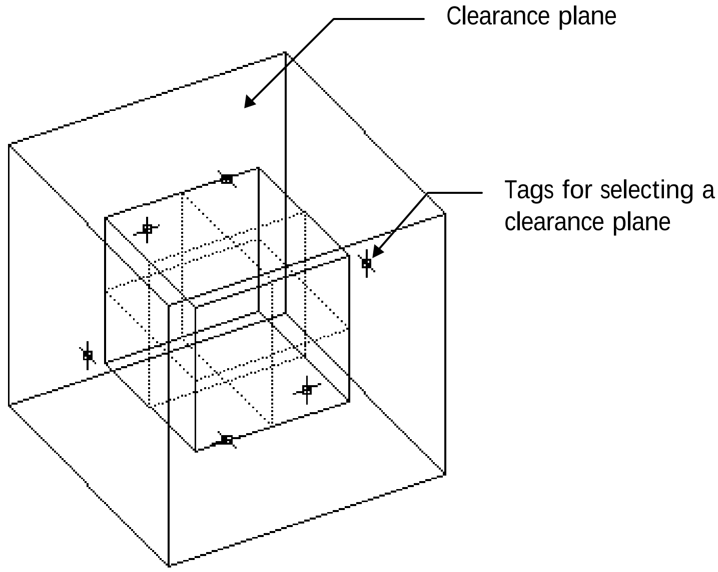


Figure 10-7

Select a clearance plane by clicking on its tag.

The currently active clearance plane is displayed in green, and the remaining clearance planes are red.

NOTE:

If you are working with these clearance planes during macro programming, the detours from one measuring run to the next are automatically generated by HOLOS-UX via the clearance planes. Ensure that the appropriate clearance plane is defined for each measuring run.

If you have not defined a valid clearance plane for the automatic detour generation (e.g. if you define a clearance plane manually via the dialog page for the measuring run parameters), HOLOS will advise you of this:

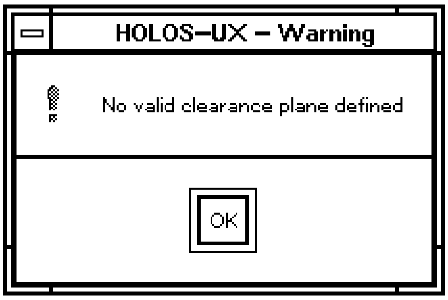


Figure 10-8

The definition of clearance planes themselves is done via a dialog page in the menu for the parameters (<Clearance planes> function).

see Chap. 12.4

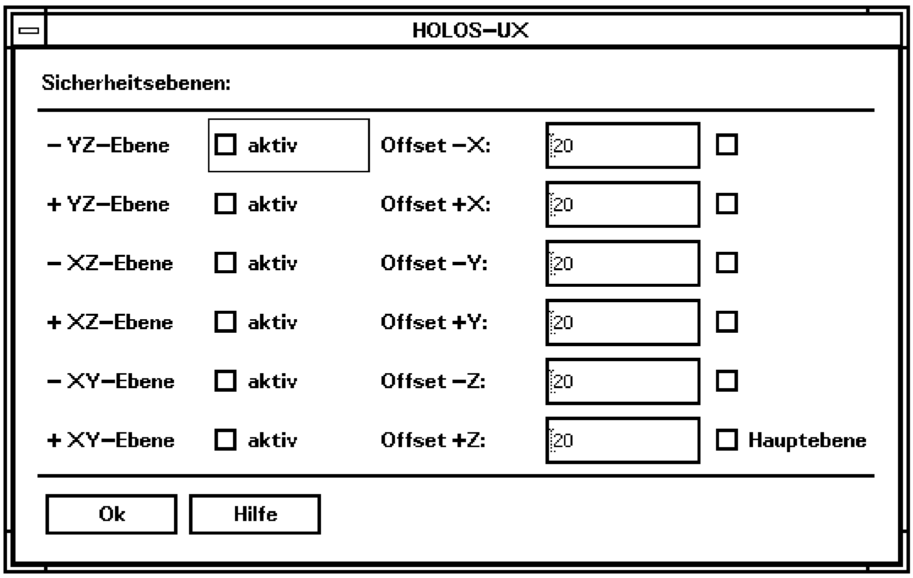


Figure 10-9

Offset

The value for the offset of the clearance planes defines the distance of the respective clearance planes to the extreme values of the workpiece surface

Activating/deactivating clearance planes

If you wish to prevent the unintentional selection of a clearance plane which cannot be achieved in a measuring run (e.g. the clamping surface of a workpiece), switch this clearance plane off.

The above details have the following meaning:

-YZ-plane	YZ-plane in the direction of the neg. X-axis	(left)
+YZ-plane	YZ-plane in the direction of the pos. X-axis	(right)
-XZ-plane	XZ-plane in the direction of the neg. Y-axis	(front)
+XZ-plane	XZ-plane in the direction of the pos. Y-axis	(back)
-XY-plane	XY-plane in the direction of the neg. Z-axis	(down)
+XY-plane	XY-plane in the direction of the pos. Z-axis	(up)

You switch a clearance plane of by clicking on the <Active> switch. The switch concerned then assumes the <Not active> value.

NOTE:
An inactive clearance plane will no longer be displayed on the screen and can thus no longer be selected. It will then no longer referenced in the generation of detours.

You can switch off the display of clearance planes in the dialog page for graphic display in the right-hand function bar of the screen.
🕮 see Chap. 3.1

Principal plane

A principal plane always defines that clearance plane via which the detour will be generated, if parallel clearance planes are defined for two successive clearance planes.

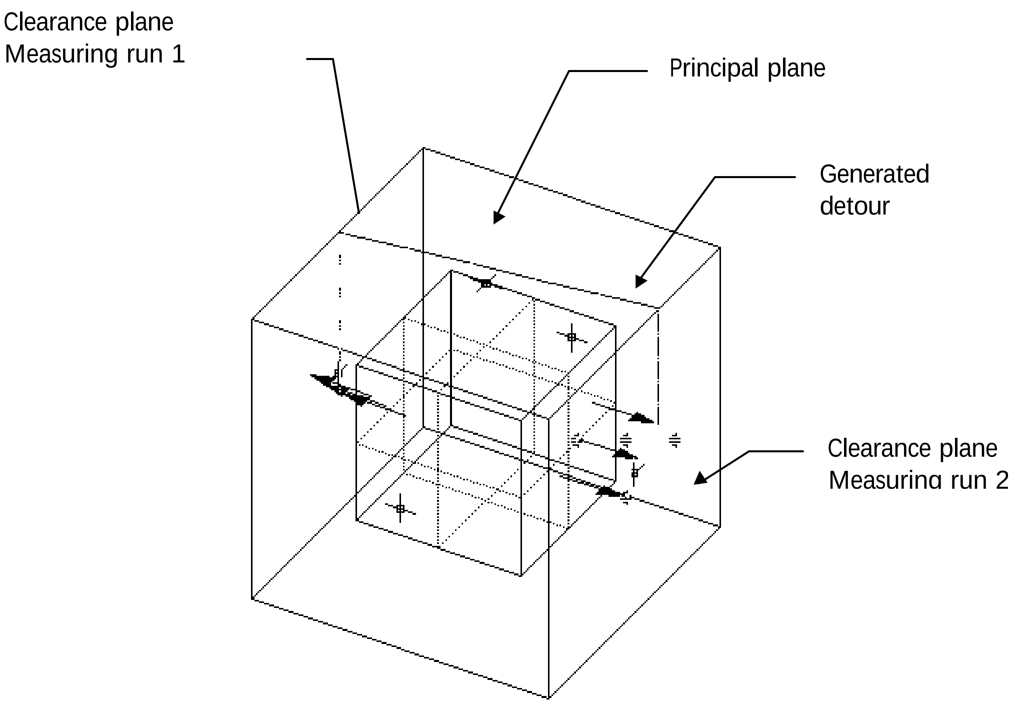


Figure 10-10

You define a principal plane by activating the switch behind the appropriate clearance plane.

The detour between two parallel clearance planes is **always** generated via the principal plane.

Switch off programmed detours

Detours generated by HOLOS during the macro programming can be switched off during a macro run.

To do this, call up the <Macro run> function in the dialog page for the macro parameters in the <Parameters> menu before the start of a macro run, and switch off the execution of the programmed detours.

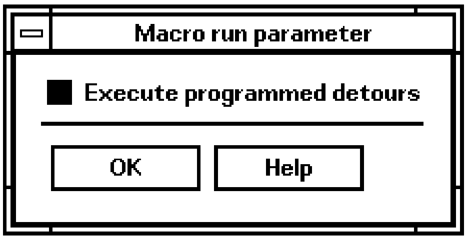


Figure 10-11

The following procedure is recommended for the programming of measuring runs with automatic detour generation:

1. Generate measuring run 1
2. Define measuring run parameters
3. Select clearance plane
4. Define principal plane
5. Start measuring run 1

6. Generate measuring run 2
7. Define measuring run parameters for measuring run 2
8. Define clearance plane for measuring run 2
9. Start measuring run 2

10. Generate measuring run 3
11. Define measuring run parameters for measuring run 3
12. Define clearance plane for measuring run 3
13. Start measuring run 3

etc....

Should the parameters (measuring run parameters, clearance plane) between successive measuring runs not change, the corresponding step can be dropped.

10.1.5 Programming a 3D fit

The programming of a 3D fit during the macro recording differs from the previous procedure.

A programmed 3D fit can only be carried out with data created during a macro run. The execution of a fit via the <Evaluation> menu is therefore **not** recorded during the macro programming.

Operation

For programming functions which are not activated in the usual manner, a function bar appears above the status line after activation of macro programming:

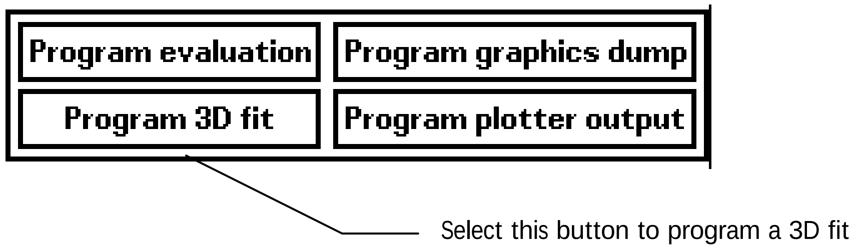


Figure 10-12

The programming of a 3D fit during macro recording can only be done using the <Program 3D fit> function in this field.

Data for the fit

The actual values created after a programmed measurement are stored in an internal buffer during the macro run. If you now program a 3D fit, all previously measured data will be used for the 3D fit in the macro run to calculate a correction matrix.

In the macro run, the correction matrix is passed immediately to the UMESS measuring software and alters the previously defined coordinate system.

For this it is necessary to program DAW 1713 (create workpiece co-ordinate system from control co-ordinate system) in the UMESS-CNC run after the 3D fit.

The new W position system is not, however, stored in UMESS and is only active during the continuous UMESS session. If you want to store the new W position system, you must either program it in the CNC run or carry it out manually.

> ***NOTE:***
> ***A further fit with the same data cannot be carried out.***

> ***NOTE:***
> ***Be aware here also, that the parameters for the fit must be defined <u>before</u> programming the fit.***

10.1.6 Programming an evaluation

Evaluations during a macro run can be documented in various ways.

The evaluation of a measuring run mainly rakes place directly after the carrying out of the measurement output in question. That is to say, the deviations are determined, displayed on the screen with the specified parameters and, if defined, the measuring record will be output to a printer or a record file.

If you want to evaluate and document several measuring runs individually, the evaluation is not directly programmed in the macro programming.

Define the output device for the measuring record for the measuring run in question:

- no output
- output to printer
- output to record file

The measuring record will then be output to the defined unit during the evaluation in the macro run.

For graphic measuring run output program the graphics output using the particular button of the macro programming functions:

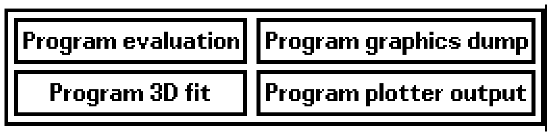


Figure 10-13

The programming of the graphics output should take place immediately after the programming of the measuring run.

The graphics output takes place in the view which is brought up on the screen at the time when the graphic output is programmed.

Then program a “Clear graphics” by pressing the appropriate button in the graphics function bar on the right-hand edge of the screen.

Figure 10-14

The contents of the graphics display created in the evaluation is thereupon deleted, and you have a “clean” screen for the next evaluation.

Using the macro function <Program evaluation> you can program a total evaluation.

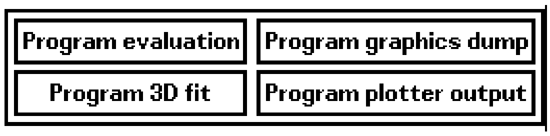


Figure 10-15

Programmed evaluation data

The actual values created after a programmed measurement are stored in an internal buffer during the macro run. If you program an evaluation now, all previously measured data is evaluated collectively in the macro run, output to the measuring record and displayed graphically.

Click on the <Program evaluation> function.

A dialog window appears, in which you define how the measuring record is to be output:

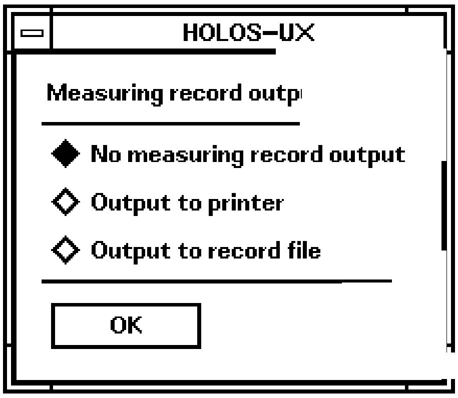


Figure 10-16

No measuring record output

If you activate this switch, no output of the measuring record takes place during the macro run.

Output to printer

If you activate this switch, output of the measuring record to the specified printer takes place during the macro run.

Output to record file

If you activate this switch, the measuring record in the macro run is stored in a record file. In the macro run, it is not possible to define the name of a record file yourself. The name of a record file is therefore composed of the name of the relevant macro and a serial number.

Select the desired option and confirm with <OK>.

To output the graphic display, proceed as described above by programming the relevant output function immediately after programming the evaluation. Here also, the output of the graphic display takes place in the view which was brought up on screen at the time of programming.

After carrying out a programmed evaluation, the internal data buffer is cleared, and therefore a total evaluation can only be programmed once.

10.1.7 Programming graphic outputs

Two types of graphic measuring records can be created in HOLOS-UX:

- Graphics dump (PCL format)

or

- Plotter output (HPGL format).

Program the output of a graphic measuring record either, as was previously usual, by clicking on the appropriate function <Graphics dump> or <Plotter> in the graphics menu bar on the right-hand edge of the screen, or via the macro function bar:

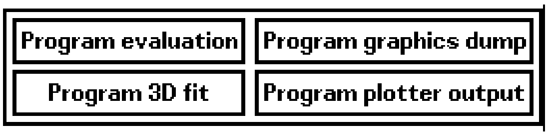


Figure 10-17

If the programming is done via the macro function bar, the output will only be programmed, but not carried out.

In the other case, the graphics output will be recorded for the macro run, and carried out immediately.

Programming a graphics dump

NOTE:
Set the required view before programming the graphics output (zoom, rotation etc.), since these settings will be stored in the macro file together with the output.

Click on the <Program graphics dump> function.

A window opens for defining the parameters for the output:

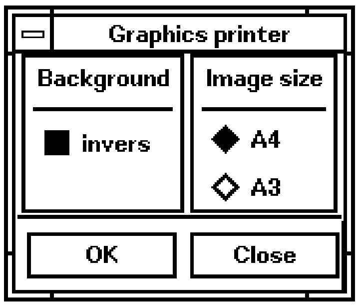


Figure 10-18

Select the required values and confirm with <OK>.

Frames are not normally created with the record data in the output of a graphics dump during the macro run.

If you also want to output this frame during a macro run, you must carry out the output of the frame before programming the graphics output (<Screen> function in the graphics functions).

Programming a plotter output

Click on the <Program plotter output> function with the left mouse button.

A window for defining the output parameters opens:

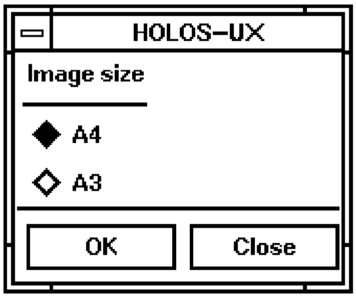


Figure 10-19

Select the required values and confirm with <OK>.

In the plotter output, the frame for the graphic measuring record is created automatically, and must not be explicitly displayed.

10.1.8 End macro recording

After programming or recording all the functions for carrying out a specific measuring run, you must end macro recording.

To do this, click on the <End macro recording> function in the <Macro recording> menu.

After macro recording is ended, the macro function bar and the "Macro programming active" message in the lower bar are removed.

NOTE:
To start a macro or to program another macro, macro recording must in any case be finished, since otherwise the appropriate function cannot be carried out.

10.1.9 Extending a macro

Using the functions for extending a macro, you can extend an existing macro after macro recording is finished.

Click on the function for extending a macro.

A list of all macros defined for the model or for a group appears.

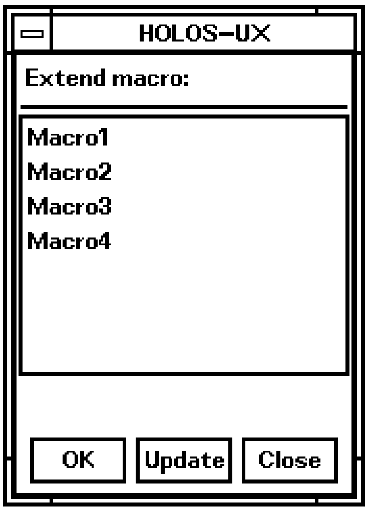


Figure 10-20

Select the appropriate macro. After confirming with <OK> you can start extending the macro.

10.1.10 Parameters in macro programming

In programming macro functions the parameters which are necessary for carrying out a specific function are stored together with each function. These parameters **must** therefore be defined **before** the function in question is programmed.

The following parameters are stored with the respective functions:

Measuring run

The following parameters are stored with a programmed measuring run:

- Output device for measuring records
- Scanning path before probing
- Scanning path after probing
- Correction value for offset correction
- Clearance plane
- Height of clearance plane
- Clearance plane after each plane
- Probe
- Upper tolerance value
- Lower tolerance value

Evaluation

The following parameters are stored with a programmed evaluation:

- Parameter record head
  Job number
  Customer
  Checker
  Part No.
  Workpiece name
  Comments

- Parameters for the graphic display
  Camera setting (zoom, rotation etc.)
  Rendering (On/Off) **only with HOLOS-UX on HP Series 700**
  Display of deviations
  Vectorial
  Marking
  Icon
  Numerical
  Magnification factor

- Lower tolerance value

- Upper tolerance value

3D fit

The following parameters are stored with a programmed 3D fit:

- Degree of freedom for the 3D fit
  Translation in X
  Translation in Y
  Translation in Z
  Rotation around X
  Rotation around Y
  Rotation around Z

Graphics output

The following parameters are stored with a programmed graphics output:

- Output type (graphics dump/plotter output)
- Display frames (for graphics dump)
- Paper size (A4/A3)
- inverse display (for graphics dump)
- Parameter record head
  Job number
  Customer
  Checker
  Part No.
  Workpiece name
  Comments
- Parameters for the graphic display
  Camera setting (zoom, rotation etc.)
  Rendering (On/Off) **only with HOLOS-UX on HP Series 700**
  Display of deviations
  Vectorial
  Marking
  Icon
  Numerical
  Magnification factor
- Lower tolerance value

- Upper tolerance value

10.2 Starting macros

Select the <Start macro> function in the <Macro run> menu.

A list of all available macros for the model or a group appears:

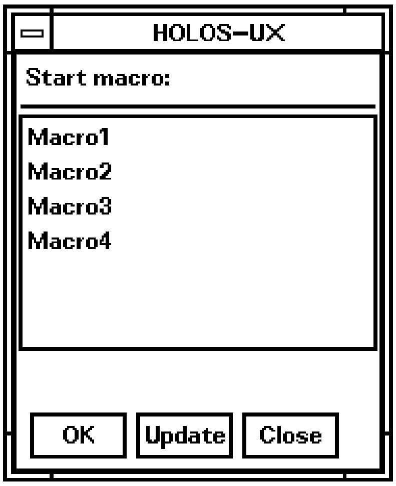


Figure 10-21

Select the macro and start the appropriate macro run with <OK>.

During a macro run the HOLOS-UX user interface is locked. No further actions can be carried out until the macro has finished executing.

10.3 Programming macros in UMESS CNC runs

HOLOS macros can be integrated into UMESS-UX software CNC runs. Prerequisite is a UMESS version from
UMESS 7.70 on.

To program a macro in a UMESS CNC run the following steps must be carried out:

1. Start the PROG mode for the UMESS CNC programming.
   see user manual for CNC programming in UMESS
2. Program your CNC run as usual.
3. Program a HOLOS macro:
4. In PROG mode call up the CADLINK option (DAW 2000).
5. After the CADLINK screen page appears, activate the <Program macro (CNC PROG->CADLINK)>function in the <Macro run> menu in the HOLOS user interface.

A list of all available macro runs for the appropriate model or for a group appears:

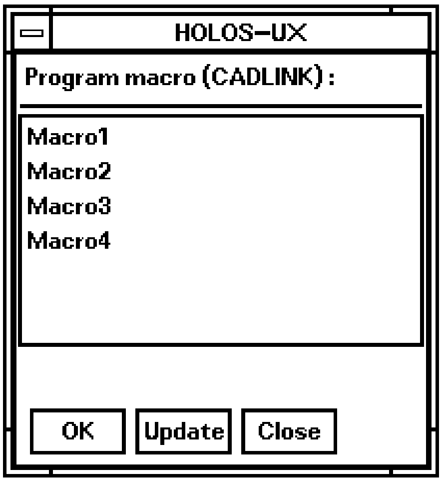


Figure 10-22

Select the appropriate macro and confirm with <OK>.

The appropriate macro run is passed to the UMESS option CADLINK and is programmed for the CNC run.

Exit CADLINK (<back>) and continue in the CNC programming.

If, during CNC programming in UMESS, you want not only to program the macro in question, but also to execute it, you must carry out the <Start macro> function in the <Macro run> menu (see above).

The appropriate macro will then be programmed for the CNC run in UMESS and processed immediately.

When programming a macro in a UMESS CNC run, in addition to the macro name, the name of the corresponding model and the name of a possibly active group will also be stored.

In this way you can program macros of various groups of a model and macros of various models in a UMESS CNC run.

If you start a HOLOS macro in a CNC run, HOLOS automatically loads the appropriate model and a possibly defined group. HOLOS must consequently already be started when you start a UMESS CNC run.

10.4 Macro runs with UMESS 300 / UMESS 1000

The CNC programming of HOLOS macros in the UMESS measuring software is only possible with UMESS-UX.

CNC programming of HOLOS macros is not possible with the other Carl Zeiss measuring software packages. Macros can, however, be started and executed from the HOLOS-UX user interface.

10.5 Display macro run

You use this function to display the contents of programmed macros.

Click on the <Display macro> function in the <Macro> menu.

A list of all available macro runs for the appropriate model or for a group appears:

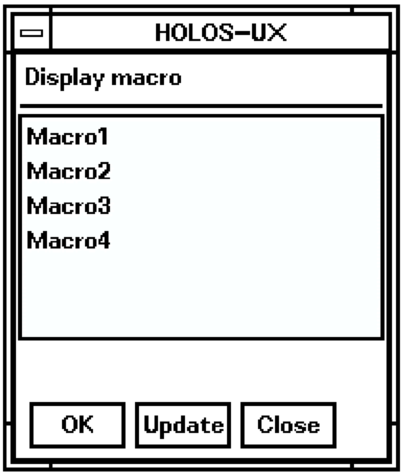


Figure 10-23

Select the macro and confirm with <OK>.

The steps to be executed in the corresponding macro run are displayed in a screen window.

Macro programming

Example:

```
Macro: Macro4
==============================

Macro created on: 08.08.96 17:54:15
----------------------------------------------------
Example macro programming

----------------------------------------------------

001: Measure:
              P_0_KUBUS_0_7.mess
              No measuring record output
----------------------------------------------------------------------------
002: Record output:
              Plotter A4
----------------------------------------------------------------------------
003: Graphics clear
----------------------------------------------------------------------------
004: Travel to clearance plane:
              SPOS: X=  29.0607, Y= -21.0000, Z=  21.0000
              Last clearance plane: XY plane in Z MAX
----------------------------------------------------------------------------
005: Measure:
              P_0_KUBUS_0_8.mess
              No measuring record output
----------------------------------------------------------------------------
006: Record output:
              Plotter A4
----------------------------------------------------------------------------
007: Graphics clear
----------------------------------------------------------------------------
008: Travel to clearance plane:
              SPOS: X= -21.0000, Y=  27.2094, Z=  21.0000
              Last clearance plane: YZ plane in X MIN
----------------------------------------------------------------------------
009: Measure:
              P_0_KUBUS_0_9.mess
              No measuring record output
----------------------------------------------------------------------------
010: Record output:
              Plotter A4
----------------------------------------------------------------------------
011: Graphics clear
----------------------------------------------------------------------------
012: Evaluation of measured files
              Measuring record output to record file
----------------------------------------------------------------------------
```

here you will find information about the macro name and date of creation

the comment entered by you is in this location

Measurement of a measuring run, no output of the measuring record in the evaluation

Output of graphics record to plotter

Graphics clear

Intermediate position on the clearance plane

Evaluation of all previously measured runs:
P_KUBUS_17.mess
P_KUBUS_18.mess
P_KUBUS_19.mess

To output a macro to a printer, click on the <Printer output> function at the lower edge of the window.

Close the window with <OK>.

If a macro is displayed which is still active (programming not yet closed), you will get an appropriate notice in the display window:

```
-----------------------------------------------
Macro4: Macro recording is still active
-----------------------------------------------
```

10.6 Delete macro run

You use this function to delete programmed macros.

Click on the <Delete macro> function in the <Macro> menu.

A list of all macro runs available for the appropriate model or for a group appears:

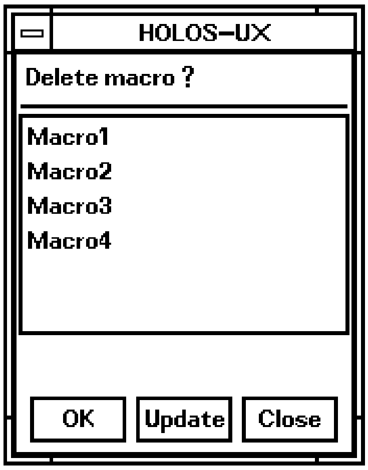


Figure 10-24

Select the macro and confirm with <OK>.

A safety query as to whether the macro is really to be deleted appears:

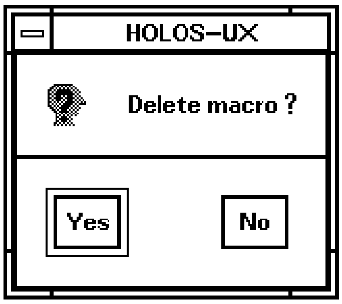


Figure 10-25

Confirm the query with <YES> to delete the macro file.

If you answer <NO>, the macro file will not be deleted.

11 Regular geometry

This program can be used to generate, measure, display and evaluate elements of regular geometry.

The measured values of any measurements and/or probings can be used to evaluate elements.

Prerequisites:

The additional "Digitizing / CAD functions" program options must be available.
It is a prerequisite for automatic measurement of regular geometries that the elements are described as freeform geometries in HOLOS-UX.

The following elements can be described and measured:

- Slot
- Rectangular hole
- Circle
- Plane
- Sphere
- Cylinder
- Cone

There are a number of ways of describing regular geometries:

- Importing IGES data
- Generating elements as freeform geometries
- Generating elements from digitizing points during probing
- Regular geometry analysis

11.1 Importing IGES data

Regular geometries can be imported into HOLOS via the IGES interface. IGES supports the following elements:

- Circle
- Sphere
- Cylinder
- Cone

11.2 Generating elements as freeform geometries

Regular geometries can be generated as freeform geometries.

Select the CAD functions menu in the menu bar and click on thek-<Regular geometries> function.

A dialog window appears on the screen:

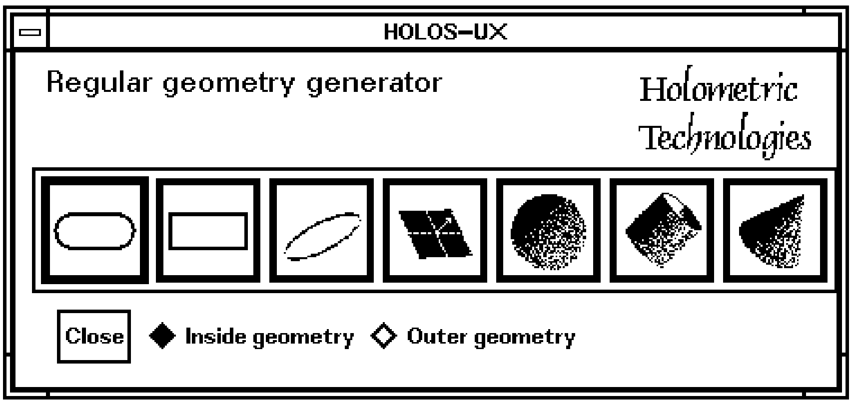


Figure 11-1

In order to generate an element, click on the corresponding icon with the left mouse button.

A dialog window appears for defining the parameters.

📖 The following sections describe the parameters for the individual elements.

11.2.1 Slot

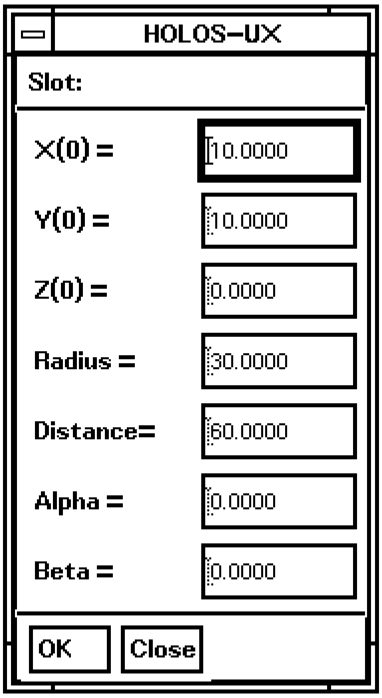


Figure 11-2

X(0), Y(0), Z(0)	A slot is an element which is made up of two semi-circles. Enter the center point co-ordinate of the first circle.
Radius	Enter the radius of the two semi-circles.
Distance	Enter the distance of the two semi-circles.
Alpha	The Alpha angle denotes the tilt angle around the Y/Z-plane. Enter a value for the tilt angle.
Beta	The Beta angle denotes the angle of rotation around the Z-axis. Enter a value for the rotation angle.

After clicking on <OK> the slot is calculated and displayed on the screen.

11.2.2 Rectangular hole

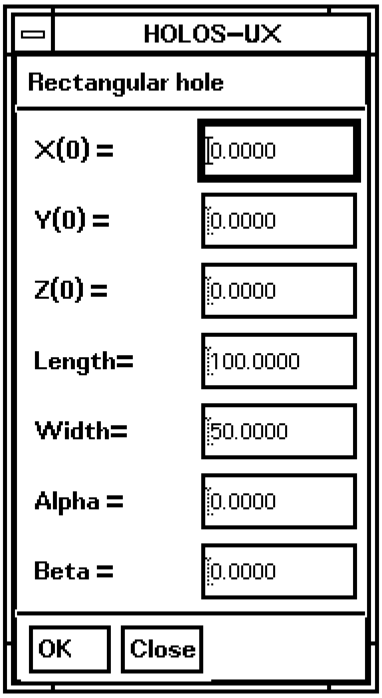


Figure 11-3

X(0), Y(0), Z(0)	Enter the co-ordinates of the center point for the rectangular hole.
Length	Enter a value for the length of the rectangular hole.
Width	Enter a value for the width of the rectangular hole.
Alpha	The Alpha angle denotes the tilt angle around the Y/Z-plane. Enter a value for the tilt angle.
Beta	The Beta angle denotes the angle of rotation around the Z-axis. Enter a value for the rotation angle.

After clicking on <OK> the rectangular hole is calculated and displayed on the screen.

11.2.3 Circle

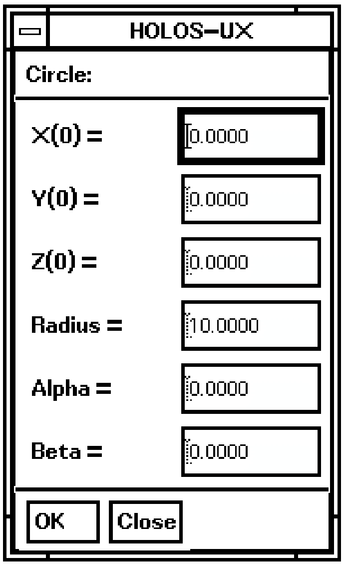


Figure 11-4

X(0), Y(0), Z(0)	Enter the co-ordinates of the circle’s center point.
Radius	Enter a value for the circle’s radius.
Alpha	The Alpha angle denotes the tilt angle around the Y/Z-plane. Enter a value for the tilt angle.
Beta	The Beta angle denotes the angle of rotation around the Z-axis. Enter a value for the rotation angle.

Select either the “Inner geometry” option, in order to generate an internal circle, or “Outer geometry” for an external circle.

After clicking on <OK> the circle is calculated and displayed on the screen.

11.2.4 Plane

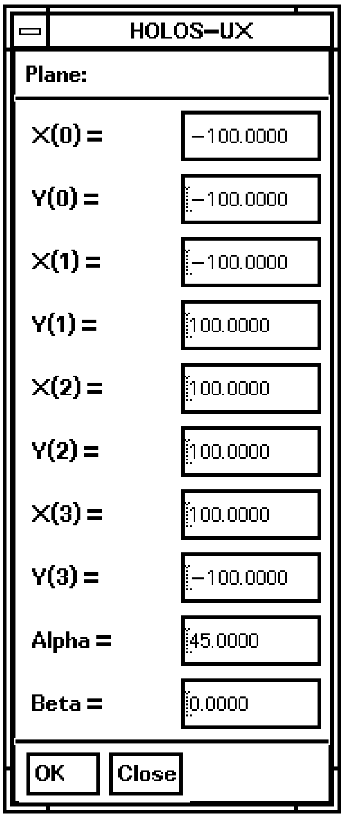


Figure 11-5

A plane is defined by four points in the X/Y-plane at the height Z = 0. In order to obtain a plane in another position, you can use the transformation functions (mirroring, rotation, translation).

X(0), Y(0):	Enter the co-ordinates of the first plane point
X(1), Y(1):	Enter the co-ordinates of the second plane point
X(2), Y(2):	Enter the co-ordinates of the third plane point
X(3), Y(3):	Enter the co-ordinates of the fourth plane point
Alpha	The Alpha angle denotes the tilt angle around the Y/Z-plane. Enter a value for the tilt angle.
Beta	The Beta angle denotes the angle of rotation around the Z-axis. Enter a value for the rotation angle.

After clicking on <OK> a plane is calculated and displayed on the screen.

11.2.5 Sphere

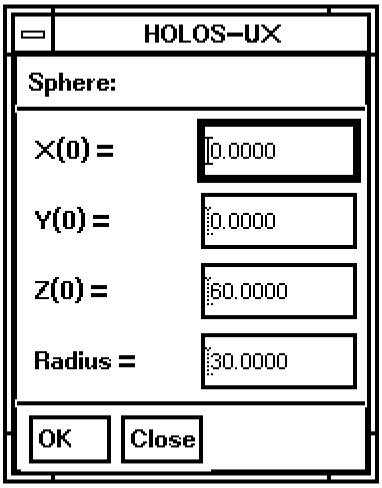


Figure 11-6

X(0), Y(0), Z(0)	Enter the co-ordinates of the sphere’s center point.
Radius	Enter a value for the sphere’s radius.

Select either the “Inner geometry” option, in order to generate an internal sphere, or “Outer geometry” for an outer sphere.

After clicking on <OK> a sphere is calculated and displayed on the screen.

11.2.6 Cylinder

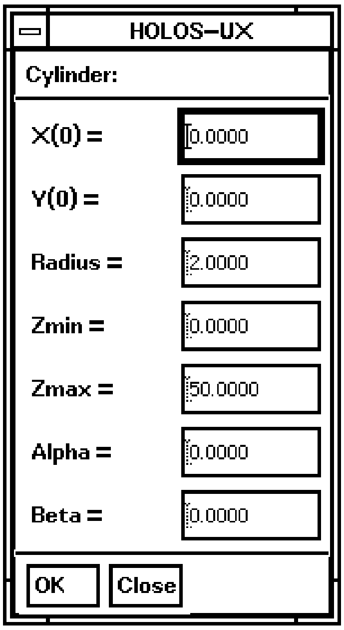


Figure 11-7

X(0), Y(0)	Enter the co-ordinates of the intersecting point of the cylinder axis with the X/Y plane.
Radius	Enter a value for the cylinder radius.
Zmin	Enter a value for the cylinder's lower position.
Zmax	Enter a value for the cylinder's upper position.
Alpha	The Alpha angle denotes the tilt angle around the Y/Z-plane. Enter a value for the tilt angle.
Beta	The Beta angle denotes the angle of rotation around the Z-axis. Enter a value for the rotation angle.

Select either the "Inner geometry" option, in order to generate an internal cylinder, or "Outer geometry" for an external cylinder.

After clicking on <OK> a cylinder is calculated and displayed on the screen.

11.2.7 Cone

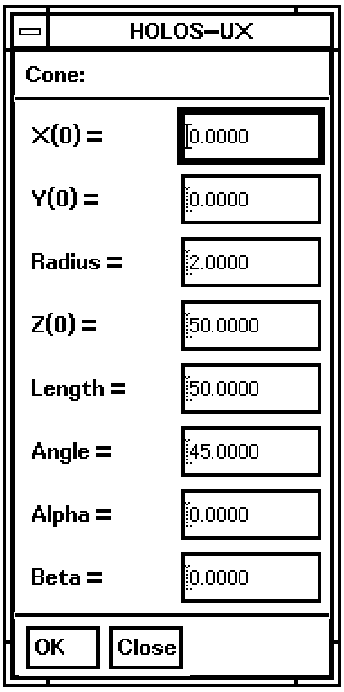


Figure 11-8

X(0), Y(0)	Enter the co-ordinates of the intersecting point of the cone axis with the X/Y-plane.
Radius	Enter a value for the cone radius.
Z(0)	Enter a value for the cone's lower position.
Length	Enter a value for the length of the cone.
Angle	Enter a value for the cone angle.
Alpha	The Alpha angle denotes the tilt angle around the Y/Z-plane. Enter a value for the tilt angle.
Beta	The Beta angle denotes the angle of rotation around the Z-axis. Enter a value for the rotation angle.

Select either the "Inner geometry" option, in order to generate an internal cone, or "Outer geometry" for an external cone.

After clicking on <OK> a cone is calculated and displayed on the screen.

11.3 Generating elements from digitized points during probing

Regular geometry elements can be directly generated by probing points on the workpiece (DIGIT POINT).

Generate regular geometry elements from manually probed points

Select the <Data> - <digitizing points>function in the "Digitization" menu.

The dialog window for managing digitizing points is displayed.

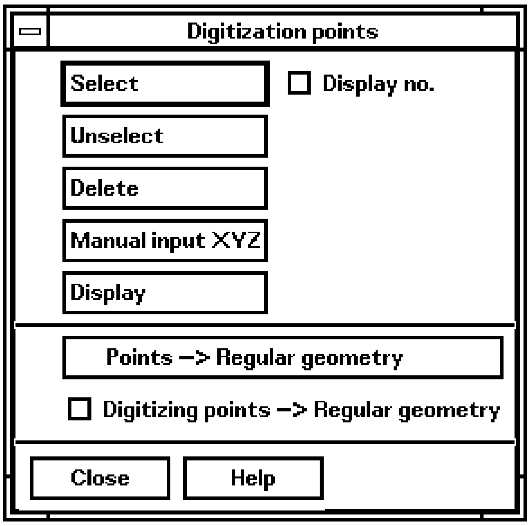


Figure 11-9

Select the <Digitizing points → regular geometry> option, so that digitizing points are automatically transformed into a regular geometry element as soon as they are transferred from CADLINK to HOLOS-UX. The elements are automatically identified.

Note that there is no automatic identification for slots or rectangular holes !

Generate regular geometry elements from selected points

If digitizing points already exist in HOLOS-UX, they can be selected and a regular geometry element generated from them.

Select the required digitizing points.

Then click on <Points → regular geometry>.

The dialog window for defining the required element appears on the screen.

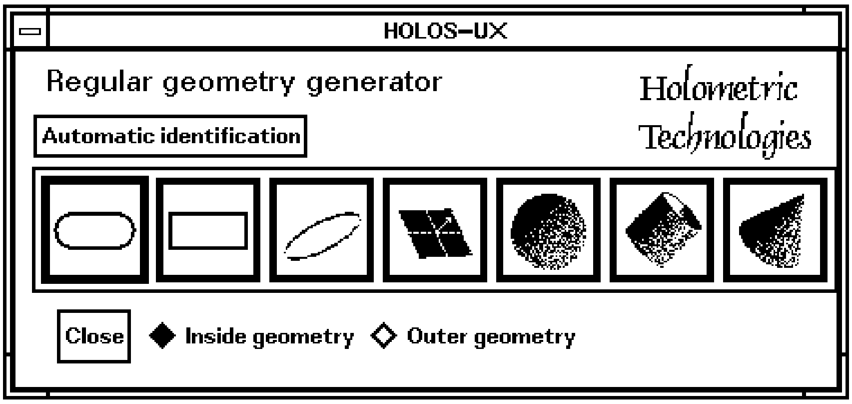


Figure 11-10

If HOLOS-UX is to automatically determine which element can be generated from the selected points, select the <Automatic identification> function.

If you wish to generate a particular element, click on the corresponding icon.

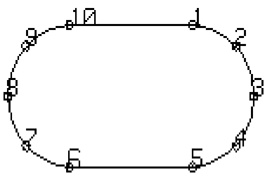
Select either the "Inner geometry" option or "External geometry", in order to generate the corresponding element for a circle, sphere, cylinder or cone.

11.3.1 Probing guidelines

In order to generate a regular geometry element from digitizing points, the following guidelines should be observed:

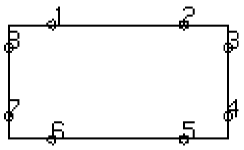
Slot

- Probe and/or select at least 6 points.
- The number of points must be divisible by two.
- The points must be distributed evenly over both semi-circles (e.g. 8 points: 4 points on semi-circle1, 4 points on semi-circle 2.)
- The points must be distributed in a logical sequence.



Rectangular hole

- Probe and/or select eight points.
- Two points must lie on each of the four straight sections.
- The points must be distributed in a logical sequence.



Circle

Probe and/or select at least 3 points.

Plane

Probe and/or select at least 3 points.

Sphere

Probe and/or select at least 4 points.

Cylinder

Probe and/or select at least 9 points.

Cone

Probe and/or select at least 9 points.

If only 3 points are probed and/or selected, a circle **and** a plane are always generated during automatic identification, as it is not possible to clearly define which element is to be generated.

11.4 Regular geometry analysis

This function allows you to investigate whether regular geometry elements are contained in free form geometries. .
The analysis identifies, generates and stores such elements.

Select one or more surface elements, in order to examine them for regular geometries.

Click on <Regular geometry analysis>.

The analysis is performed.

The result of the analysis is displayed in a text window. This provides you with information about the regular geometries found and generated. .

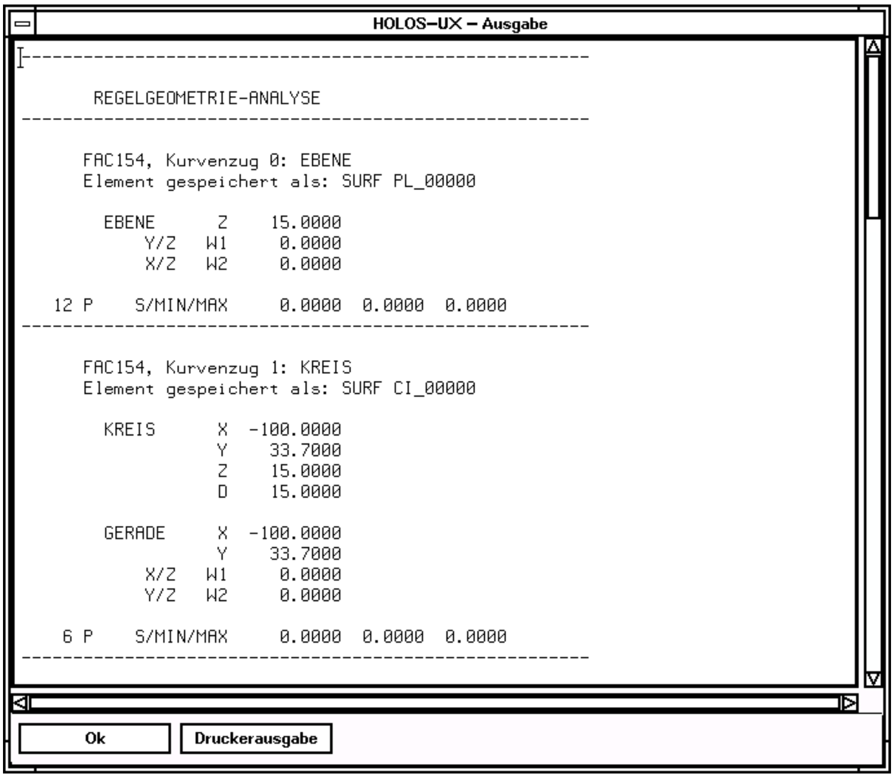


Figure 11-11

11.5 Measuring elements

Regular geometries can be measured either in manual mode or in CNC-mode.

11.5.1 Manual measurement

Probe points manually on the workpiece surface.

The measured values are displayed on the screen.

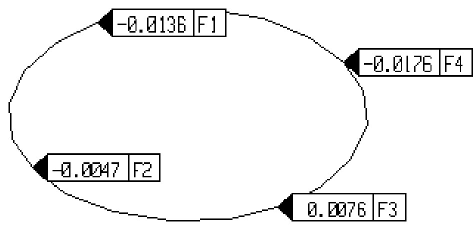


Figure 11-12

As direct evaluation is not possible in manual mode, you must first of all select the displayed measurement values for the evaluation:

In the <Evaluation> menu select the <Regular geometry> function, then <Evaluation with selected actual values>.

You are now in the mode for selecting actual values: “Select: POINT” is displayed in the status bar.

Select the actual values by clicking on the arrow point with the left mouse button or use the fence for selecting all actual values within a window.

After the first actual value has been selected, the dialog window opens for managing the selected points:

Regular geometry

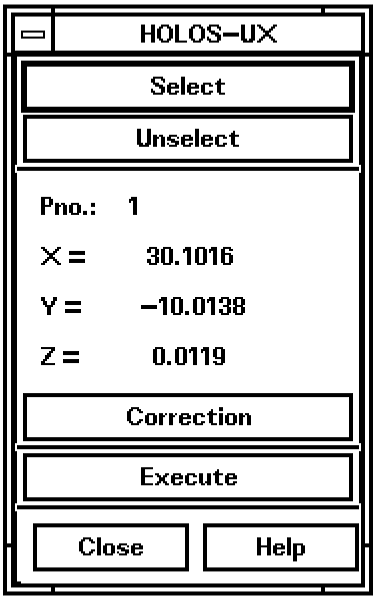


Figure 11-13

The co-ordinates of the selected points are displayed in the window.

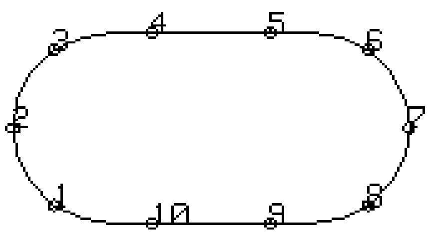
Select

Mode for selecting actual values.

The following guidelines apply for evaluating regular geometry elements:

Slot:

- 10 actual values must be selected for evaluation.
- The first 3 points must lie on the first semi-circle.
- The next 2 values must lie on the first straight section.
- The next 3 values must lie on the second semi-circle.
- The last two values must lie on the second straight section.
- The points must be distributed in a logical sequence.



Rectangular hole:
8 values must be selected for evaluation, of which 2 values must lie on each of the four straight sections. The points must be distributed in a logical sequence.

Circle:
At least 3 points must be selected for evaluation.

Plane:
At least 3 points must be selected for evaluation.

Sphere:
At least 4 points must be selected for evaluation.

Cylinder:
At least 9 points must be selected for evaluation.

Cone:
At least 9 points must be selected for evaluation.

Deselect — Cancels the selection of all currently selected actual values. **Note that you must “deselect” all actual values, before you evaluate a new element.** Selection of the previously selected values is not canceled automatically.

Correction — Cancels the selection of the last selected actual value.

Execute — Starts evaluation of the selected points as a regular geometry element.

Start evaluation when all required points have been selected.

The regular geometry selection panel is displayed:

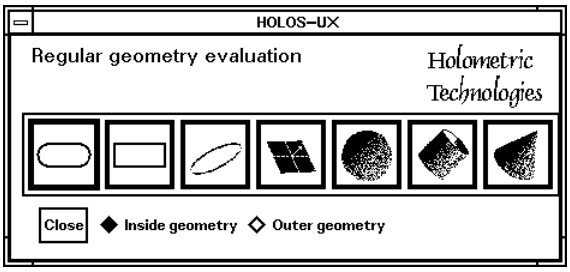


Figure 11-14

Regular geometry

Click on the icon of the element which you wish to evaluate.

The element is evaluated. The result is both displayed on the screen and output in the measuring record:

Result displayed for a circle

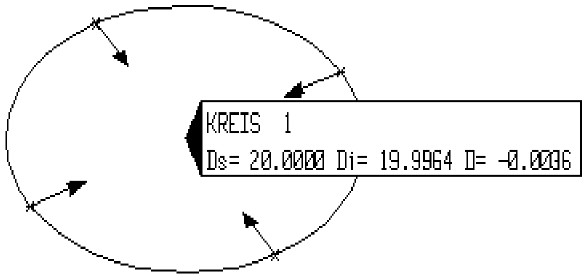


Figure 11-15

Measuring record for circle in space

```
=====================================================
                          IST        SOLL     OTOL    L
=====================================================
 2      KREIS I     X     -0.0009     0.0000  0.2000 -0.2
                    Y     -0.0079     0.0000  0.2000 -0.2
                    Z      0.0000     0.0000  0.2000 -0.2
                    D    139.9993   140.0000  0.2000 -0.2
                    E      0.0079

        ACHSE       X     -0.0009     0.0000  0.2000 -0.2
                    Y     -0.0079     0.0000  0.2000 -0.2
            X/Z    W1      0.0000     0.0000  0.2000 -0.2
            Y/Z    W2      0.0000     0.0000  0.2000 -0.2

   4 P     S/MIN/MAX       0.0054    -0.0054  0.0054
=====================================================
```

11.5.2 Measuring in CNC mode

Measuring procedures for automatic measuring are available for the following regular geometry elements:

- Circle
- Slot
- Rectangular hole
- Cylinder
- Cone

After measurement and during subsequent evaluations the measurement points are automatically evaluated as a regular geometry element.

Operation

Select the <Define measuring run> - <regular geometries> function from the <Measurement> menu.

First of all select a surface element which describes the required geometry element.
Then define the parameters.

The parameters for the various regular geometry elements are described below.

Confirm your entries with <OK>.

The measuring run is stored.

Regular geometry

Measure circle

First of all select a surface element which describes a circle. Then define the parameters for circle measurement.

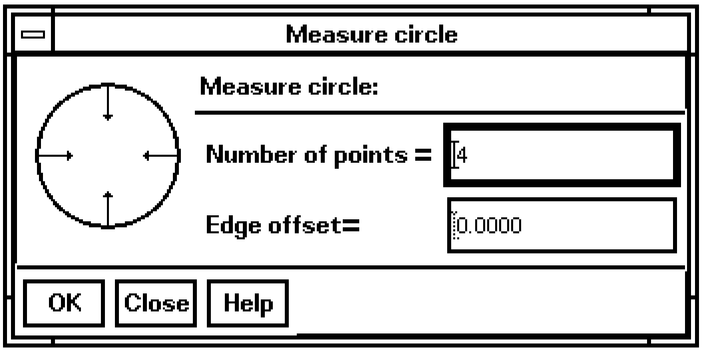


Figure 11-16

Number of points	Enter the number of points which are to be measured on the circle.
Edge offset	Preset a value for the edge offset if the points on the circle are not to be probed directly on a workpiece edge. The probing points are then moved down by this amount.

Measure slot

First of all select a surface element which describes a slot. Then define the parameters for measuring the slot.

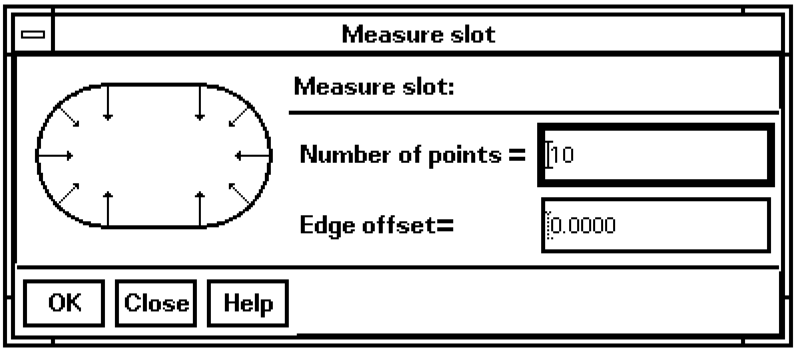


Figure 11-17

Number of points	Enter the number of points which are to be measured on the slot.
Edge offset	Preset a value for the edge offset if the points on the slot are not to be probed directly on a workpiece edge. The probing points are then moved down by this amount.

Regular geometry

Measure rectangular hole

First of all select a surface element which describes a rectangular hole. Then define the parameters for measuring the rectangular hole.

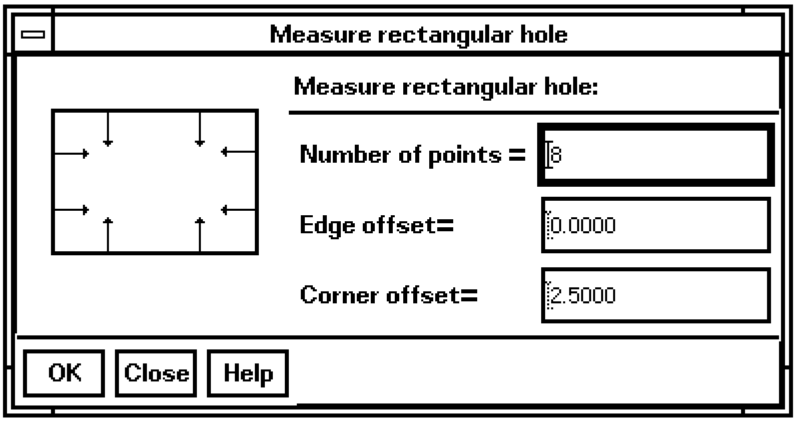


Figure 11-18

Number of points	Enter the number of points which are to be measured on the rectangular hole.
Edge offset	Preset a value for the edge offset, if the points on the rectangular hole are not to be probed directly on a workpiece edge. The probing points are then moved down by this amount.
Corner offset	Points in the corner of a rectangular hole cannot be probed. Enter a value for the corner offset. The entered value must be larger than the probe radius used.

Measure cylinder

First of all select a surface element which describes a cylinder. Then define the parameters for measuring the cylinder.

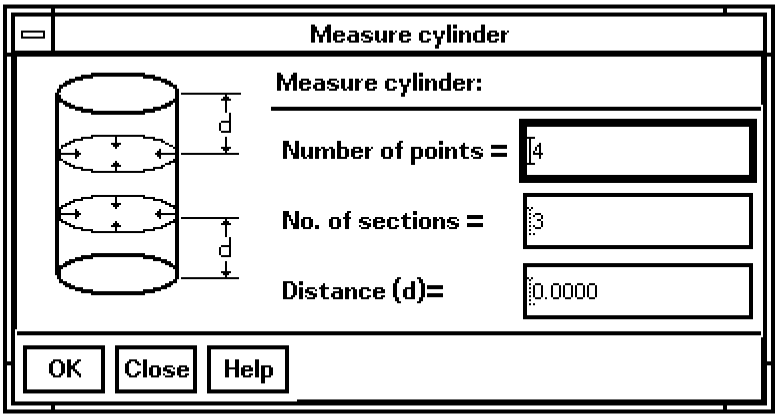


Figure 11-19

Number of points	Enter the number of points which are to be measured on the cylinder.
Number of sections	Enter the number of sections which are to be measured on the cylinder. If only one section is defined, measurement and evaluation are performed as for a circle.
Distance	Enter a value for the distance which the probing points are to have from the upper and/or lower cylinder edge.

Regular geometry

Measure cone

First of all select a surface element which describes a cone. Then define the parameters for the cone measurement.

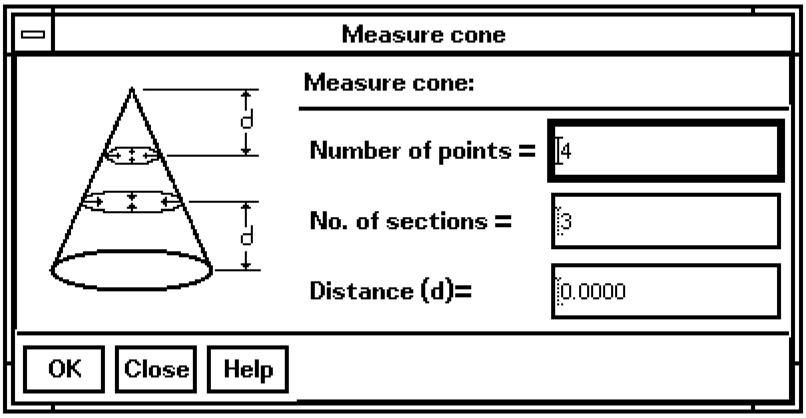


Figure 11-20

Number of points	Enter the number of points which are to be measured on the cone.
Number of sections	Enter the number of sections which are to be measured on the cone. If only one section is defined, measurement and evaluation will be performed as for a circle.
Distance	Enter a value for the distance which the probing points are to have from the lower and/or upper edge of the cone.

11.6 Evaluation

In order to graphically display the evaluations of regular geometries, you can preselect which data is to be displayed on the screen.

Select the <Evaluation> - <Regular geometry graphic symbols> function in the <Parameters> menu.

The selection panel is displayed:

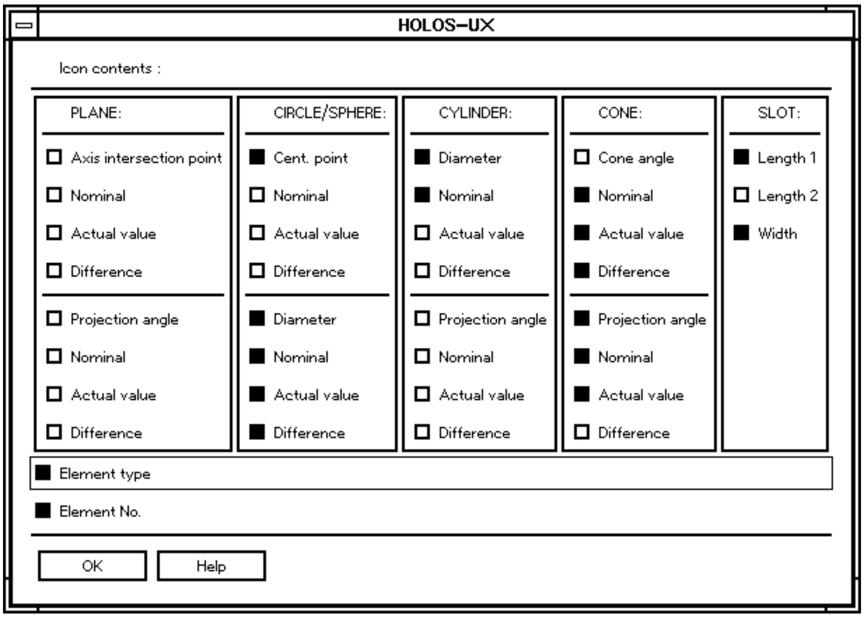


Figure 11-21

Select the options for the required results display.

12 Definition of parameters

This chapter describes the functions of the <Parameter> menu. The functions are used for setting up fundamental parameters for the many different areas.

The main function <Parameter> subdivides into the following functions:

- Graphics
- Rendering
  - Rendering parameters
  - Rendering colors
- Markings
- Measuring run
- Evaluation
- Graphic symbols
- Macro run
- Clearance planes
- Digitize
- Patch ident
- Probe
- Tolerances
- Tolerance classes
- 3D best fit
- Measuring record output
- Record type
- Record head
  - Standard record head
  - User record head
- Output
- Sections
- System
- Printer set-up

- Serial interface (only with UMESS300 /UMESS 1000)
  All parameter windows will be operated by the entry of text or the selection of options.

Read up on the operation in Chap. 1.8.4 and Chap. 1.8.3.

12.1 Graphic representation parameters

Graphics parameters are linked both to a model and to the subgroups of the model. When you load a model or a group, the associated graphics parameters will be selected as a result of this. If you have not yet defined any graphics parameters for a model or a group, the last parameters that were defined will still be active.

The graphics parameters apply to various elements of the graphic representation.

12.1.1 Display parameters

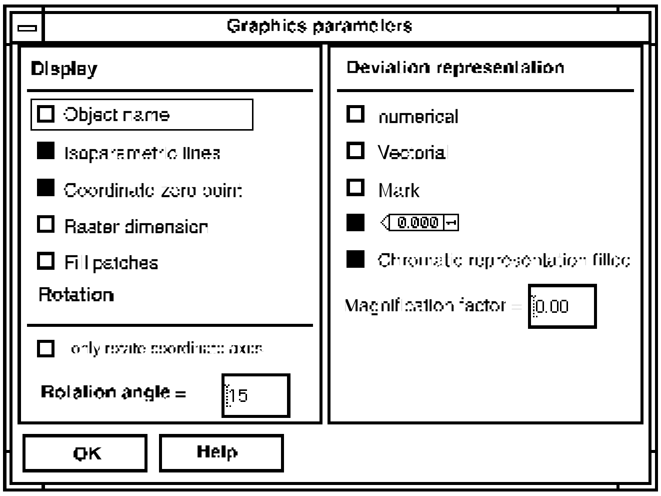


Figure 12-1

Object names

The names of the graphic objects curves, surfaces and faces will de displayed. Precondition: their representation must be turned on (Function <Representation> in the graphics menu bar).

Isoparametric lines

The isoparametric lines of surfaces and patches will be displayed. Significance: isoparametric lines are useful in clicking on surfaces and patches.

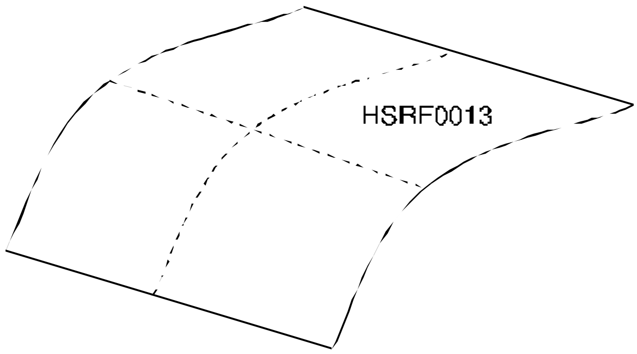


Figure 12-2

Coordinate zero point

The origin of the workpiece coordinate system will be displayed on the screen.

Raster dimension

In the view of the model in the three basic planes (function <Subimage>) a raster can be displayed as well.

In a window you select the basic planes that are to be rastered and enter the grid gap.

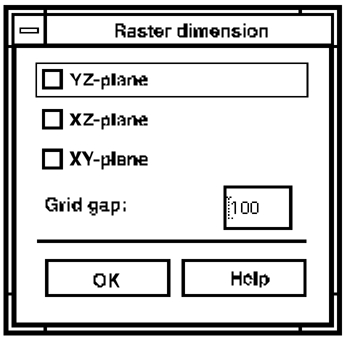


Figure 12-3

Definition of parameters

Fill patches

The patches will be filled. The representation takes place in the order that the patches were stored, i.e. patches lying at the back will not be represented, if they are defined as "hidden surfaces“.

12.1.2 Rotation parameters

Rotate coordinate axes only

You rotate the entire graphic interactively on the screen by moving the mouse whilst keeping the right mouse button pressed. As the mouse is moved, the graphic rotates at the same time. For large models however, the screen construction will be carried out more slowly. To save on time, this parameter enables just the coordinate axes to be rotated at the same time. The model will only be built again when you release the right mouse button.

Rotation angle

The rotation angle preselects the step width for the rotation. It is identical to the rotation angle in the graphics menu bar.

12.1.3 Deviation parameters

The deviation parameters come in useful for the evaluation of actual data (function <Actual data> in menu <Evaluation>).

numerical

The deviation of a measured point will be output as a numerical value.

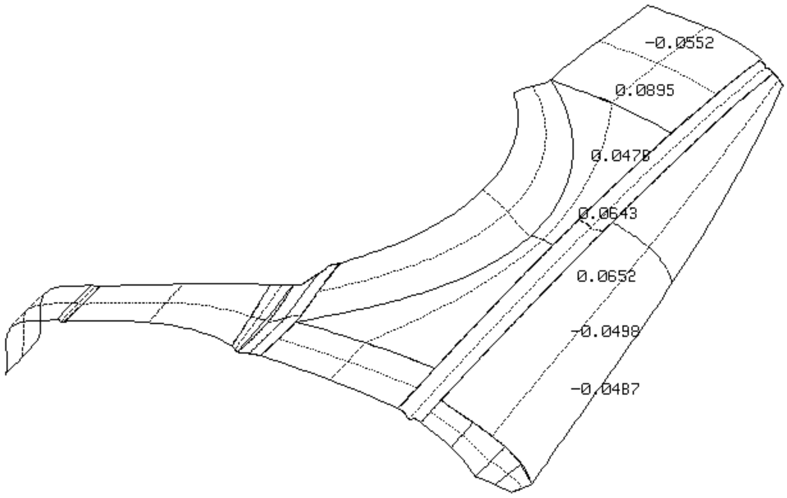


Figure 12-4

vectorial

The deviation of a measured point will be shown by a vector of a certain length.

symbol

The deviation of a measured point will be output as a numerical value in a colored symbol. The color corresponds to the tolerance zone position.

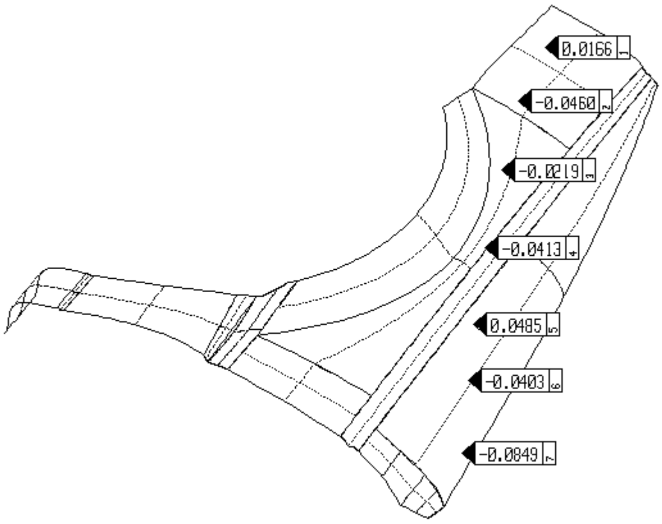


Figure 12-5

Definition of parameters

marking

The deviation of a measured point will be displayed as a colored square around the measured point. The size of the square will be automatically adjusted, although it will always be clipped at a patch boundary. The color corresponds to the tolerance zone position.

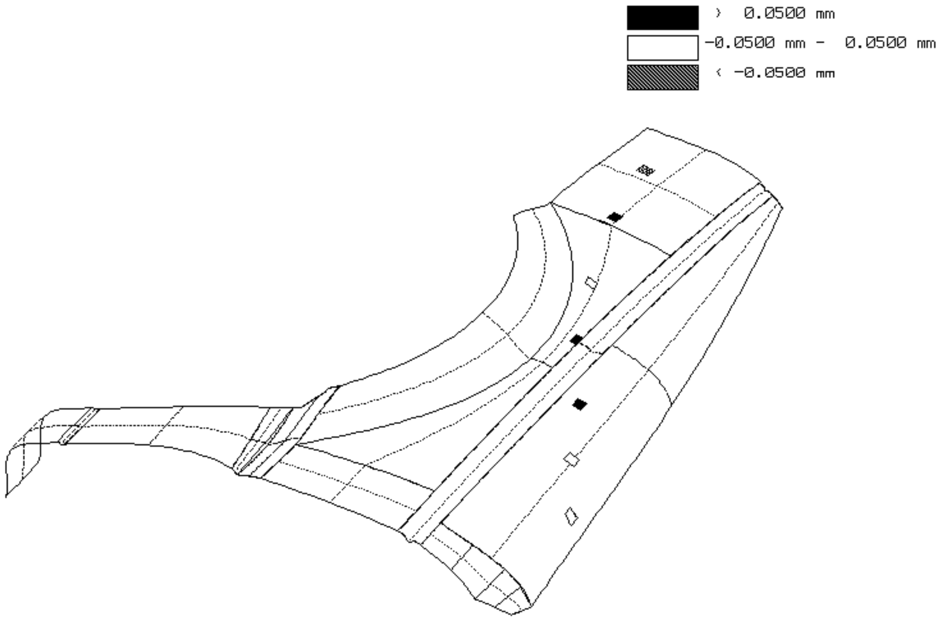


Figure 12-6

The marking is suitable both for manually probed points and for points that have been probed in a CNC run.

chromatic representation filled

In the evaluation of measuring runs the deviation can be represented in chromatic coordinates. In contrast to the above-described marking the chromatic coordinates yield, through interpolation, a continuous colored surface. The surface consists of triangles. These triangles can be filled or not filled.

magnification factor

The deviation can be displayed in magnified form, either vectorially, chromatically or as a section. This factor specifies the magnification.

12.2 Rendering function parameters

With the rendering functionyou define the parameters for the illuminated and colored display of the workpiece surface. In this display hidden edges of the workpiece geometry can be overlayed.

The function branches into the submenus

- Rendering parameters
- Rendering colors

12.2.1 Rendering parameters

Operation

To define the parameters for the rendered display click on the <Rendering><Rendering Parameters> function.

A window appears for parameter definition.

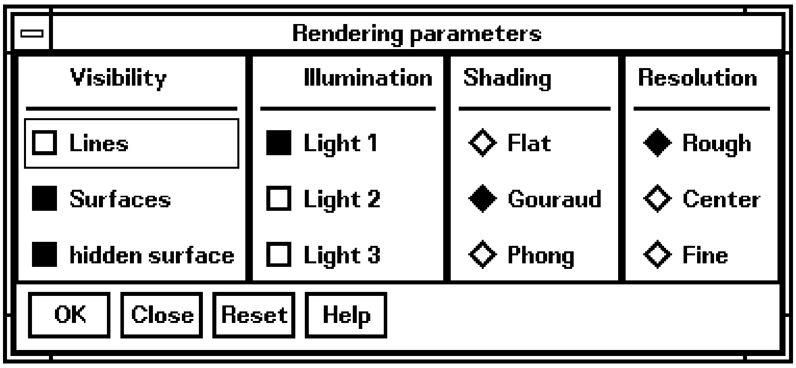


Figure 12-7

Lines

The lines on the workpiece surface are displayed graphically (wire-frame model). They can also be displayed with a switched on surface model.

Surfaces

The workpiece surfaces are displayed graphically (surface model). They can also be displayed with a swtiched on wire-frame model.

Definition of parameters

Hidden surface

Hidden edges are removed.

Illumination

The light source can be switched on and off with this parameter. A total of three light sources can be defined, which are staggered over an angle of 120 degrees above the workpiece.

Shading

This parameter defines the illumination model of the graphical display.

Resolution

With this parameter you define the resolution of the displayed workpiece surface. A coarse resolution is sufficient as a rule. In some cases a higher resolution may be necessary. A higher resolution means a larger number of points and, as a result, increased computing times.

OK

This function closes the window and displays the rendered display on the screen.

Close

This function closes the parameter window.

Reset

The Reset function is used to deactivate the Rendering function. The memory required for the rendered display during calculation is released.

12.2.2 Rendering colors

With this parameter you define the actual colors for the illumination model.

Operation

Click the function <Rendering><Rendering Colors>.

A window appears for defining the colors.

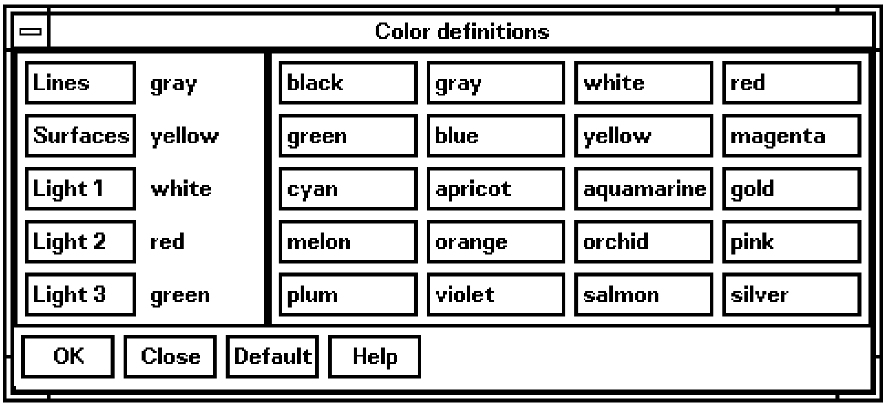


Figure 12-8

First define the elements whose colors you want to change. To do this, click on the corresponding element.

Then define which color is to be assigned to the element in question. Click the corresponding color.
The <Default> key always gives you the preset color value for the element in question:

Lines:	grey
Surfaces:	yellow
Light 1:	white
Light2:	red
Light3:	green

Confirm the selection with <OK>.

12.3 Parameters for markings

With this function you define with which symbols different are graphically displayed.

Operation

Click the function <Markings>.

A window appears for defining the markings.

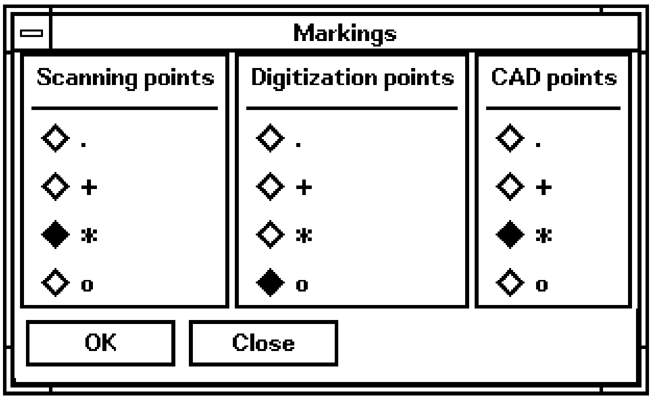


Figure 12-9

Select the required markings and confirm with <OK>.

12.4 Measuring run parameters

Measuring run parameters are linked both to a model and to the subgroups of a model. If a model or a group is loaded, the associated measuring run parameters will be activated. If up until now, no parameters have been defined for a model or a group, the last parameters that were defined will still be active.

> ***NOTE:***
>
> *If you define one of these parameters, in principle you overwrite the definition in the measuring software's CADLINK module. If you want to utilize the parameters from CADLINK, you are not permitted to define any parameters here.!*

The measuring run parameters will be specified with the function <Measuring run>.

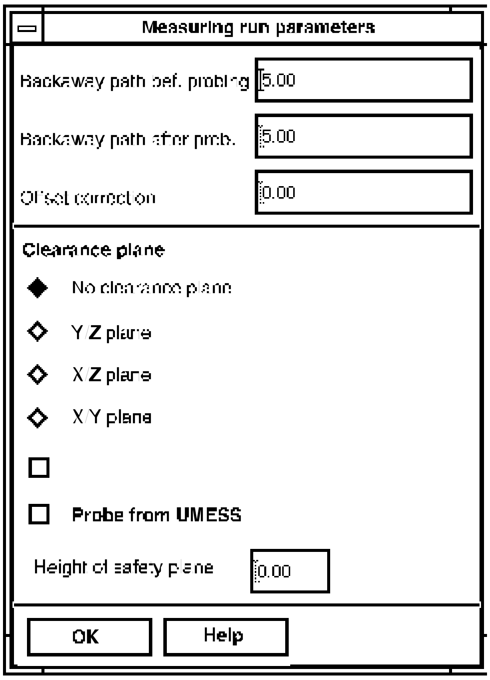


Figure 12-10

Definition of parameters

Backaway path before probing

Distance of an intermediate position from the target position. The intermediate position lies ahead of the probing. Vectorial probing will take place from this position.

Backaway path after probing

Distance of an intermediate position from the target position. The intermediate position lies after the probing. Vectorial backaway will take place up to this position.

Offset correction

Correction value for offset surfaces, e.g. to take into account sheet thicknesses. The sign bit of the offset value determines the direction for the correction..

Offset positive: Correction in direction of surface normal.

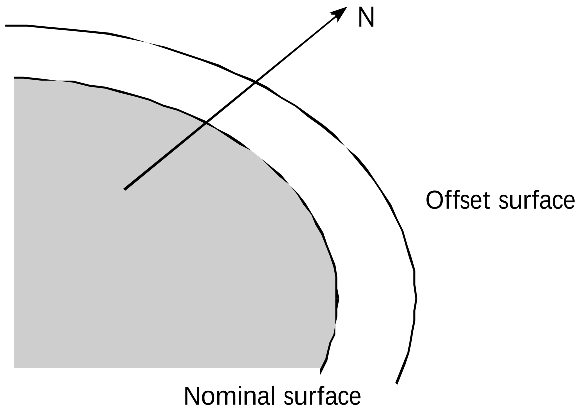


Figure 12-11

Offset negative: Correction in opposite direction to surface normal.

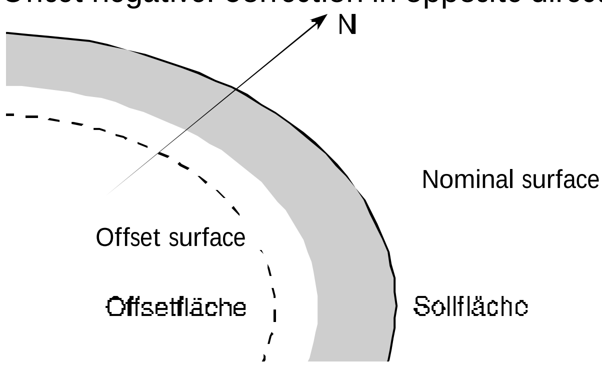


Figure 12-12

Clearance plane

To avoid collisions during CNC operation, the coordinate measuring device travels to a clearance plane at the end of a measuring run. Depending on the setting this can be after each surface or after . each point. You specify this clearance plane here. The basic planes XY, YZ and ZX of the workpiece coordinate system are the possibilities.

NOTE:

The clearance plane is a plane in the workpiece coordinate system, not a plane in the machine coordinate system.

You also specify whether or not the coordinate measuring device is to travel to the clearance plane after every probing point. The height of the clearance plane depends on the selected plane and will be measured from the origin., NOT however as the distance from the workpiece.

Using the function <Clearance plane in space> in CADLINK you can define any plane you like.

12.5 Evaluation parameters

Different parameters can be defined for evaluating measuring results.

Select the <Evaluation> function in the <Parameters> menu.

A dialog window opens:

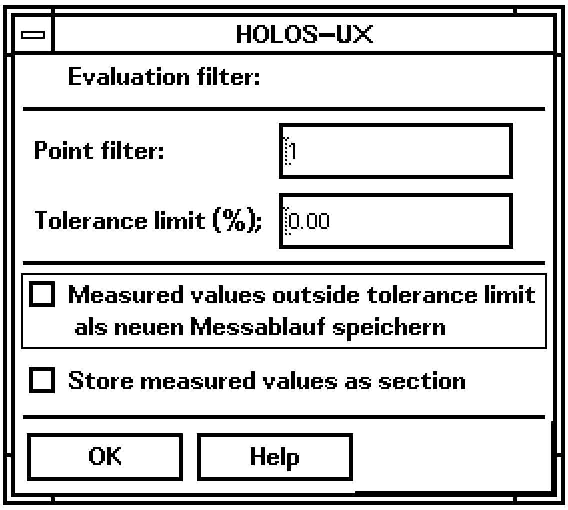


Figure 12-13

Point filter

The value defines the distance of the measurement points to be evaluated.
A value n means that each n-th point is evaluated.

Tolerance limit

The value defines the tolerance limit as a % during evaluation of the measurement results.
The value “0” means that all points are evaluated. The value “100” means that only those points are evaluated which lie outside the defined tolerances.

Measurement values outside tolerance

If you select this option, all measurement values which lie outside the tolerance limit entered above are stored as a new measuring run.

Store measurement values as a section

Select this option in order to store the evaluated values as a section. It can then be used for section evaluation.

Regular geometry evaluation

With this option, when measured values are evaluated, the regular geometry elements are automatically also evaluated.
The prerequisite is that the points have been measured on a surface element, that HOLOS has identified the element as a regular geometry element, and that an adequate number of points have been probed for the element.

Calculate center of gravity

Switch this option on if you wish to calculate the center of gravity of the measured values when calculating the deviation. The center of gravity will then be output in the measurement record .

Display deviation distribution

This option displays the deviation distribution in a window during an evaluation, as during manual measurement.

12.6 Parameters for graphic symbols

You can define different settings for the graphic symbols, which are used to represent deviations.

Definition of parameters

Figure 12-14

Point number

Display the number of the measured point.

Deviation

Display the deviation of the measured point.

Nominal point

Display the nominal value of the measured point.

Actual point

Display the actual value of the measured point.

Deviation vector

Display the deviation vector for the measured point.

Point type

Display the type of measured point: F = surface points, K = edge points.

Read/save positions

You can move graphic symbols at random on the screen or arrange them automatically at the edge of the screen.
This option allows you to save the defined positions for individual measuring runs. The graphic symbols will automatically be displayed in the established positions during the next evaluation, if the measuring runs that relate to the relevant run and the <Read position> option are switched on. ..

12.7 Digitizing parameters

With the function <Digitize> you set up the parameters for the digitizing functions.

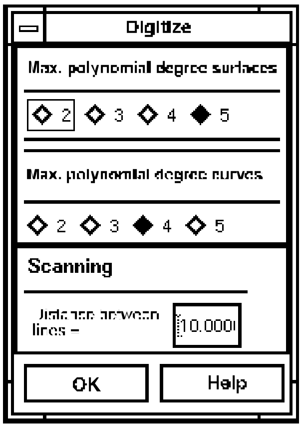


Figure 12-15

Polynomial degree

The polynomial degree of curves and surfaces is first of all dependent on the number of probed points:
Number of points - 1 = Polynomial degree

The polynomial degree does however have an upper limit. This upper limit is to be selected for the Max. polynomial degree (the term polynomial degree is explained in the glossary).

Scanning lines distance

In the scanning of areas with the LTP60, laser triangulation probe lines will be scanned in a meandering manner. The parameter "Distance between lines " defines the distance between these lines in mm.

12.8 Patch identification parameters

"Patch identification" denotes the following process: during probing of a known workpiece (e.g. an imported VDA data record) the nearest patch will be searched for in a particular area around the probing point. This search area takes the shape of a sphere around the probing point. The parameter you specify is the radius of this sphere. On system startup the setting for the search area has a default setting of 5 mm. If no patch can be found in the search area the probing will be rejected.

With the function <Patch ident> enter the search area.

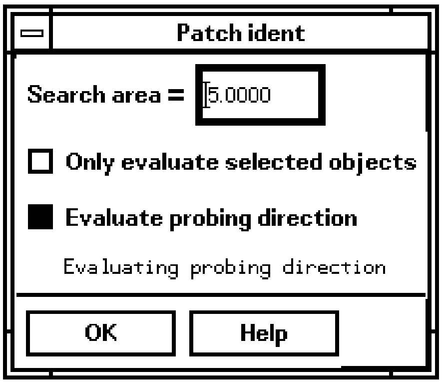


Figure 12-16

only select selected objects

During manual probing of points on the workpiece surface a surface segment which contains the measurement point is automatically determined by HOLOS.

To do this, HOLOS defines the surface segment with the shortest distance to the probed measurement point.

If only particular objects (surfaces, patches or faces) are to be taken into consideration when defining a surface segment, select this option.

Prerequisite

The selected objects must be located at the position of the probed points, otherwise an evaluation cannot be made.

Then select the objects which are to be taken into consideration in the evaluation and probe points on the workpiece surface.
When determining the deviation only the selected objects are taken into consideration.

Evaluate probing direction

During manual probing with a coordinate measuring device, in addition to the position of the measured point, the probing direction will also be transferred. By evaluating this probing direction the system can determine whether or not the orientation of the found surface is correct. If this is not the case the orientation will be changed automatically.

When using with diverse optical systems the transfer of a valid probing direction cannot always be guaranteed. For such cases the evaluation of the probing direction must be turned off to prevent incorrect results being obtained.

The precondition for getting correct measuring results remains however, that the orientations of the surfaces are correct!

12.9 Defining probes

With the function <Probe> you specify the probe, with which the subsequently generated measuring runs will be measured.

Only probes that are currently active can be selected.

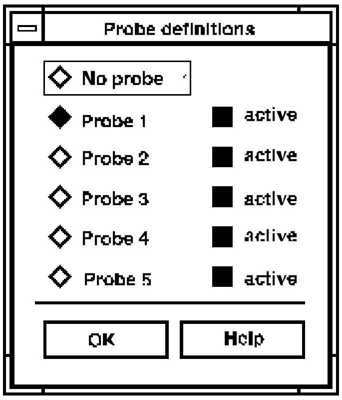


Figure 12-17

If no probe should be linked to particular measuring runs, select the option "No probe “. In the measuring run, the probe that is set up at the control console will then be used.

A color is assigned to each probe. The nominal points from the measuring runs will be displayed in this color. If no probe is specified the nominal points will be displayed in white.

You can also select the probes using the symbolic button on the graphics menu bar.
🕮 see Chap. 3.12

12.10 Inputting tolerances

Tolerances are linked to a model and to the subgroups of that model. If a model or group is loaded the associated tolerances will also be selected. If no tolerances have yet been defined for a model or a group, the last defined values will still be active.

With the function <Tolerances> you enter the upper and lower tolerance values for the evaluation of the measuring runs.

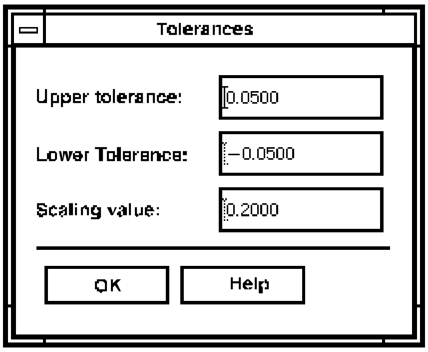


Figure 12-18

You enter negative tolerances including their sign.

Scaling value

When measuring individual points deviations will be output not just to the graphics but also to a deviation diagram (tolerance range with deviations). If you have preset both the upper and the lower tolerances to "0.0“, you will need to specify another dimension for the graphic representation of the deviations. This is the scaling value.

12.11 Tolerance classes

This function is used to display deviations in chromatic coordinates in different tolerance classes. Areas having the same tolerance position will be shown in the same color.
You can define a minimum of 3 and a maximum of 21 tolerance classes. The middle tolerance class will always be limited by the upper and lower tolerances.

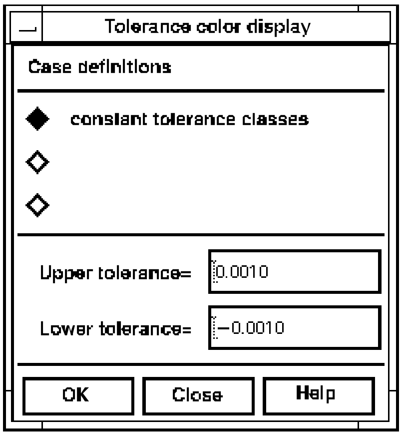


Figure 12-19

You can define the following types of tolerance classes:

Constant tolerance classes

The width of the tolerance class is entered in millimeters or inches and is identical for all tolerance classes.

Example:	tolerance width = 0.1 mm
Class n	from 0.2 ... 0.3 mm
Class n+1	from 0.3 ... 0.4 mm
Class n+2	from 0.4 ... 05 mm ...

Variable tolerance classes

The width of the tolerance class is entered in millimeters or inches and can be any size at all for each class
There is simply the restriction that all values within the first and the last classes must be covered.

Example:

Class n from 0.2 ... 0.3 mm (Class n+1 *must* begin at 0.3 mm
Class n+1 from 0.3 ... 0.6 mm
Class n+2 from 0.6 ... 0.9 mm ...

Percentage tolerance classes

The width of the tolerance classes is entered in millimeters or inches and is guided by the upper or lower tolerance respectively.

If you enter 100 as a percentage factor, all tolerance classes will be created with a width of 1 * tolerance.

If you enter 30 as a percentage factor, all tolerance classes will be created with a width of 0.3 * tolerance

Example: upper tolerance 1.0; percentage factor = 100

Class (n-1/2) from lt .... 1.0 mm
Class (n-1/2)+1 from 1.0 ... 2.0 mm
Class (n-1/2)+2 from 2.0 ... 3.0 mm ...

Example: upper tolerance 1.0; percentage factor = 30

Class (n-1/2) from lt .... 1.0 mm
Class (n-1/2)+1 from 1.0 ... 1.3 mm
Class (n-1/2)+2 from 1.3 ... 1.6 mm ...

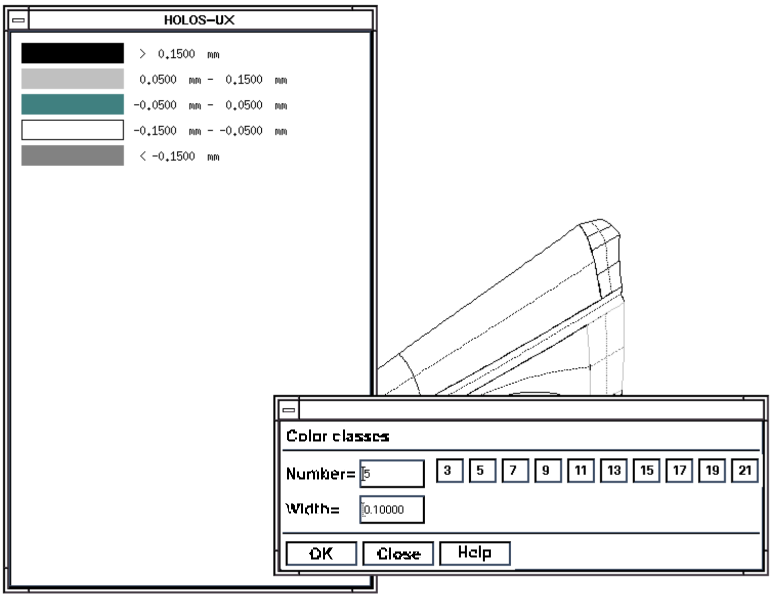


Figure 12-20

12.12 3D best fit parameters

With the function <3D best fit> you can select or block degrees of freedom for the 3D best fit.

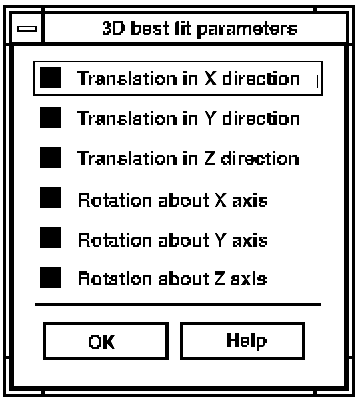


Figure 12-21

A bright display field indicates that the degree of freedom is selected, i.e. that translation and rotation are permitted during the best fit. A dark display field indicates that the degree of freedom is blocked, i.e. that translation and rotation are not permitted.

Significance of the degree of freedom

For workpieces that are symmetrical in terms of rotation and translation the degrees of freedom "Rotation" and "Translation" must be restricted. For example, with a hemisphere the rotation about the middle axis must be blocked, since otherwise there would be an endless number of equivalent results in the transformation calculation and the program would be unable to determine the optimum transformation.

12.13 Controlling output of the measuring record

With the function <Measuring record output> you specify where your measuring records will be output after they have been generated. A measuring record will be generated as soon as you evaluate the measured values with the functions of the <Evaluation> menu.

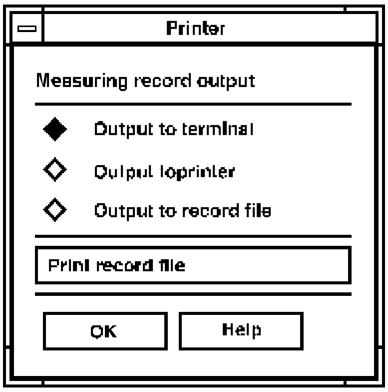


Figure 12-22

Output to terminal

The measuring recordswill be output on the screen. They can be listed on the screen by using the function <Measuring record> in the menus <Evaluation> or <Patch ident> and then printed out from this window. Since the records will not be stored for the output to the screen, you can only look at the record of the last evaluated measuring run each time.

Output to printer

The measuring records will be output to the printer that is installed with the system. This takes place automatically when a measuring record has been generated using the functions of the <Evaluation> menu.

Output to record file

The measuring records will be output to files. The files will be automatically designated with the name "protocol_x“, where x is a consecutive numbering. The record files can be displayed later in the above window with the function <Print record file >.

Definition of parameters

Print record file

With this function you can print out any of the record files at a later time. For selection of the file, a list will be overlayed showing all of the stored record files. After selection and confirmation with <OK> the file will be printed out on the installed printer.

12.14 Record type

For the HOLOS measuring record you have an option of two record types.

Click on <Record type> in the parameter window for measuring records.

The dialog screen is displayed for the record type:

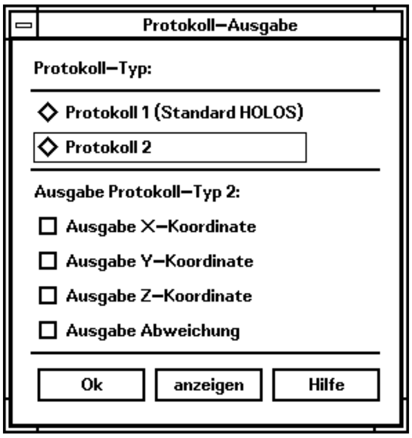


Figure 12-23

Record 1

Standard record output. You can use the <Display> function to show what the measuring record looks like. :

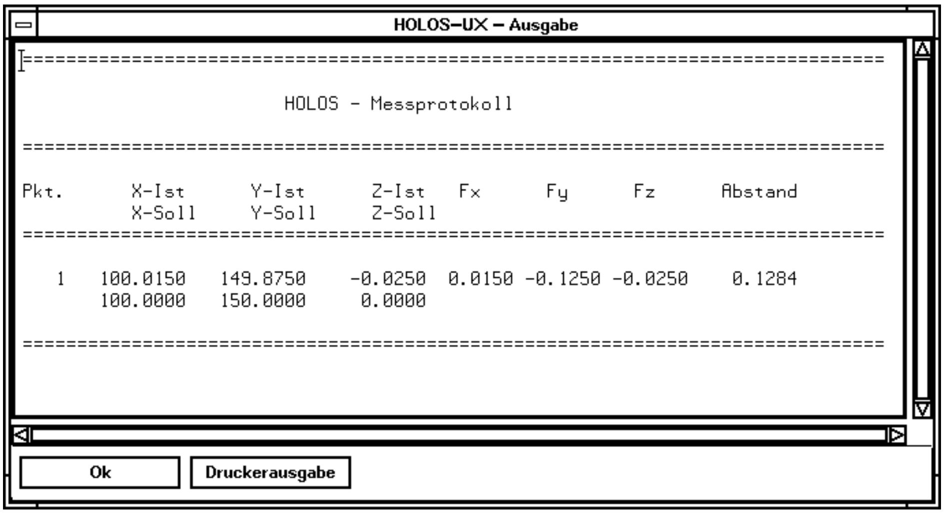


Figure 12-24

Record 2

For this record type, you yourself can define the values to be output in the measuring record:

Output X-coordinate:	The values for the X-coordinates.
Output Y-coordinate:	The values for the Y-coordinates.
Output Z-coordinate:	The values for the Z-coordinates.
Output deviations:	The values for the deviations.

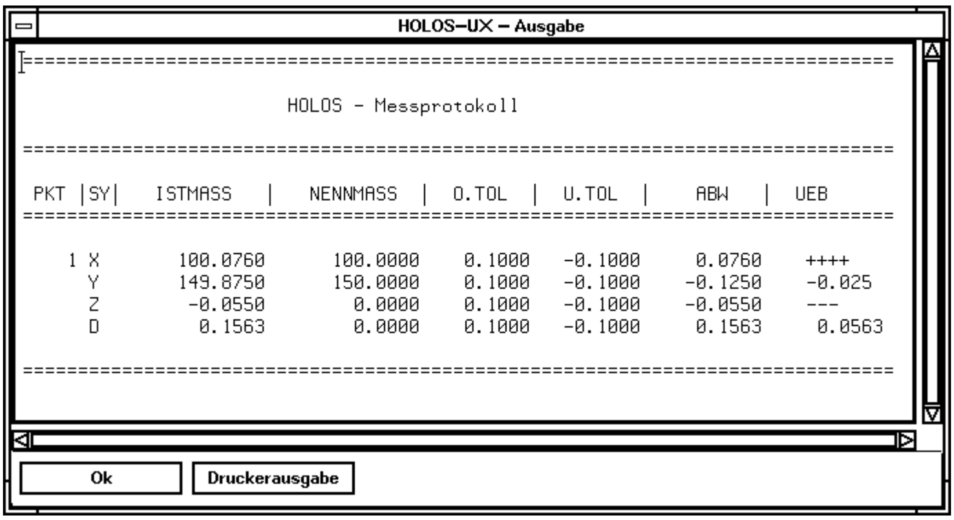


Figure 12-25

12.15 Create record head

With this function you define the entries for the record head.of your measuring records. You have the choice between a standard record head and a self-defined record head.

12.15.1 Standard record head

With this function you define the entries for the standard record head.

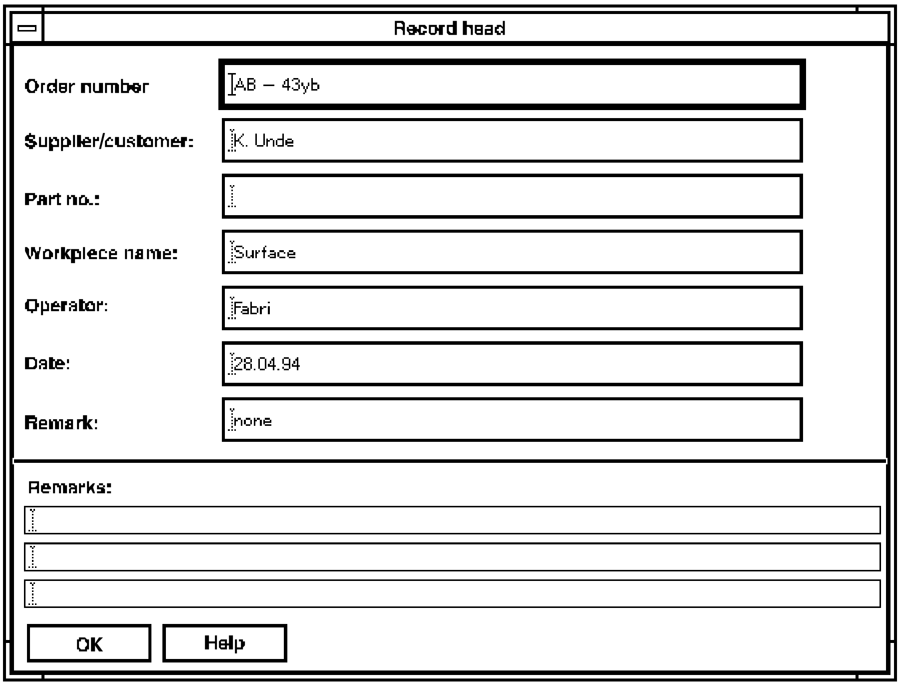


Figure 12-26

The record head will be used

- for the measuring records
- for output of the graphic window (functions <Screen> and <Plotter> on the graphic menu bar).

The record head is linked to a model and to subgroups of that model. When you load a model or a group the associated record head will be selected. If you have not yet defined a record head for a model or group, the last one that was defined is still active.

12.15.2 User record head

After activationof this function a dialog editor is displayed for defining a self-defined record head. This record head will be used during the output of measurement records, if you have activated the output of a user-defined record head in the output parameter page.

Click the function <Record head><User record head>.

A dialog editor for entering the record head is displayed.

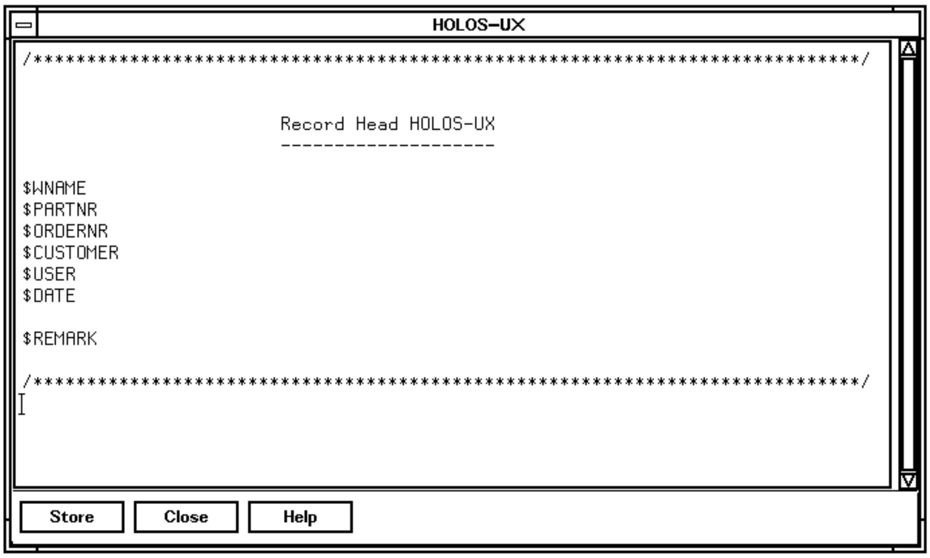


Figure 12-27

Input the required entries in the editor and confirm with <Store>.

If you want to accept the entries from the standard record head in your self-defined record head, you can define this by giving various keywords.

The keywords must always begin each time at the first column in a record head line and given in their exact spelling, since otherwise they will not be recognized by the system. The first character is always a $.

Definition of parameters

Keywords:

$ORDERNR	accepts the entry for the order number
$CUSTOMER	accepts the entry for the supplier/customer
$PARTNR	accepts the entry for the part number
$WNAME	accepts the entry for the workpiece name
$USER	accepts the entry for the operator
$DATE	accepts the entry for the date
$REMARK	accepts the entry for the remarks

The keywords are displayed in the record head editor with their actual spelling. The current entry then appears in the record itself:

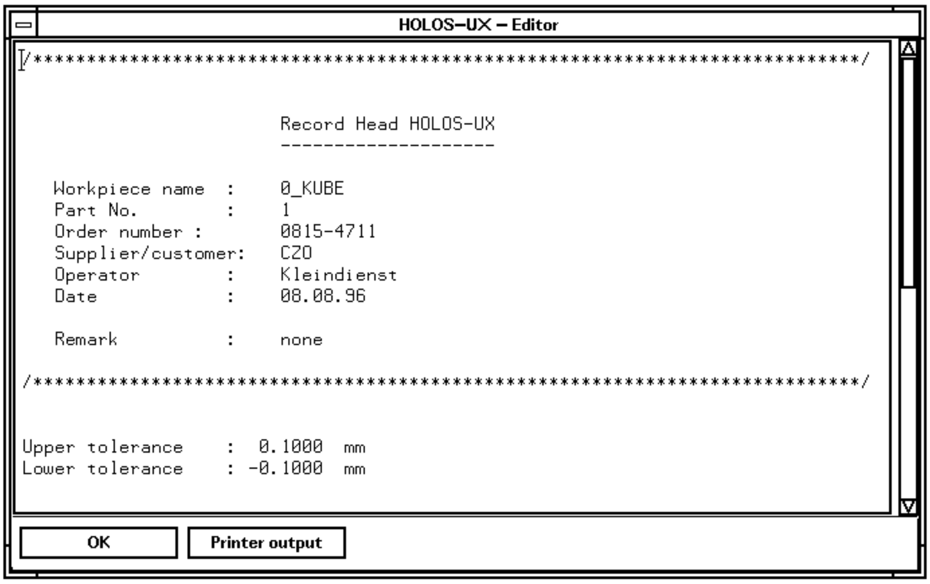


Figure 12-28

12.16 Output

With this function you define the parameters for the output of the record.

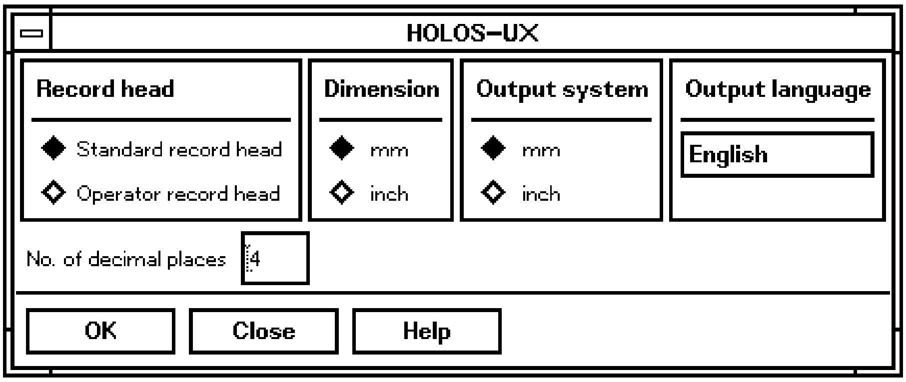


Figure 12-29

Record head

With this function you define whether the measuring record output is to be processed with the standard record head or with a user-defined record head.

Dimension

For dimension you can select measurement units in mm or inches. This unit determines in which unit of measurement your data model is available.

Output system

For output system you can select measurement units in mm or inches. This unit will then be used in displaying measurement results. If the output measurement system differs from the defined measuring system for your data model, the measurement results are converted.

Output language

With this parameter you define the language in which the measuring results output will be.

Definition of parameters

No. of decimal places

The number of decimal places for the measuring record output and the graphic output of measuring results can be set as desired. The number of decimal places is limited to a maximum of six.

With a value of six decimal places, no longer can all of the components in the measuring record be output. With up to five decimal places the following components appears in the measuring record:

Pnt X Y Z Nx Ny Nz distance

With 6 decimal places the point number can no longer be displayed.

For long-term storage of the parameters for the current workpiece confirm the function with <OK>.

When the function is ended by means of the <Close> button, the parameters are only active locally during the current work session.

12.17 Parameters for section representations

You can define various parameters for the graphic representation of sections in the menu <Parameter>-<Section>.
After selection of the function a dialog window is opened for these parameters to be defined.

Operation

Select the function <Parameter>-<Section>.

A dialog window is opened to define the parameters.

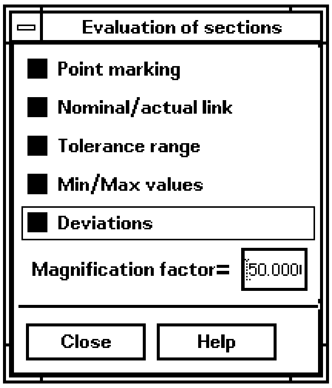


Figure 12-30

If you have not defined any of these parameters, the representation of sections is carried out as the superimposition of polygons of the nominal / actual values.

The polygon of the nominal values will be shown in green, the polygon of the actual values in red.

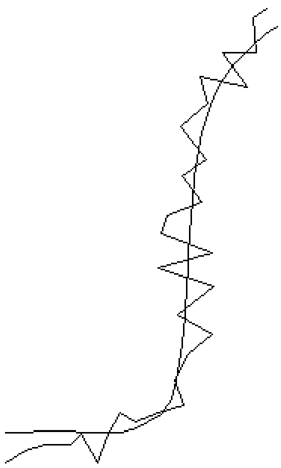


Figure 12-31

Definition of parameters

Point marking

If you have selected the parameter for the point marking, the nominal points will be indicated as yellow stars.

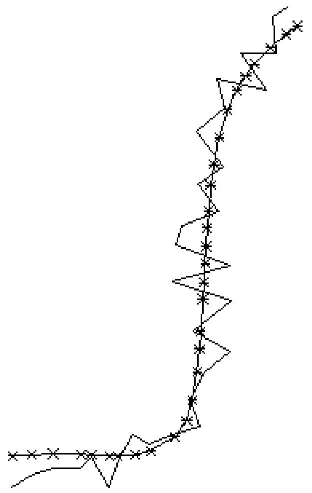


Figure 12-32

Nominal/actual link:

With this parameter you link together the nominal and actual values of the respective polygons with a red line.

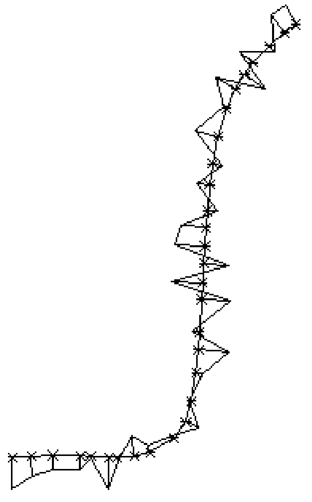


Figure 12-33

Tolerance range

Here you represent the lower and upper tolerances as a tolerance range around the polygon of nominal values. Tolerance ranges will be drawn in blue. .

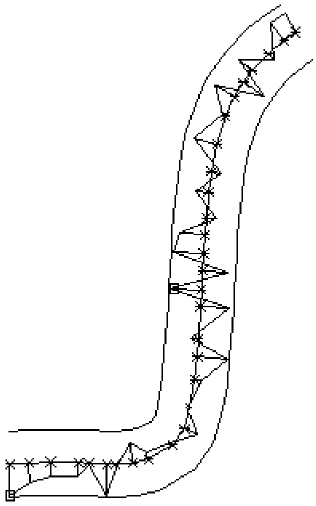


Figure 12-34

Min-/Max values

With this parameter you show the absolute value of the smallest and largest deviations of the nominal values. The extreme values will be indicated by means of a white square (black on the plotter).

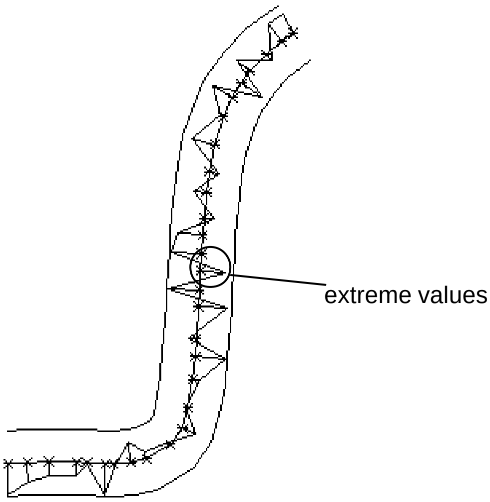


Figure 12-35

The representation of the polygons of the actual values as well as the tolerance ranges, can be carried out with a magnification factor since

Definition of parameters

for very small deviations nominal and actual polygons can hardly be differentiated.

Deviations

With this function you can display the deviations in the corresponding points.

Magnification factor

With this function you can define a magnification factor for displaying the polyline for the actual values as well as for the tolerance ranges.

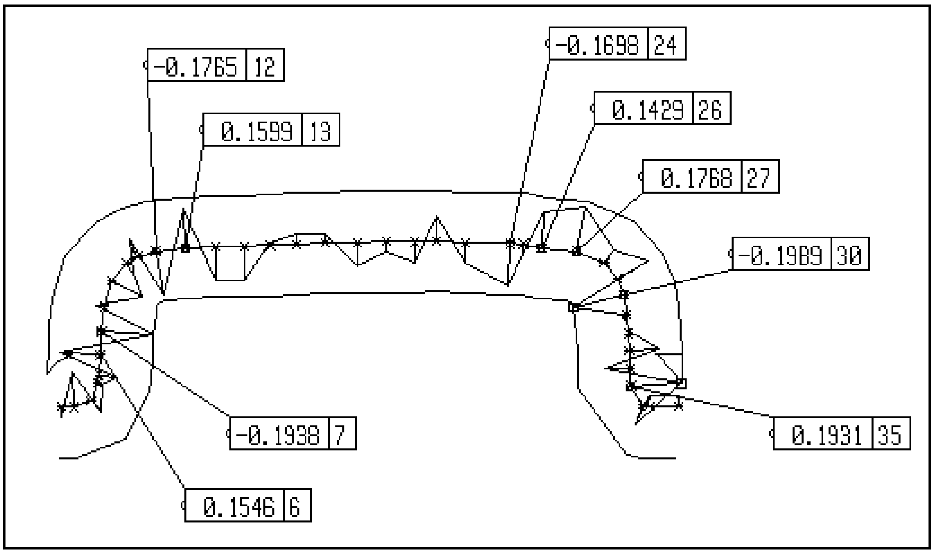


Figure 12-36

12.18 System parameters

With this function you define various parameters which the system uses when generating filenames, calculating distance from points and measuring points generation.

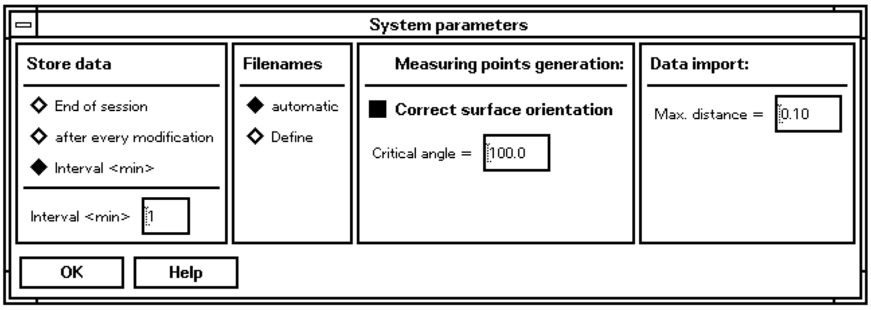


Figure 12-37

Store data

With the function <Store data> you specify when the modified data structure is to be stored. The data structure is modified when, for example, new objects are generated, the orientation of objects is rotated or parameters are changed.

You can store the data as follows:

- on exiting from HOLOS ("End of session“)
- after every modification
- after preset time interval in minutes, however only if the data really has been modified.

Automatic file name

When storing nominal values the measurement strategy utilized for the generation of file names will be taken into account..

Dependent on the current measurement strategy, the file name will automatically be prefixed with the following designation:

P_ Points (individual points or raster resp. grid points where points outside of FACE boundaries have been removed.)

D_ Grid points for digitization (Digitize surface)

L_ Line points

G_ Grid points

R_ Raster points

Definition of parameters

C_ Nominal points on parallel curves

S_ Scanning runs

File name defined

You have a further possibility to freely define the file names.

If you select the option <Define filenames> the system asks for a file name each time that you store nominal values.

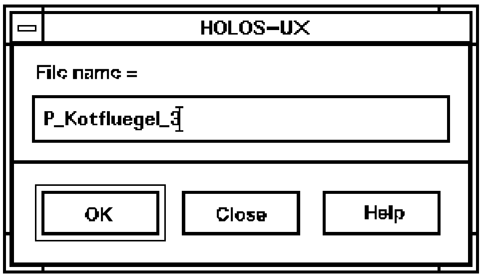


Figure 12-38

Here, the file name generated by the system will always be proposed as the default setting.

Correct surface orientation

During measuring point generation, the normal vector of a measuring point points into the workpiece if the orientation of the current surface is not correctly defined. This is normally always the case for some surfaces during surface modelling, since it is not imperative to pay attention to a uniform surface orientation during construction in the CAD system.

Since the normal vector of a measuring point is used for defining the probing direction, the surface under a measuring point must always present the correct orientation.

If you have activated the mode for correcting the orientation of the surface, the system itself can, in most cases, carry out a correction of the current surface orientation.

1. Measuring points generation for individual points and CAD points.

If you define an incorrect surface orientation when generating measuring points (normal vector pointing to interior of workpiece):

Click on the surface with the mouse.

Activate the <Rotate orientation> function in the <Objects> menu.

The orientation of the surface will then be rotated. The orientation of all the measuring points lying on this surface will automatically be rotated with it.

2. Measuring points generation on a line or a grid.

If you have switched on the mode for correcting surface orientation, the orientation of the normal vectors for measuring points and the associated surfaces is automatically carried out in the generation of measuring points on a line and a grid.

For this, the angle between the normal vectors of two consecutive measuring points will be compared. The angle must not exceed a maximum value which is to be defined.

NOTE:

The first defined measuring point is used as a reference for the definition of the orientation. If the orientation of the surface does not agree with this measuring point, a correct result cannot be obtained

Automatic correction is not feasible in various cases (for example at exact 90 degree corners). In this case, you have to carry out the surface orientation correction manually.

Definition of parameters

Limiting angle

The limiting angle value gives the maximum value for the angle between the normal vectors of two consecutive measuring points, until no rotation of the orientation takes place.

Max. distance with data import

When importing various data the points to be imported must have a minimum distance to a surface which exists in the system in order to be accepted in the stored data.

Enter the desired minimum distance here.

The maximum distance to a surface is evaluated with the following functions:

- Measuring poiny generation from CAD points
- Import of nominal values

12.19 Printer management

Printers and plotters which HOLOS-UX uses for outputting measurement records are always set up using the installation tool, INSTALL.

If other printers which are connected to computers in your company or company area network are to be used temporarily, you can control them using the printer set up in the <Parameters> menu.

Prerequisite

The respective printers must have been previously installed in the operating system.

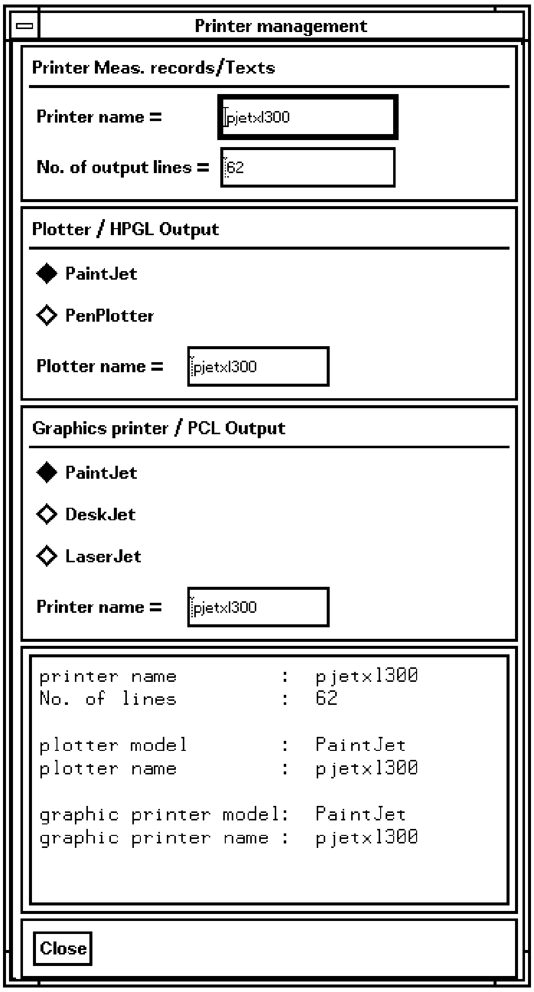


Figure 12-39

Definition of parameters

Click on the box in the “Printer name” or “Plotter name” field and select a printer from the list

If the printer is entered in the bottom text window, it can be used for the subsequent printouts.

If you define a printer which is not known to the system, an error message will appear.

12.20 Serial interface parameters

With the configuration of the serial interface you define the parameters for the link to the UMESS 300 or UMESS 1000 measuring software.

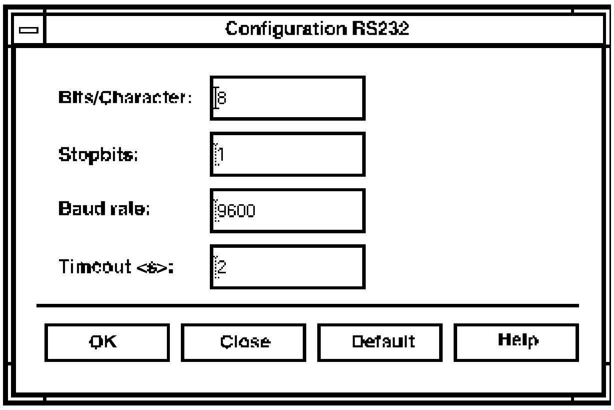


Figure 12-40

<OK> initializes the serial interface with the preset values.
<Close> cancels the initialization of the interface.
<Default> invokes a default setting.

Parameter	**Meaning**	**Default**
Bits/Character	Number of bits per character transferred	8
Stop bits	Number of stop bits per character transferred	1
Baud rate	Transmission speed in bits per second	19200
Timeout	various according to DIN 66019 defined response time in sec	2

The settings for the parameters must be identical in HOLOS and CADLINK!

13 Working with objects

This chapter describes the functions in the <Objects>. menu. The functions are used for the processing of objects, e.g. for selection, masking or changing the orientation.

Objects are curves, surfaces, patches and faces.

The main function <Objects> branches off to the following functions:

Delete selected objects
Mask selected objects
Demask masked objects
Delete masked objects
Show masked objects
Analysis
Rotate orientation
Catalog
Search object

13.1 Select Objects

In numerous functions you need to element select an object before it will be processed. There are two ways in which you can select objects:

- by clicking on them in the graphics window using the mouse
- by selecting the name of the object from a catalog (function <Catalog>).

To select objects in the graphics window you need to click on the objects in certain places:

Object	**Click**
Surfaces and patches	on the isoparametric lines
Curves	on the curve
Faces	within the Face
Points	on the point
Lines	on the line

A selected object will be deselected if you click on it once again.

13.2 Delete selected objects

With this function you delete all selected objects from the hard disk. Before the delete action a list of all currently selected objects appears. In addition you need to confirm a safety query.

Objects cannot be deleted if they have other objects that depend on them.

Example: a curve, that will be referenced by a FACE, cannot be deleted before the FACE is.

13.3 Mask selected objects

With this Function you mask selected objects. Masked objects will no longer be taken into account in all calculations and graphic representations. They are nevertheless still physically present and can be demasked again at any time.

Masked objects are either blank or shown colored brown depending on the parameter "masked objects“ in the function <Representation> on the graphics menu bar.

NOTE:

In certain functions surfaces will be masked by the program itself. This is the case if through "Re-parametrization” a new surface will be calculated.

In the program version currently supplied, during the conversion to a VDA file, the masked objects will also be converted. Therefore, they must be deleted beforehand if they are not to appear in the VDA file.

Operation

First select the objects with the aid of the function <Define group>.

Then select the function <Mask selected objects>.

The selected objects will be masked.

13.4 Demask masked objects

With this function you can demask masked objects. They will then be available again to all functions. You can only demask all objects of a type, not a selected individual object.

The types of the objects will be selected via subfunctions:

- all objects
- all surfaces
- all patches
- all faces
- all curves

13.5 Delete masked objects

Using this function you can delete masked objects without re-selecting them.

You can choose whether you wish to delete all masked objects, only masked surfaces, masked faces or masked curves.

Call up one of the functions for deleting masked objects.

The masked objects are displayed in the graphic display.

In the window which appears you must confirm the function for deleting masked objects.

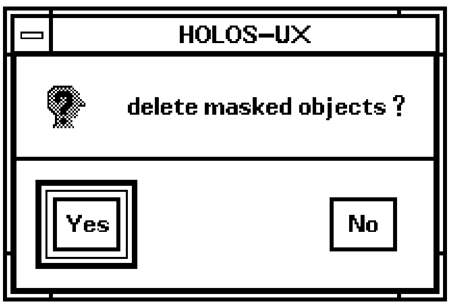


Figure 13-1

Click <YES> to delete the masked objects or <NO> to cancel the function.

13.6 Show masked objects

With the function <Representation> on the graphics menu bar you can, to start with, set up for whether masked objects will always be shown or not.

If they will never be shown, you can show them on the screen colored brown by using the function <Show masked objects>.

13.7 Analysis of objects

The analysis of an object provides you with a whole string of information that is listed out in the following table.

Object	Information
Surface (SURF)	Name of surface Number of elements in S and T Direction of the surface normal
Patch	Name of surface Position of the patch in S and T of the surface Polynomial degree in U and V (iordu and iordv) Direction of the surface normal
Curve (CURVE)	Name of Curve Number of curve segments Orientation of the curve
FACE	Name of FACE- and of SURF Number of surface curve traces Orientation of the surface

The surface normal and the direction of the curve resp. orientation of the surface will be shown on the object itself in the graphics window. You will find all other information in the status line.

NOTE:

To obtain information about a segmented surface, you must click on the isoparametric lines of this surface. These however only become visible when you have turned off the representation of patches (function <Representation> in the graphics menu bar).

Purpose of the function

- If you are generating surfaces interactively on the screen (functions in the <Digitize> menu) you need to know the orientation of the curves for a correct definition.
- If you need to "re-parametrize" one or more surfaces “, then to execute the function correctly you need to know the U and V directions, that is the orientation of the surface.

Operation

First click on the function <Analysis>.

The program switches to analysis mode and this is shown in the status line with "Select: Analysis“.

Now select the object to be analyzed by clicking on it or via the catalog.

The results of the analysis will appear.

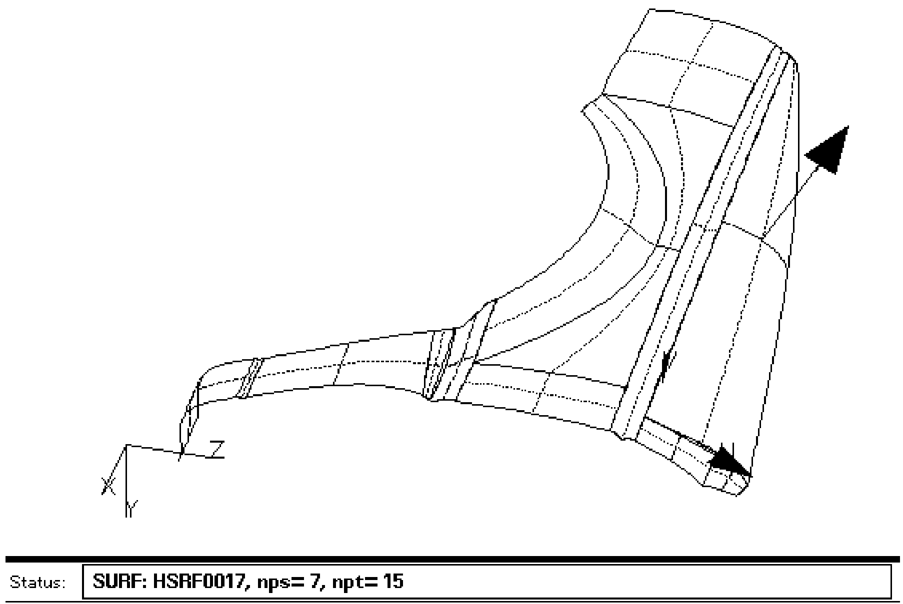


Figure 13-2

Working with objects

Whilst the program is in analysis mode you can have as many objects analyzed as you like.

To exit from the analysis mode, press the middle mouse button whilst the mouse cursor is positioned within the graphics window.

The program switches back to Single-Select mode.

13.8 Attributes for surface elements

You can allocate the following attributes to surface elements (surfaces, faces):

Color:
When the rendering is switched on, the surface element is displayed in the defined color in the graphic representation.

Tolerances:
The assigned tolerances are taken into account when evaluating measuring runs. Each element is evaluated with its defined tolerance. Evaluation with defined tolerance classes is not possible in this case, nor can different tolerances be taken into consideration in evaluations with chromatic coordinates .

Offset:
The offset is used to correct metal thicknesses. When evaluating measuring runs, the entered offset is taken into consideration for each element.

If no attributes are entered, then display and evaluation occur in accordance with the standard settings.

Click on the <Attributes> function in the <Objects> menu.

At the bottom left the message SELECT: ATTRIBUTE appears.

Select a surface element.

The selected element is marked in color, and a dialog window appears for entering the attributes:

Working with objects

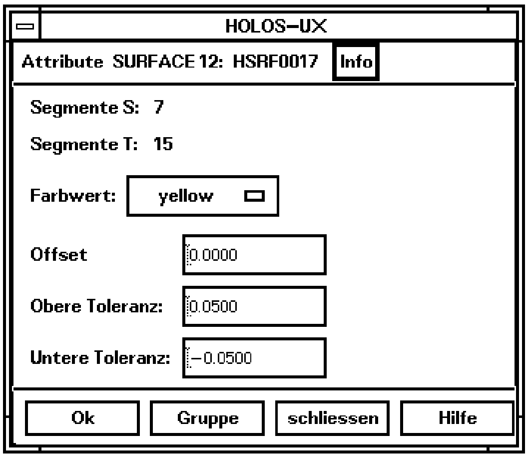


Figure 13-3

Various information about the selected element appears at the top of the window, e.g. the name of the element, the number of segments.

Color value

Click on the key for setting the color.

A list of available colors appears.

Click on the desired color.

Offset

Enter the offset value in the text field.

Tolerances

Enter the values for the upper and lower tolerance into the text fields.

Accept the settings for the selected element with <OK>.

Group

You can define attributes for a group of elements.

First, select a group.
Then click on the <Attributes> function in the <Objects> menu and define the attributes as described above.

Click on <Group>, in order to accept the attributes for the whole group.

Info

Click on <Info>, if you require information about already defined attributes.

You will obtain a list of the elements for which attributes have already been defined.

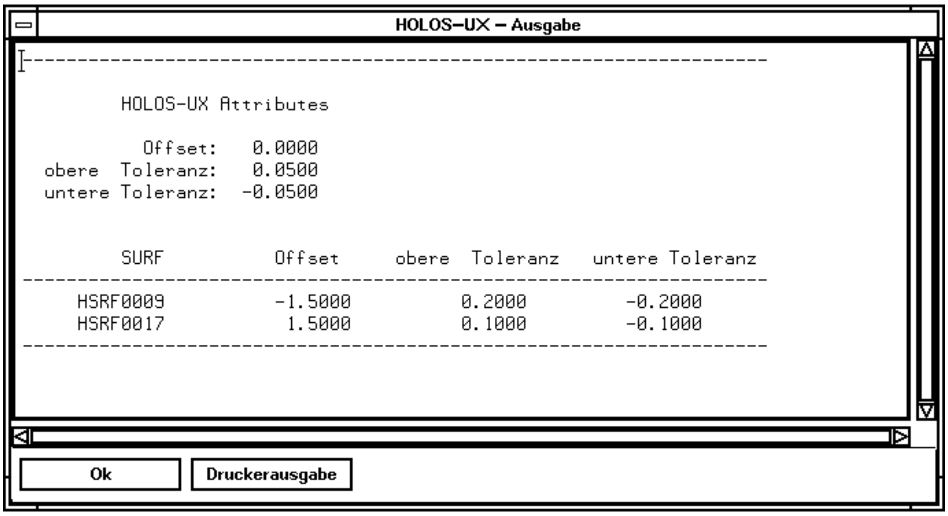


Figure 13-4

The set attributes are taken into account during subsequent evaluations for actual data and sections:

Example:

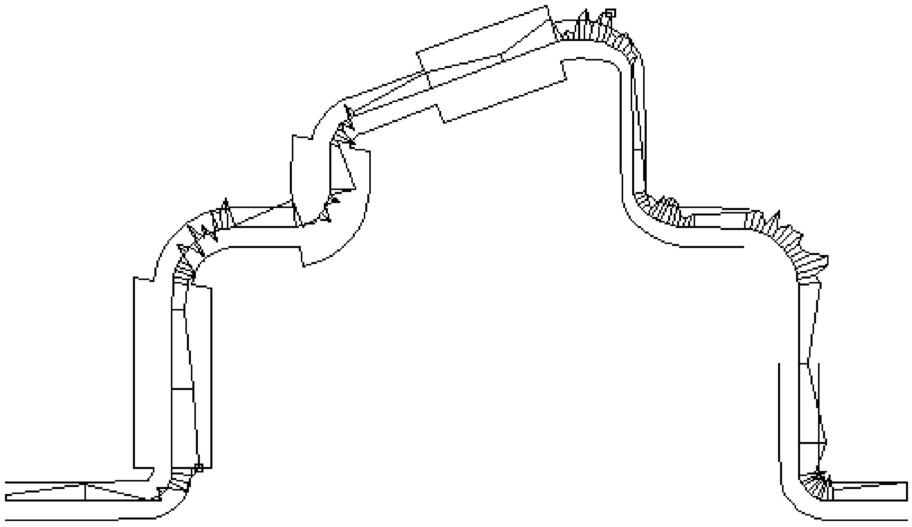


Figure 13-5, Section evaluation with different tolerances

Rotate orientation

With this function you rotate the orientation of the selected object. A rotation in the orientation can be necessary if you generate surfaces from curves or if you "reparametrise“ several surfaces (see function <Analysis>) or if the orientation in the VDA file is incorrectly defined, which would lead to collisions in the measuring run.

The function has the following effects:

- For surfaces the parameters S and T will be interchanged. The surface normal will be rotated.
- For Patches the parameters u and v will be interchanged. The normal of the entire surface will be rotated.
- For Faces the orientation of the associated surface will be rotated.
- For curves the direction of travel will be rotated.
- The orientation will be displayed immediately.

The rotation of the orientation cause a change in the data structure. The data structure will be stored in accordance with the system parameters in the <Parameter> menu.

NOTE:

In manual probing ("Patch identification“) the program recognizes whether the probing direction agrees with the surface normal of the identified patch. If this is the case, the orientation of the patch will be automatically rotated.

Operation

Select the object that is to be modified.

Click on the function <Rotate orientation>.

The orientation will be rotated and displayed immediately.

13.10 Catalog of the objects

The function <Catalog> lists all existing objects of a particular type by their names and then permits the selection of a particular object. The object types will be selected via the subfunctions:

- Surfaces
- Faces
- Curves

Purpose of the function

The function is used for the selection of objects where clicking on one with the mouse is difficult. This is the case, for example, when several objects are lying one on top of the other. Selected objects will be immediately marked in color.

Operation

Click on the function <Catalog> and then the desired object type.

A window will be overlaid with all objects of this type.

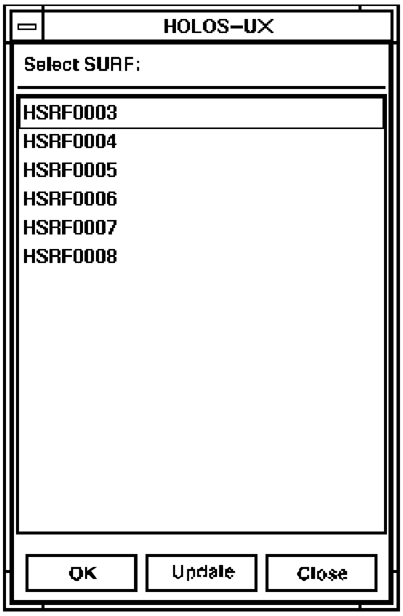


Figure 13-6

Select the object name.

The object will be color marked in the graphics window.

By renewed selection, an already selected object will be deselected again.

13.11 Search for object

With the function <Search for object> you can search for objects via their names.

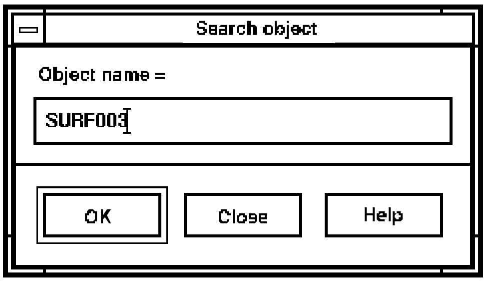


Figure 13-7

Operation

Click on the function <Search for object>.

A window is opened for entry of the object name.

Enter the text and accept the entry with <OK>.

The object will be in the graphics window color marked and selected.

By clicking on <OK> again you deselect the object again.

14 Working with groups of objects

This chapter describes the functions in the <Group> menu. They are used in the definition and management of groups.

If certain functions are to have an effect on a number of objects, combine these objects together in a glossary group beforehand.

The main function <Group> branches off to the following functions:

- Define group
- Extend group
- Delete group
- Display group
- Bézier polygon
- Store group
- Load group
- Select group
- Copy group
- Rename group
- Delete group

14.1 Local groups

A local group is valid until the "Select mode“ (group, single, analysis) is changed, but will however have a maximum duration of a work session.

Groups will be formed by selecting objects.

You will find further information about how to select objects in Chap. 13.1.

Purpose of the group

A group is a prerequisite for numerous interactive functions. A defined group is a requirement for the definition of certain measuring runs and in the interactive generation of surfaces from curves.

14.1.1 Define group

With the function <Define> you activate the "Groups select mode“, which is noticeable by the message "Select: GROUP“ in the status line. As long as this mode is active, you can select objects by clicking on them and then combine them into a group.

Operation

Click on the function <Define>.

A group that possibly exists will be deleted.. You can now define a new group.

Click on the objects that you want to combine into a group.

The objects will be marked in color.

If you want to remove an object from the group, click on it once again.

If you want to add objects to an existing group, utilize the function <Extend>.

To arrive back in the "Single select mode", press the middle mouse button whilst the mouse cursor is in the graphics window.

The status line then shows "Select: SINGLE“.

14.1.2 Extend group

With the function <Extend> you can add objects to an existing local group. This function is only necessary, if the program is no longer situated in "Groups select mode“.
If the program is still in the above mode, a group can be extended at any time by clicking on further objects.

Operation

The function <Extend> activates the "Groups select mode “ and will subsequently be operated like the function <Define>.

14.1.3 Delete group

With the function <Delete> you deselect all objects in the current group and as a result delete the group. The objects themselves will not be deleted in the process.

14.1.4 Display group

With the function <Display> all objects in the current group will be listed together with their names in a special window.

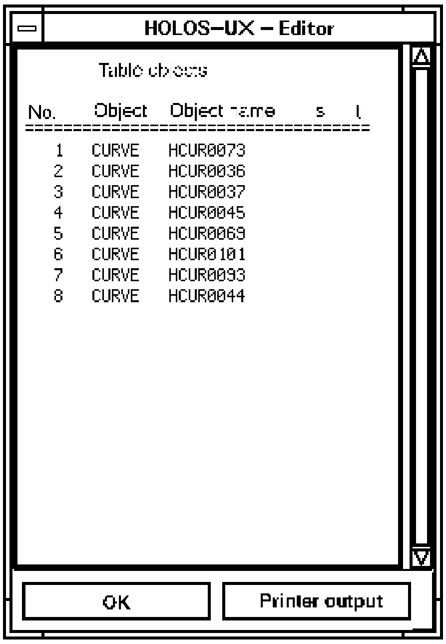


Figure 14-1

14.2 Display Bézier polygon

With the function <Bézier polygon> you display the Bézier polygon for the surfaces and curves of the current group. The Bézier polygon shows the interpolation points of a surface.

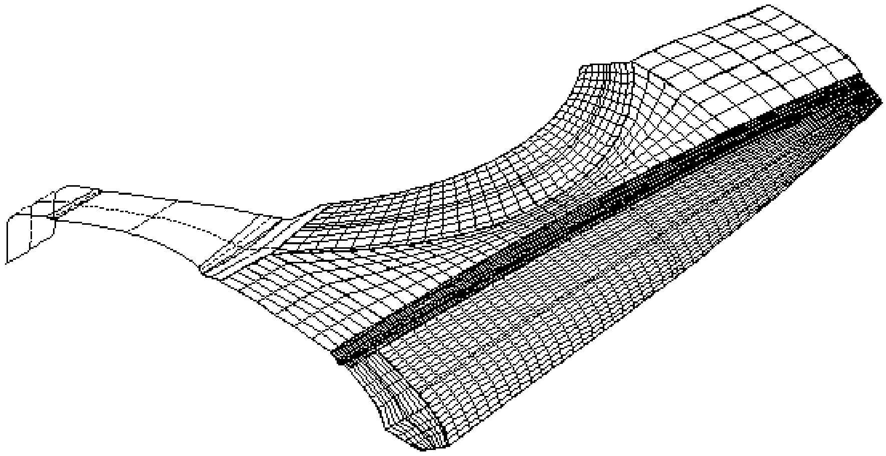


Figure 14-2

Further information on the Bézier polygon is contained in the appendix.

NOTE:

If the representation is changed (rotation, view, refresh etc.) the polygon will be deleted again.

14.3 Global groups

A global group will be stored under a name and is therefore available again at any time.

NOTE:

If a VDA file contains the element GROUP, it will as a result be transferred as a global group.

A global group can be selected and deleted as a totality and consequently provides a faster access.

14.3.1 Store group

With the function <Store> you file away a local group as a global group. The group will be stored in conjunction with the entry of a name.

📖 Text entry is described in Chap. 1.8.4.

Once you have entered the name and confirmed it, the remaining part of the model will be blanked out. All subsequent actions then apply only to the group.

Via the management of the global groups you can always obtain access to the entire model. If you want to work with the entire model once again, load it by means of the function <Load group>.

14.3.2 Load group

With the function <Load> you load a global group into the main memory. To select the group, a window will be overlayed listing all the groups for a model. The model itself is always included.

📖 The operation of selection windows is described in Chap. 1.8.5.

14.3.3 Select group

With the function <Select> you select a group from the list of existing groups. In the process you automatically select all of the objects in this group. This has the advantage that you no longer have to click on the objects individually.

> **NOTE:**
> *If you select the entire model as a group, **all** of the objects that the model contains will be selected.*

14.3.4 Copy group

With the function <Copy> you copy the grouptemporarily available in the working memory, and file it under another name on the hard disk.

To create the copied group, you have to enter a group name.
🕮 Text entry is described in Chapter 1.8.4.

14.3.5 Rename group

With the <Rename> function you allocate a new name to a group.

For selecting the group, all existing groups are overlayed in a window.
🕮 The selection window is described in Chapter 1.8.5.

Select the required group and confirm with <OK>.

Another window appears.

Enter the new name and confirm with <OK>.
🕮 Text entry is described in Chapter 1.8.4.

14.3.6 Delete group

With the function <Delete> you delete global groups from the hard disk. The objects in a group will not be deleted in the process. To select the group, a window will be overlayed listing all the groups for a model.

The operation of selection windows is described in Chap. 1.8.5.

Before the delete action is carried out, you first have to confirm a safety query.

You cannot delete the model itself by using this function. For this purpose utilize the function <Delete model>.

> ***NOTE:***
> *You cannot delete an active group. If you want to delete the active group, you must first load a different group or the model.*

15 Transformation of objects

This chapter describes the functions in the <Transformation> menu. The functions are used to modify the position of objects or to generate new objects in a modified position.

The main <Transformation> function is subdivided into the following functions:

Mirroring

Translation

Rotation

Offset surface

Scaling

Mirroring nominal values

Basic information on transformations

NOTE:

Take care when using these functions since in the process surface data will be modified. Also remember that afterwards the nominal data will no longer be valid!

Where objects are dependent on other objects, these will be automatically transformed at the same time. Example: a FACE is to be transformed. As a result of this, the associated surfaces and curves will also be transformed.

15.1 Mirroring objects

With the function <Mirroring> all selected objects will be mirrored. The "mirror axis" is one of the three basic planes. You select one of them via the function's input window.

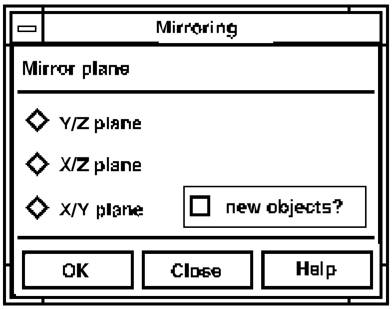


Figure 15-1

If the option "new objects?“ is selected, new objects will be created in addition to the original. If option is not selected, the original objects will be overwritten by the mirrored objects.

If you want to transform objects which will be referenced by several other objects, where necessary copies will have to be generated, which won't then be overwritten.

Example: A curve can be referenced from several FACE elements. If just one of these FACES is transformed, the original curve is thus preserved.

Operation

First select the object or the group of objects that are to be mirrored.

Click on the function <Mirroring>.

An input window is opened.

Select the plane in which mirroring is to take place.

Decide whether new objects are to be created, and if so, click on the "new objects?" check box.

Accept the options that were entered with <OK>.

The operation will be carried out.

15.2 Translation of objects

With the function <Translation> you translate all of the selected objects. You enter the direction and magnitude of the translation in the function's input window as the "Translation vector“.

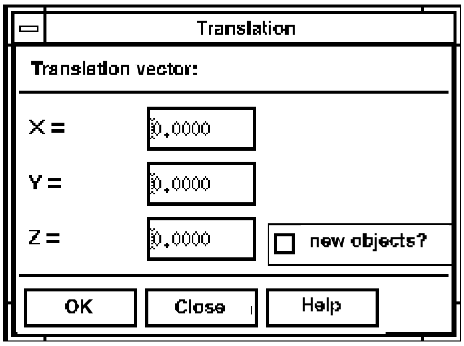


Figure 15-2

If the option "new objects?“ is selected, new objects will be created in addition to the original. If option is not selected, the original objects will be overwritten by the translated objects.

Operation

The function <Translation> is operated in the same way as the <Mirroring> function.

📖 The text entry operation is described in Chap. 1.8.4.

15.3 Rotation of objects

With the function <Rotation> you rotate all selected objects. You enter the rotation point and rotation angle in the function's input window. The rotation angle refers each time to an axis, about which rotation will then take place.

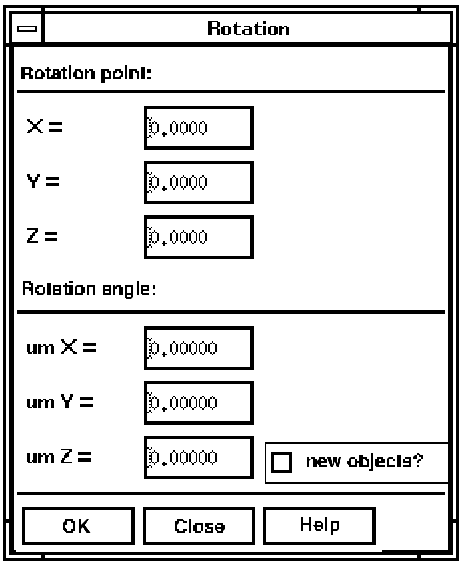


Figure 15-3

If the option "new objects?“ is selected, new objects will be created in addition to the original. If option is not selected, the original objects will be overwritten by the translated objects.

Operation

The function <Rotation> is operated in the same way as the <Mirroring> function.

🕮 The text entry operation is described in Chap. 1.8.4.

15.4 Scaling

To scale selected objects activate the <Scaling> function in the <Transformation> menu.

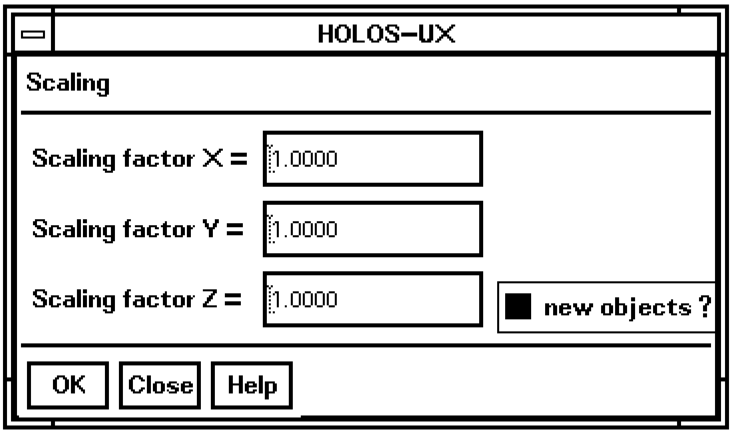


Figure 15-4

Scaling factor in X, Y and Z

Enter the scaling factor here. The defined objects are transformed by the scaling factor.

New objects

If you activate this function, new elements are generated during scaling.
If the function is deactivated, no new objects are generated, i.e. the defined elements are transformed directly.

Transformation of objects

When a transformation function is activated, a further window is overlayed, in which you can define which elements are to be transformed:

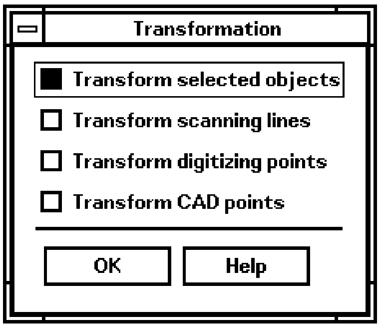


Figure 15-5

Transform selected objects

Activate this function in order to transform selected objects (surfaces, faces, curves).

Transform scanning lines

Activate this function in order to transform scanning lines. If scanning lines are selected, only these scanning lines are transformed.

Transform digitizing points

Activate this function in order to transform digitizing points.

Transform CAD points

Activate this function in order to transform CAD points.

15.5 Mirror nominal values

For axially symmetrical workpieces as a rule only the data for one half will be stored and supplied to further processing systems. Therefore in HOLOS not all of the data is available, that is necessary for a complete quality assurance.

Using the function <Mirroring measuring runs> nominal values that have already been defined can be mirrored in a mirror plane. If there are no surfaces in existence for the mirrored area, the associated surfaces will be automatically co-mirrored.

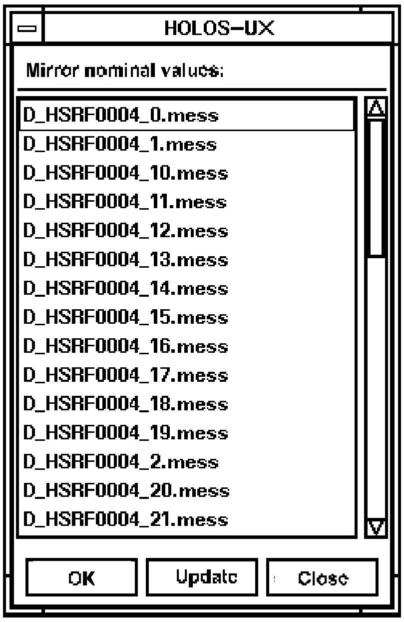


Figure 15-6

Operation

Click on the function <Mirror nominal values>.

A window is opened to select from existing measuring runs.

Select the relevant measuring run and confirm with <OK>.

The nominal values will be displayed on the screen and a window is opened to specify the mirror plane.

Transformation of objects

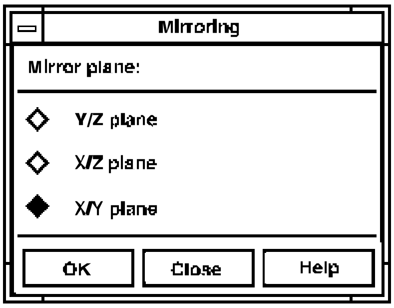


Figure 15-7

Select the desired mirror plane and confirm with <OK>.

The measured points displayed will be mirrored.
An attempt will be made to identify a surface in the target area.

If no surface is found, the surface that belongs to the nominal points will be co-mirrored.

15.6 Offset surface

The offset surface denotes a surface that has been shifted in the normal direction. For this type of translation the direction is fixed. You simply specify the value of the translation. The value can be positive or negative.

positive value:	Offset surface will be shifted in the directional sense of the normal.
negative value:	Offset surface will be shifted contrary to the directional sense of the normal.

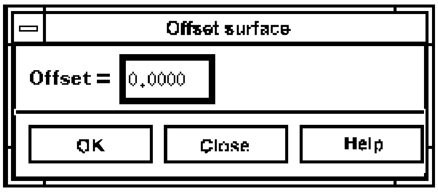


Figure 15-8

Purpose of the function

If for example, the surface was generated on the model, the sheet thickness can be added by means of the positive offset value.

Operation

First select the surface.

Click on the function <Offset surface>.

A window is opened for entry of the offset.

Enter the value and confirm with <OK>.

The offset surface will be calculated and shown in addition to the old surface. In the process the old surface will be marked.

16 Installation

16.1 General

The software will normally be already pre-installed on the hardware that is delivered. Where this is not the case you will receive a DAT tape containing your software.

To install the software carry out the following steps:

1. Terminate all processes that are currently running.
2. Log on to your system as super-user.
3. Mount the supplied DAT tape in your DAT drive.
4. By entering the following command your software will be installed:

update -s /dev/dat “*”

/dev/dat designates the device file for the DAT drive. If a different device file is defined in your system, you will need to substitute it for the one given here.

5. Log off as super-user
6. Start your system.

Your HOLOS-Software has now been installed.
With a new installation there are various parameters to be defined. The necessary steps to carry this out are contained in this description.

When installing a software update the steps described above are likewise to be carried out. The following installation tasks must not however be repeated, as the defined parameters will not be overwritten.

16.2 Prerequisites

During the installation of HOLOS-UX a directory "/users/holos/“ will be created. All the files that are necessary for the HOLOS processes are located within this directory. The only exception this are the resource files for the operator interface under X-Windows, because specific resources also need to be available to other processes.

The drivers for the graphics software and for graphics output to external media (plotters, printers) are not fixed-programmed, but will be read in to the system via environment variables during the actual program start. This facilitates matching to various types of peripheral devices. Various definitions are necessary for this however, which will normally be carried out by the CZ-Installation Tools.

These environment variables will be defined either in a local file "kshrc“ or "profile“ in the user's home directory.

16.2.1 Graphics screen

The driver for the output to the graphics screen is defined via the environment variable SB_OUTDRIVER.
The delivered version has the sox11 driver predefined:

HOLOS SB_OUTDRIVER=sox11
export SB_OUTDRIVER

16.2.2 Plotter output

The driver for output to a plotter or ink-jet printer (Paintjet) is defined via the environment variable SB_PLTDRIVER. This variable can have the following values:

(1) SB_PLTDRIVER=hpgl

(2) SB_PLTDRIVER=CADplt

(3) SB_PLTDRIVER=CADplt2

All three drivers generate HPGL files as output , which can be directed to a plotter or ink-jet (Paintjet) printer that is installed on the network.

The table listed below shows which drivers you have to define for which plotters during the system installation.

This table is an extract from Hewlett-Packard documents. For that reason no guarantee can be made regarding its current correctness. If problems arise in connection with specific plotters, ask your Systems Administrator.

Driver	Plotters supported		
HP-GL	HP 7440A	HP 7470A	HP 7475A
hpgl	HP 7550A	HP 7570A	HP 7575A
	HP 7576A	HP 7580A	HP 7580B
	HP 7585B	HP 7586B	HP 7595A
	HP 7596A	HP C1600A	HP C1601A
HP-GL	HP 7510A	HP 7550A	HP 7570A
CADplt	HP 7575A	HP 7576A	HP 7580B
	HP 7585B	HP 7586B	HP 7595A
	HP 7596A,	HP C1600A	HP C1601A
HP-GL/2	HP 7595B	HP 7596B	HP 7599A
CADplt2	HP C1600A	HP C1601A	HP C1602A
	HP C1620A	HP C1625A	HP C1627A
	HP C1629A	HP C1631A	

When the system is delivered the following driver is predefined for plotter output.

```
SB_PLTDRIVER=CADplt
export SB_PLTDRIVER
```

Plotter pens

Assign the pens for the output to a plotter as follows:

Pen 1:	Black
Pen 2:	Red
Pen 3:	Yellow
Pen 4:	Green
Pen 5:	(any, since not used)
Pen 6:	Blue
Pen 7:	(any, since not used)
Pen 8:	(any, since not used)

16.2.3 X-Windows environment

To initialize the X-Windows functionality of the operator interface the display variable DISPLAY needs to be defined. As a rule this is specified after installation of the software. The definition of these variables is located in local file ".x11start" in the user's home directory.

For installation on the system console:

```
: ${DISPLAY=`hostname`:0.0}; export DISPLAY
```

or

```
DISPLAY=`hostname`:0.0
export DISPLAY
```

For installation for an X-Terminal:

```
: ${DISPLAY=xterm:0.0}; export DISPLAY
```

or

```
DISPLAY=xterm:0.0
export DISPLAY
```

The definition of the directory for the operator interface resources under X-Windows is carried out via the environment variable XAPPLRESDIR. The entire resource files necessary for the Zeiss software are located in this directory. This directory will be created during the software installation and contains all the necessary entries.

The definition of the environment variables XAPPLRESDIR takes place in the local file ".x11start" in the user's home directory and is generally carried out by the CZ Installation Tools.

: ${XAPPLRESDIR:="/users/zeiss/app_defs/"}; export XAPPLRESDIR

or

XAPPLRESDIR="/users/zeiss/app_defs/"
export XAPPLRESDIR

The remaining installation tasks such as the creation of all the necessary directories and special entries in system files will be carried out by the HOLOS Installation Tool.

16.3 Installation tool, INSTALL

You invoke the HOLOS Installation Tool by means of the command "INSTALL". The HOLOS Installation Tool will be used to define various parameters such as language identification, measuring software on the coordinate measuring device's computer, as well as the drivers for the peripheral devices.

For the installation of the data communications module for communication with the measuring software a number of entries need to be made in system files or directories. For that reason the installation tool INSTALL needs to possess the super-user access rights.

As a rule this will be carried out during the software installation. If nevertheless there are problems after the installation, the access rights of the installation tool INSTALL, should be checked first of all. This is carried out with the command "ll /users/holos/bin/". In the list that appears the entry for INSTALL should look like the following:

-rwsrwsr-x 1 root sys 1149101 Jan 11 15:58 INSTALL

Installation

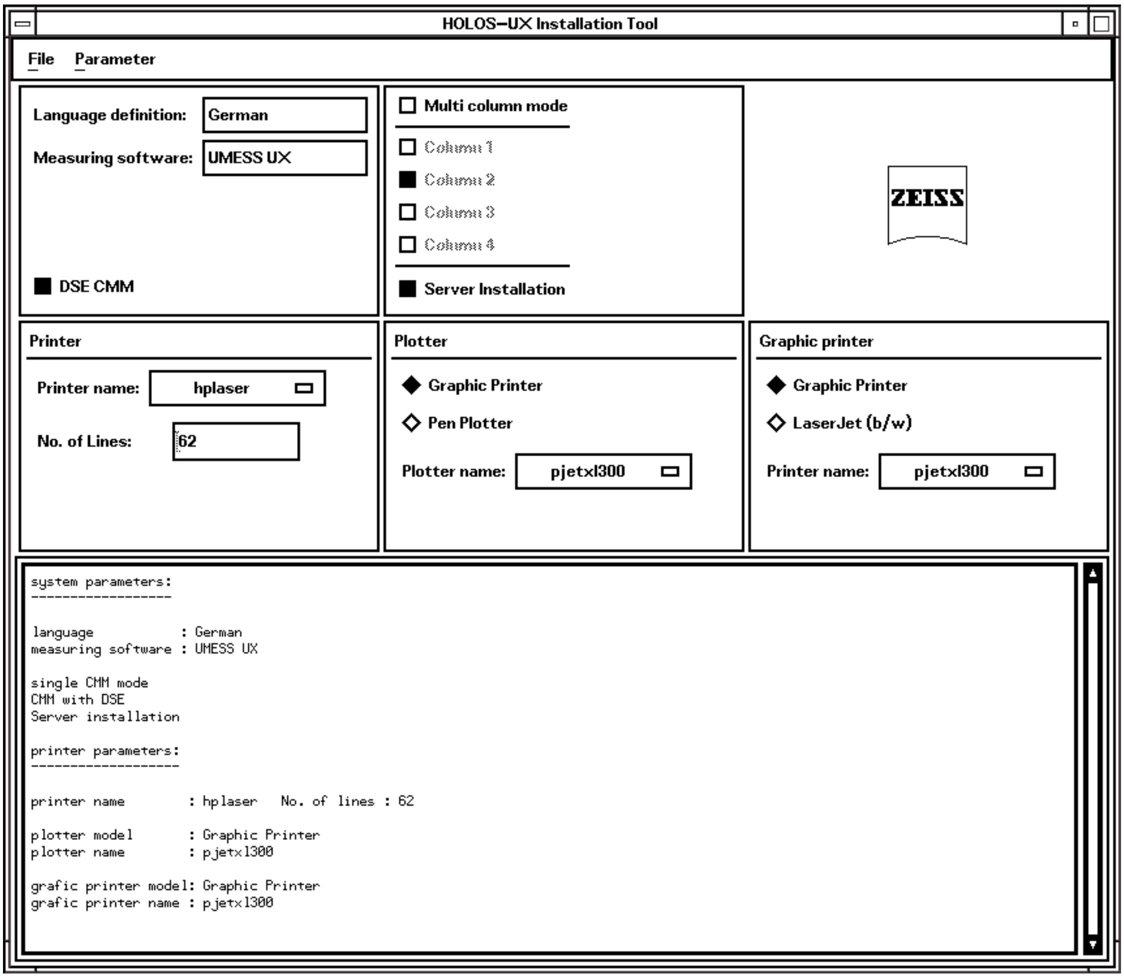


Figure 16-1

On a screen form you define the parameters in the installation tool INSTALL:

- language definition
- measuring software
- printer (Printer settings)
- plotter (Plotter settings)
- graphics printer (Graphics printer settings)

16.3.1 Language definition

Here you set up the language definition for text output and for the operator interface text.

By clicking on the menu button for the language definition with the left mouse button, a menu appears showing all of the available languages. The respective language definition is transferred by clicking on it with the right mouse button.

The default setting for the language definition is German. If a language definition is set up which does not exist on the system, the system will switch back to the default setting.

16.3.2 Measuring software

Here you define the measuring software on the coordinate measuring device's computer.

By clicking on the menu button for the definition of the measuring software with the left mouse button, a menu appears showing all of the available systems. The respective system is transferred by clicking on it with the right mouse button.

- UMESS 300: measuring system on CMS systems
- UMESS UX: measuring system on UNIX systems
- UMESS 1000: measuring system on HP 1000 systems
- SCANMAX

For communication with the corresponding measuring software a number of entries need to be made in system files or system directories. For that reason the installation tool, INSTALL needs to have super-user access rights (see above).

16.3.3 Peripheral devices

Here you define the connections to the peripheral devices, such as printers, plotters and graphics printers. The peripheral devices can be installed either locally on the HOLOS computer, or on another computer within the network.

During the installation of such devices in the system device names will be issued. You must specify these device names in the installation tool INSTALL.

Printer parameters

printer name	Name of a printer installed in the system. All text output will be printed on the printer that is defined here (e.g. measuring records).
lines	Number of lines per output page

Plotter parameters

plotter model	During the installation of a plotter (Pen plotter or Paintjet) you need to define the type and the name of the plotter. By clicking on the menu button for the definition of the plotter type with the left mouse button, a menu appears with the available plotter systems. You transfer the respective plotter type by clicking on it with the <u>right</u> mouse button.
plotter name	Name of a plotter that is installed in the system

Graphics printer parameters

printer model	During the installation of a graphics printer you need to define the type and the name of the graphics printer. By clicking on the menu button for the definition of the printer type with left mouse button, a menu appears with the - available printer systems. You transfer the respective printer type by clicking on it with the <u>right</u> mouse button.

printer name	Name of a graphics printer that is installed in the system.

Graphics printers are used in the output of graphics dumps. In the process the entire contents of the graphics window will be output on the printer. In this way, outputs that cannot be output on plotters (e.g. the representation of deviations in chromatic coordinates), can also be produced in a paper form.

The graphics printer types Paintjet and Deskjet permit the output of colored images. On the Laserjet only black-and-white images can be output.

In principle the output of the measuring records is also possible on the graphics printer. Since however the types Paintjet and Deskjet in particular are relatively slow, this is not to be recommended by using one of these graphics printers.

16.3.4 Parameters

The parameters that have been modified can be stored or displayed in the lower text window with the function <Parameter> in the menu bar.

16.3.5 Terminating the installation tool, INSTALL

You quit the installation tool INSTALL
via the <Quit> function in the <File> menu.

If the parameters that have been modified, have not also been saved by using the function <Save parameters>, then on quitting the installation tool INSTALL, the user will be requested to save the changes. For this a dialog window is opened.

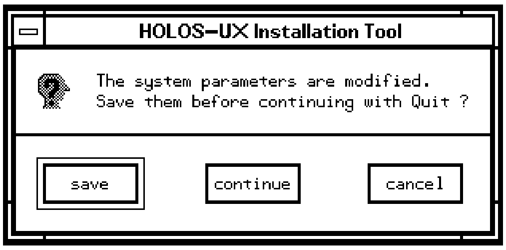


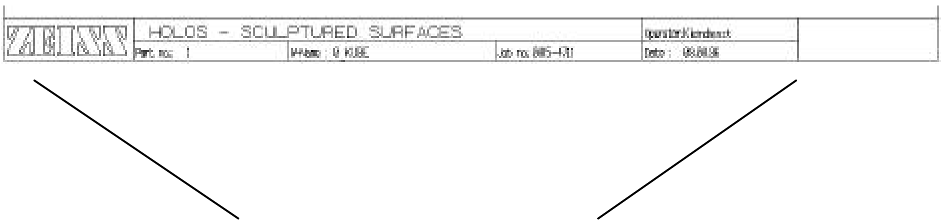
Figure 16-2

Using the <Save> button the parameters that have been modified will be transferred and the previously defined action continued. (<Quit> or <Start HOLOS>).

The <Continue> button resumes the previously defined action without transferring the defined parameter values.
With the <Cancel> button you cancel the action, and the installation tool INSTALL remains active.

Appendix A – Variable Logo in Graphic Log

HOLOS-UX offers the possibility of entering your own logo as part of the graphic log.



Frame 1 Frame 2

Frame positions for entering own logo

Diag. A-1

The two frame positions are defined by their coordinates on the screen.

Frame 1: Range of values X: 0 ... 140 Y: x1 0 ... 40

Frame 2: Range of values X: 920 ... 1075 Y: 0 ... 40

The characters for the display of your own logo must be projected within this range of values.

must A maximum of 200 points per character can be set.

The data be in a file with the name logo.dat in the directory /users/holos/sys.

The file holds data in the following format:

Number of characters
Number of points character 1, fill_wazzu flag, color, closed_flag
y1
x2 y2
: :
: :
xn yn
Number of points character 2, fill_flag, color, closed_flag
: :
: :

Model management

Number of characters:	defines how many characters are held in the file
Number of character points:	defines the number of points a character is stored composed of
fill_flag:	defines whether a character is displayed color-filled or only as a boundary polygon. 0 = not filled 1 = filled
color:	defines the color in which the character is to be displayed. 0 = white 2 = red 3 = yellow 4 = green 5 = cyan 6 = blue 7 = magenta
closed_flag:	Defines whether a character concerned is a closed polygon. 0 = not closed 1 = closed

Example:

```
2
4  0  2  1
   0    0
   140          0
   140          40
   0            40
4  0  3  1
   920          0
   1075         0
   1075         40
   920          40
```

This example of the file logo.dat draws a rectangle at each of the two frame positions.

The rectangles are not filled with color (fill_flag = 0) and are closed (closed_flag = 1).

Rectangle 1 will be displayed in red (color = 2), rectangle 2 will be displayed in yellow (color = 3).

NOTE:
A logo.dat fill is supplied with the system, in which the ZEISS-logo is defined. Before you create your own file, this file should be copied for safety.

Glossary

Bézier polygon

The Bézier polygon is an approximation to a real surface. In other words: a curved surface will be approximately described with plane polygons (sets of connected lines). With the help of the Bézier polygon inaccuracies in the curvature progression of a generated surface will be made visible.

Continuity

A function is continuous at a particular point

- if the value of the function exists at this point and
- if the left- and right-hand side limiting value at this point is equal to the value of the function.

In other words: a function is continuous at a particular point if it has neither a gap nor a step there.
HOLOS-UX differentiates three degrees of continuity:

1. C0 continuous or continuous:	the above-mentioned condition applies only to the function.
2. C1- continuous or tangential continuous:	the above-mentioned condition also applies to the first derivative of the function.
3. C2- continuous or curvature continuous:	the above-mentioned condition also applies to the second derivative of the function.

Deviation

A deviation in the measuring technology sense relating to freeform surfaces is the perpendicular distance of a measured spatial point from a freeform surface (distance in the direction of the surface normals).

Glossary

Digitization

Digitization denotes the collection of individual points on a surface. In HOLOS-UX the digitize function is used to describe unknown contours mathematically. For this purpose, various functions are available for the generation of individual points, curves and surfaces. Individual points and curves can be further processed to surfaces in a graphic interactive manner.

Digitization process

In HOLOS-UX the digitization process denotes the procedure of collecting additional surface points on the workpiece surface, in order to attain a particular accuracy. This procedure runs automatically to a large extent, so that relatively little operator interaction is necessary.

FACE

A FACE is a freeform surface bounded by curves. The surface with its surface segments can in its mathematical description go beyond the limits of an actual existing surface geometry. The actual surface will then also be limited in its mathematical description by curves on the mathematical surface.

"Fix in space"

The nominal/actual value pairs must be chosen such that a model's points of contact are also the nominal points.
This will prevent the model from moving in an undesired direction during the transformation and giving rise to incorrect values.

Freeform surface, SURF

A freeform surface is any given smooth surface with a contour having numerous curves. A freeform surface can consist of several surface segments (patches), which are themselves independently, mathematically described.

Patch-Ident

Patch ident denotes the identification of a surface segment after any given probing on the workpiece surface. In the process the deviation on this surface segment will be determined.

Polynomial degree

The maximum exponent in the mathematical description of a curve or surface. The maximum polynomial degree that HOLOS can process from external data is 20.

Re-parametrisation

Re-parametrisation in HOLOS-UX denotes the combining of patches to form a new surface with a modified number of surface segments, that is modified parameters S and T. The re-parametrisation is used to close and define surface transitions.

Segmentation

Subdivision of a freeform surface into patches (= surface segments). The parameters S and T determine the division in rows and columns of patches.

Surface segment, Patch

A Patch is a segment of a freeform surface which in itself is completely described mathematically. Patches have a local parametrisation in the parameters u and v, where u and v can assume values between 0 and 1.

Transformation

The computing rule for the conversion of values. The alignment of the measured points on the surface points yields a computing rule for converting the machine coordinates to the workpiece coordinates. This computing rule is called transformation.

Translation

Translation of the coordinate system without rotation.

Glossary

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