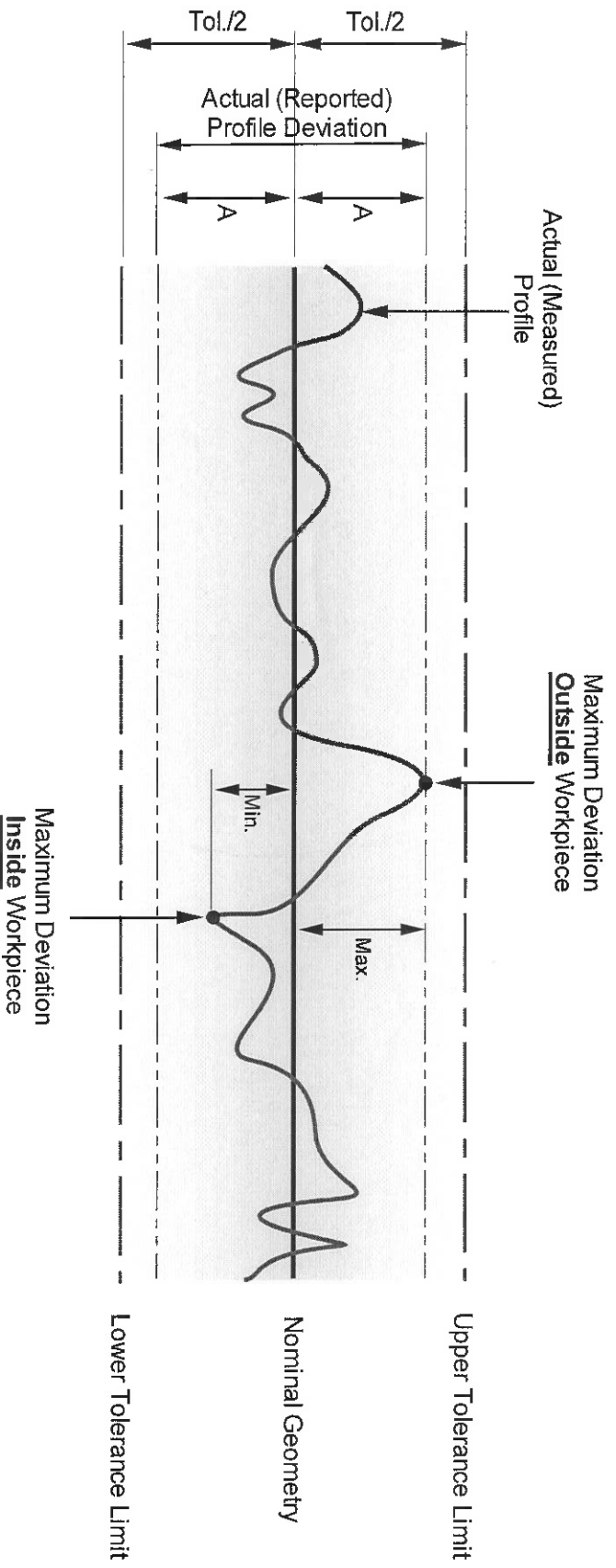# Profile Tolerance Calculation

Tolerance zone shape: *Bilateral (Equally-Distributed)*

1. Find the largest deviation **OUTSIDE** workpiece (Max).
2. Find the largest deviation **INSIDE** workpiece (Min).
3. **A** = Largest **ABSOLUTE** value of either Max, or Min.
4. Reported **Actual** profile deviation = **2xA**

Profile Tolerance Calculation

Tolerance zone shape: *Bilateral (Equally-Distributed)*

Tol.

Tolerance Zone

Nominal Geometry

Max = 0.0456
Min = -0.0185

A = 0.0456
Actual. Profile Deviation = **2xA** = 0.0912

Features window:

Comment: Plane1

Clearance Group — Nominal Definition Alignment

CP +X — Options — Base Alignment

Strategy — Evaluation

Tolerance For: Plane1

	Nominal	Actual
☐ X	-67.0000	-65.5129
☐ Y	-0.0000	1.4831
☑ Z	0.0000	0.0000
☐ A1 XYZ	0.0000	-0.0000
☐ A2 YIZ	0.0000	0.0000

Space Axis: Z — Z

Length 1	67.0000	64.8094
Length 2	78.0000	75.0086
Start Angle	0.0000	0.0000

Sigma: Form 0.0641 — Point no 185 — Point to Max 251

Min -0.0185 — Max 0.0456

OK — Reset

GDT Profile window:

DIN Flächenform1 — Comment

Bilateral — 0.1000 Tolerance — Shape Of Zone — Tolerance [one side] 0.0000

Feature: Plane1

Alignment of Feature — Datum Reference Frame
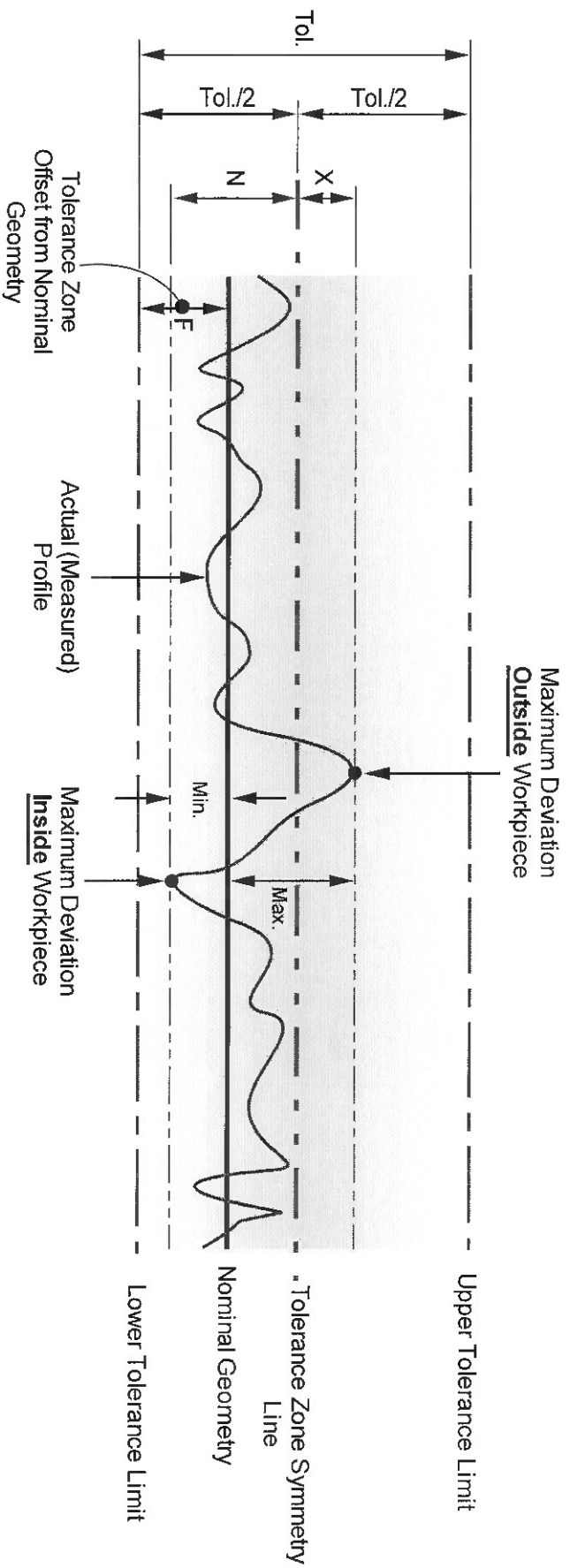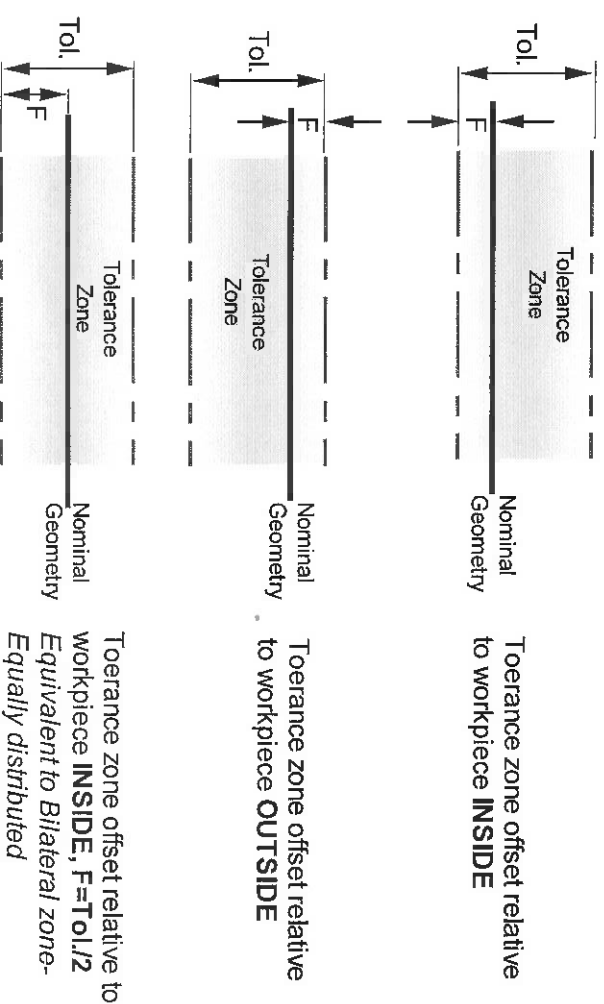
Primary Datum: Base Alignment

Actual: 0.0912

OK — Reset

---

1. Find the largest deviation OUTSIDE workpiece (Max).
2. Find the largest deviation INSIDE workpiece (Min).
3. **A** = Largest ABSOLUTE value of either Max, or Min.
4. Reported **Actual** profile deviation = **2xA**

3

Profile Tolerance Calculation

Tolerance zone shape: *Bilateral (Unequally-Distributed)*

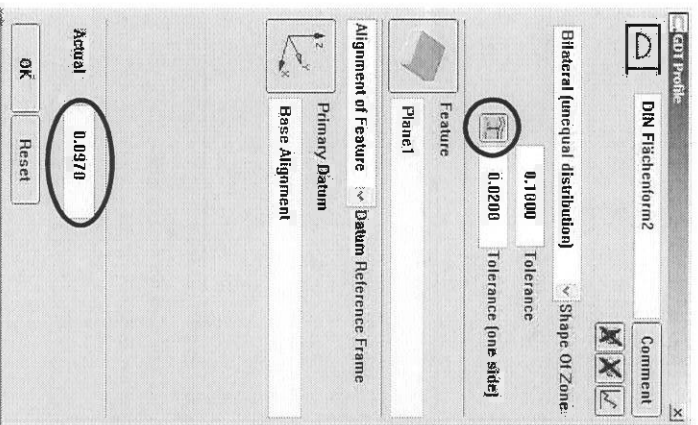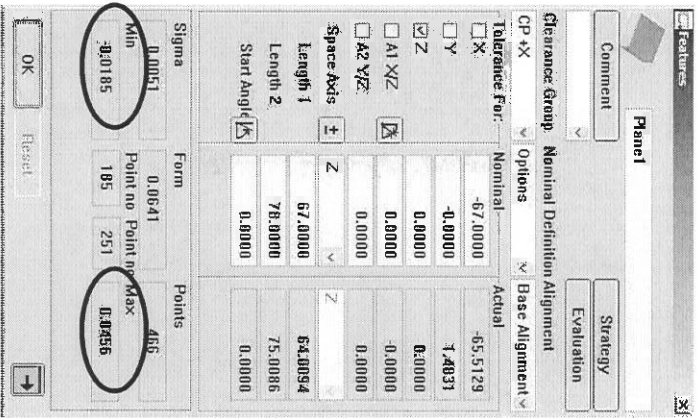
1. Construct the **symmetry line** for the tolerance zone.
2. Find the largest deviation **OUTSIDE** workpiece (Max).
3. Find the largest deviation **INSIDE** workpiece (Min).
4. **X** = Distance between **Max** and tolerance zone **symmetry line**.
5. **N** = Distance between **Min** and tolerance zone **symmetry line**.
6. **A** = Largest value of either **X**, or **N**.
7. Reported **Actual** profile deviation = **2xA**

Toerance zone offset relative to workpiece **INSIDE**

Tolerance zone offset relative to workpiece **OUTSIDE**

Tolerance zone offset relative to workpiece **INSIDE, F=Tol./2** Equivalent to Bilateral zone-Equally distributed

4

Profile Tolerance Calculation

Tolerance zone shape: *Bilateral (Unequally-Distributed)*

Features — Plane1

Tolerance For:	Nominal	Actual
	-67.0000	-65.5129
	-0.0000	1.4831
Z	0.0000	0.0000
	0.0000	-0.0000
	0.0000	0.0000

Z	Z
67.0000	64.0094
78.0000	75.0086
0.0000	0.0000
0.0000	0.0000

Sigma	Form	Point no	Point no Max	Points
0.0051	0.0641	185	251	466
Min -0.0185			**Max 0.0456**	

GD&T Profile — DIN Flächenform2

Bilateral (unequal distribution) — Shape Of Zone
0.1000   0.0200 Tolerance [one side]
Feature: Plane1
Primary Datum — Base Alignment

Actual 0.0970

Tol. F Tolerance Zone Nominal Geometry

Max = 0.0456
Min = -0.0185
Tol = 0.1
F = 0.02 to workpiece **INSIDE**

Tol. Zone Symmetry Line Location = Tol./2 - F
= 0.05 - 0.02 = 0.03

X = 0.0456 - 0.0300 = 0.0156
N = 0.0185 + 0.0300 = **0.0485**

A = 0.0485
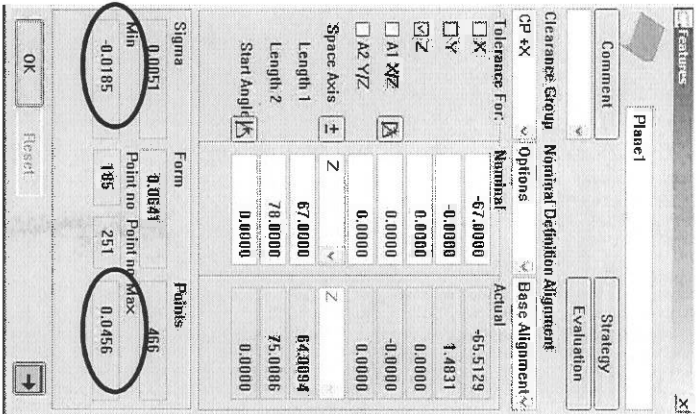Actual. Profile Deviation = 2xA = 0.0970

Profile Tolerance Calculation
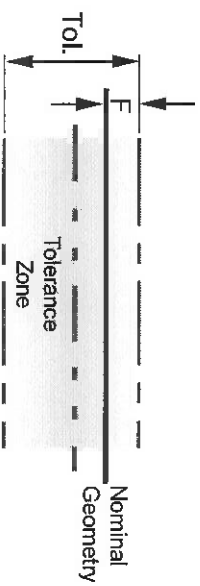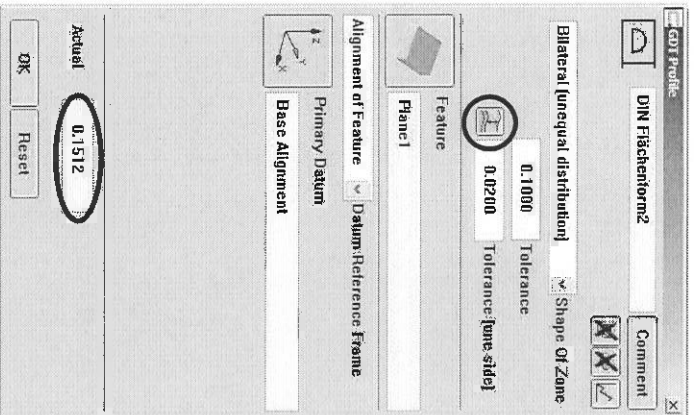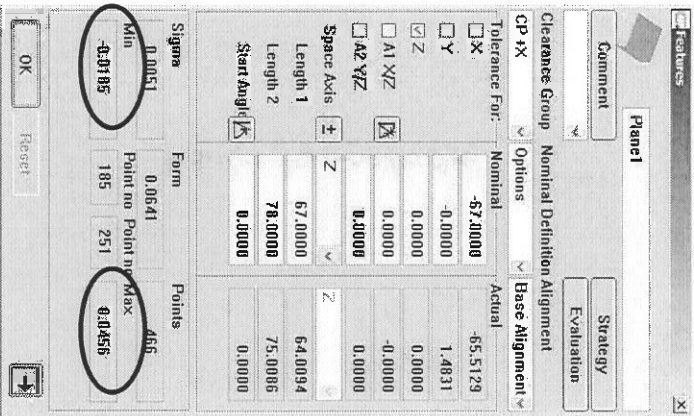
Tolerance zone shape: *Bilateral (Unequally-Distributed)*

Max = 0.0456
Min = -0.0185
Tol = 0.1
F = 0.02 to workpiece **OUTSIDE**

Tol. Zone Symmetry Line Location = F - Tol/2
$\qquad\qquad$ = 0.02 - 0.05 = -0.03

X = 0.0456 **+ 0.0300 = 0.0756**
N = 0.0300 - 0.0185 = 0.0215

A = 0.0756
Actual Profile Deviation = 2xA = 0.1512

Tolerance zone shape: *Bilateral (Unequally-Distributed)*

When F = Tol/2, the symmetry line for the tolerance zone coincides with the nominal geometry. The tolerance zone becomes **bilateral**, and **equally distributed** around the nominal geometry. The tolerance zone becomes irrelevant, and the same result is obtained from all three cases (bilateral-equally distributed, INSIDE/OUTSIDE).
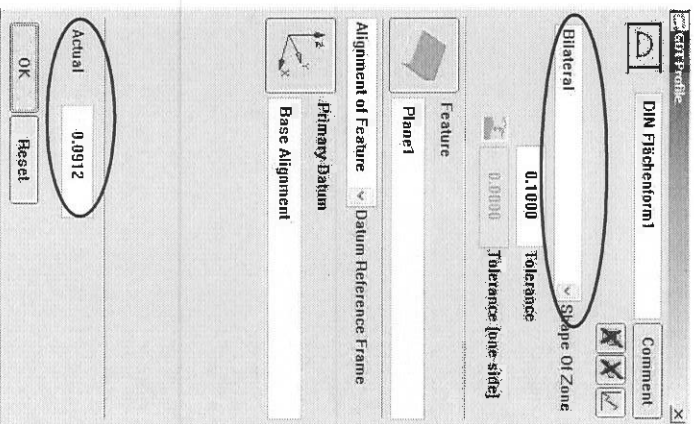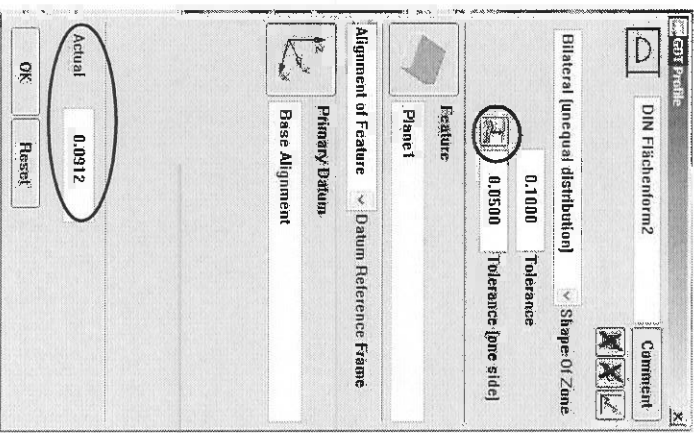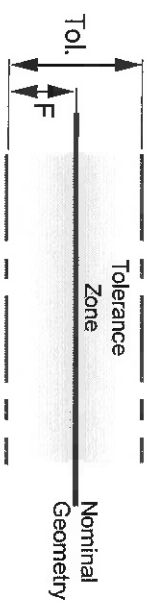
Tol. Zone Symmetry Line Location = F - Tol./2 = 0.0

X = 0.0456
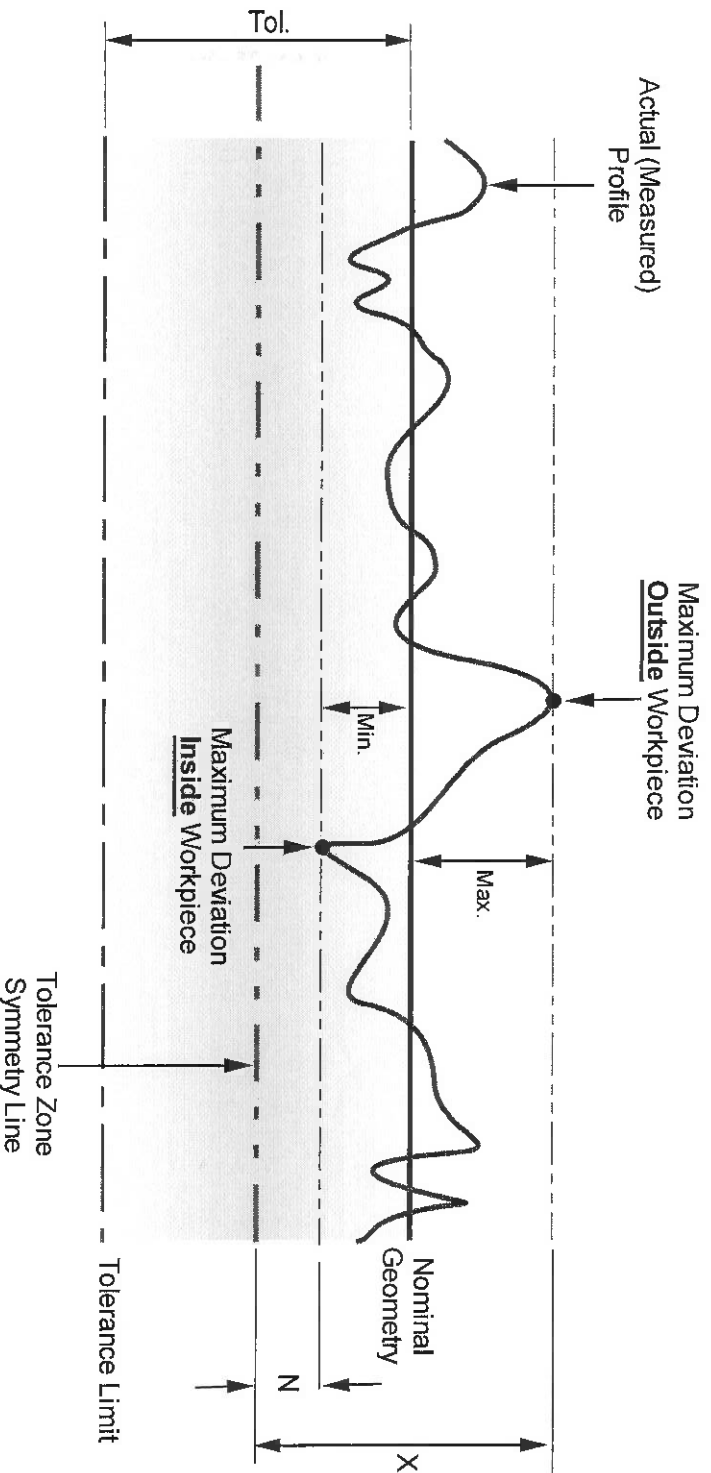N = 0.0300

A = 0.0456
Actual. Profile Deviation = 2xA = 0.0912
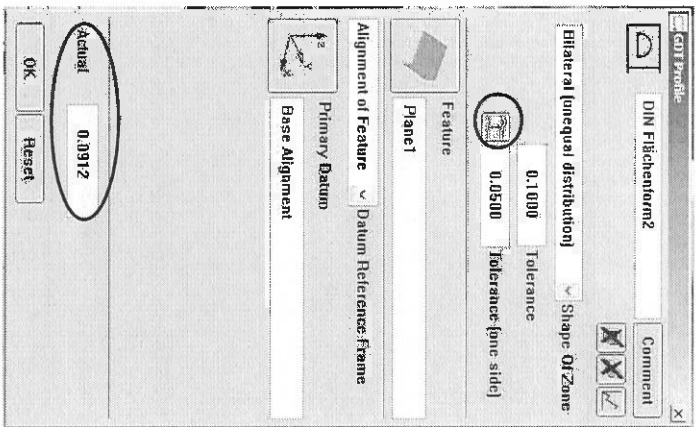
Max = 0.0456
Min = -0.0185
Tol = 0.1
F = 0.05

Profile Tolerance Calculation

Tolerance zone shape: *Unilateral (Inside)*

1. Construct the symmetry line of the tolerance zone.
2. Find the largest deviation **OUTSIDE** workpiece (Max).
3. Find the largest deviation **INSIDE** workpiece (Min).
4. **X** = Distance between **Max** and tolerance zone **symmetry line.**
5. **N** = Distance between **Min** and tolerance zone **symmetry line.**
6. **A** = **Largest** of either **X**, **N**.
7. Reported **Actual** profile deviation = **2xA.**

Profile Tolerance Calculation

Tolerance zone shape: *Unilateral (Inside)*

Tol.

Tolerance Zone

Nominal
Geometry
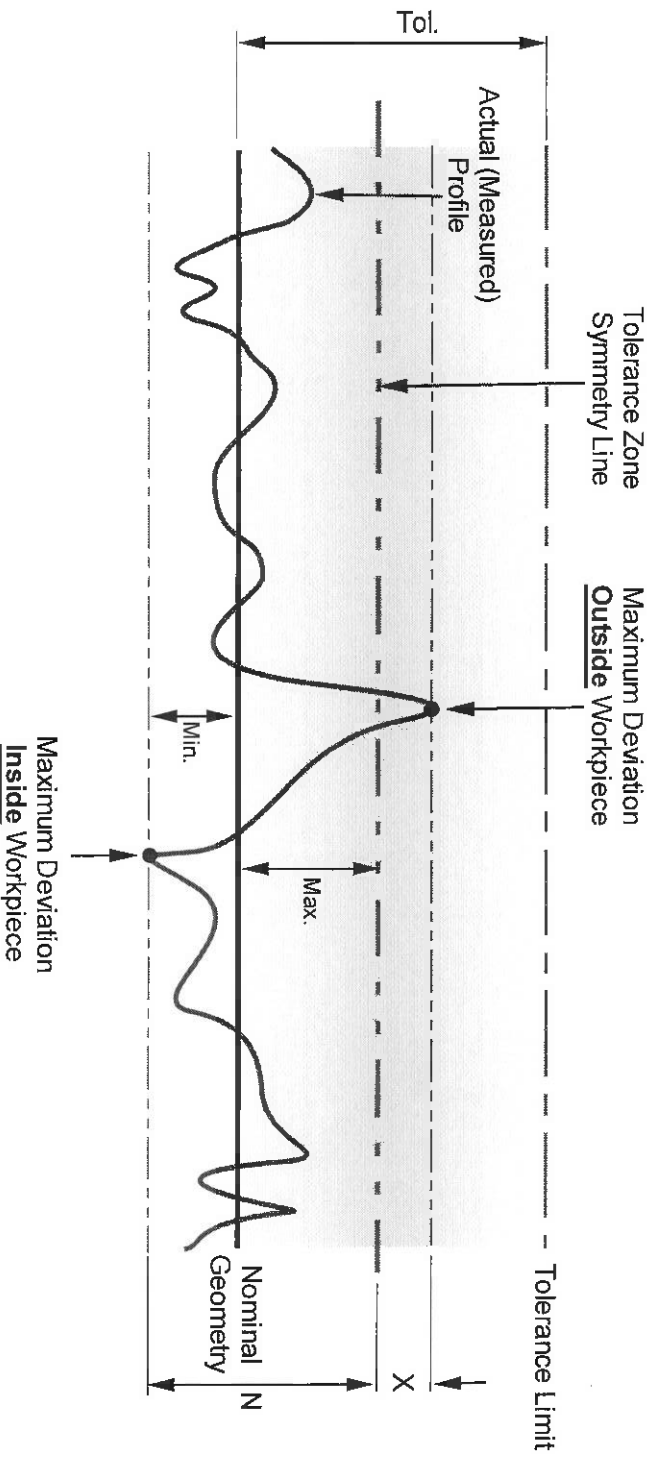
Max = 0.0456
Min = -0.0185
Tol = 0.1

Tol. Zone Symmetry line location = -0.05
X = 0.0456 + 0.0500 = 0.0956
N = 0.0500 - 0.0185 = 0.0315

A = 0.0956
Actual. Profile Deviation = 2xA = 0.1912

Profile Tolerance Calculation

Tolerance zone shape: *Unilateral (Outside)*

1. Construct the symmetry line of the tolerance zone.
2. Find the largest deviation **OUTSIDE** workpiece (Max).
3. Find the largest deviation **INSIDE** workpiece (Min).
4. **X** = Distance between **Max** and tolerance zone **symmetry line**.
5. **N** = Distance between **Min** and tolerance zone **symmetry line**.
6. **A** = **Largest** of either **X, N**.
7. Reported **Actual** profile deviation = **2xA**.

Profile Tolerance Calculation

Tolerance zone shape: *Unilateral (Outside)*

Tol.

Tolerance Zone
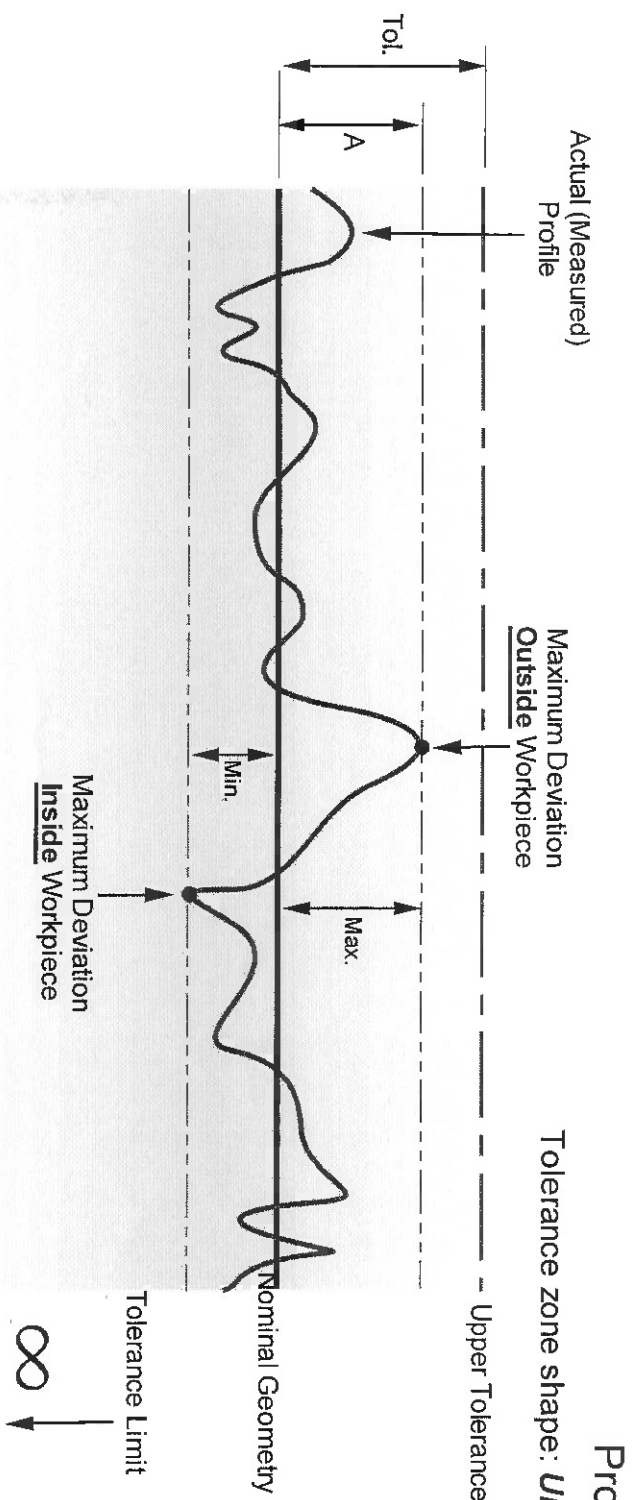
Nominal
Geometry

Max = 0.0456
Min = -0.0185
Tol = 0.1

Tol. Zone Symmetry line location = 0.05
X = 0.0500 - 0.0456 = 0.0044
N = 0.0500 + 0.0185 = 0.0685

A = 0.0685
Actual. Profile Deviation = 2xA = 0.1370

Profile Tolerance Calculation

Tolerance zone shape: *Unilateral (Inwards into infinity)*

Tol.

A

Actual (Measured) Profile

Maximum Deviation **Outside** Workpiece

Min.

Max.

Maximum Deviation **Inside** Workpiece

Nominal Geometry

Upper Tolerance Limit

Tolerance Limit

∞

1. Find the largest deviation **OUTSIDE** workpiece (Max).
2. **A** = Max
3. Reported **Actual** profile deviation = **A**.

Features

Comment   Plane1

Clearance Group   Strategy
CP +X   Evaluation

Nominal Definition Alignment
Tolerance For: Options   Base Alignment

☐ X
☐ Y
☑ Z
☐ A1 XYZ
☐ A2 YZ

Space Axis   Nominal   Actual
                Z   -67.0000   -65.5129
Length 1   -0.0000   1.4831
Length 2   0.0000   -0.0000
Start Angle   0.0000   0.0000

Form   Point no   Point no   Max.
0.0641   105   251   0.0456

                Nominal   Actual
            Z   67.0000   64.0094
                 78.0000   75.0086
                 0.0000   0.0000
                 0.0000   0.0008

Sigma
Min   Max
0.0185   0.0456

OK   Reset

GDT Profile

DIN Flächenform3   Comment

Inwards into infinity
        0.1000   Tolerance
        0.1000   Tolerance (one side)   Shape Of Zone

Feature: Plane1

Alignment of Feature   Datum Reference Frame
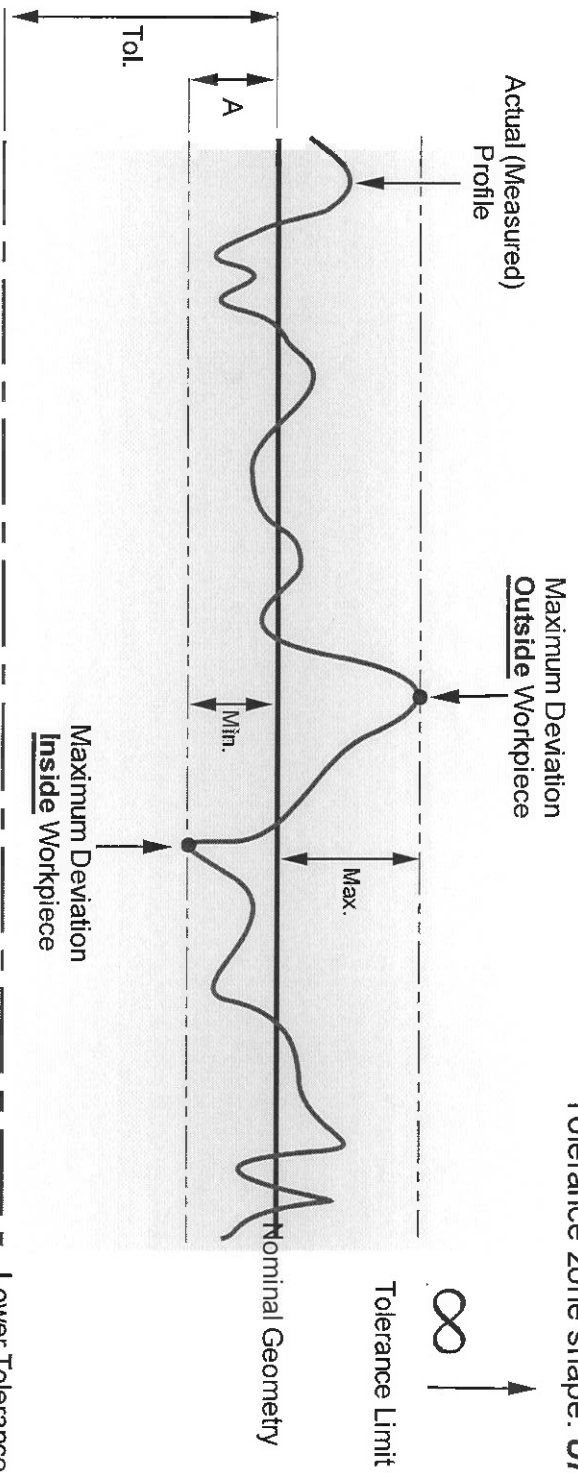Primary Datum
Base Alignment

Actual   0.0456

OK   Reset

Profile Tolerance Calculation

Tolerance zone shape: *Unilateral (Outwards into infinity)*

1. Find the largest deviation **INTSIDE** workpiece (Min).
2. **A** = **ABSOLUTE** value of Min
3. Reported **Actual** profile deviation = **A.**

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