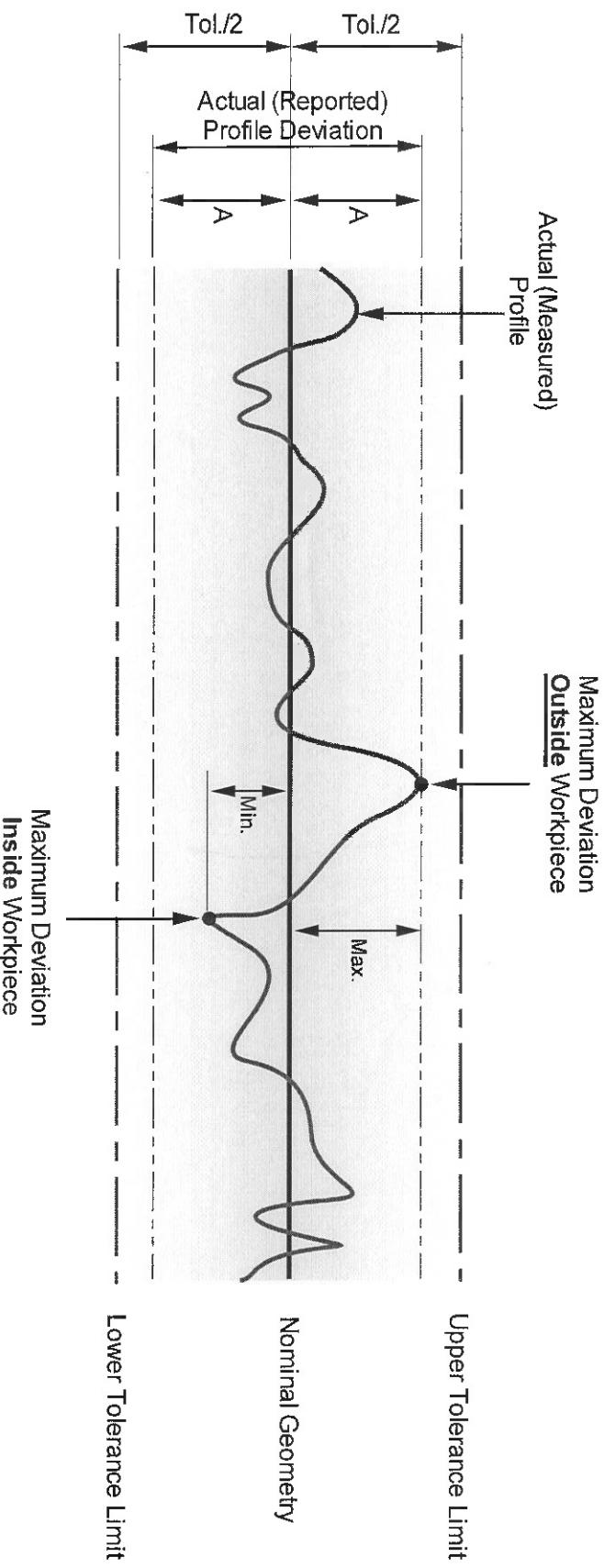


Profile Tolerance Calculation

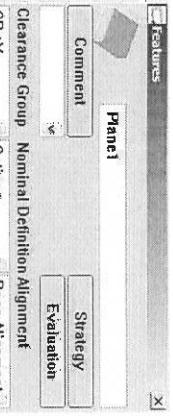
Tolerance zone shape: *Bilateral (Equally-Distributed)*



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 = $2 \times A$

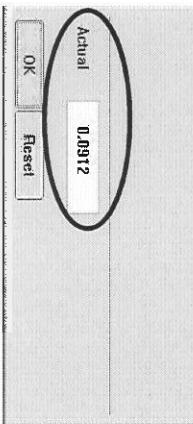
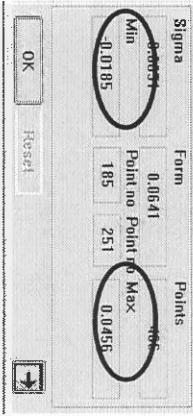
Profile Tolerance Calculation

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



Max = 0.0456
Min = -0.0185

$A = 0.0456$
Actual. Profile Deviation = $2 \times A = 0.0912$



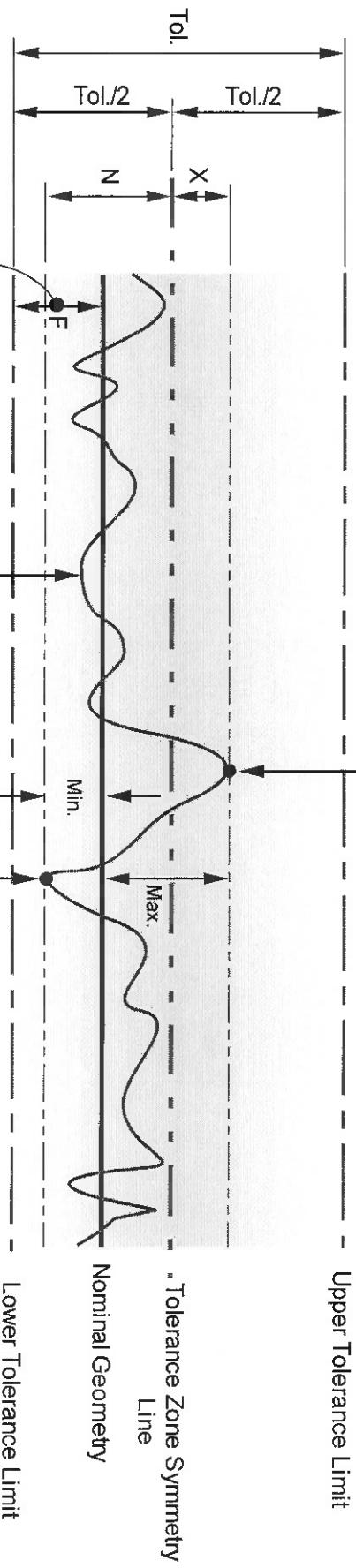
1. Find the largest deviation **OUTSIDE** workpiece (Max).
2. Find the largest deviation **INSIDE** workpiece (Min).
3. **A** = Largest **ABSOLUTE** value of either Max. or Min.
4. Reported Actual profile deviation = $2 \times A$

Profile Tolerance Calculation

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

Maximum Deviation
Outside Workpiece

Upper Tolerance Limit



Tolerance Zone
Offset from Nominal
Geometry

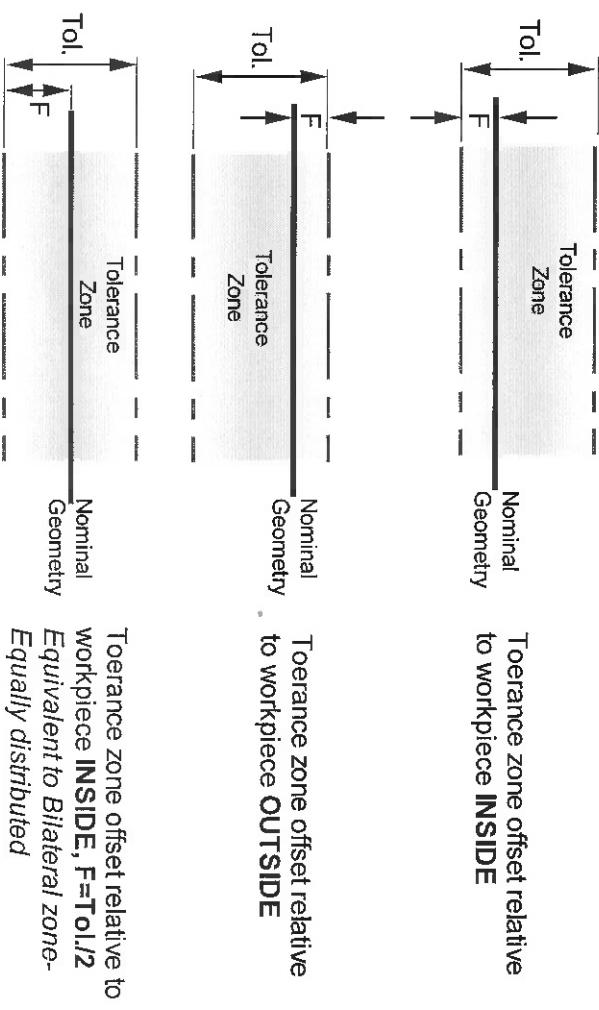
Actual (Measured)
Profile

Maximum Deviation
Inside Workpiece

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).

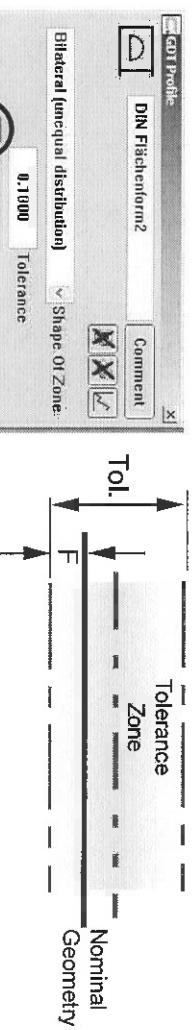
4. X = Distance between **Max** and tolerance zone symmetry line.
5. N = Distance between **Min** and tolerance zone symmetry line.
6. A = Largest value of either X, or N.

7. Reported Actual profile deviation = $2 \times A$



Profile Tolerance Calculation

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



$$\begin{aligned} X &= 0.0456 - 0.0300 = 0.0156 \\ N &= 0.0185 + 0.0300 = \underline{\underline{0.0485}} \\ A &= 0.0485 \\ \text{Actual Profile Deviation} &= 2 \times A = 0.0970 \end{aligned}$$

Features		
Plane1		
Comment	Strategy	
Evaluation		
Clearance Group: Nominal Definition Alignment		
CP <input checked="" type="checkbox"/>	Options	
Tolerance For:	Nominal	
<input type="checkbox"/> X	-67.0000	
<input type="checkbox"/> Y	-0.0000	
<input checked="" type="checkbox"/> Z	1.4031	
<input type="checkbox"/> A1 X/Z	0.0000	
<input type="checkbox"/> A2 Y/Z	0.0000	
Space Axis	<input checked="" type="checkbox"/> Z	
length 1	67.0000	
Length 2	78.0000	
Start Angle	0.0000	
Sigma	Form	Points
0.0051	0.0641	466
Min	Point on Point no.	Max
-0.0185	185	251
		0.0456
OK Reset		

GDT Profile	
DIN Flächenform2	Comment
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
Bilateral (unequally distribution)	
Shape of Zone:	
Feature	Plane1
Tolerance: 0.0200	Tolerance (one side)
Alignment of Feature	
Primary Datum	Datum Reference Frame
Base Alignment	
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	
OK Reset	

Profile Tolerance Calculation

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

Features

Plane1		Strategy	
Comment		Evaluation	
Clearance Group			
CP-X:	Nominal Definition	Alignment	
Tolerance For:		Base Alignment	
<input type="checkbox"/> X	Nominal	Actual	-65.5129
<input type="checkbox"/> Y	-67.0000		
<input checked="" type="checkbox"/> Z	0.0000	1.4831	
<input type="checkbox"/> A1 X/Z	0.0000	0.0000	
<input type="checkbox"/> A2 Y/Z	0.0000	0.0000	
Space Axis	Z	Z	Z
Length 1	67.0000	64.0094	
Length 2	78.0000	75.0086	
Start Angle [k]	0.0000	0.0000	

DIN Flächenform2

Comment		Shape of Zone	
<input type="checkbox"/> Feature		0.1000	Tolerance: [unequal side]
<input type="checkbox"/> Plane1		0.0200	
Alignment of Feature		Datum Reference Frame	
<input type="checkbox"/> Primary Datum			
<input type="checkbox"/> Base Alignment			

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

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

$$\begin{aligned} X &= 0.0456 + 0.0300 = \underline{\underline{0.0756}} \\ N &= 0.0300 - 0.0185 = \underline{\underline{0.0215}} \\ A &= 0.0756 \\ \text{Actual} &= 0.1512 \end{aligned}$$

Actual. Profile Deviation = $2 \times A = 0.1512$

Features

Plane1	Comment	Strategy
CP +X	Options	Evaluation
Tolerance For:	Nominal	Base Alignment
<input type="checkbox"/> X	-67.0000	Actual
<input type="checkbox"/> Y	-0.0000	+65.5179
<input checked="" type="checkbox"/> Z	0.0000	1.4831
<input type="checkbox"/> A1 XYZ	0.0000	0.0000
<input type="checkbox"/> A2 XYZ	0.0000	-0.0000
Space Axis	<input type="checkbox"/> Z	<input type="checkbox"/> Z
Length 1	67.0000	64.0004
Length 2	78.0000	75.0086
Start Angle ^c	0.0000	0.0000

Features

DIN Flächenform2	Comment	X
Bilateral [Unequal distribution]	Shape Of Zone	X
0.1000	Tolerance	
<input checked="" type="radio"/> Feature	Primary Datum	
Plane1	Base Alignment	
OK	Reset	

GAP Profile

DIN Flächenform2	Comment	X
Bilateral [Unequal distribution]	Shape Of Zone	X
0.0500	Tolerance [One side]	
<input checked="" type="radio"/> Feature	Primary Datum	
Plane1	Base Alignment	
OK	Reset	

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



GAP Profile

DIN Flächenform2	Comment	X
Bilateral [Unequal distribution]	Shape Of Zone	X
0.1000	Tolerance	
<input checked="" type="radio"/> Feature	Primary Datum	
Plane1	Base Alignment	
OK	Reset	

GAP Profile

DIN Flächenform1	Comment	X
Bilateral	Shape Of Zone	X
0.0500	Tolerance [One side]	
<input checked="" type="radio"/> Feature	Primary Datum	
Plane1	Base Alignment	
OK	Reset	

Features

Plane1	Comment	X
CP +X	Options	Evaluation
Tolerance For:	Nominal	Base Alignment
<input type="checkbox"/> X	-67.0000	Actual
<input type="checkbox"/> Y	-0.0000	+65.5179
<input checked="" type="checkbox"/> Z	0.0000	1.4831
<input type="checkbox"/> A1 XYZ	0.0000	0.0000
<input type="checkbox"/> A2 XYZ	0.0000	-0.0000
Space Axis	<input type="checkbox"/> Z	<input type="checkbox"/> Z
Length 1	67.0000	64.0004
Length 2	78.0000	75.0086
Start Angle ^c	0.0000	0.0000

Max = 0.0456
Min = -0.0185
Tol = 0.1
F = 0.05

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 material side from which to offset 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 = $F - Tol/2 = 0.0$

$$X = 0.0456$$

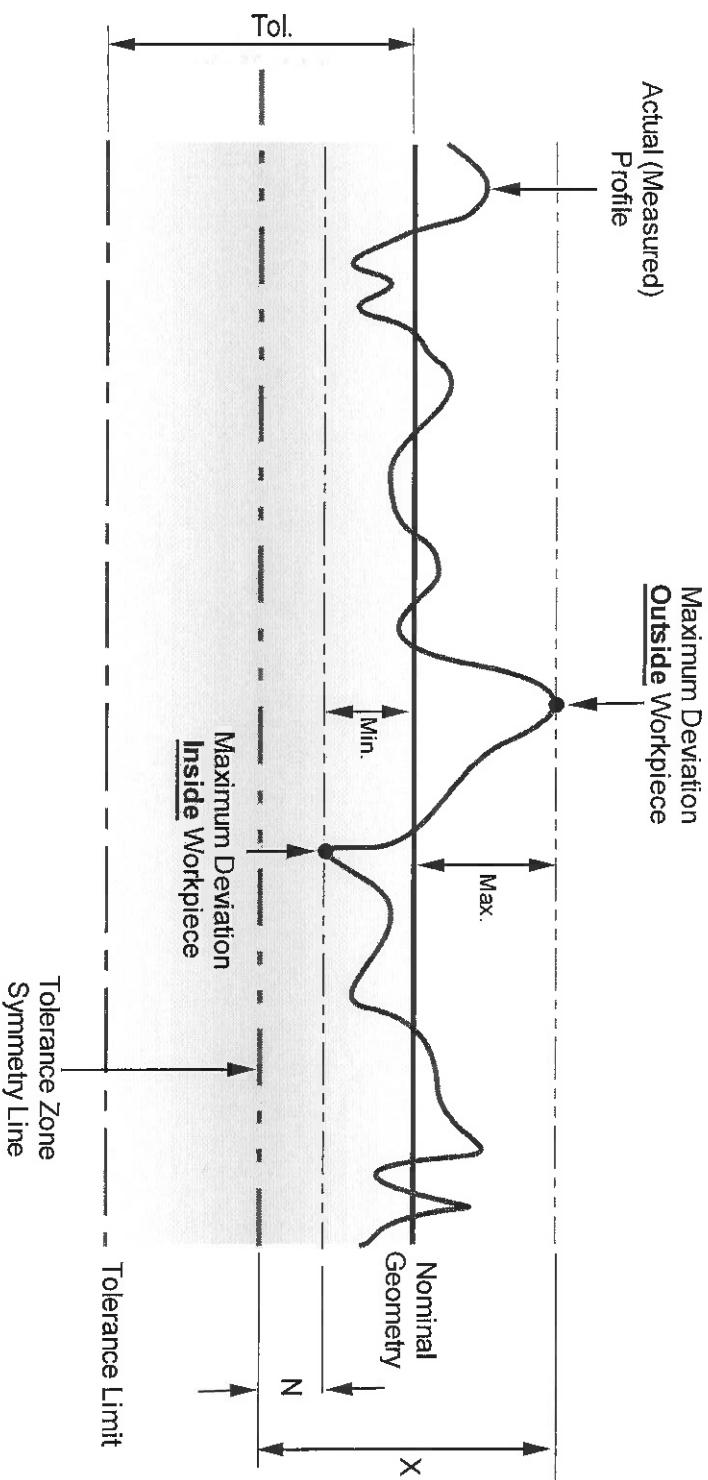
$$N = 0.0300$$

$$A = 0.0456$$

$$\text{Actual Profile Deviation} = 2 \times A = 0.0912$$

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)*

Features		Nominal Geometry	
Plane1		Tolerance Zone	
Comment		Strategy	
Clearance Group		Evaluation	
CP +X		NominalDefinition Alignment	
Tolerance For:		Base Alignment	
<input type="checkbox"/> X	Nominal	Actual	
<input type="checkbox"/> Y	-67.0000	-65.5129	
<input checked="" type="checkbox"/> Z	-0.0000	1.4831	
<input type="checkbox"/> At XYZ	0.0000	0.0080	
<input type="checkbox"/> At YZZ	0.0000	-0.0000	
Space Axis	Z	Z	
Length 1	67.0000	64.0094	
Length 2	78.0000	75.0086	
StartAngle	0.0000	0.0000	
Signor	Form	Points	
0.0051	0.0641	466	
Min	Point no Max		
-0.0195	185	251	
Actual	0.1912		
		OK	Reset

Get Profile DIN Flachenform4 Comment

Unilateral (nominal contour inside) Shape Of Zone 0.1000 Tolerance

0.1000 Tolerance [one side]

Feature Plane1

Alignment of Feature Primary Datum Base Alignment

Datum Reference Frame

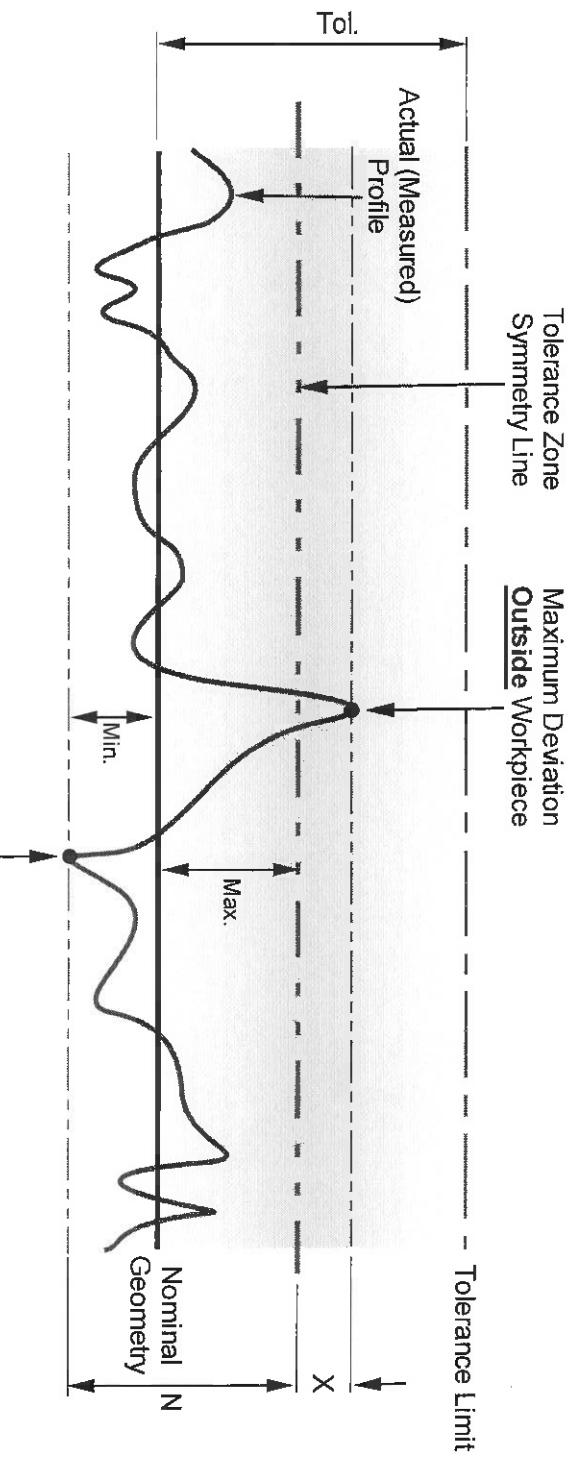
Max = 0.0456
Min = -0.0185
Tol = 0.1

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 = $2 \times A = 0.1912$

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)*

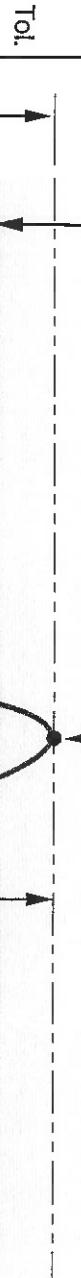
The screenshot shows two overlapping dialog boxes from a CAD application:

- Top Dialog (Features):**
 - Plane 1
 - Comment:
 - Strategy:
 - Evaluation:
 - Clearance Group: Nominal Definition Alignment
 - CP +X:
 - Tolerance For: Nominal: -67.0000, Actual: -65.5129
 - Options: Base Alignment:
 - Base Alignment: Options: Nominal: -4.0000, Actual: 1.4831
 - Space-Axis: Z: 0.0000, A1 XYZ: 0.0000, A2 YZ: 0.0000
 - Length-1: 67.0000, Length-2: 78.0000, Start Angle: 0.0000
 - Sigma: 0.0051, Form: 0.1641, Points: 466
 - Min: -0.0185, Point no Max: 185, 251, Value: 0.0456
- Bottom Dialog (DIN Flächenform):**
 - DIN Flächenform 4
 - Comment:
 - Shape Of Zone: Unilateral [nominal contour inside]
 - Tolerance: 0.1000
 - Feature: Plane 1
 - Alignment of Feature: Primary Datum: Datum Reference Frame
 - Tol.:
 - 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: 0.1370
 - OK, Reset

Profile Tolerance Calculation

Actual (Measured) Profile
Maximum Deviation Outside Workpiece

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



Max.

Min.

A

Tol.

Maximum Deviation
Inside Workpiece

Tolerance Limit



Upper Tolerance Limit

Nominal Geometry

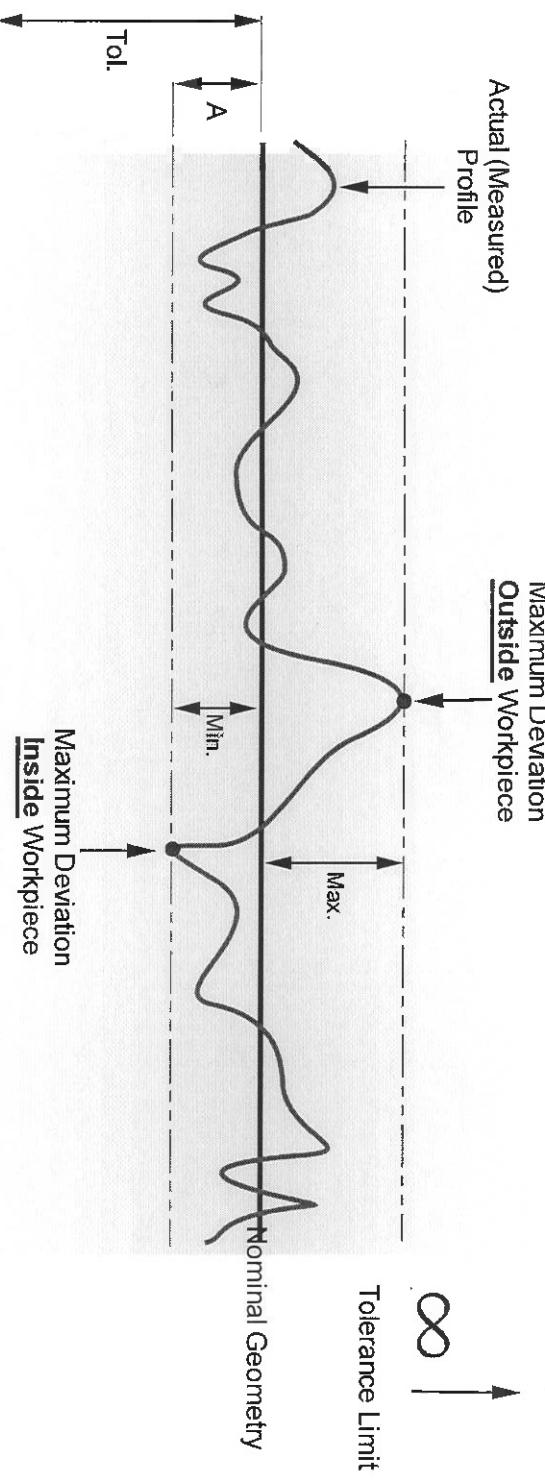
1. Find the largest deviation **OUTSIDE** workpiece (Max).
2. **A** = Max
3. Reported **Actual** profile deviation = **A**.

Features		Plane1		Strategy	
Comment					
Clearance Group		Nominal Definition Alignment			
CP < X		Options			
Tolerance Fun:		Nominal		Actual	
<input type="checkbox"/> X		-67.0000		-65.5129	
<input type="checkbox"/> Y		-0.0000		1.4831	
<input checked="" type="checkbox"/> Z		0.0000		0.0000	
<input type="checkbox"/> A1 A2 X2Z		0.0000		-0.0000	
<input type="checkbox"/> A2 X2Z		0.0000		0.0000	
Space Axis		±		Z	
Length 1		67.0000		64.0094	
Length 2		78.0000		75.0086	
Start Angle		0.0000		0.0000	
Sigma		Form		Points	
0.0051		0.0641		466	
Min 0.0185		Point no 185		Max 251	
				0.0456	
OK		Delete		Cancel	

DIN Flächentoleranz		Comment	
Inwards into infinity			
0.1000		Tolerance	
0.1000		Tolerance [one side]	
Feature:			
Plane1			
Alignment of Feature		Datum Reference Frame	
Primary Datum			
Base Alignment			
OK		Reset	

Profile Tolerance Calculation

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



Features	
Plane1	Strategy
Comment	Evaluation
DIN Fächentorm3	
Clearance Group	Nominal Definition Alignment
CP +X	Actual
Tolerance For:	Nominal
<input type="checkbox"/> X	-67,0000
<input type="checkbox"/> Y	0,0000
<input checked="" type="checkbox"/> Z	1,4931
A1 X/Z	0,0000
A2 Y/Z	0,0000
Space Axis	0,0000
Start Angle	0,0000
Lower Tolerance Limit	
Outwards into infinity	
Feature	0,1000
Plane1	0,1000
Tolerance [one side]	
Alignment of Feature	
Primary Datum	Datum Reference Frame
Base Alignment	
OK Reset	