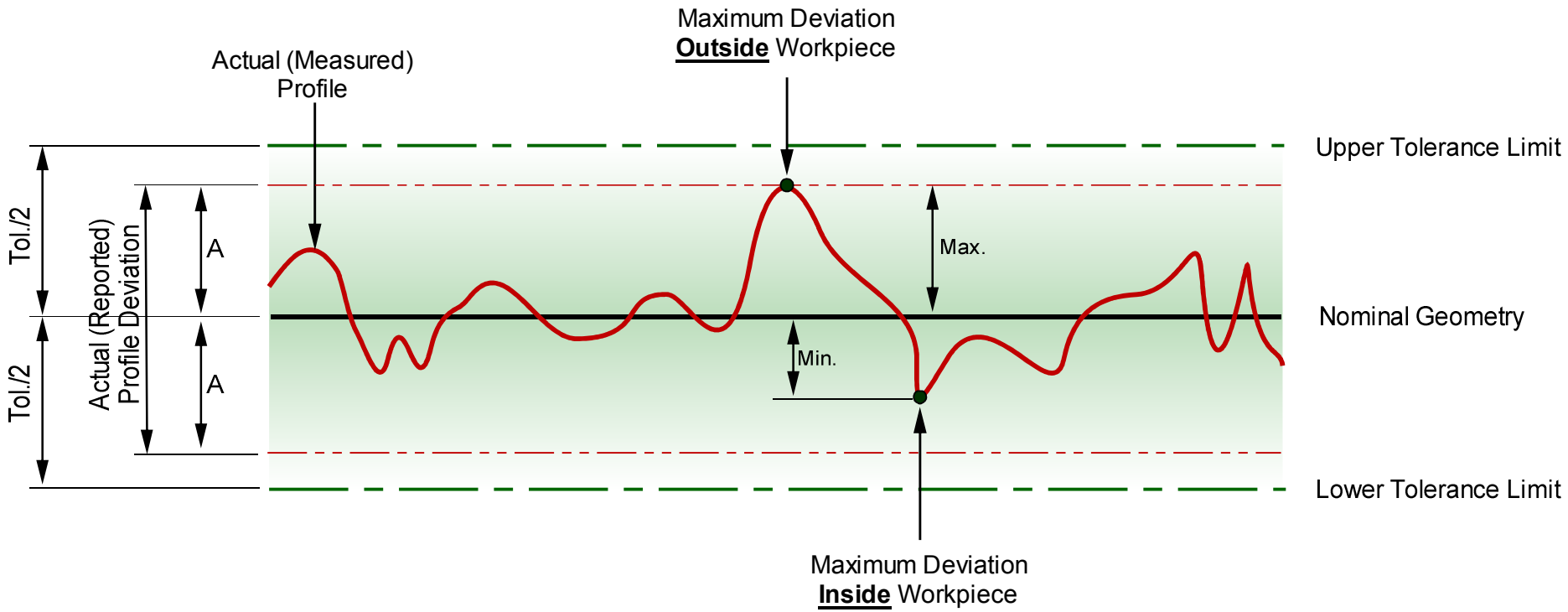
# Profile Tolerance Calculation

*Illustrated explanation, and examples*

## Contents:

# Profile Tolerance Calculation

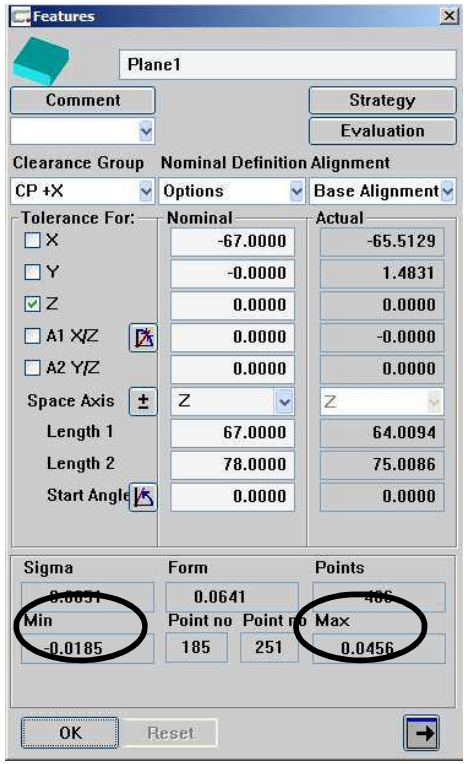
Tolerance zone shape: ***Bilateral (Equally-Distributed)***

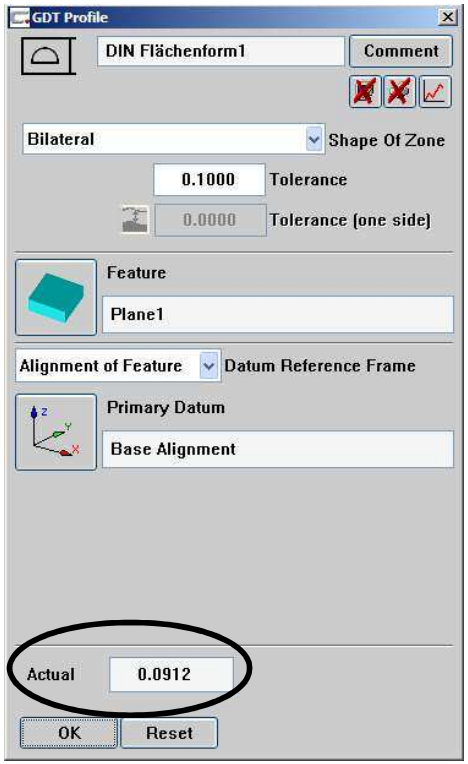


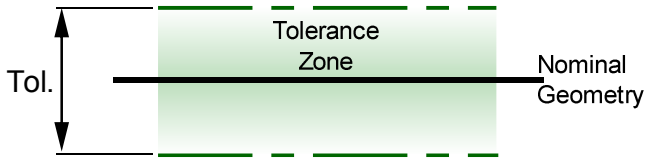

1. Find the largest deviation **OUTSIDE** workpiece (Max).
2. Find the largest deviation **INSIDE** workpiece (Min).
3. **A** = Largest **ABSOLUTE** value of either Max, or Min.
4. Reported **Actual** profile deviation = **2xA**

# Profile Tolerance Calculation

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



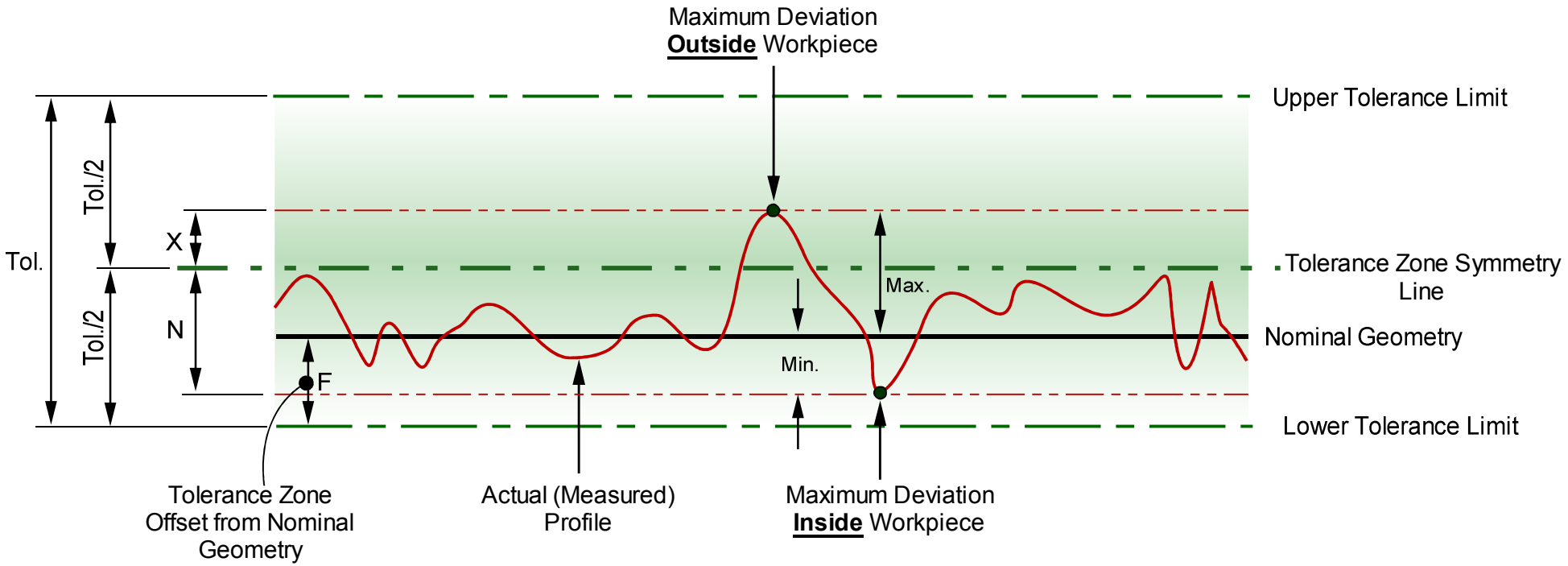

Max = 0.0456
Min = -0.0185

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

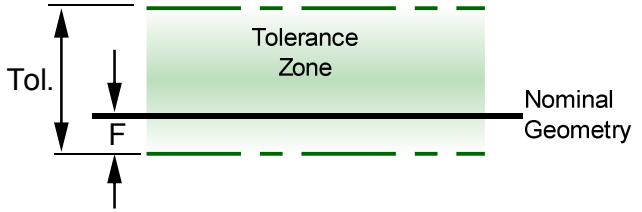
1. Find the largest deviation **OUTSIDE** workpiece (Max).
2. Find the largest deviation **INSIDE** workpiece (Min).
3. **A** = Largest **ABSOLUTE** value of either Max, or Min.
4. Reported **Actual** profile deviation = **2xA**

# Profile Tolerance Calculation

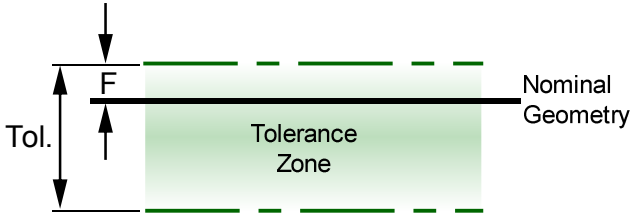
Tolerance zone shape: ***Bilateral (Unequally-Distributed)***



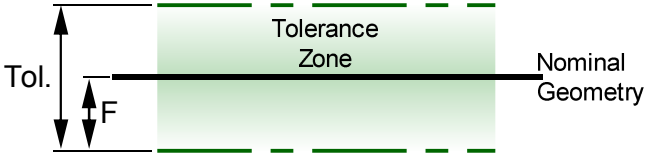

1. Construct the **symmetry line** for the tolerance zone.
2. Find the largest deviation **OUTSIDE** workpiece (Max).
3. Find the largest deviation **INSIDE** workpiece (Min).
4. **X** = Distance between **Max** and tolerance zone **symmetry line**.
5. **N** = Distance between **Min** and tolerance zone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




Toerance zone offset relative to workpiece **INSIDE**



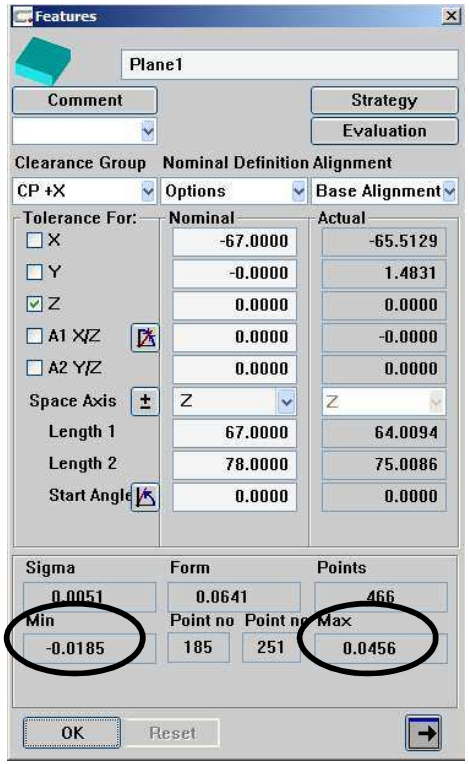

Toerance zone offset relative to workpiece **OUTSIDE**

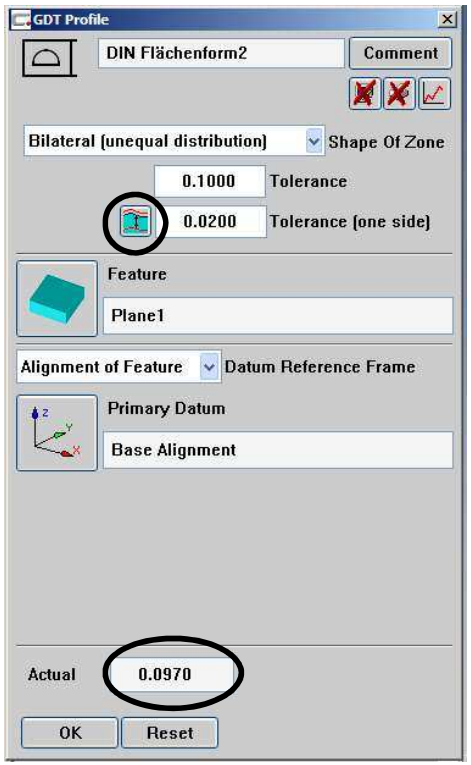


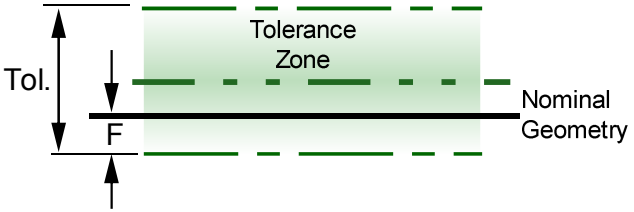

Toerance zone offset relative to workpiece **INSIDE, F=Tol./2**
*Equivalent to Bilateral zone-Equally distributed*

# Profile Tolerance Calculation

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




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

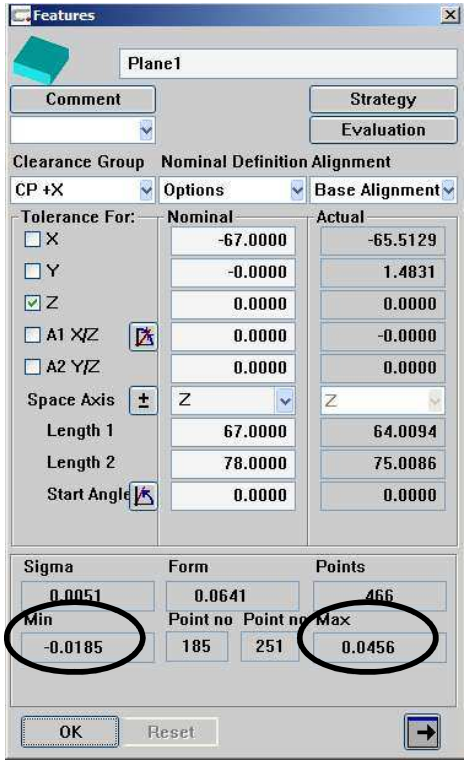
Tol. Zone Symmetry Line Location = Tol./2 - F
= 0.05 - 0.02 = 0.03

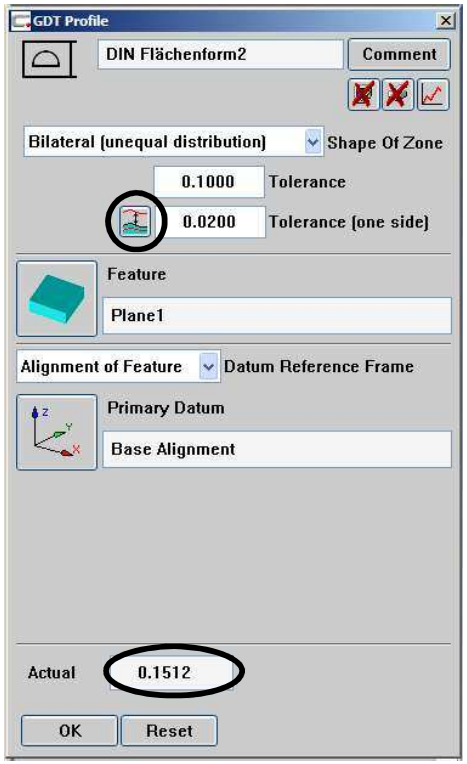
X = 0.0456 **-** 0.0300 = 0.0156
N = 0.0185 **+** 0.0300 = **<u>0.0485</u>**

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**

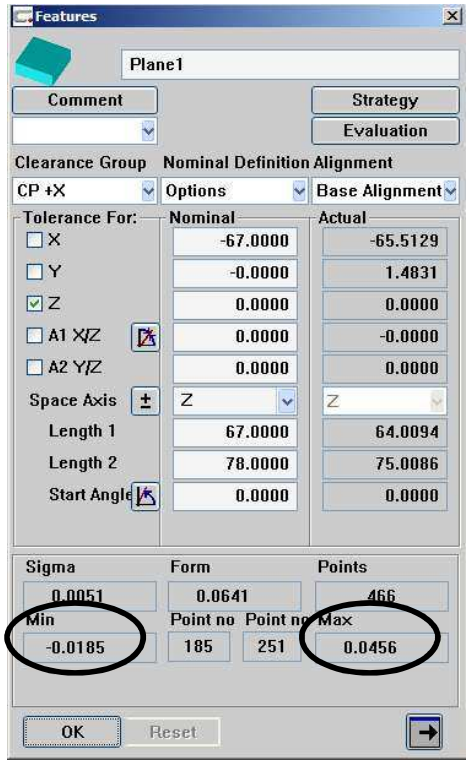
Tol. Zone Symmetry Line Location = F - Tol./2
= 0.02 - 0.05 = -0.03

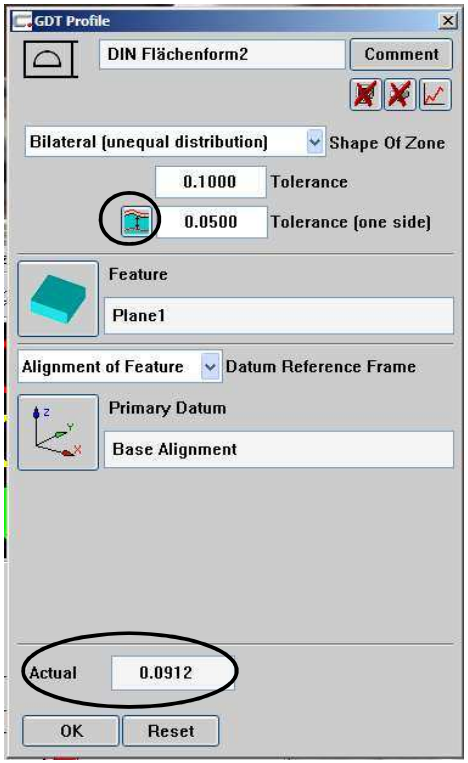
X = 0.0456 **+** 0.0300 = **0.0756**
N = 0.0300 **-** 0.0185 = 0.0215

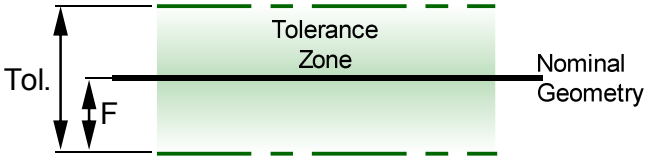
A = 0.0756
Actual. Profile Deviation = 2xA = 0.1512

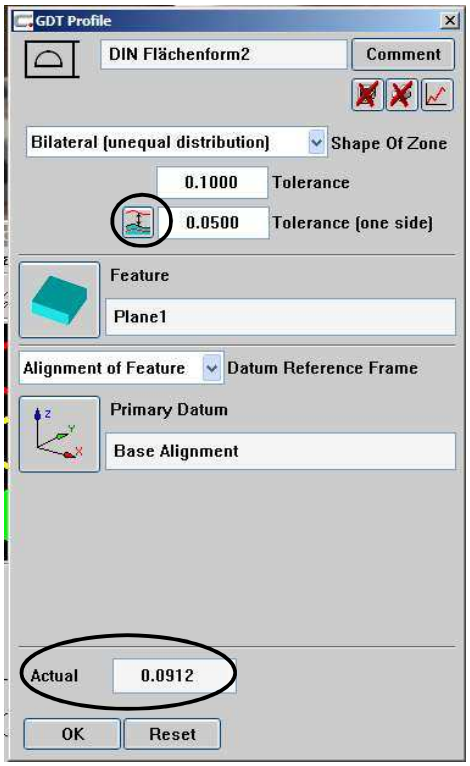
# Profile Tolerance Calculation

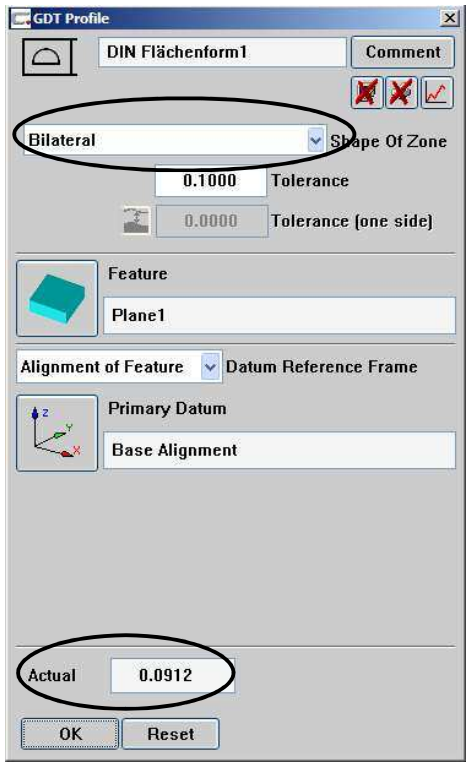
Tolerance zone shape: ***Bilateral (Unequally-Distributed)***




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).

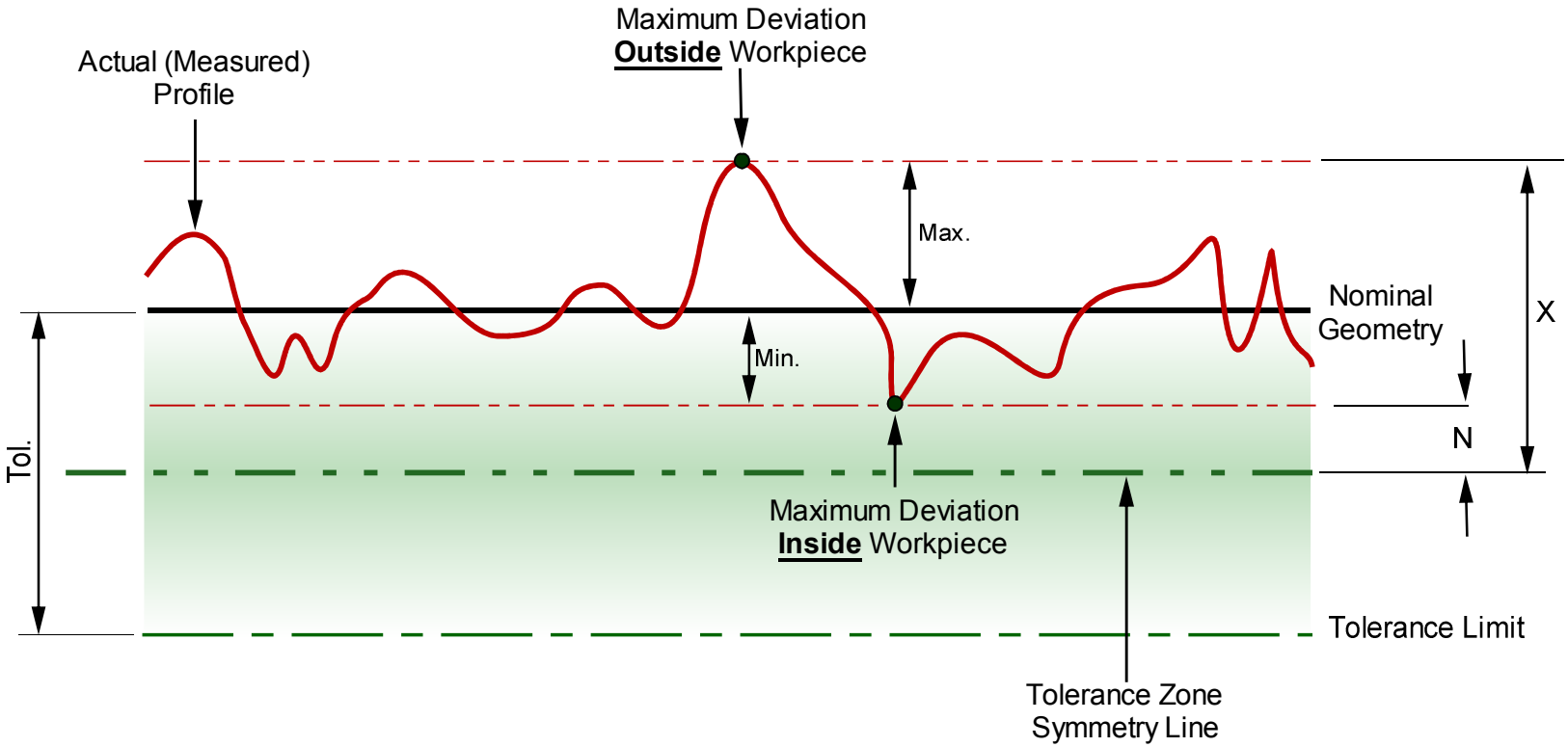
Tol. Zone Symmetry Line Location = F - Tol./2 = 0.0

X = 0.0456
N = 0.0300

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

# Profile Tolerance Calculation

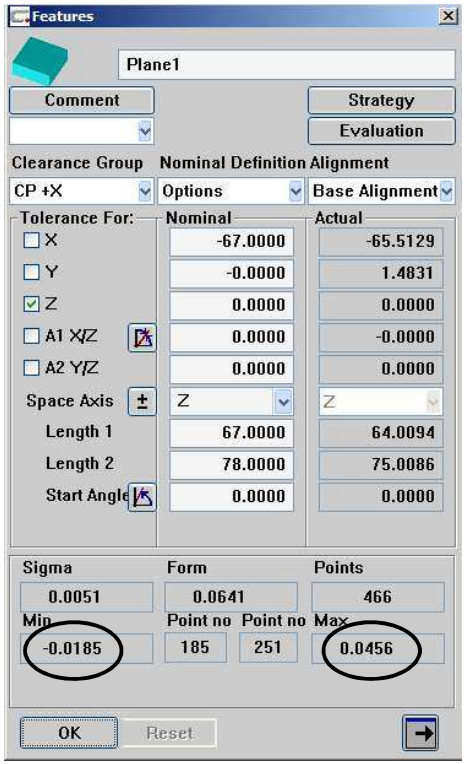
Tolerance zone shape: ***Unilateral (Inside)***

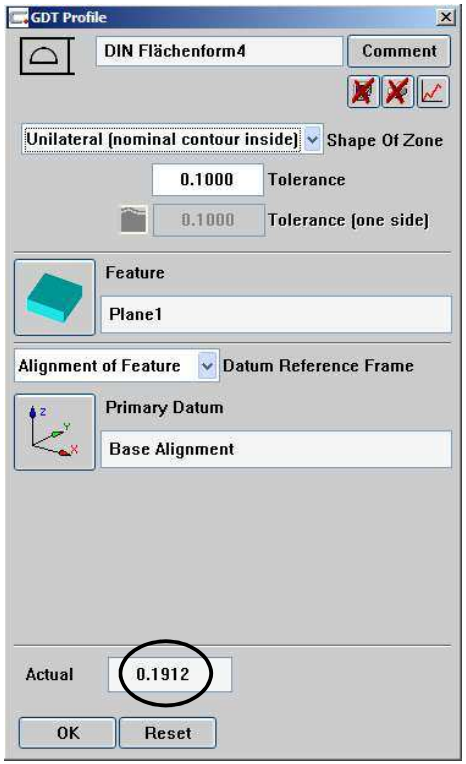



1. Construct the symmetry line of the tolerance zone.
2. Find the largest deviation **OUTSIDE** workpiece (Max).
3. Find the largest deviation **INSIDE** workpiece (Min).
4. **X** = Distance between **Max** and tolerance zone **symmetry line.**
5. **N** = Distance between **Min** and tolerance zone **symmetry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

# Profile Tolerance Calculation

Tolerance zone shape: ***Unilateral (Inside)***





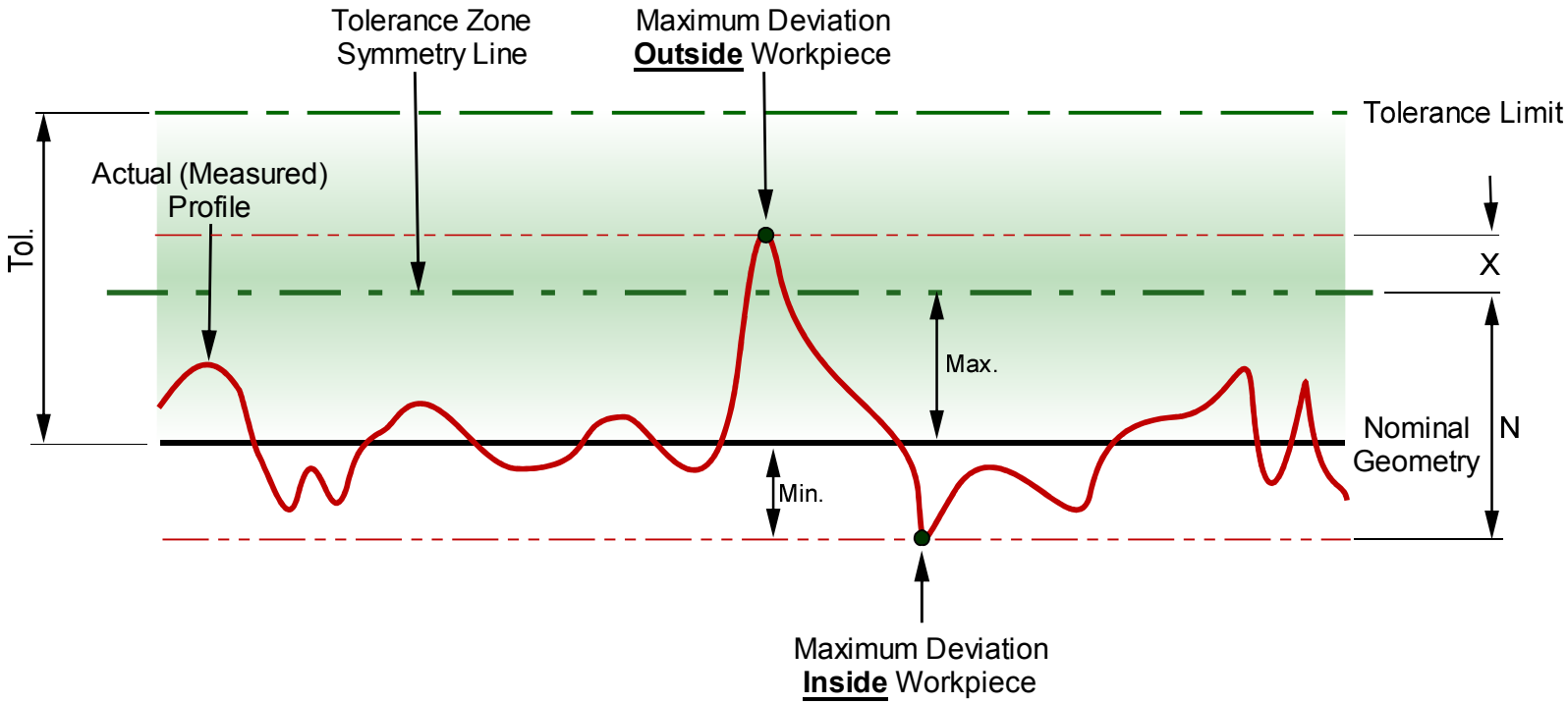
Max = 0.0456
Min = -0.0185
Tol = 0.1

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

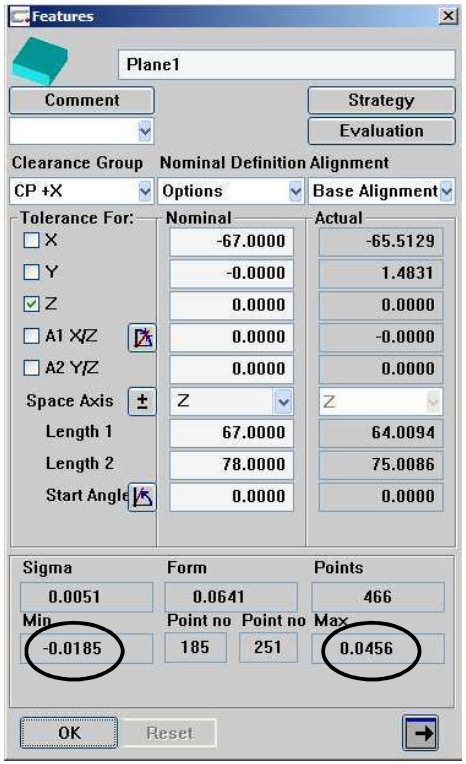
Tolerance zone shape: ***Unilateral (Outside)***

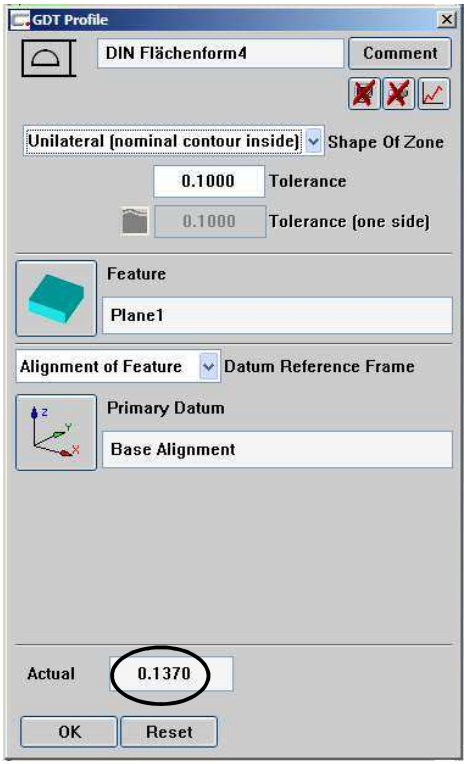



1. Construct the symmetry line of the tolerance zone.
2. Find the largest deviation **OUTSIDE** workpiece (Max).
3. Find the largest deviation **INSIDE** workpiece (Min).
4. **X** = Distance between **Max** and tolerance zone **symmetry line**.
5. **N** = Distance between **Min** and tolerance zone **symmetry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

# Profile Tolerance Calculation

Tolerance zone shape: ***Unilateral (Outside)***





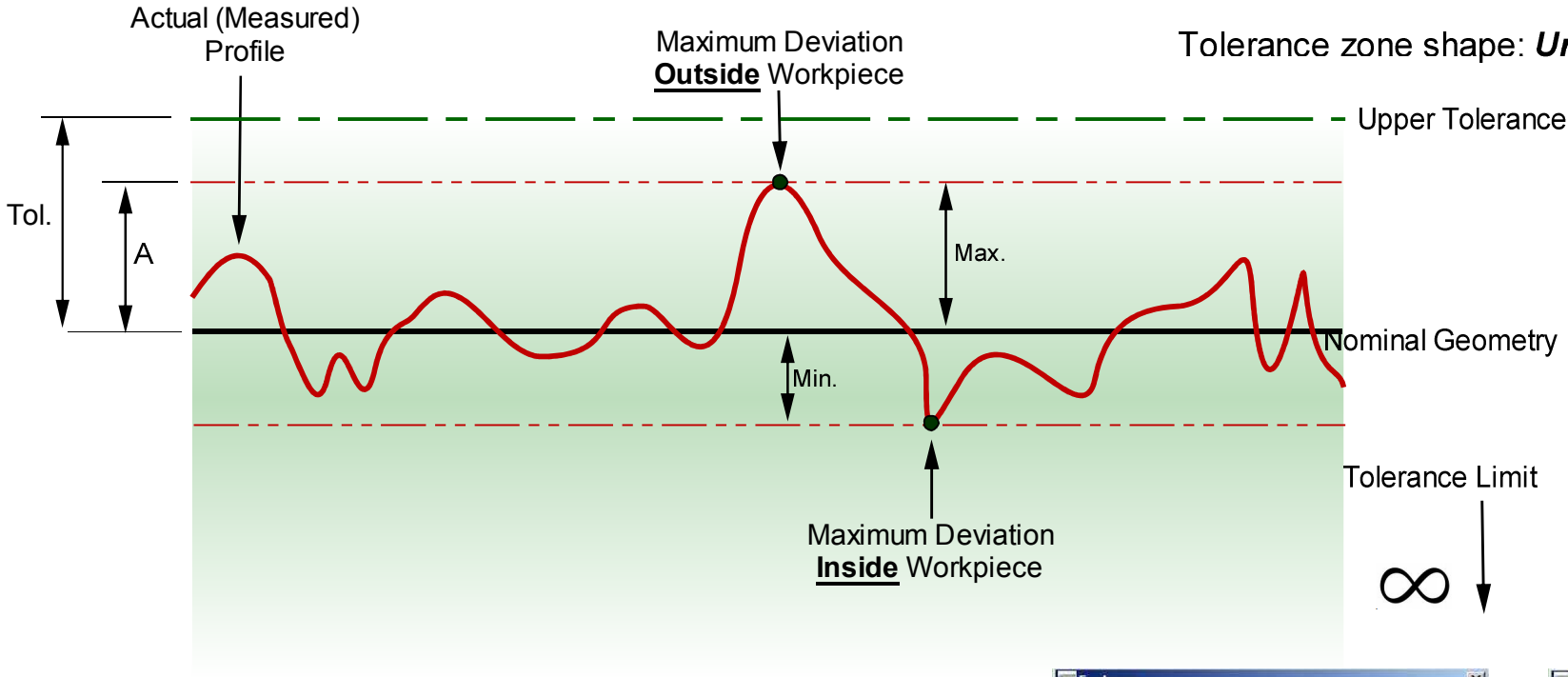
Max = 0.0456
Min = -0.0185
Tol = 0.1

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

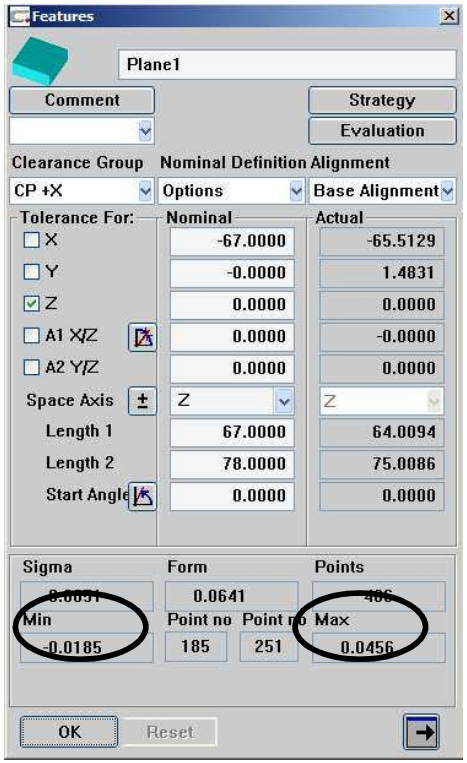
**A** = 0.0685
Actual. Profile Deviation = 2xA = 0.1370

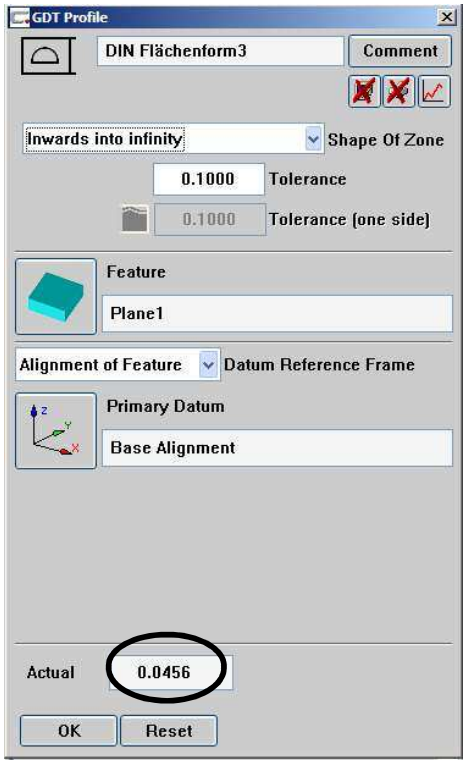
# Profile Tolerance Calculation

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



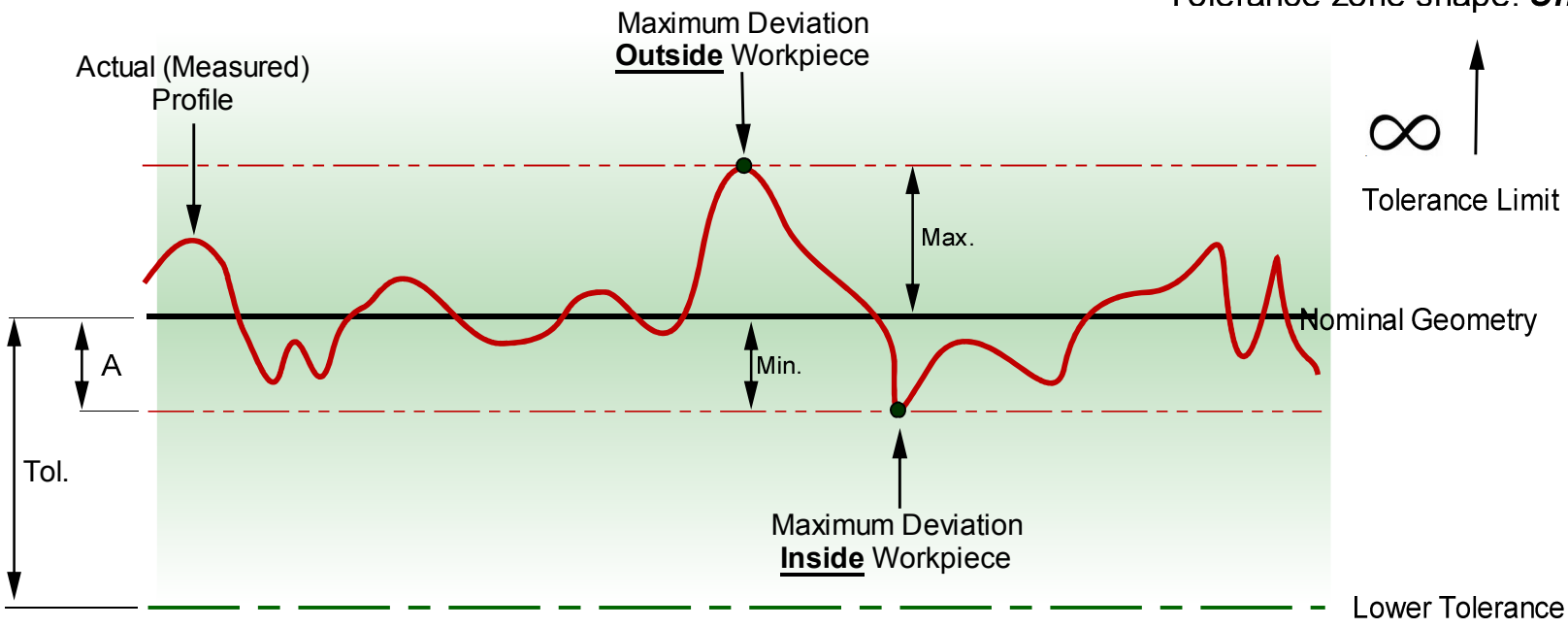

1. Find the largest deviation **OUTSIDE** workpiece (Max).
2. **A** = Max
3. Reported **Actual** profile deviation = **A.**



# 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.**