

## QUINDOS CMM Error Simulation

The measuring errors of a Three Coordinate Measuring Machine (CMM) are described in the ISO standard 10 360: „Performance of coordinate measuring machines“. Usually the two most important specifications: the „Volumetric length measuring error E" and the „Volumetric probing error P" are specified by the CMM manufacturer.

These errors are valid for clearly defined test procedures only. At the inspection of real parts the errors are different. That is because often probe extensions are used with an increased measuring error. Furthermore the probing error at a datum measurement can lead to a much larger error on a feature a certain distance away from that datum.

The package QUINDOS CMM Error Simulation calculates the actual range of error for each feature.

An existing QUINDOS part program is executed n-times, with the „real" CMM switched off.

At every run the virtual CMM generates measuring points, distributed around the nominal points. The range of those points depends on the P value entered. QUINDOS takes this points as if they would come from a real Measuring Machine and calculates all the features.

Finally the range of the result for each feature is evaluated statistically.

Example: Comparison of the measuring error of 2 coordinate measuring machines

Range of concentricity result, 50 virtual measuring runs

CMM A: Probing Error  $P = 1\mu\text{m}$

CMM B: Probing Error  $P = 3\mu\text{m}$

By repeating the procedure, using P-values of different CMMs, the operator can analyse which CMM is capable of inspecting a certain workpiece.

Furthermore the effects on modifications of the measuring strategy (i.e. using shorter extensions, increase the number of probing points at critical datums etc.) can immediately be evaluated.

