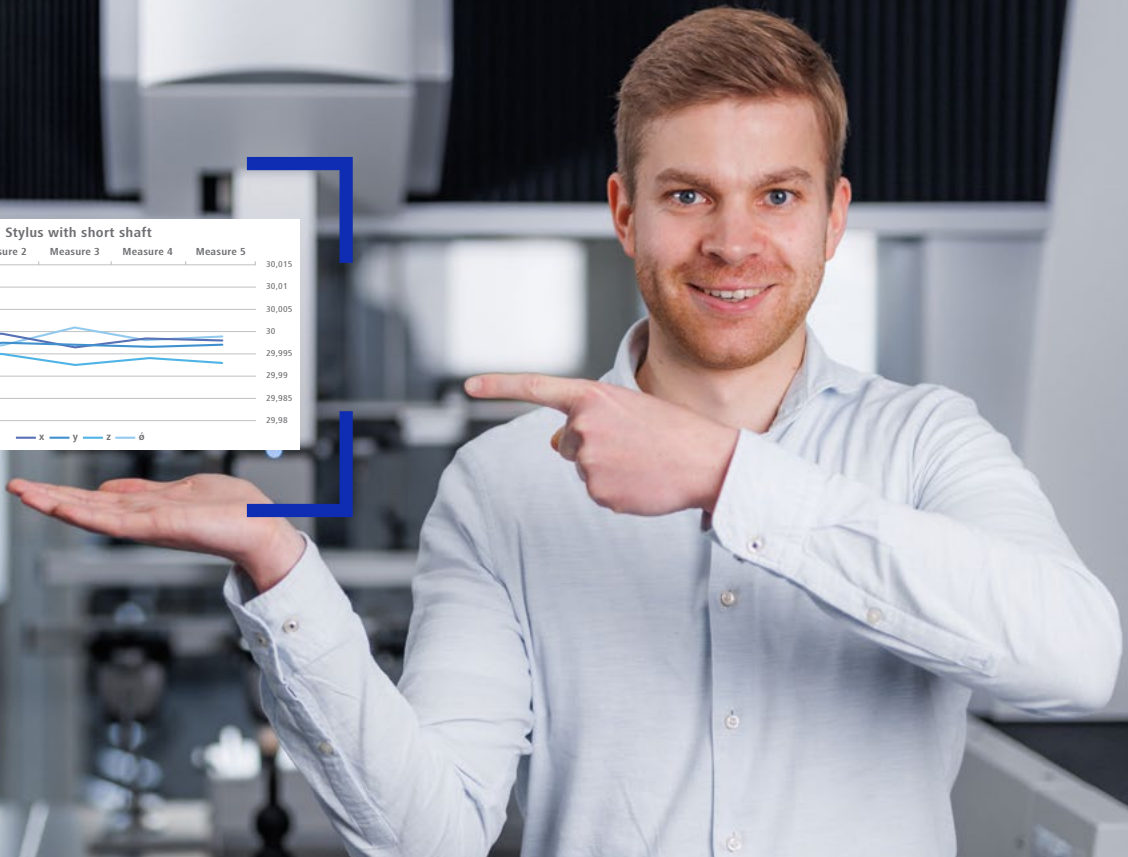
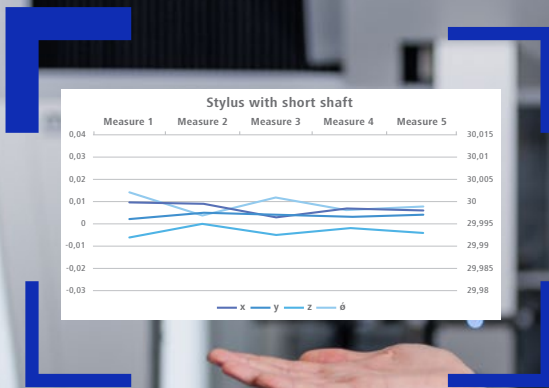




Seeing beyond

ZEISS Metrology Expert Tip



**Achieve reproducible
measurement results**

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Reproducibility of measurement results

Every measurement is subject to a certain degree of measurement uncertainty, i.e., more or less large scatter occurs, which prevents the actual value from being reliably determined. These scatters result on the one hand from the machine accuracy and on the other hand from external influencing factors such as measuring strategy, user, environment or clamping.

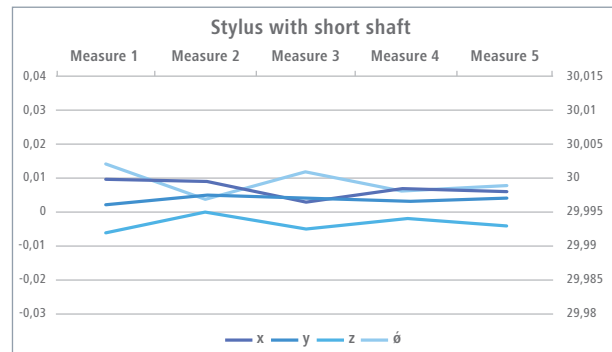
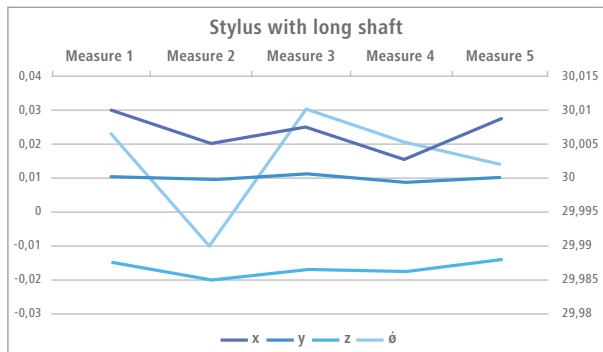
However, the touch probe system has the greatest influence on the scatter. More than 75% of measuring errors are caused by incorrect or inferior material with which the probe head is equipped. This unnecessarily detracts from the largely excellent performance of the machine. To ensure a reliable measuring process with minimum scatter values, it is recommended to regularly check the reproducibility of the entire measuring system (i.e., machine and equipment) to determine the actual performance of the overall system and to optimize it if necessary.

Checking the reproducibility:

1. Measure the calibration ball with the reference probe
2. Set the position of the center of the sphere to zero
3. The diameter is assumed to be the calibrated value
4. Measure the ball with all other styli
5. Measure the calibration ball with the other styli. Repeat the measurement with the probe system about 5-10 times.

Important: Before each measurement, the ball center must be set to zero with the reference probe.

Example measurements of two probe systems with a short and a long shaft:



Regular checks give you a feel for the changes that occur in the measuring process. These can be caused by collisions or aging processes, for example. Based on the measurement results obtained, you can determine whether the scatter is within your expectations. If outliers occur, the probe system could be the cause. Depending on the interpretation of the results, conclusions can be drawn for further investigations to ultimately achieve an optimization of the reproducibility.



Use quality diagrams to document the results of inspections. This gives you more accurate insights into your measurement process to ultimately achieve reliable measurement results.

Scatter

How is the scatter visible?

- Carry out the measurement several times as described.
- Check how the results relate to each other.
- Identify what the target of your measurement results looks like.

Are the results precise and comparable?

This is very good as the machine and accessories seem to be in order and the scatter uncertainty is low.



precise
comparable

Are the results precise but not comparable?

The scatter is relatively high, but the measurement results are close to the nominal value. This means that the machine seems to be in order, but it is recommended to check the probe system equipment.



precise
not comparable

Are the results comparable but not precise?

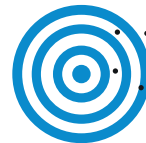
The scatter is relatively small, so the environmental conditions and stylus equipment are fine. The machine probably needs to be corrected. In that case, ZEISS recommends an intermediate test with a CMM Check.



not precise
comparable

Are the results neither comparable nor precise?

The dispersion is very high and far away from the nominal value. The machine and the equipment are not aligned. ZEISS recommends a touch probe and intermediate test and also a CMM Check.



not precise
not comparable



If you have questions, always contact the technical service department.

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