

## Twist Measurement on Planetary Transmissions



### Transmission gears: 100-percent control with workpiece cycle time of approx. 20 seconds

Gears in a planet transmission must match exactly to minimize wear. For one gear manufacturer, Mahr have developed a customer-specific solution for quality assurance. It provides 100-percent control with a cycle time of only 20 seconds, which includes printing a data matrix code on each gear. This special solution can be modified for other gear and gearbox manufacturers.

In tractor planetary transmission, three stepped planets travel around two sun gears. The challenge for the gear manufacturer is that the rotation must be exactly the same at all three levels. This minimizes wear and increases the life of the transmission. A special design created by the application team at Mahr provided a breakthrough in quality assurance. The Mahr measuring station reliably tests the orientation of the gear teeth after each processing stage.

Due to the very short measurement time of only 1-2 seconds and the cycle time of only 20 seconds per part, 100-percent testing can be achieved.

The innovative measuring station is designed to work directly on the shop floor. The cycle has 3 stages:

**Step 1: Workpiece clamping:** The operator places the workpiece with the help of a centering pin, the correct location is confirmed by sensors. Only when the user closes the door of the safety cabin is the workpiece moved into measuring position, thus avoiding any potential damage to the probe.

**Step 2: Measuring with a repeatability of 0.5 micron:** Two probe heads contact the gear, positioned between the teeth. The ruby spheres of the probe are adapted to accommodate the circular pitch. They are connected to a Millimar P1300MA probe via levers, supported by high-precision lever bearings. The measurement repeatability is 0.5µm. The monitor displays the results and a pass / fail indication. Measurement is conducted using a Millimar X1741 interface. Data storage and analysis uses the proven Mahr D1200X software.

**Step 3: Automatic data matrix code Printing:** For the manufacturer's internal quality management, a data matrix code is printed on the gears along with the number of the twist class. This print takes place immediately after the measurement and is triggered by the operator. The data matrix code includes the class number of the rotation, batch number, year of manufacture, date as well as the piece number.

Mahr can modify the measuring station for other gear and gearbox manufacturers and adjust it for larger or smaller gears. Moreover, the measurement system can be combined with diameter and length measurements.

The philosophy behind the Mahr special solutions is that the stations are built mostly from Millimar standard components. The advantage for customers: they receive reliable technology at an optimal price-performance ratio. Each special solution project by Mahr is managed by a dedicated project engineer from the needs analysis to a successful final acceptance.

MahrSolution specialize in meeting the manufacturers specific needs, whether for a simple stand-alone manual system, or a fully automated in-line solution

