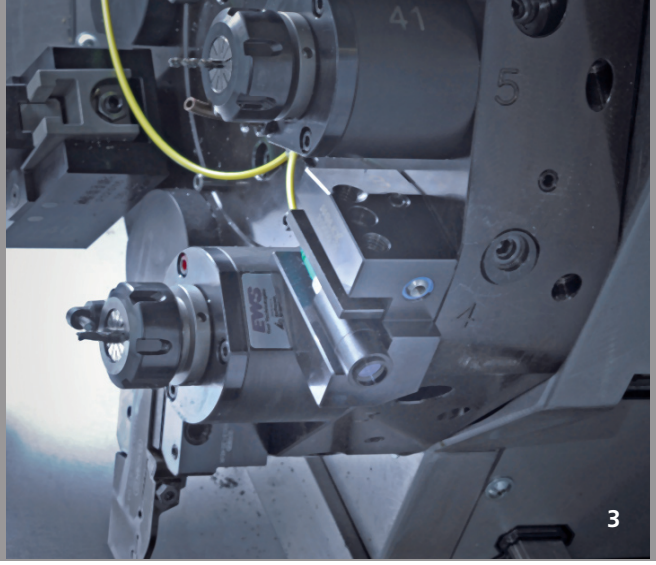
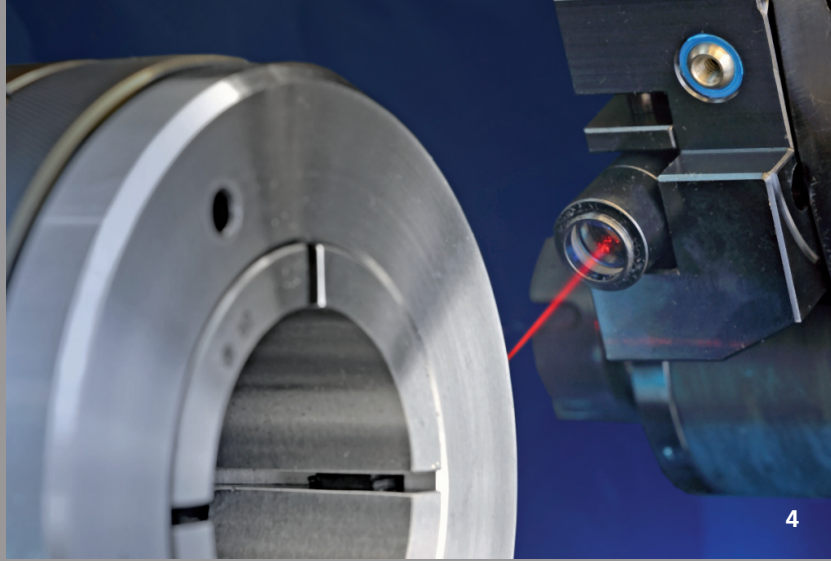


3



4

OPTICAL SENSORS FOR TOOL MACHINES

Task

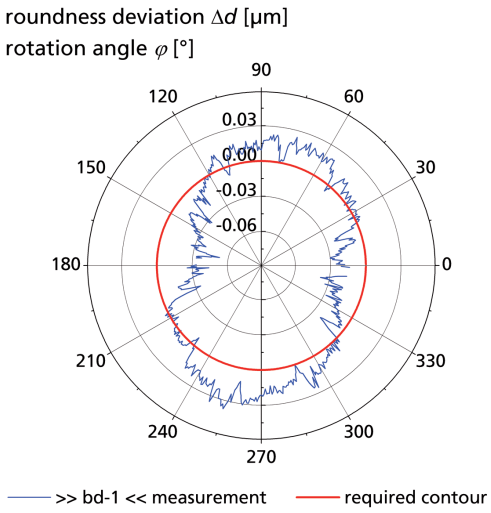
Increasing requirements upon manufacturing tolerances from machine tools are currently placing challenges on measuring technology. Established tactile measuring processes are suitable, as a rule, for measuring the workpiece in separate measuring devices, but not, however, for measuring during or immediately after the processing on the machine.

Method

Fraunhofer ILT has developed a new optical process to measure roundness deviations of parts turned on lathes without contacting the pieces. The measuring plant consists of a fiber-coupled measuring head attached to the machine tool. The measuring beam is directed upon the surface of the turned part and is reflected there back to the measuring head. From the reflected beam, a signal processor ascertains the measuring distance at a precision of less than 100 nm.

Result

The sensor »bd-1« was used on an ultraprecise CNC lathe to measure the roundness of a spindle with a diameter of 200 mm at a revolution speed of 5000 rpm at sub-micrometer precision. At a measuring frequency of 50 kHz deviations of under 30 nm were measured (see diagram).



Applications

In addition to measuring roundness deviations, »bd-1« can also be used to precisely record other geometry tests, e.g. the alignment of machine tools and workpieces as well as thermal linear expansion on the machine.

The work was conducted using devices and plants that were funded by the State of North-Rhine Westphalia and the European Union's European Regional Development Fund EFRE (»Regionale Wettbewerbsfähigkeit und Beschäftigung 2007-2013«) under the grant number 290047022.

Contact

M.Sc. Jann Kämmerling
Telephone +49 241 8906-8109
jann.kaemmerling@ilt.fraunhofer.de

Priv.-Doz. Dr. Reinhard Noll
Telephone +49 241 8906-138
reinhard.noll@ilt.fraunhofer.de

3 Fiber-coupled measuring head of »bd-1«-sensor technology on a turret.
4 Measurements on a spindle.