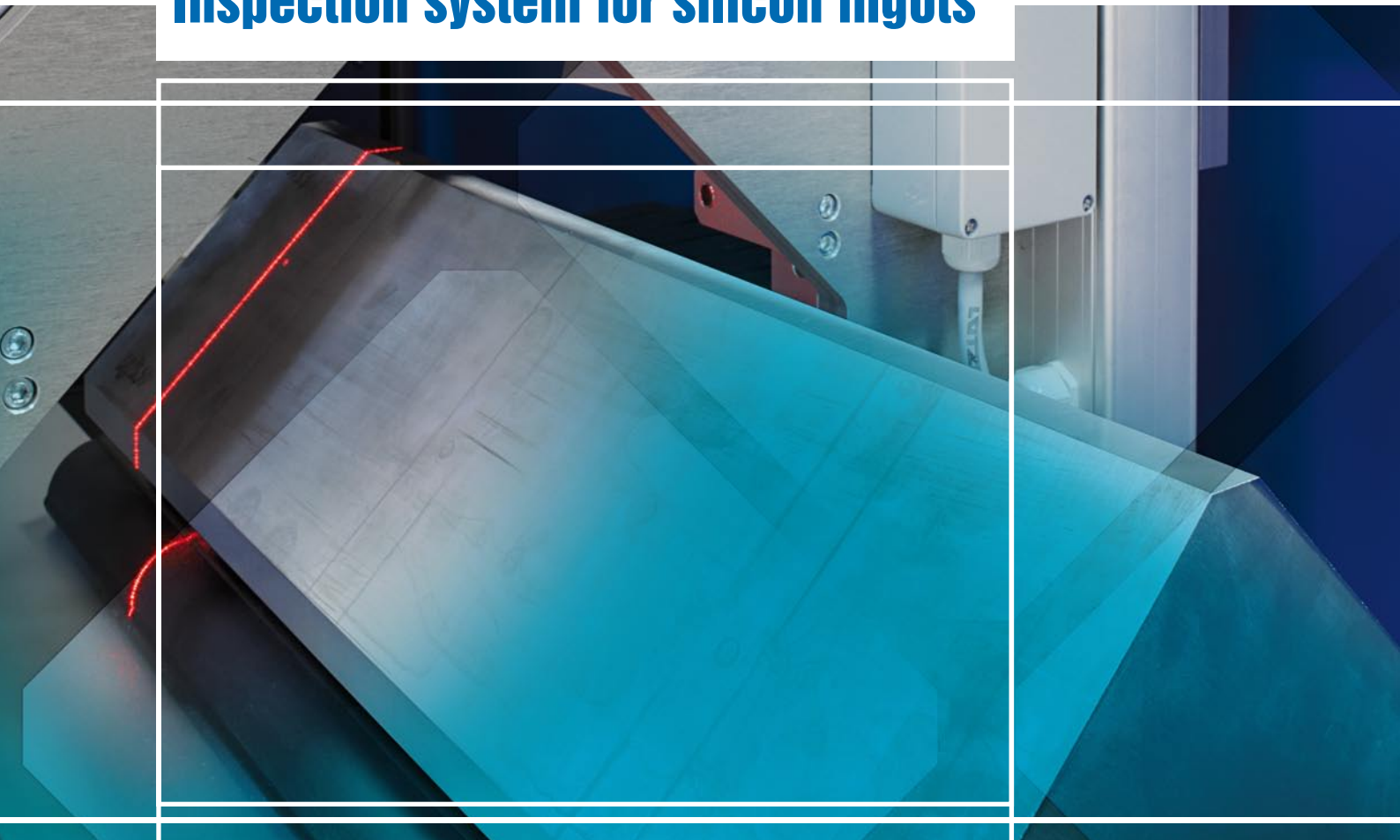




# More Precision.

**Inspection system for silicon ingots**



# Automatic geometry inspection of silicon ingots



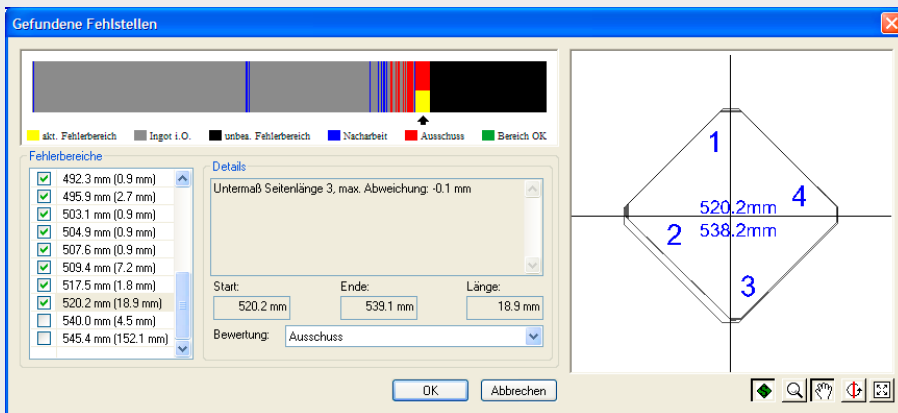
For loading the ingot the inspection system can be opened.

## Material: silicon wafer blocks (ingots)

- sliced
- squared
- chamfered

## Measurement of

- side length
- phase length
- angle
- diagonal length
- weight
- total length



### Functions

The optical dimensionCONTROL 8260 for Ingots inspection system for silicon ingots automatically measures the surface of the ingot and automatically performs, among other things, a measurement of the side lengths, phase lengths, angles and diagonal lengths. The flatness of the side surfaces is also measured.

The automated optical inspection opens up numerous benefits. It is non-contacting, wear-free and does not exert any kind of mechanical influences on the target and, in contrast to manual inspection, repeatability is very high.

The automatic measuring system compares set values with actual measured values and then classifies the ingot accordingly. The system calibrates itself automatically to the common ingot sizes of 125mm x 125mm, 156mm x 156mm and 210mm x 210mm. Ingot lengths of up to 2,500mm can be measured.

The ingot to be inspected is inserted into the measuring system manually using lifting equipment. Afterwards, the system calibrates itself to the respective ingot completely automatically using integrated master parts. The nominal values are transmitted to the measuring system from the host computer. Alternatively, a barcode scanner can also be used or the operator can make a manual input.

### System design

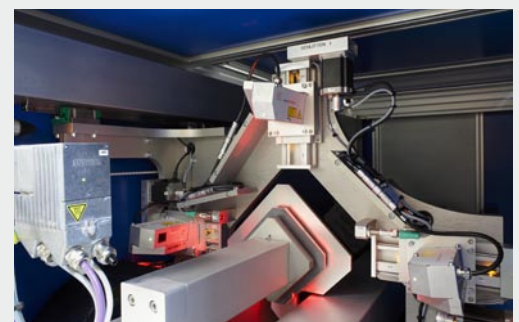
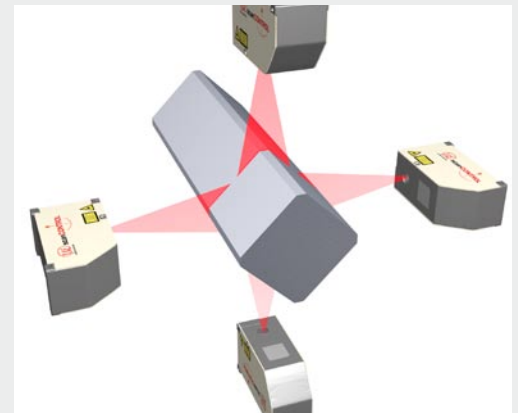
There are four laser optical line scanners on a sensor base plate. They each project a laser line onto the ingot. The reflected line is detected and evaluated by

the scanner. It contains precise information about the geometry of the ingot. The sensor base plate with the sensor system traverses along the test item during the measurement process. In doing so, measurements can be performed at specified distances depending on the customer requirements. A measurement of the ingot geometry per running millimetre is typical. The profile information is already lined up during the measurement so that a virtual reconstruction of the surface is possible. Defective places are marked and removed later during the cropping. This marking can be performed automatically or manually by the worker. The size from which a defect should be marked can be specified in the software. For example, it can be defined that a new brick should not be marked until there are ten sequential defective locations.

### Benefits

Depending on the machining state of the ingot, the surface reflection alternates between reflective and matt. Commercially available laser scanners regulate the exposure time depending on the reflection factor of the surface from profile to profile. However, conventional laser scanners cannot cope if reflection fluctuations occur within a profile.

The laser scanners used in the inspection system are fitted with an innovative, dynamic exposure changeover. Badly reflecting and reflective areas are always optimally illuminated using this function, which results in precise measurements.



### Non-contact optical measuring technique

The geometric factors are determined using four opposing laser profile sensors which are able to compensate for reflection differences within a profile line. Conventional profile sensors are influenced by such reflection fluctuations.

### System advantages

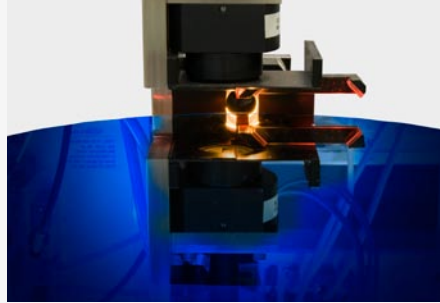
- non-contact measurement without impact on the ingot
- innovative compensation of changing surface reflection
- auto calibration with integrated master parts

## Sensors and measuring systems from Micro-Epsilon



### Sensors and systems for displacement, position and dimension

- Eddy current displacement sensors
- Optical and laser sensors
- Capacitive sensors
- Linear inductive sensors
- Draw wire displacement sensors
- Laser micrometer
- 2D/3D profile sensors (scanner)
- Image processing



### Wafer edge inspection system



### Turn key systems for inspection

- of plastics and film
- of tires and rubber
- of endless band material
- of automotive components
- of glass