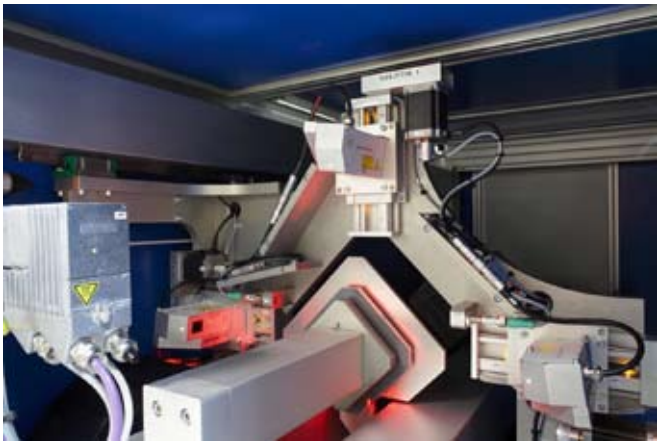
Optical geometrical inspection of silicon ingots

The silicon ingots used in the manufacture of semiconductor wafers have to meet very strict requirements. Even the slightest deviation in geometrical dimensions or surface defects will affect other machining processes. Therefore, up to now, quality inspection has normally been carried out manually. However, this type of inspection is time consuming and labour-intensive.
As a manufacturer of innovative inspection systems, Micro-Epsilon has developed a measuring system that automatically checks the surface of the ingot, as well as measuring the side lengths, phase lengths, angles and diagonal lengths of the ingot.



This automated optical inspection system brings numerous benefits. It is a non-contact, wear-free system and does not exert any kind of mechanical influences on the target and, in contrast to manual inspection methods, has excellent repeatability. Nevertheless, providing a suitable optical geometrical inspection system is only possible if the supplier possesses the appropriate expertise.
Depending on the machining state of the ingot, the surface alternates between reflective and matt. Normally, the exposure time at the sensor automatically regulates itself for each profile depending on the reflection characteristics of the surface. However, if the surface changes within one laser line, most conventional scanners cannot cope.
Four split beam scanCONTROL 2800 customised sensors are used in this system. Micro-Epsilon has developed a technical solution with dynamic exposure changeover for the changing surfaces. Using this function, any poorly reflecting or reflective areas can be optimised and illuminated. In order to perform high-precision measurements of ingots, even a high-end sensor must have some modifications made to it. Measurement of such objects would be impossible with conventional line scanners.

Requirements for the measuring system:
- Measurement on reflecting surfaces
- Dynamic exposure regulation

Sensor series used:
- scanCONTROL 2800

MICRO-EPSILON
Königbacherstr. 15
94496 Ortenburg/Germany
Tel. +49 (0) 85 42/1 68-0
Fax +49(0) 85 42/1 69 90
info@micro-epsilon.com
www.micro-epsilon.com
A member of micro-epsilon group
Certified DIN EN ISO 9001 : 2000
Modifications reserved / 9781178-A010039FHF