QISAB
progress by physics

Presentation for

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progress by physics

Presentation of

CWS – Coherent **W**ave **S**catter System

Robust laser system for process in-line measurements of surface quality parameters in the nanometer range

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Halmstad, 2014-

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Automated polishing for the EU tooling industry

poliMATIC

Concept

- In-line surface metrology support for automation of laser and robot polishing.

Developers

HÖGSKOLAN I HALMSTAD

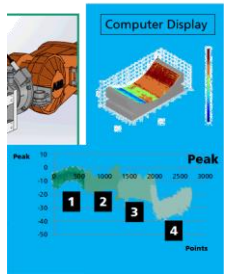
toponova – kvalitetssäkring av ytor!

Fraunhofer ILT

Fraunhofer IPT

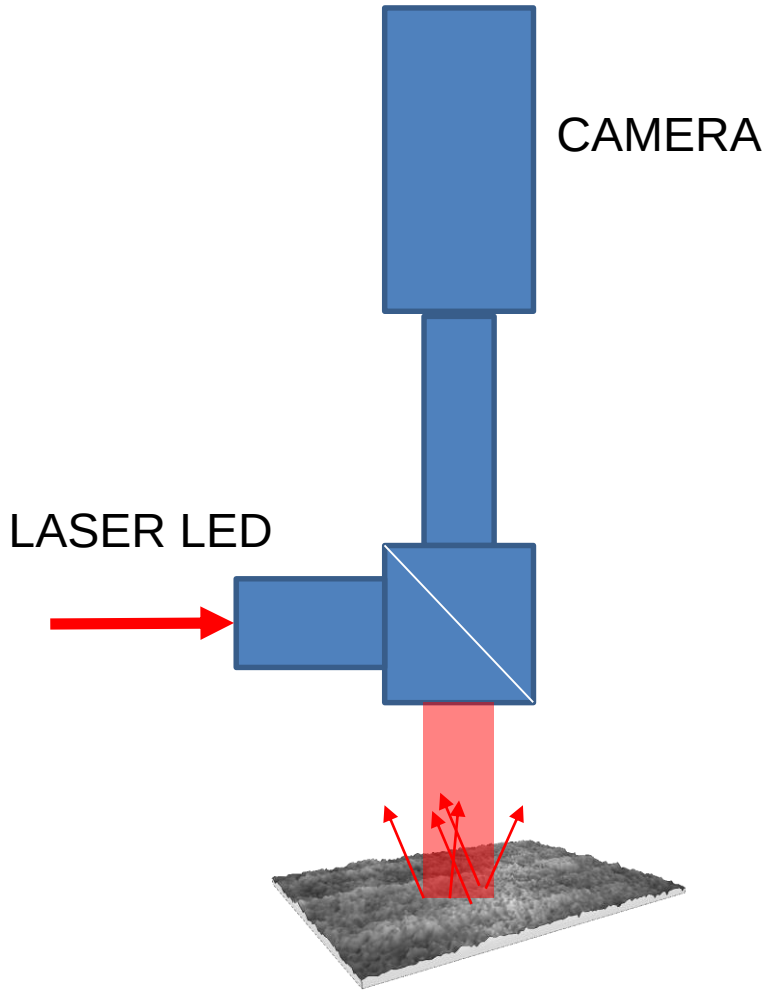
Product

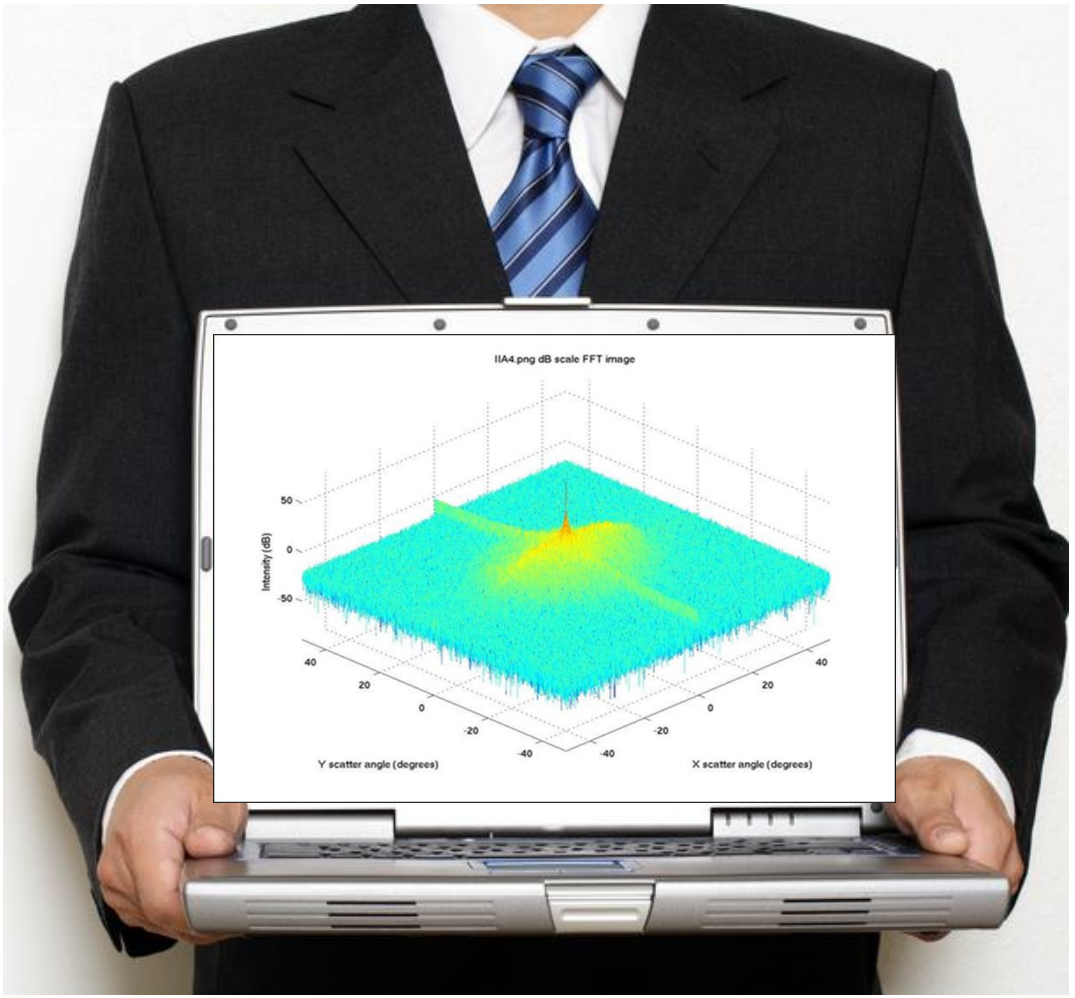
- CWS system from QISAB
- Qualitative statistic measurement system for fast, in-line, process feedback



CWS - Coherent Wave Scatter system

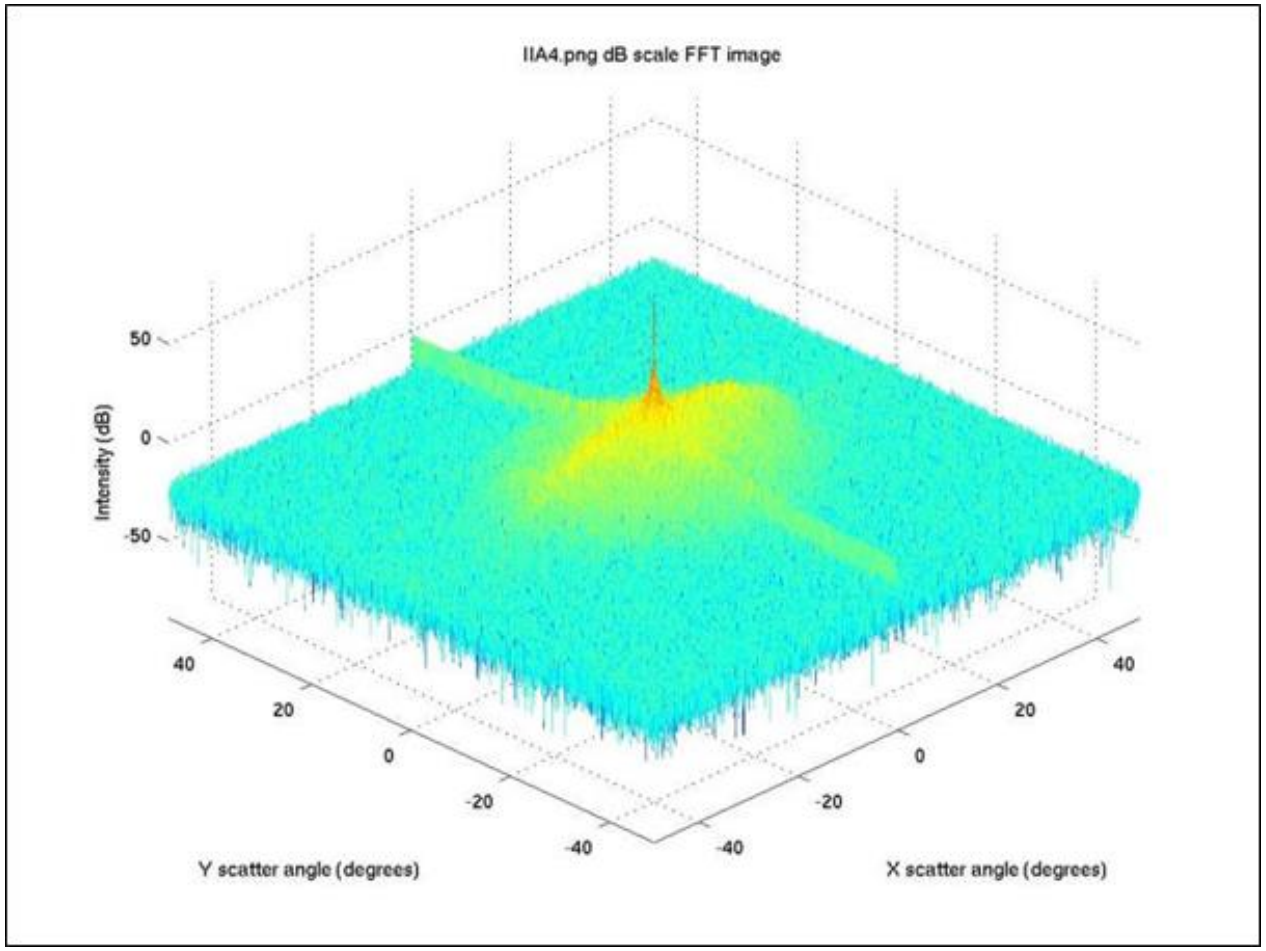
Statistical analysis of surface quality in the nm range using laser imaging





CWS surface quality feature parameters

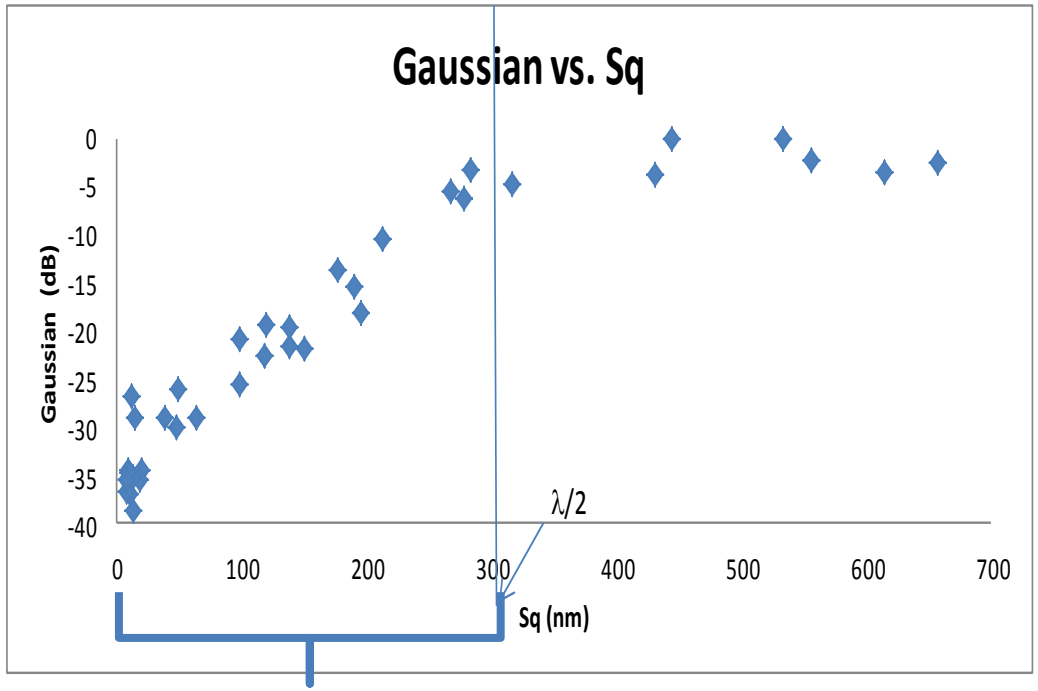
Single shot, 4x4 mm area scatter diagram



Gaussian (dB)	negative value= smoother surface. Correlates to surface texture amplitude parameter Sq (rms) ISO 25178
Gloss (dB)	Parameter shows how glossy the surface appear.
Texture isotropy	The parameter shows isotropy of the surface and indicates e.g. if polished in one direction. Correlates to surface texture isotropy parameter Str (ISO 25178)
Structure (dB)	Indicates existence of larger structural features on the surface, like scratches or grooves.
Texture Angle (deg)	This parameter calculates the main angle for the texture of the surface. Correlates to surface texture direction parameter Std (ISO 25178)

Correlation to surface texture

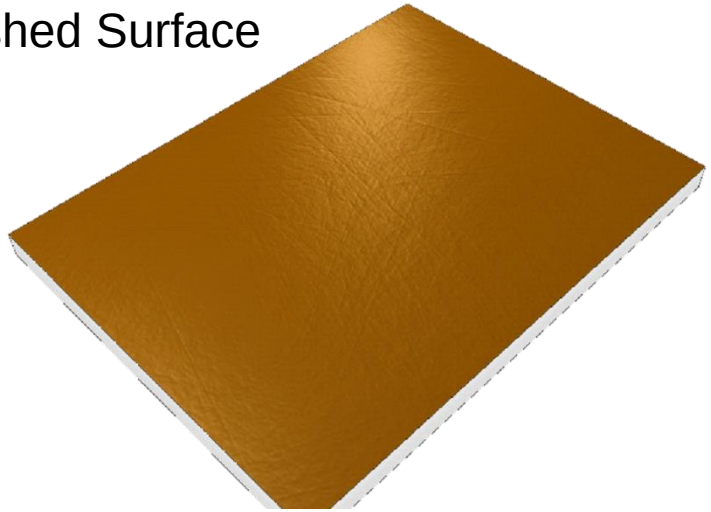
- System used for surfaces, Sq 0,010- 0,350 µm

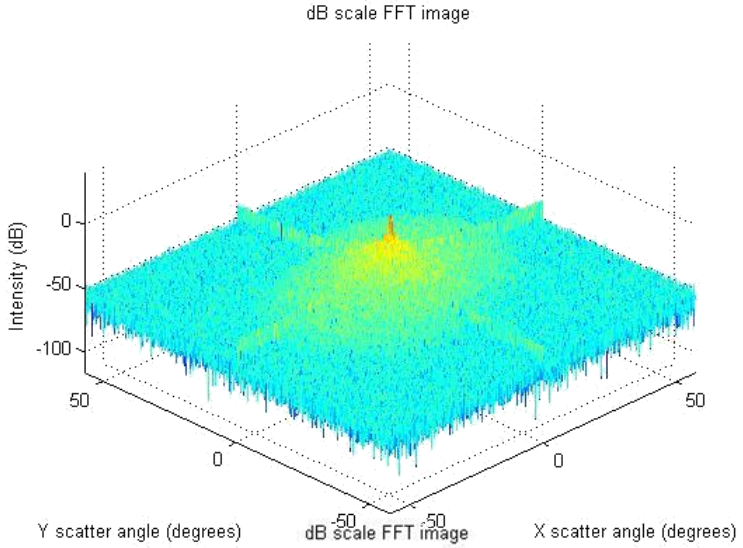


Verified correlation, Gaussian parameter vs. Sq (ISO 25178).
Sq 10 to 350 nm

Surface quality by single measurement

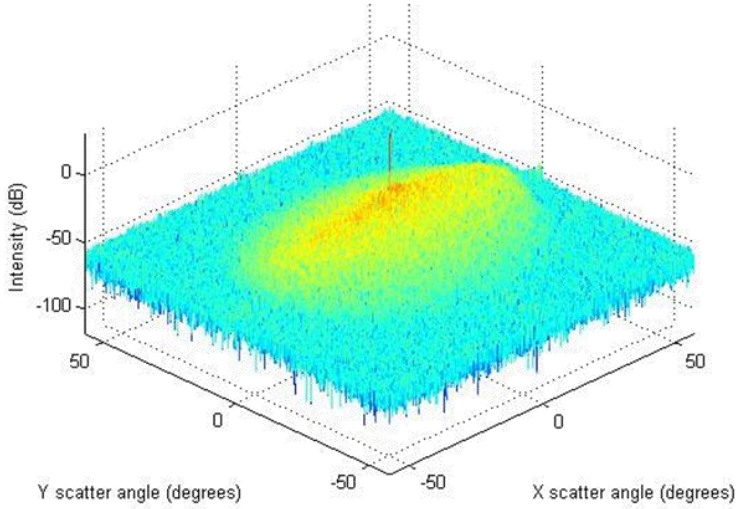
High Polished Surface





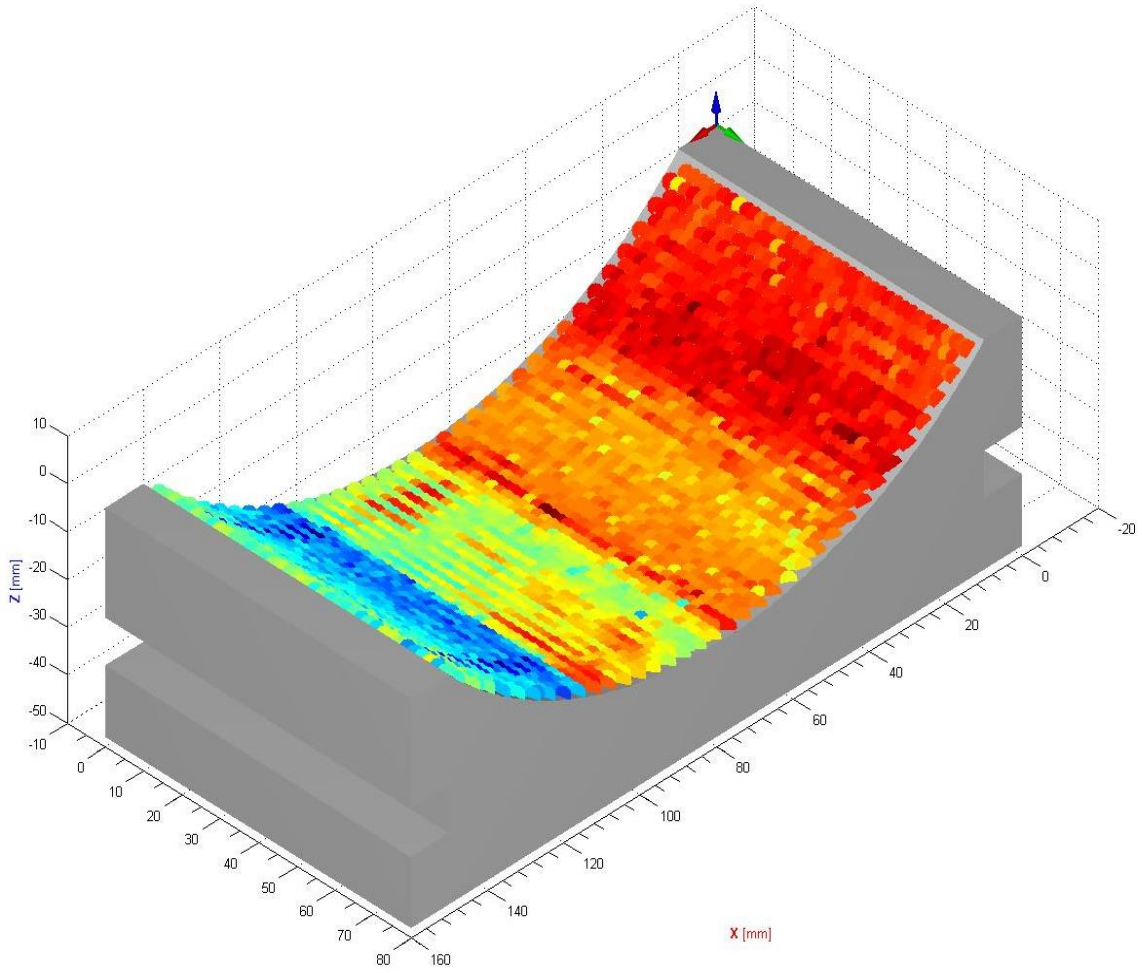
Gaussian:	-24,36 dB
Gloss:	-3,30 dB
Texture isotropy:	0,917
Structure:	-15,24 dB
Texture Angle:	180 deg

Grinded Surface



Gaussian:	0 dB
Gloss:	18,19 dB
Texture isotropy:	0,0048
Structure:	13,99 dB
Texture Angle:	93,21 deg

Surface quality of complete object by scanning



CWS applications and significances

- Suitable for automated in-line processes
- Robust system
- Fast measurement
- Easy determine and follow up of surface quality
- Replaces manual inspections
- Non-contact measurement
- Areal surface measurement
- Independent on surface orientation

Summary: **Wherever objective measurements, control and parameters of surface quality are required**

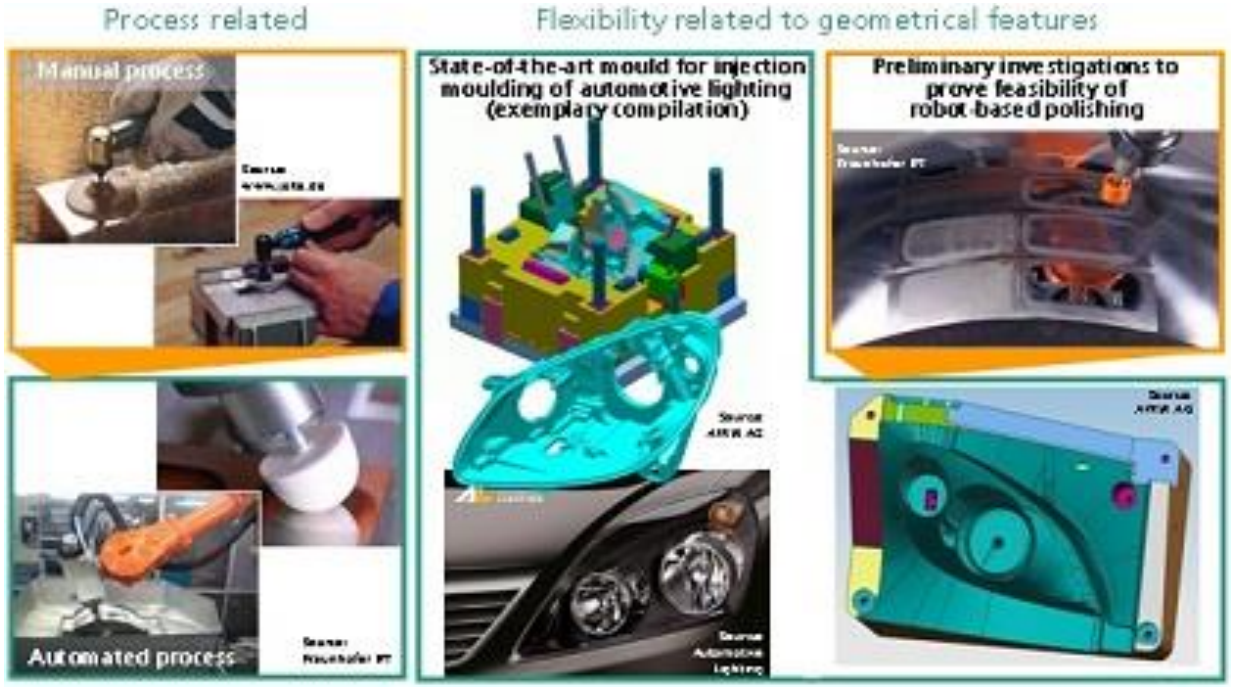
CWS benefits and added values

- Objective measurements
- Process and quality documentation
- Shorter process time.
- Possibility for process optimizations
- Automating of previous manual process
- In-line surface quality control
- Less scrap by faster detecting quality problems close to production
- Enhanced tool maintenance and replacement scheduling

Summary: **Opportunity for significant total cost savings**

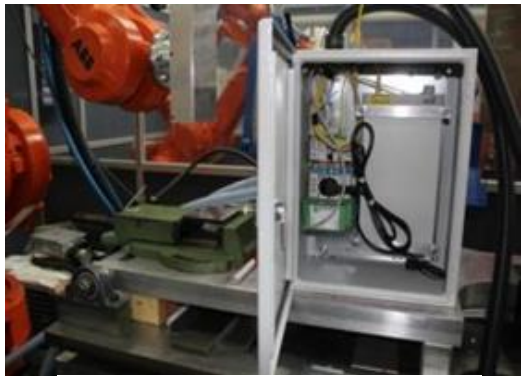
Ex. branches with benefit of CWS

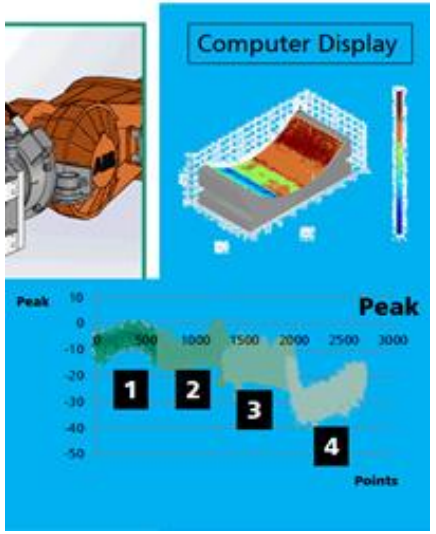
- Mold and Tool Makers
- Automotive Industry
- Aero Industry
- Turbo machinery and Gas Turbines
- Implant Manufacturing, Med-tech



CWS Technical Specification

Laser diode		640 nm @ 0,1 – 10,0 mW
Power requirement		10 W
SW platform		MS Windows
Electrical		110 – 240 VAC
Instrument amplitude resolution		Sq 10 – 350 nm
Depth of field		1 mm
Required positioning acc.		< 1 mm
Measurement area		≥ 4x4 mm
Measuring time		1 ms
Analysis time		0.2-0.5 sec
x, y resolution		2048x2048 pixels
x, y sensitivity		2 – 200 µm
Working distance		75 – 400 mm
Temperature range		-10 – +50°C
Weight sensor		2 kg
Dimensions sensor		300x100x50 mm
Control		Active X
Data output		Active X or to SQL database
Communication	-PC / back-end	GigE Ethernet, USB, max 1000 m
	-Sensor / back-end	Robot tube: 24 VDC, GigE E., optical fiber, max 100 m





Thank you for your attention!

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