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Shunt Resistor Inspection System (SHX)
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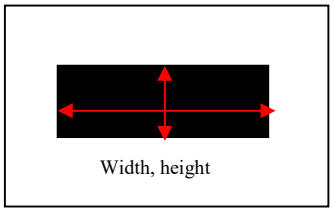
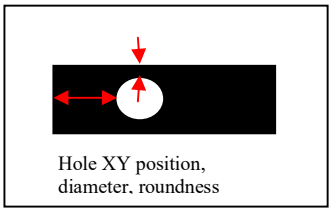
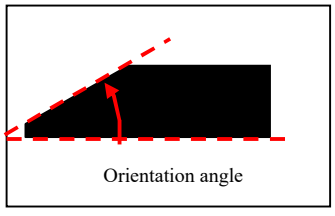
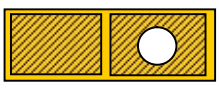
The shunt resister is a measurement power resistor of very low impedance. Its full metal body provides external electrical contacts of even lower resistance (0.005 Ohm or lower). This is only possible with extremely clean metal contact pads, no contamination, no major surface irregularities etc.
Consequently an extensive optical inspection of the metal surface is mandatory. Also, the outside dimensions, shape of the device and flatness is critical, because these device often are encapsulated with mold, specifically for the automotive industry.
STV provides the inspection system for

- Dimensional measurements in XY, width, height, hole position, asymmetry etc
- Positions and quality of welding lines,
- Orthogonality of mechanical cuts in progressive stamping
- Verification of burr, indentations in the stamping process
- Metal surface inspection
- Specific focus on deformations over sanded rough regular surface of the metal
- Coining, scratches
- Welding spots on the surface
- Oil spots, finger prints etc on surface
- Device orientation
- Product mix check
- Field of view 80 x 80 mm
- Confocal top light, plus various dark field illumination
- Indirect back light illumination for XY dimension measurements
- High speed, high resolution cameras
- Tele optics, no effect of device motion on measurement results
- Power LED stroboscope lights, integrated into the camera module
- Interface to external handling system
- Dual camera modules (one for top surface, one for back surface


Width, height


Hole XY position, diameter, roundness

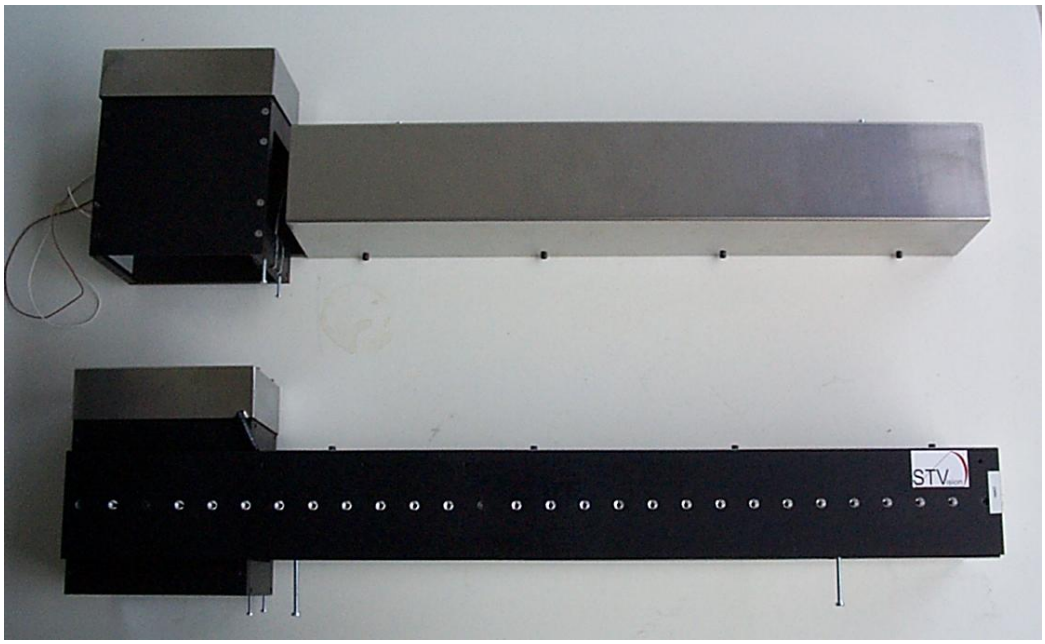

Orientation angle


Surface free form inspection area definition (around hole)


Surface damage: coining, spots etc


Contour damage, burr

The system consists of two camera modules and a PC. The field of view is large (80x80 mm), and the optics is a Cmount Tele lens to guarantee precise geometric measurements even on thick devices. Various illumination components are integrated into the module. Two camera modules inspect the device from both surfaces.



The software is a highly optimized and tuned collection of inspection tools. Specifically the surface inspection includes a mix of surface pattern statistics, filtering, and a detailed object measurement and parameter analysis / classification, to separate random surface roughness from local defects. Mathematical tools from optical densitometry are used to extract depth of defect features from the image information.
Each camera digitizes 1 or 2 images with varying illumination. The total cycle time per device is around 0.8 sec for the standard camera, or 0.7 sec for both high resolution cameras.
The system is proven in a number of installations, running production 24 hours per day, with high MTBA, high time between assist, in automatic mode.

Technical Data

Camera	**standard**	**Medium**	**Hi-res**	**dimension**
Resolution	1300 x 1040	1900x1200	2500x2000	Pixel
Image format	60 x 47	60x37	48	Mm
Pixel size	46	31	24	Micron
Measurement XY	+/- 16	+/- 12	+/- 8	Micron
Surface defects	>= 80	>= 60	>= 40	Micron
Exposure time	20	20	20	microsec
Camera speed	<= 15	50	25	Fps
Cam0 # of images	2	2	2	
Cam1 # of images	1	1	1	
Cycle time	0.8	0.7	0.7	Sec
Handling	0.2	0.2	0.2	Sec
Cycle time	1	1	1	Sec
Host interface	24V parallel			
Operating system	Win-10-64			