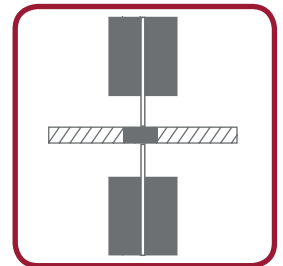## Weld Seam Control System
EHR® ALUCHECK

Non-destructive Control and Inspection
of Weld Seam for Steel and Aluminum
Laser based function principle

Geometrical evaluation and reliable detection
of three-dimensional geometric errors

THE ROLAND PLUS

► **Automatic visual inspection**
► **Maintenance-free**
► **Secure quality control**

- Approaches of both types of system in one sensor:
  - Inspection of the surface
  - Inspection of the geometry
- Flexible diversity:
  - 1x3D sensor, stationary or robot-guided
  - 1x2D/3D sensor (Incident or transmitted light, type K), stationary or robot-guided
  - 1x3D sensor & 1x2D/3D sensor (Incident or transmitted light, type S), stationary or robot-guided
  - 2x3D sensor, stationary or robot-guided
- Absolute measuring process
- Integrated Fieldbus interface

Description:

The **EHR® AluCheck System** has been developed for the control of weld seams of aluminum and steel. By the usage of different sensors respectively combinations of these sensors it is possible to detect and classify all regular optical wed seam defects.

Actually the system has been extended so that other types of welding (e.g. RobScan welding) allow safe quality controls too.

The **EHR® AluCheck System** consists in the standard version of three components:
- Mounting plate (here the components switch cabinet and controller (Embedded PC) are mounted.)
- Controller (for each camera of a AluCheck sensor a controller is necessary. For example a 2D/3D AluCheck sensor requires: 2 controllers, one 2D controller and one 3D controller. For the inspection of the rear side, a total of 3 controller are required.)
- Sensor(s)

Function:

The function of the Weld Seam Control System **EHR® AluCheck** is based on the principle of laser triangulation and optical matrix measurement. Two types of system in one sensor allow the inspection of the surface and of the geometry.

Technical data:

|	
Voltage: switch cabinet:	24 V DC ± 20 %
Power supply switch cabinet:	7A
Protection class:	IP 66 (switch cabinet),
	IP 54 (controller)
	IP 54 (sensors) at connected sensor cables
Ambient temperature:	0°C ... +50°C during operation
Storage temperature:	-20°C ... +70°C
Ambient pressure:	Atmosphere pressure
Measuring principle:	2M, Laser triangulation,
	Laser class 2, EN 60825-1
	Semiconductor laser
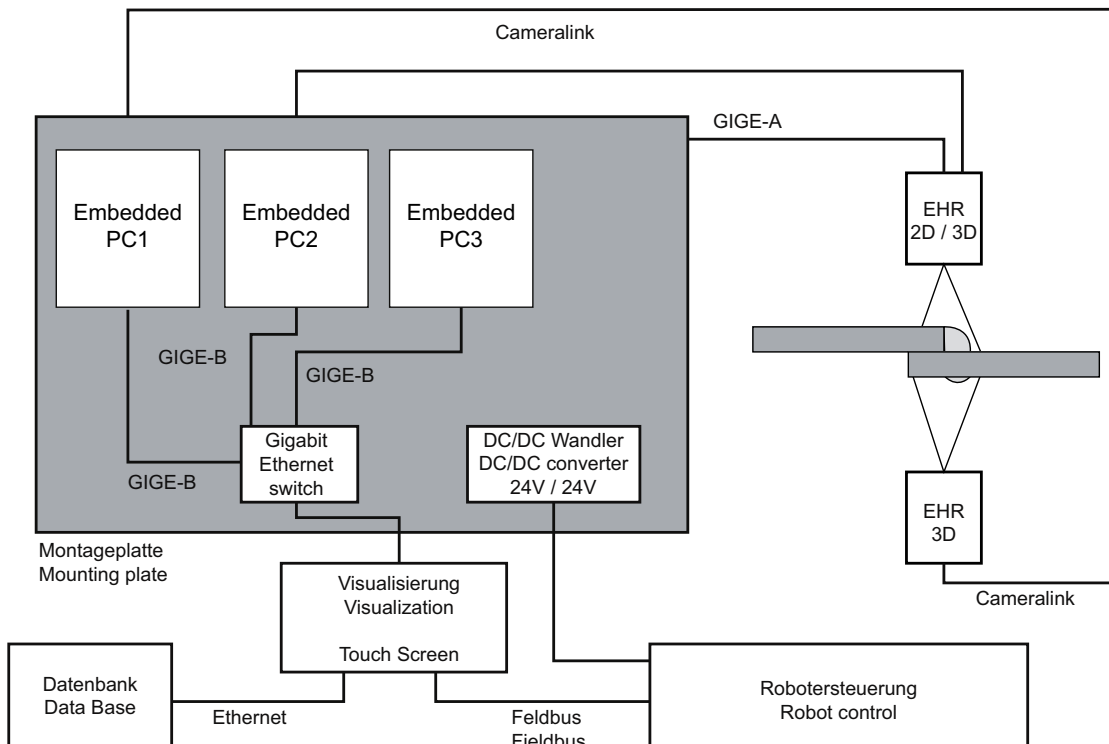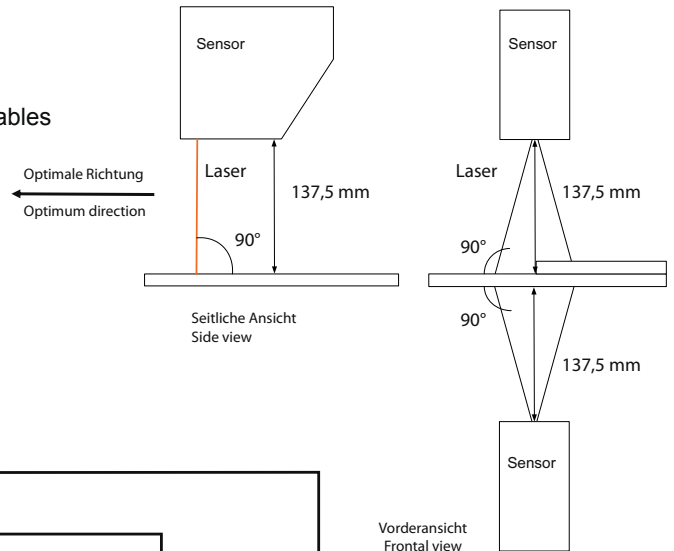
Illustration: Overview of the cabling of an **EHR® AluCheck** system (full version)

Sensor systems:

The EHR® AluCheck control system is available in four versions:

● **EHR® 3D AluCheck system** (3D front side): 3D camera (triangulation technology). Errors differing in the spatial coordinates (width, height and position) from a good weld seam are recognized.

● **EHR® 2D/3D AluCheck system** (2D/3D front side): 3D camera and 2D camera are enclosed in a sensor housing. This offers the possibility to examine error characteristics by a 2D matrix image (e.g. smaller pores).

● **EHR® 2D/3D AluCheck and rear side 3D AluCheck** (incident light version): Weld Seam Control from both sides (front and rear). The control of the front side is done by a 2D/3D sensor; the rear side of the weld seam is inspected by a 3D camera.
Here pushthroughs (root pass-through, return, angle) can then be detected too. The clearance between two welded plates can also be determined with this variant.

● **EHR® 2D/3D AluCheck and rear side 3D AluCheck** (transmitted light version): Double-sided Weld Seam Control.
The Weld Seam Control is done line in the version above, the incident light version. The transmitted light version allows the inspection of the work piece in the backlight. Through holes in the Weld Seam are detected reliable. The double-sided Weld Seam Control makes a calibration both of the sensors to each other necessary.

● **EHR® 2x 3D AluCheck** (3D front side and 3D rear side): For the detection of gaps between top sheet and bottom sheet.

Techical data	2D sensors	3D sensors
Parameters:	Performance data:	Performance data:
Welding speed:	375 mm/sec	Standard: 3 m/min -> 50 mm/sec
Active field of view:	15 mm x 19 mm	17 mm x 17 mm
Scans per sec:		Max. 200 scans/sec *(dependent of the set of viewing area)*
Optical resolution x: *(x= Camera resolution 90° to direction of travel)*	15 µm/Pixel (800 dpi)	17 µm/Pixel
Optical resolution y: *(y=Resolution in direction of travel; dependent on travel speed and scans/camera)*	15 µm/Pixel (800 dpi)	250 µm/Scan at 3 m/min -> 50 mm/sec 125 µm/Scan at 1.5 m/min -> 25 mm/sec
Height difference z:		+/- 10 mm
Depth of field of optical system:	+/- 1 mm	
Working distance:	137.5 working distance; +/- 10 mm	137.5 working distance; +/- 10 mm (with Autofocus Unit)
Scans per second:	50 images / sec.	
Sensor resolution:	1280 x 1024 Pixel 1/1.8¨	1024 x 1024 Pixel 1/1.8¨
Sensor type:	CMOS Global Shutter	CMOS
Spectral range (band-pass):	450 +/- 10 nm	660 +/- 10 nm
Camera interface:	GigE	CameraLink; optional GigE
Required controller unit		
Controller unit:	I7 Dual Core and Hyper Threading / Embedded Com Express Modul 5	

WELD SEAM CONTROL SYSTEM EHR® ALUCHECK

System versions

EHR® 3D AluCheck	3D front side	One side weld seam control, 1 sensor
EHR® 2D/3D AluCheck	2D/3D front side	One side weld seam control, 1 sensor
EHR® 2D/3D + 3D AluCheck, A	Incident light	Double side weld seam control, 2 sensors
EHR® 2D/3D + 3D AluCheck, D	Transmitted light	Double side weld seam control, 2 sensors
EHR® 2x3D AluCheck	3D front side and 3D rear side	Double side weld seam control, 2 sensors

More available versions: **S**=stationary, **R**=robot-guided	Transmitted light versions: **type K**, **type S**

Spare parts list

Description / Article		EHR® 3D AluCheck stationary	EHR® 3D AluCheck robot-guided	EHR® 2D/3D AluCheck Incident light, stationary	EHR® 2D/3D AluCheck Incident light, robot-guided	EHR® 2D/3D AluCheck Transmitted light, type K, stationary	EHR® 2D/3D AluCheck Transmitted light, type K, robot-guided	EHR® 2D/3D + 3D AluCheck stationary	EHR® 2D/3D + 3D AluCheck robot-guided	EHR® 2D/3D + 3D AluCheck Transmitted light, type S, stationary	EHR® 2D/3D + 3D AluCheck Transmitted light, type S, robot-guided
2D/3D TIVIS weld seam sensor with integrated illumination for incident light (pore inspection)	BVS0059			X	X			X	X		
3D TIVIS weld seam sensor	BVS0060	X	X					X	X		
3D TIVIS weld seam sensor with integr. illumination for incident light	BVS0069									X	X
2D/3D TIVIS weld seam sensor with connection for control line of the transmitted light illumination	BVS0070					X	X			X	X
TIVIS AluCheck controller module with CL interface for connection to Siemens Integra PC; suitable for fitting on robot	HWS0960	X	X		X	X	X	X	X	X	X
TIVIS AluCheck 2D controller module with GigE interface, for connection to Siemens Integra PC; suitable for fitting on robot	HWS0961			X	X	X	X	X	X	X	X
TIVIS AluCheck 3D controller module with CL-interface, for connect. to Siemens Integra PC; suitable for fitting on robot: IP addr. 2	HWS0969							X	X	X	X
Integra Siemens PC with configuration	HWS0962	X	X	X	X	X	X	X	X	X	X
AluCheck controller mounting unit with compact switch cabinet, 1 controller	MK0933	X	X								
AluCheck controller mounting unit with compact switch cabinet, 2 controller	MK1116			X	X	X	X				
AluCheck controller mounting unit with compact switch cabinet, 3 controller	MK1117							X	X	X	X
CameraLink cable robot compatible 5 m	BV0144		X		X		X		**X**(2x)		**X**(2x)
CameraLink cable 3.5 m robot compatible	BV0148							**X**(2x)		**X**(2x)	
TIVIS transmitted light illumination blue 5 m	BV0165					X	X				
GigE cable AluCheck 12 m	EK1561	X	X	X	X	X	X	X	X	X	X
Control cable for transmitted light illumination	EK1811					X	X				
TIVIS AluCheck control cable RS232 3.5 m	EK1894	X		X		X		**X**(2x)		**X**(2x)	
TIVIS AluCheck voltage supply cable 3.5 m	EK1895	X		X		X		**X**(2x)		**X**(2x)	
Ethernet cable GigE 3.5m 2xM12 plug	EK1896			X		X		X		X	
TIVIS AluCheck control cable RS232 5m robot compatible	EK1897		X		X		X		**X**(2x)		**X**(2x)
TIVIS AluCheck voltage supply cable 5m robot compatible	EK1898		X		X		X		**X**(2x)		**X**(2x)
Ethernet Kabel GigE, 5m 2xM12-Stecker robot compatible	EK1995				X		X		X		X
Control cable for transmitted light illumination 1.5 m	EK2100									X	X
Robot compatible cable package for AluCheck	EK1800 EK1801	If the AluCheck system is installed on the robot, a special cable packet consisting of a power and an Ethernet cable must be used. The cable is laid from the foot of the robot to the Alu Check distribution box. Both cables are supplied, without tube.									

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