Individual and precise

Automatic robot path correction

VMT BK

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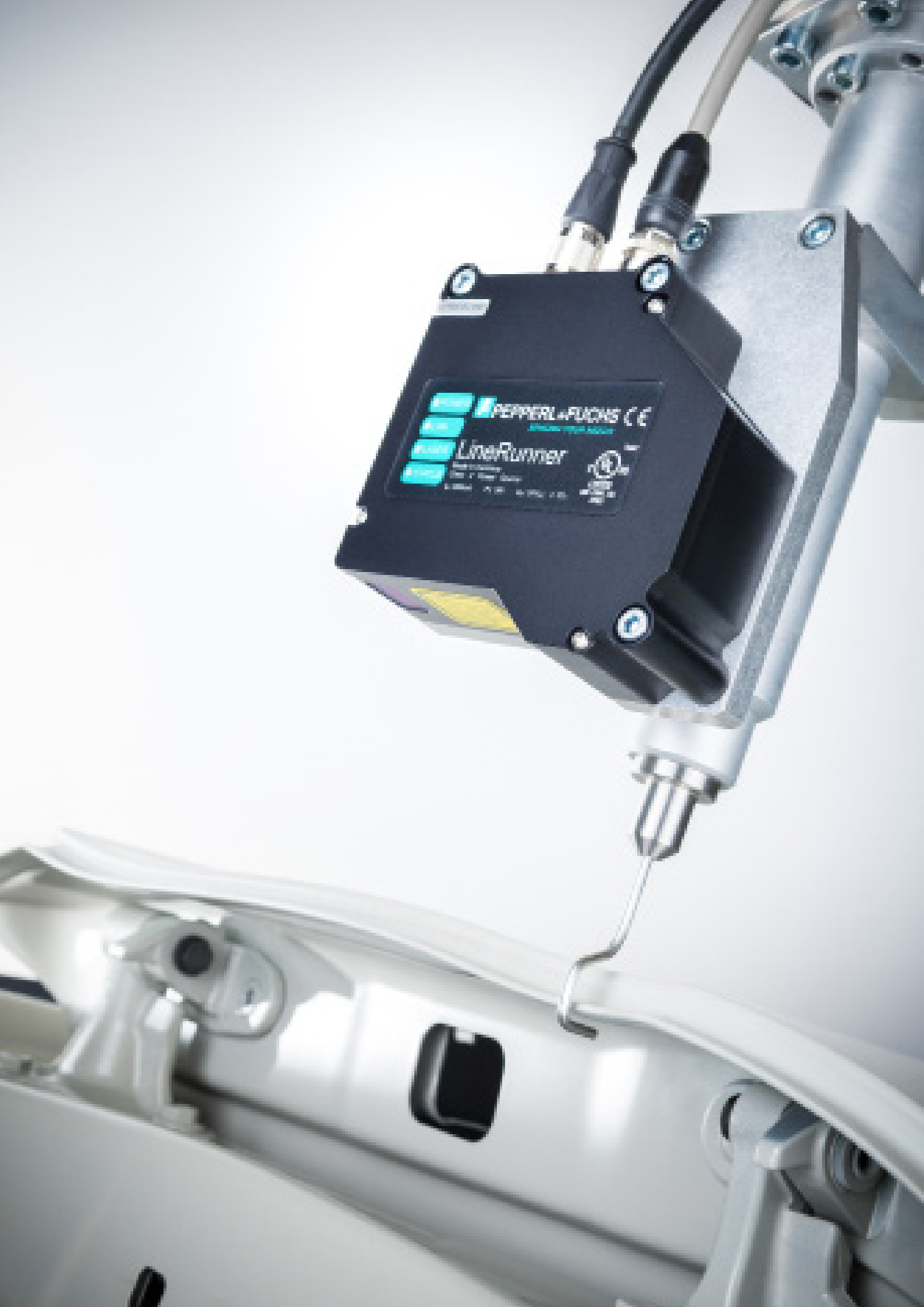
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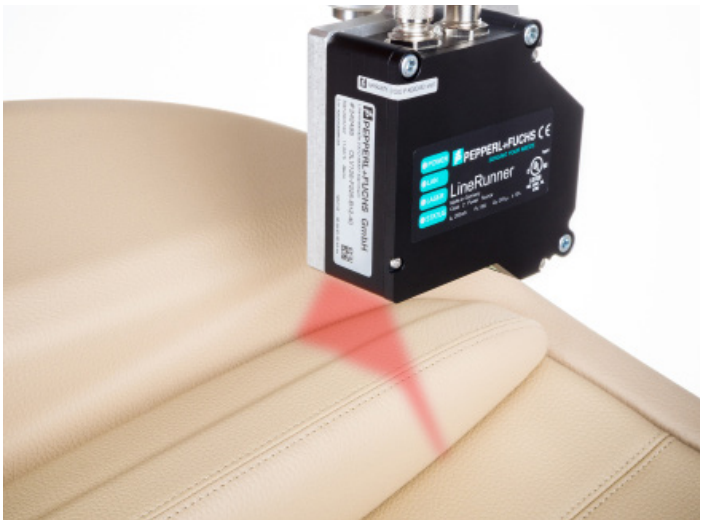
LineRunner

Functionality and application possibilities

The VMT BK system is an automation process that adapts the nominal path of a robot optimally and individually to the shape/ contour of any component.

The process is based on three components developed by VMT: The LineRunner, a laser triangulation sensor, that generates the measurement value along the processing contour, the technology package to communicate with all current robot controls and the VMT software for evaluation and visualization. Everything from a single source: VMT.



Advanced automation in different production processes requires an individual processing path that fits the respective component.

VMT BK includes the respective component or processing contour and guides the robot along the component in keeping with the data.

VMT BK deployment is conceivable for all robot applications in which a processing tool has to be guided on the basis of the respective component geometry.

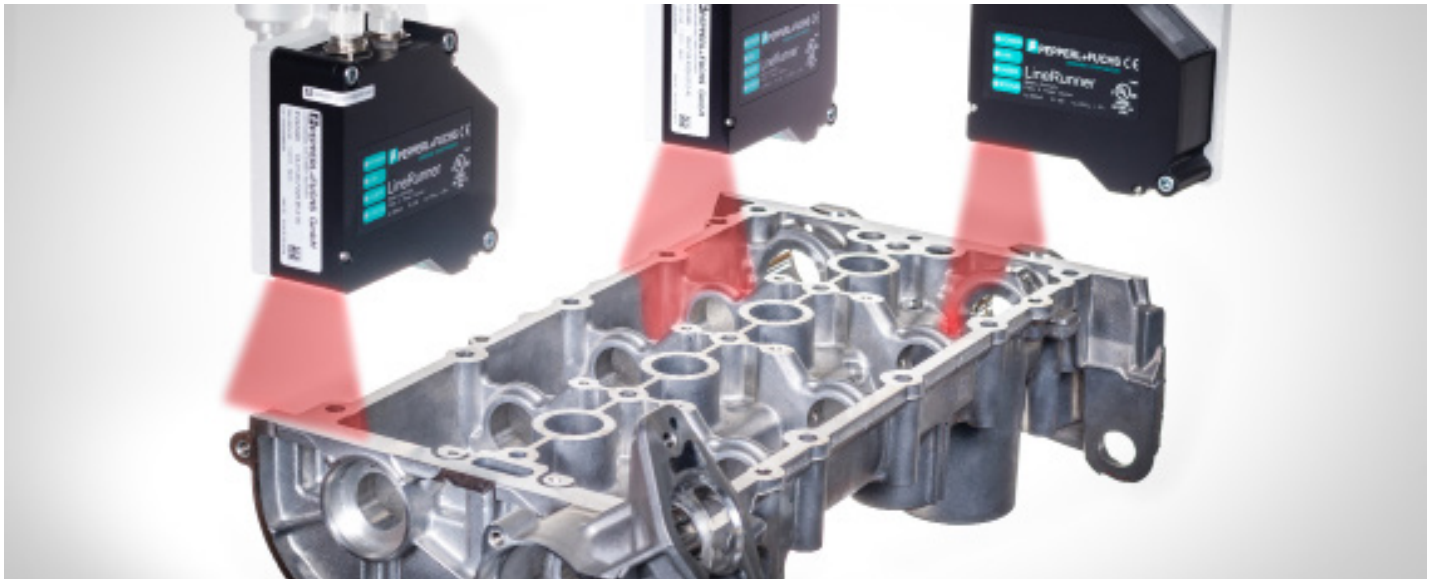
The different component geometries are achieved by production and assembly processes but can also be created by unstable components.

- Cosmetic joint sealing in vehicle doors and hatches (hem-flange seam sealing)
- Precise welding applications along sheet overlaps for example
- Sewing application on leather elements for vehicle interiors or even shoes for example

The application in detail

With the VMT BK system for automated path correction, nominal path for robots are corrected and updated with a precision of +/- 0.1 mm.

Path correction is carried out in a two-stage process. In a measurement run, deviations in component position are first measured to a reference component. Finally, a correction is calculated using the VMT software and the nominal path of the robot is optimally calculated so that the available component is aligned. The result is visualized and can be individually aligned within the VMT working scope. Depending on applied laser triangulation sensors, the position and component tolerances can be corrected to a high degree of precision in the range of +/- 15 mm.



Measuring run

During the measuring run, the contour of the component is scanned and compared with the reference component. To do this, the robot's VMT laser triangulation sensor is guided along the processing contour. By means of the measuring points, the current 3D position of the component is determined. With this information, the robot's nominal path is corrected with a precision of +/- 0.1 mm.

During the measuring run, the VMT BK system also checks the nominal path of the robot for potential collision risks present in the processing area. If any are detected, an application run is not allowed.

Application run

The VMT BK system calculates an optimal and individual robot path adapted to the available component and relative to the nominal path. If a collision-free application is possible, the robot administers it so that the component is highly precise and process-safe.

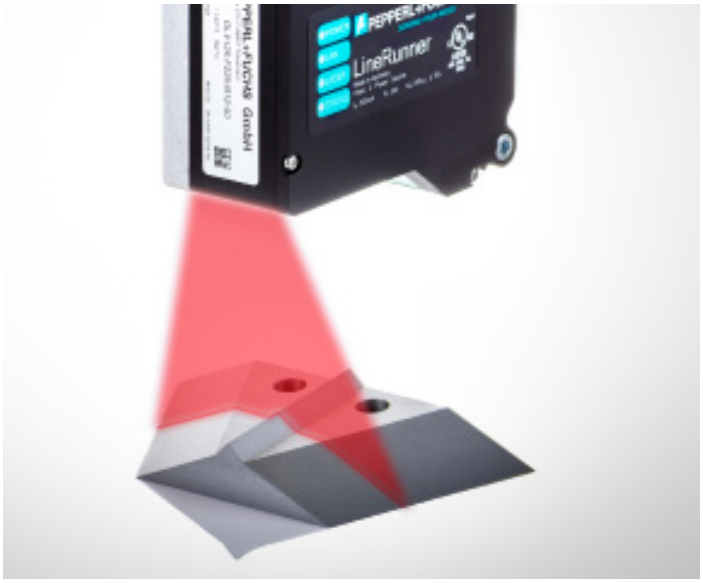
On the robot side, the operation of the system is assumed by a provided technology package. The package does not require any expensive programing and is available for all current robot controls.

System advantages

Flexible and extendable – even in the most demanding applications VMT offers individual and optimal solutions. The market-tested automation system ensure high system availability, process safety and system capacity.

Automated determination of tool data

The VMT BK sensor is internally calibrated ex works. The measurement results are therefore given in millimeters. Using a simple, automatable process, it is possible to determine the tool data of the sensor on the robot quickly and precisely. Monitoring sensor TCP data is also possible this way at any time.



Managing measurement data

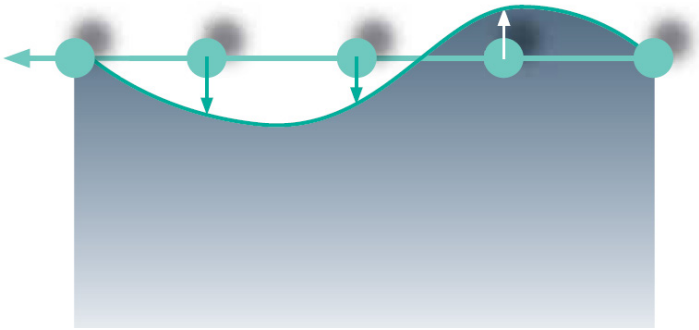
The VMT BK system solution seamlessly logs all system activities and measurement values. For long-term data storage it can be connected to a database.

Robust sensor system

The VMT LineRunner laser triangulation sensor works in the infrared range and because of this is robust in varying lighting conditions, surface properties and backgrounds.

System extensions

Additionally, the BK module can be extended with each VMT software module: 3D position detection, 2D position detection, inspection etc.



Application can be optimized when there are form deviations in components

The VMT BK system can be individually aligned to the form and stability of a component. The number of measurement points is scalable and is aligned with the requirements of the component. System scalability allows position correction of the entire component, different areas or even single points.

VMT BK allows safe detection of component edges, sheet overlapping, - in brief, any contour that can be geometrically determined.

LineRunner Sensor family

For challenges in guide correction, edge and slot measurement or inspection tasks, VMT has developed a high-performance and secure laser stripe sensor family.

In laser stripe processes, a line is projected onto an object, and this line is determined by a camera at a given angle. With the triangulation principle, height and width information can be determined. Thanks to the VMT product family's laser protection class 1, no additional protective measures are required.

Highlights

- No influence from extraneous light during measurement using IR laser
- No influence from changing background appearances
- No limitations in choice of measurement location using object geometry
- No influence from changing surface appearances (color quality)
- using laser class 1, no additional protective measures are required
- only Ethernet and power supply line (no video lines on the robot)

Technical data LR300		
General data	Measurement area	Xmin = 0 mm ... 40 mm Xmax = 0 mm ... 100 mm Z = 100 mm ... 300 mm
Electric data	Operating voltage	U_B 24 V DC ± 10 %, SELV/PELV
	Power consumption	P_0 max. 5 W, outputs or load
Interface	Interface type	Ethernet over TCP/IP, 100 MBits/s
Input	Input voltage	24 V
	No. / type	3 digital inputs and external triggering
Output	No. / type	2 digital outputs
	Switch type	PNP
	Operational voltage	24 V
Ambient conditions	Ambient temperature	0 ... 40 °C (32 ... 104 °F)
	Storage temperature	-20 ... 70 °C (-4 ... 158 °F)
Mechanical data	Degree of protection	IP67
	Mass	ca. 500 g

Technical data LR230		
General data	Measurement area	Xmin = 0 mm ... 30 mm Xmax = 0 mm ... 55 mm Z = 115 mm ... 230 mm
Electric data	Operating voltage	U_B 24 V DC ± 10 %, SELV/PELV
	Power consumption	P_0 max. 5 W, outputs or load
Interface	Interface type	Ethernet over TCP/IP, 100 MBits/s
Input	Input voltage	24 V
	No. / type	3 digital inputs and external triggering
Output	No. / type	2 digital outputs
	Switch type	PNP
	Operational voltage	24 V
Ambient conditions	Ambient temperature	0 ... 40 °C (32 ... 104 °F)
	Storage temperature	-20 ... 70 °C (-4 ... 158 °F)
Mechanical data	Degree of protection	IP67
	Mass	ca. 500 g

Technical data LR125		
General data	Measurement area	Xmin = 0 mm ... 15 mm Xmax = 0 mm ... 21,5 mm Z = 65 mm ... 125 mm
Electric data	Operating voltage	U_B 24 V DC ± 10 %, SELV/PELV
	Power consumption	P_0 max. 5 W, outputs or load
Interface	Interface type	Ethernet over TCP/IP, 100 MBits/s
Input	Input voltage	24 V
	No. / type	3 digital inputs and external triggering
Output	No. / type	2 digital outputs
	Switch type	PNP
	Operational voltage	24 V
Ambient conditions	Ambient temperature	0 ... 40 °C (32 ... 104 °F)
	Storage temperature	-20 ... 70 °C (-4 ... 158 °F)
Mechanical data	Degree of protection	IP67
	Mass	ca. 500 g

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Printed in Germany • Part. No. 205850 05/16