HEXAGON

Accurex
Dimensional Measurement Systems

Tube and wire inspection solutions

Metrology for the tube and wire production industry

TubeInspect

TubeInspect is the leading solution for high-speed tube measurement. Based on a multiple-camera optical scanning system built into a turnkey single-piece cell format, TubeInspect represents the height of what's possible with optical scanning in the tube and wire production industry.

Powered by the dedicated BendingStudio software platform, TubeInspect is available in both an industrial-sized TubeInspect P16.2 and a smaller TubeInspect P8.2 variant. Both models are also available in HRC high-resolution camera versions delivering improved detail and feature analysis. High-end models also offer the possibility of integration within a larger robotic production cell, making the tube and wire quality process fully Industry 4.0 compatible.

The system's integrated long-life and low-maintenance LED illumination technology guarantees smooth illumination of the measuring field, automatically controlled through BendingStudio. Imaging is fast and detailed with GigE camera technology that ensures synchronic capture of the measuring object within milliseconds. And all this is built on an innovative three-dimensional glass reference surface that is highly precise and offers the reliable stability demanded for shop floor use.
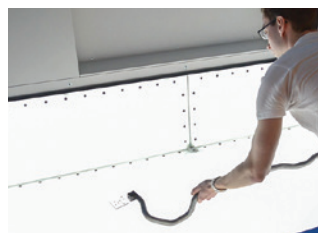
TubeInspect

A turnkey solution for instant high-end tube measurement.

- Enclosed concept suitable for rough production environments.

- Measurement within seconds after placing tube into the measurement system.

- Stable construction delivers highly reproducible and user-independent results.

- Applicable for serial inspection of high-volume batches and for reverse engineering and prototyping.

- Measure flexible, malleable or freeform bent tubes.

- High-end HRC models for more detailed inspection and automation capability.

- Can be fully integrated within a larger robot manufacturing cell.

- Position and orientation measurement of end holders, fittings and fixtures through high-resolution image analysis with CAD-adaptors.

- Hotkey button on front panel for beginning and confirming measurements.

- Quick return on investment due to less waste and higher bender availability.
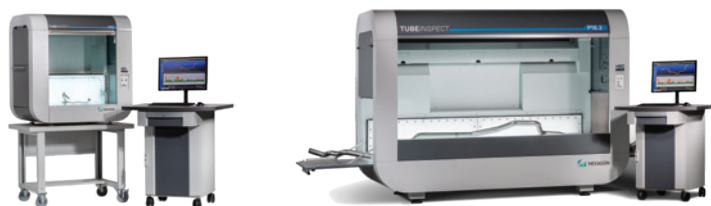
Solutions specifications

	P8.2	P8.2 HRC	P16.2	P16.2 HRC
Measurement technology	High-resolution camera array			
Software	BendingStudio			
Measurable tube diameter	2-125 mm	0.8-125 mm	3-200 mm	1.5-200 mm
Measuring volume	1000 x 580 x 400 mm		2600 x 1250 x 700 mm	
Max. tube length	Unlimited (with repositioning)			
Bending angle	1-340°			
Min. push between bends	Bend-in-bend and freeform possible			
Measurement accuracy (tube sheath deviation)	0.035 mm (1σ)		0.085 mm (1σ)	
CAD-adaptors	no	yes	no	yes
Rectangle-section tube measurement	no			
Automation compatibility	no	yes	no	yes

System specifications

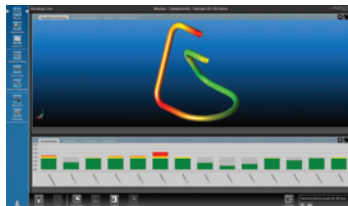|	P8.2	P8.2 HRC	P16.2	P16.2 HRC
Measurement speed	> 3 sec/measurement			
Camera array	8 high-resolution digital cameras with GigE technology		16 high-resolution digital cameras with GigE technology	
Resolution	3 MP	12 MP	3 MP	12 MP
Reference field	Three-dimensional glass reference surface			
System dimensions (W x D x H)	1140 mm x 746 mm x 1140 mm		2980 mm x 1640 mm x 2300 mm	
Weight	240 kg		1200 kg	
Power requirement	100-240 V 50-60 Hz AC 400 VA		100-240 V 50-60 Hz AC 1300 VA	
Working temperature	5-40°C			
Relative humidity	10-90% not condensing			
Marks of conformity	CE			

BendingStudio

The BendingStudio software platform links all data and processes related to the production of bent parts, from design and process planning to manufacturing and quality control. BendingStudio is the only tool to meet and combine these requirements with an emphasis on metrological processes.

Evaluate parts quickly with clear actual-nominal value comparison. Implement multiple inspection plans with individual measurement criteria for each part. Enjoy comparable result presentation no matter the origin of the data. BendingStudio is the complete package for complex analysis and management of tube and wire production.

The complete solution for managing bending production and quality control, end-to-end.

- Optimised communication and data handling across production, quality control and design offices.

- Complete cross-compatibility between TubeInspect and Absolute Arm systems for measurement inputs.

- One-click functionality for measurement results, data import and export.

- Simple and clearly structured handling concept, including interfaces for statistical process control software such as qs-STAT.

- Wide range of measurement functions such as bending points, bend data, sheath deviation and diameter changes, as well as measurement of branched tubes and bevel-cut ends.

- Optimise series inspection of parts and improve process reliability with measurement jobs.

- Open tube bender interface for calculation and communication of production correction data.

- Assign different inspection plans to single a part – display drawing requirements and mounting conditions from the same measurement.

- Automatic correction of self-weight deformation effects in thin or elastic workpieces.

- Position and orientation measurement of end holders, fittings and fixtures through scanner point cloud analysis with CAD-adaptors.

BendingStudio packages

		Efficient	Tube	Tube +	Wire	Professional	Automatic
Measurement systems	• TubeInspect P8.2, P16.2 and Absolute Arm with RS5 Laser Scanner • TubeInspect P8.2 HRC and P16.2 HRC • Absolute Arm with RS6 Laser Scanner	■ ■	■ ■	□ ■	■ ■	■ ■	□ ■ □
Basic functions	Part database; user management; measurement of tubes and wires; calculation of bending data (LRA/PBR, XYZ); nominal-to-actual comparison; sheath tolerance inspection (optical gauge); reverse engineering; reports; interface to qs-Stat®.	■	■	■	■	■	■
Advanced functions	Inspection criteria for functional dimensions; deflection compensation for long, thin or elastic tubes; rotationally symmetric formed tube ends; bevel cut ends; diameter changes.	□	■	■	■	■	■
CAD-adaptors	Position and orientation measurement of end holders, fittings and fixtures without mechanical adaptor.	□	□	■	□	■	■
TubeInspect adaptors	Straight-on and elbow adaptors; TubeInspect adaptors.	□	■	■	□	■	□
Branched tubes	Measurement of branched tubes.	□	□	□	□	■	■
Hoses	Straightening of hose components.	□	□	□	□	■	□
Bender interface standard	Calculation of bending correction data; virtual gauge simulation tool; open bender interface. Note: uploading of correction data must be enabled on the bender.	■	■	■	■	■	■
Bender interface freeform	Calculation of bending correction data including bending radii; virtual gauge simulation tool; open bender interface. Note: uploading of correction data must be enabled on the bender.	□	□	□	■	■	□
Automation	Integration in automated manufacturing cell including remote control of relevant BendingStudio functionalities by third-party controller based on XML interface.	□	□	□	□	□	■
CAD-WIZARD	Import/export of IGES and STEP files; import by automatic or interactive selection of bending data; export of tube geometry in IGES and STEP format.	○	○	■	○	■	■
Offline	Offline licence with same functionalities/modules as main licences but without interface to measurement system. Also available as network licence.	○	○	○	○	○	○

All BendingStudio packages include a 12-month SMA
■ included □ not included ○ option

BendingStudio specifications

BendingStudio	
CAD model import formats	IGES, STEP
CAD export formats	IGES, STEP
Data import	CSV, FIF, GTT (G-Tube), SV, VDA, XML and other ASCII formats
Data export	CSV, FIF, SV and other ASCII formats
Measurement report export	XPS (PDF equivalent), DFQ (qs-Stat)
Available languages	English, Chinese (Simplified), Czech, Dutch, French, German, Italian, Japanese, Polish, Portuguese, Romanian, Russian, Spanish, Swedish, Turkish