



New software technology for freeform bending of tubes

Tube measurement specialist TeZet Technik AG, Switzerland, has developed new technology to meet the challenge of freeform bending.

A freeform bend is described in the CAD Dictionary (by Ralf Blien www.blien.de) as "a bend which, analytically speaking, cannot be explained precisely. Those bends should preferably run smoothly through many given points. Those bends have continuously changing tangent slopes...Freeform bends can be defined through approximation or interpolation."

Freeform bent tube parts can be generated graphically via polygons, but freeform bent tubes cannot be

extracted from CAD drawings in such a way that the tube bender can bend them. Such bends require a new measuring technology, as with conventional technology the tube coordinates cannot be collected.

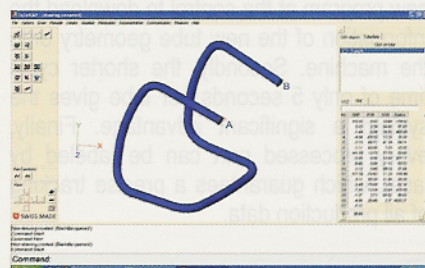
Microscan – the 3D linelaser, mounted to a Microscribe



Varying large radii floating into one another without a cylinder in between must be generated and processed. The CAD-design of those parts that are generated from undefined radii no longer generates tubes from coordinates but out of planes.

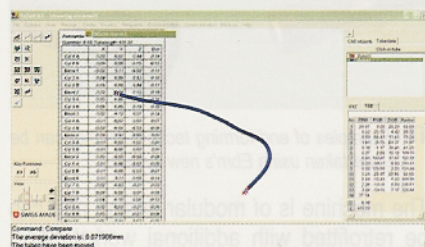
As a tube bender cannot bend a tube from data of planes, it is necessary to convert this unreadable CAD data into expedient tube data.

TeZet has developed a software module for this conversion that enables the user to convert a 3D Iges file and extract the tube coordinates and bending data which are necessary for the masterpiece inspection and comparison within the production procedure.



Freeform bent tube measured with its documented xyz and bending data

Comparison between 2 measured freeform bent tubes during the production, with the average of deviation at 0.07mm



Until now, the only measuring method that enabled the measuring of the reproducibility and quality control for freeform bent tubes was laser scanning, which involves collecting points, converting the point cloud into polygons, nurbs etc, to generate a tube design on the screen.

TeZet has developed a laser measurement method using a 3D linelaser, which automatically calculates tube data during the scanning procedure, removing the need to convert millions of points.

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Trimmed down processor system

Sikora, Germany, has launched the Ecocontrol 1000 processor system, in response to interest in a 'slim version' of the company's existing Ecocontrol 2000 system.

The system offers the display of measured values, controlling and protocol printing, and like the Ecocontrol 2000, features a touch screen combined with an active 15" colour monitor. All inputs, such as the setting of nominal values and tolerances, are made directly on the touch screen.

The Ecocontrol 1000 allows automatic control of line speed or extruder rpm, and provides trend and statistical data, including maximum and minimum, mean value, standard deviation and Gaussian distribution. Automatic shrinkage calculation and storage of data are only available on the Ecocontrol 2000, which is equipped with a 100GB hard disk. Ecocontrol 1000 is supplied with a 1GB flash disk.

The Ecocontrol 1000 can be combined with the diameter gauge heads of the Laser 2000 series, as well as Sikora lump detectors. The system has a maximum of four interfaces for the connection of Sikora measuring systems, with four electrically isolated digital inputs, four contact outputs for tolerance and status messages, a USB interface, an ethernet interface, and a parallel interface for a printer (optional). Additional in-/outputs or interface modules, for additional control functions, can be added as an option.



Example of the data displayed by Sikora's Ecocontrol systems

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