

## TubeInspect

### TubeInspect replaces articulated arm

The Swiss tube manufacturer Serto has replaced his articulated arm by AICON's tube measuring system TubeInspect. With TubeInspect, the team around production manager Florian Windler could not only decrease manufacturing costs significantly. Also the time to acquire data of new tubes is many times shorter now.

Serto is located in the idyllic community Aadorf in Switzerland. On a greenfield site, the former family owned business has turned into a very modern production plant that delivers tubes and pipe connections to customers worldwide. Being asked to which industries Serto's customers belonged, production manager Florian Windler answers: "We mainly bend tubes for companies from the domestic appliance and rail vehicle industries. However the number of customers from other business fields such as water treatment or the semiconductor industry is rising."



Production manager Florian Windler



Bending machine and TubeInspect applied at Serto AG, Switzerland

ment in comparison to the old measuring principle. However, it had several drawbacks: A measurement took quite a long time. This obstructed our smooth work flow. Moreover, the setup of the bending machines was rather time consuming when we didn't have any CAD data of the tubes and therefore had to wait for the measuring data of the samples. Additionally, we encountered some problems with respect to measuring accuracy. When two people conducted the same measurement with the articulated arm, we got two different results. And finally, we could only measure tubes up to 1.20m in length with the arm. In order to measure longer tubes, we would have had to rearrange it every time which would have caused another loss of accuracy. That was not acceptable."

#### Worldwide aromatic coffee thanks to Serto's tubes

But also the customer list of Serto's customers themselves is impressive. "Mc Donald's, Starbucks and Dunkin Donuts use coffee dispensers in which our tubes are built-in", exemplifies Florian Windler. In the area of railway construction, Bombardier is a frequent customer. For Bombardier in Great Britain, Serto converts brake pipes for the bogies of railway vehicles. In Taiwan, the brake fluid of the trains runs through Serto's pipes, too.

#### Quality assurance in the past: Measuring with obstacles

The tubes are bent on three bending machines that cope with tube diameters up to 60mm and tube lengths up to 4,000mm. In the past, Serto controlled the quality of the manufactured tubes with conventional gauges. Hoping for faster and more exact measuring results, Serto acquired an articulated arm. Yet it could not fulfill the expectations at long sight. Florian Windler reports: "The tactile system was an enormous improve-

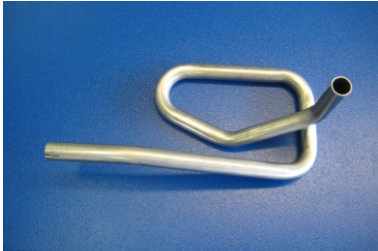
For more information, contact:  
 Accurex Dimensional Measurement  
 phone: 800-535-5798  
[www.accurexmeasure.com](http://www.accurexmeasure.com)

AICON 3D Systems GmbH

Biberweg 30 C  
 D-38114 Braunschweig  
 Germany  
 tel. +49 (0)531-58 000 58  
 fax +49 (0)531-58 000 60  
[info@aicon.de](mailto:info@aicon.de)  
[www.aicon3d.com](http://www.aicon3d.com)

## Quality assurance today: Fast and precise

Tubelnspect measures the tube geometries with the help of 16 high resolution digital cameras, i.e. in a non-contact way. The tube to be measured is simply placed in the optical measuring cell.



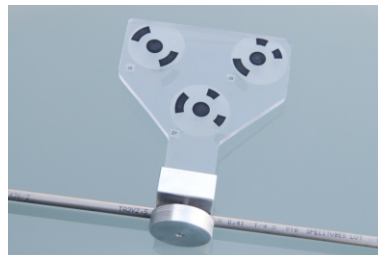
• Sample tube at Serto

Tubelnspect merely needs a few seconds to calculate the measuring results. The geometry is reported in an easily understandable way allowing for an immediate and correct evaluation of the tube's quality. As the measuring results are additionally shown in the language of the bending machines, that means "Push / Bend / Rotate", the machines can easily be setup and corrected.

Serto applies Tubelnspect both for the measurement of sample tubes and for quality assurance in production according to the existing quality control plan. Tubes of up to 2,500mm can be inspected in one step. Longer tubes are measured in several steps while the results are automatically connected.

## Measurement of long tubes with connecting adapters

In this case, AICON's new connecting adapters are applied. Whenever it is not possible to merge the partial measuring results by means of common bending points, the connecting adapters allow for the step-by-step measurement of tubes with long,



• Connecting adapter

straight parts devoid of bending points or with very flat bends. Thanks to the new adapters, the partial results are merged with an accuracy of +/- 0.1mm.

## Master measurement for sample tubes

In order to measure sample tubes of which no CAD data are available, Serto makes use of Tubelnspect's function "master measurement" that measures the tube in two different positions and generates its correct bending data. These data are then saved as nominal geometries in the Tubelnspect data base. What are

the advantages of the master measurement? Florian Windler explains: "In the past we had to store samples of every manufactured tube, no matter if the lot size comprised 20 or 10,000 pieces. This was necessary to handle follow-up orders rapidly. Today we are in the position to send back the sample tubes to our customers as soon as the data are digitally saved. As a consequence, we have been able to reduce the storage capacity immensely. Moreover, the data of new tubes are captured very quickly."

## Considerable decrease of material costs

Also regarding the setup of the bending machines, Serto records vast improvements. Florian Windler affirms: "The number of deficient tubes has strikingly reduced. When a new production run starts, the second tube meets the requirements." It is obvious that this saves hard cash especially in case of large tubes that consume much material. Windler adds: "And as we mainly manufacture tubes made of expensive materials, we clearly notice the strong decrease of costs in this area." For example Serto employs the material 1.45.71 (rust-acid-resistant, titanium-stabilized stainless-steel) in order to manufacture tubes for coffee machines. This material has, just as the whole stainless-steel market, experienced significant price increases in the last years. Due to the optimized material consumption, Serto can partially absorb them now.

## Stable measurements

Tubelnspect has also been able to solve the problem of the scarce measuring accuracy. Florian Windler says: "We are happy about the accuracy of Tubelnspect. The machine is much less susceptible to operator errors than a tactile system." And Serto staff member Ivica Pancisko adds: "I use Tubelnspect every day, and I like the easy handling of the software."

Concluding Florian Windler states: "We are very proud of having such a machine. The measuring system has pushed us far forward in the area of quality assurance. And that's what our customers approve!"

**Results of comparison**

Measured part:  
Part name: \_\_\_\_\_  
Date of: \_\_\_\_\_  
Bending: \_\_\_\_\_  
Comments: \_\_\_\_\_  
State of last measurement: Calculation finished

		Measured elements													
Bp.		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Push		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Angle		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rotations		1	1	1	1	1	1	1	1	1	1	1	1	1	1

F1 Measure F2 Manual F3 Assign points F4 Reference position F5 Bending elements F6 Deviation statistics F7 Deviation graphics F8 Save and print F9 VDA-Export F10 Close

Ready Analysis