Ultrasonic Wall and Concentricity Measurement Systems

UltraScan Series

Providing Unmatched Precision & Performance for Plastic Tube Production

The UltraScan Advantage:

- Achieves the highest ultrasonic accuracy and repeatability with unique patented “Snap Technology” that optimizes each measurement in the Digital Signal Processor (DSP)
- Delivers a wall measurement accuracy to ±0.001 mm (±0.000040 in.), concentricity accuracy to ±0.1%
- Provides automatic setup, search, and tracking capabilities via Snap Technology, eliminating the need for operator interaction and potential error
- Finds short-term wall variations (thick/thin spots) with High-Speed Tolerance Checking option
- Measures a wide range of tube types including multi-layer tubes
- Optional thin wall algorithm capable of 0.025 mm (0.001 in.) wall thickness on tubes as small as 0.250 mm (0.010 in.)
- Shortens response time for controlling extrusion processes with OD ultrasonic option (Hot OD)
- Increases measurement repeatability with line speed and temperature compensation
- Flexible communications integration to UltraScan DSP with RS-232, DeviceNet, CANopen, and Profibus
- Compact gauges allow ease of installation into existing cooling troughs without the need for extra tanks

The UltraScan Series from Beta LaserMike is an advanced ultrasonic measurement system that enables tube manufacturers to **increase production efficiencies** and **reduce material costs** by better controlling product wall thickness and concentricity. UltraScan effectively performs high-speed, multi-point measurements with maximum precision and without contacting the product, so you produce the highest quality tubes in less time and with less material give-away. The potential production savings are significant.

UltraScan is engineered with a set of innovative features that provide a number of superior productivity advantages. What sets UltraScan apart from competitive systems is the unique **UltraScan DSP** intelligence module with patented “Snap Technology.” As the **world’s only** ultrasonic measurement system with automatic setup, UltraScan DSP offers unmatched performance and repeatable accuracy — and eliminates human error created by manual setup. UltraScan can also be equipped with several advanced options including **Thin Wall Measurement Algorithm** and **High-Speed Tolerance Checking** to take the production of quality product to the next level. Best of all, UltraScan is easy to install and use so plant personnel can become productive fast.

Beta LaserMike offers a complete line of UltraScan gauges to meet your unique application needs. See for yourself why UltraScan is the ultrasonic wall thickness and concentricity measurement system of choice by the industry’s leading tube manufacturers.

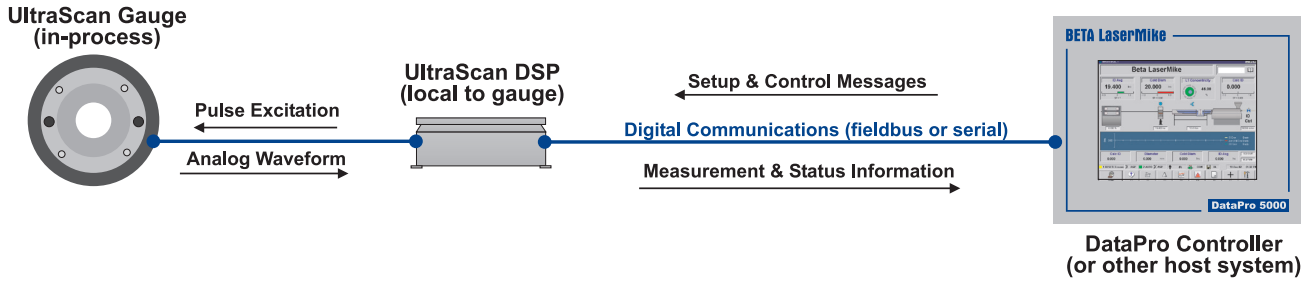
BETA LaserMike

Measured by Commitment

UltraScan Measurement System

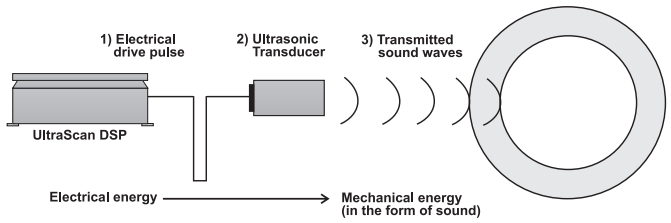
Most Powerful and Advanced Ultrasonic Solution in the World

1. The **Ultrasonic Gauge** consists of a fixture holding multiple ultrasonic transducers around the tube. Each transducer generates an ultrasonic signal that is capable of measuring one layer or multiple layers of the tube.
2. The **Ultrasonic Intelligence Module** interfaces to the ultrasonic transducers and analyzes the signals in a Digital Signal Processor (DSP) to perform and communicate the measurements. The Beta LaserMike ultrasonic intelligence module, called **UltraScan DSP**, is the most powerful and advanced system of its kind in the world, and is the key to providing the user with a very robust and easy-to-use ultrasonic system.

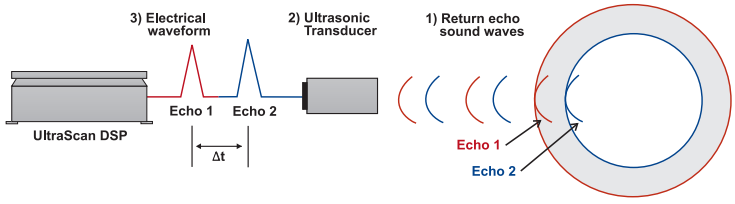


Ultrasonic Wall & Concentricity Measurement Principle

UltraScan DSP sends an electrical drive pulse and the transducers convert that energy into an ultrasonic sound wave.



Echoes are sent back to the ultrasonic transducers from the walls of the tube and the transducers convert that energy into an electrical waveform. With **multi-layer tubes**, an echo occurs at each layer and therefore each layer can be measured individually.



The UltraScan DSP calculates the wall thickness as:

Wall = (Δt * s) / 2

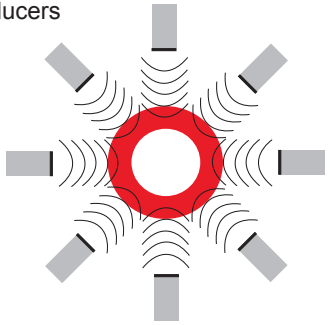
Δ**t** = time between echoes

s = speed of sound through the material[1]

[1]The DataPro 3000 and 5000 controllers provide a feature that allows the UltraScan DSP to determine the speed of sound through the material on line.

Multi-Point Wall & Concentricity

Using multiple transducers provides full measurement of the product. This allows the calculation of concentricity and the determination of the minimum and maximum wall thickness.



Communications

UltraScan gauges provide flexible communications integration to UltraScan DSP with RS-232, DeviceNet, CANopen, and Profibus.

RS-232 | DeviceNet | CANopen | Profibus

UltraScan Gauge Models

A range of UltraScan gauges are available to cover various tube diameter and wall thickness sizes. Gauges can support multiple transducer types and are capable of measuring multiple layers. Beta LaserMike engineers will select the appropriate transducer type for your application.

Specifications (all models):

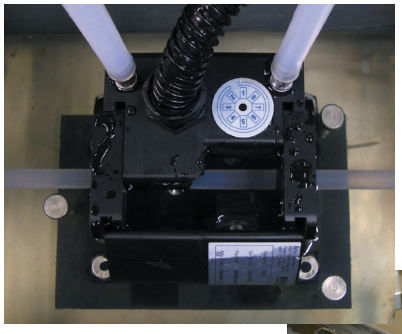
- Wall measurement accuracy to ±0.001 mm (±0.000040 in.)
- Concentricity accuracy to ±0.1%

	UltraScan 1012	UltraScan 1025	UltraScan 1040	UltraScan 1063
OD range	0.25 – 12 mm (0.01 – 0.5 in.)	2.5 – 25 mm (0.1 – 1.0 in.)	4.0 – 40 mm (0.16 – 1.57 in.)	7.5 – 63 mm (0.30 – 2.5 in.)
Minimum Wall Thickness[1]	**Without thin wall:** 0.254 mm (0.010 in.) @ 10 MHz 0.127 mm (0.005 in.) @ 20 MHz **With thin wall:** 0.025 mm (0.001 in.) @ 20 MHz	**Without thin wall:** 0.254 mm (0.010 in.) @ 10 MHz 0.127 mm (0.005 in.) @ 20 MHz **With thin wall:** 0.025 mm (0.001 in.) @ 20 MHz	0.254 mm (0.010 in.) @ 10 MHz	2.540 mm (0.100 in.) @ 1 MHz 1.125 mm (0.044 in.) @ 2.25 MHz 0.508 mm (0.020 in.) @ 5 MHz 0.254 mm (0.010 in.) @ 10 MHz
Transducers	4, 8	4, 8	4, 8	4, 6, 8
Transducer Frequency	10 MHz, 20 MHz	10 MHz, 20 MHz	10 MHz	1 MHz, 2.25 Mz, 5 MHz, 10 MHz

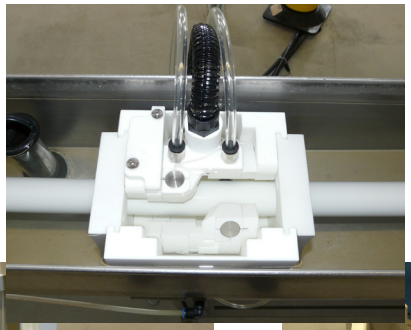
*Larger gauges available upon request.

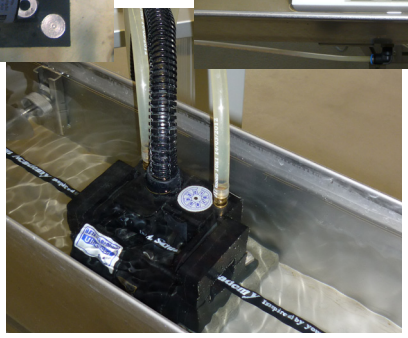
[1]Maximum wall thickness is dependent on type of material.

US1012

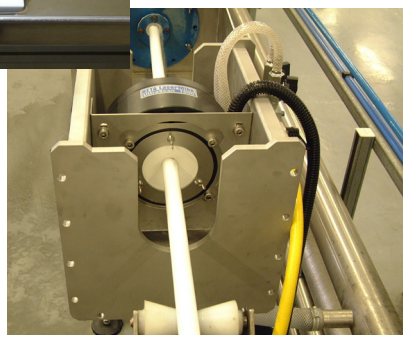


US1040





US1025



US1063

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Unique Ultrasonic Technology

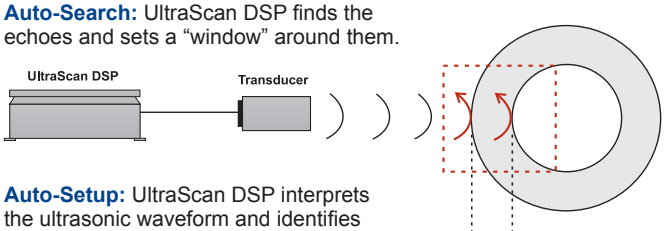
Snap Technology

So simple, it's always being used.
All ultrasonic measurement systems require some form of setup of the ultrasonic waveform. The measurement system must know the proper echoes and positions in the waveform to trigger on and measure from, and the user must set this up.

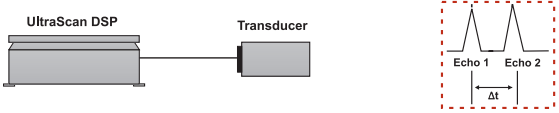
But the UltraScan DSP, with its unique and powerful patented **Snap Technology**, is the world's only ultrasonic system that is capable of completely setting up its own ultrasonic waveforms instantly and automatically. The intelligence of Snap Technology provides fully automatic ultrasonic measurement with:

- Auto-search
- Auto-setup
- Auto-tracking

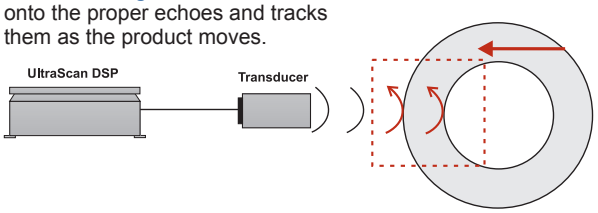
Auto-Search: UltraScan DSP finds the echoes and sets a "window" around them.



Auto-Setup: UltraScan DSP interprets the ultrasonic waveform and identifies the proper echoes.

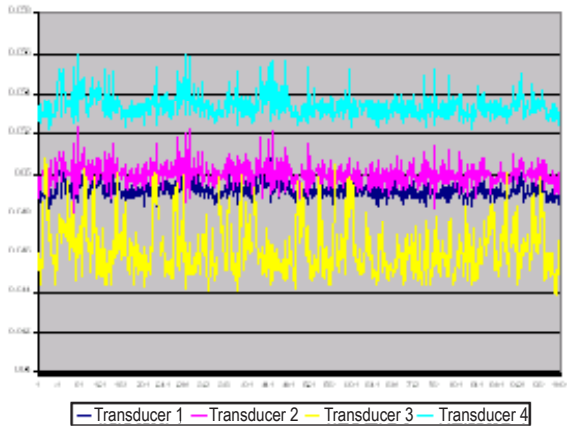


Auto-Tracking: UltraScan DSP locks onto the proper echoes and tracks them as the product moves.



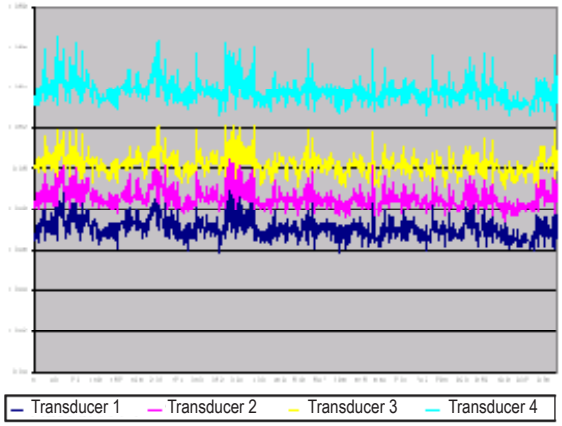
Highest Achievable Ultrasonic Accuracy

Since each ultrasonic transducer is set up individually, other ultrasonic systems have the potential to introduce error in the measurements due to the human error created by manual setup. And when conditions of the product or the process change, the fixed manual setup does not adapt the signal processing with the changes. But when the measurements are set up automatically with Snap Technology, it ensures that the setup is the same across all transducers. And when conditions of the product or the process change, the auto setup **instantly adapts** the signal processing with the changes. This continuous and automatic setup of all transducers ensures **maximum consistency** across each transducer, thus providing **higher accuracy** of average wall and concentricity measurements.



Gauge 1: Manual waveform setup

The four on-line wall measurements show some inconsistency (caused by differences in the manual waveform setup of the 4 transducers).



Gauge 2: Automatic waveform setup

The four on-line wall measurements all follow the wall changes precisely the same, due to Snap Technology's automatic setup and tracking software.

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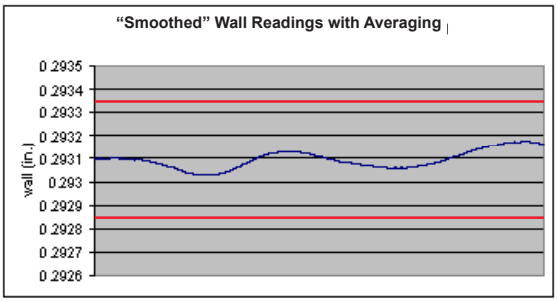
Advanced UltraScan Options

High-Speed Tolerance Checking

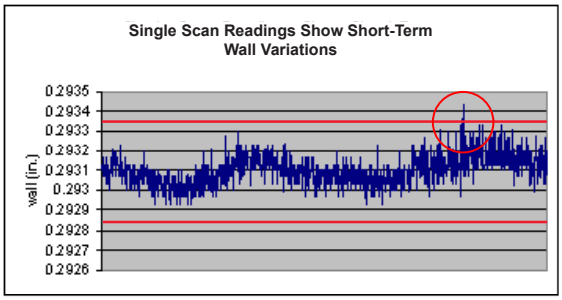
Detection and notification of short-term wall variations

Ultrasonic systems are often implemented in tube extrusion lines to monitor and correct gradual changes in the wall thickness. Short-term variations in wall thickness are often missed when the ultrasonic system is averaging data and monitoring for periodic changes. But UltraScan systems are capable of taking approximately 2,000 wall measurements per second, depending on diameter and thickness, and have an advanced feature for **High-Speed Tolerance Checking**. The UltraScan DSP checks each scan of each transducer and compares the measurement against wall tolerances. This high-speed checking of tolerances is designed to catch short-term wall variation on each individual layer of the tube.

Once a high-speed tolerance error is found, the UltraScan DSP sends a signal to indicate that an error has occurred.



Standard tolerance checking compares averaged wall values against tolerance limits



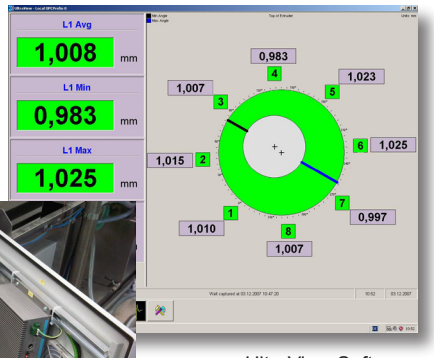
High-speed tolerance checking compares individual scans against tolerance limits

OD Ultrasonic Measurement

The **UltraScan OD Option** provides fast, easy-to-understand information about the outer diameter of the hot tube. Working hand-in-hand with this advanced software option, UltraScan produces the optimum transducer echoes to create a high-precision OD measurement. UltraScan OD shortens the delay time and gives you more control over measurements. UltraScan OD also provides a cost-effective alternative for adding Laser OD scanning capabilities to your system, enabling you to handle a range of OD measurement applications from small-to-large size tubes.

UltraView Diagnostic Software

With the **UltraView** software, you can configure the Beta LaserMike UltraScan DSP module to communicate with a PC via RS-232 to perform diagnostics and troubleshooting.



UltraView Software

UltraView Web Server Solution

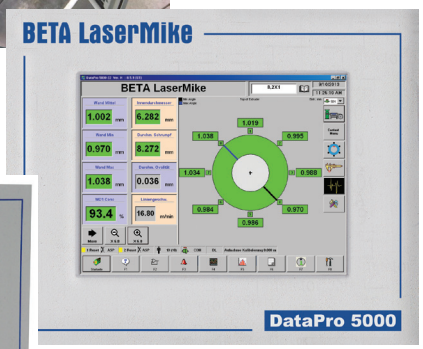
With the **UltraView Web Server** solution, the Beta LaserMike UltraScan DSP module is connected to a fanless, robust web server PC. This solution enables you to easily view the UltraScan page that visualizes the tube cross-section without the need for programming. All critical functions, such as calibration and diagnostics, can be performed via the UltraView Web Server screen. The web server does not include hardware I/O options. Use the Profibus interface on the DSP and independently connected to your PLC controller to create fault tolerances, status signals, or perform data logging.

UltraView Web Server

Beta LaserMike Process Controllers & Data Management Systems

Integrate the UltraScan gauges with Beta LaserMike's DataPro 3100 and DataPro 5000 controllers to accurately manage the production process every step of the way for quality results.

DataPro 3100

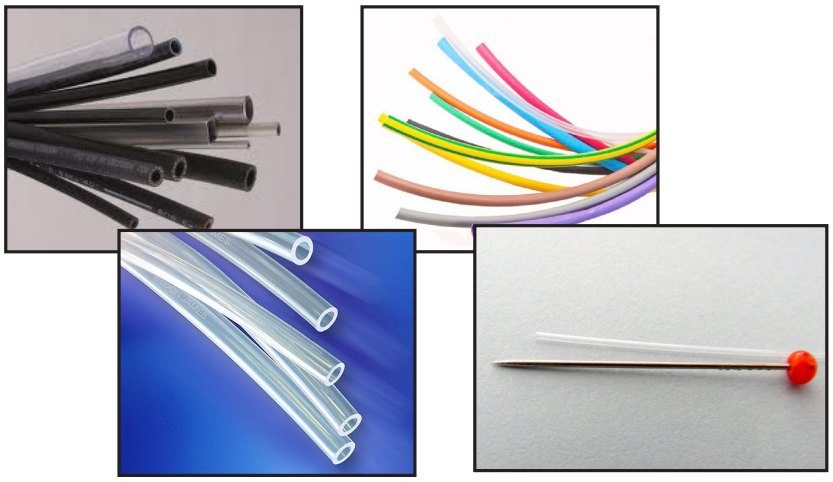


DataPro 5000

Applications

UltraScan is a proven performer in a wide range of industrial tube applications, such as:

- Automotive
- Consumer
- Heat Shrink
- Irrigation
- Medical Micro
- Sanitary
- Technical
- And other tube applications



Customer Story:

Leading Plastics R&D Center

A. Schulman is a leading R&D center in Kerpen, Germany and international supplier of high-performances plastic compounds, masterbatches, standard plastics thermoplastic elastomers, and specialty powders. These materials are used in a wide range of industrial products and processes.

One important new product is the pioneering and cost-effective Schulatube plastic tube system, designed particularly for the automotive industries, which requires the extremely precise measurement of the thickness and diameter of the layered tube. With the move towards smaller and more fuel-efficient cars, vehicle manufacturers are looking for plastics with much higher resistance to both heat and pressure.

A. Schulman uses Beta LaserMike's UltraScan 1025 with DSP "Snap Technology" at the trough on its extrusion line to accurately measure the wall thickness and concentricity of engineered multi-layered tubes to ensure greater quality control, better productivity, and less waste. "Beta LaserMike's measurement systems have enabled us to develop a leading-edge, high-pressure tubing system that meets the demanding requirements of our customers."

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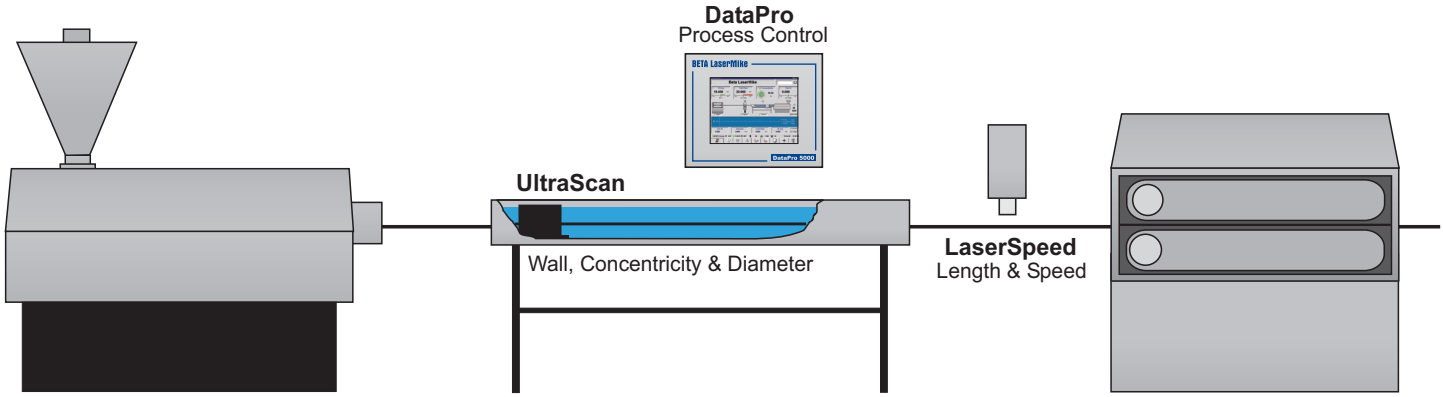
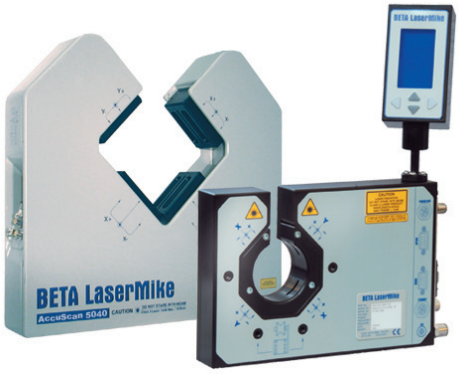
Tube Production Systems Solutions

The UltraScan gauge can be combined with Beta LaserMike's AccuScan diameter and ovality gauge, LN lump and neckdown detector, LaserSpeed length and speed gauge, and Data Pro process controller and integrated into your production line for a complete measurement system solution. You can also add the OD measurement option to UltraScan for effective diameter functionality. The result is high-precision dimensional monitoring at all points in your process for the production of superior quality tube products and significant manufacturing savings.





AccuScan
High-Speed Diameter and Ovality Measurement Systems

LaserSpeed
Non-Contact Length and Speed Measurement Systems

LN Detectors
Lump and Neckdown Measurement Systems

BETA LaserMike
Measured by Commitment

Serving Your Measurement & Control Needs with World-Class Solutions

About Beta LaserMike

Beta LaserMike provides integrated process control solutions using a wide range of non-contact measurement technologies designed to improve product quality and reduce manufacturing costs. These solutions provide in-process dimensional monitoring, control, and sample/part inspection of products such as wire and cable, fiber optics, metals, rubber and plastic, flat rolled goods, pipe and tube, and other manufactured goods. Every system is backed by Beta LaserMike's world-class service and support organization. With offices around the globe, we're committed to serving your unique measurement application needs.

BETA LaserMike

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