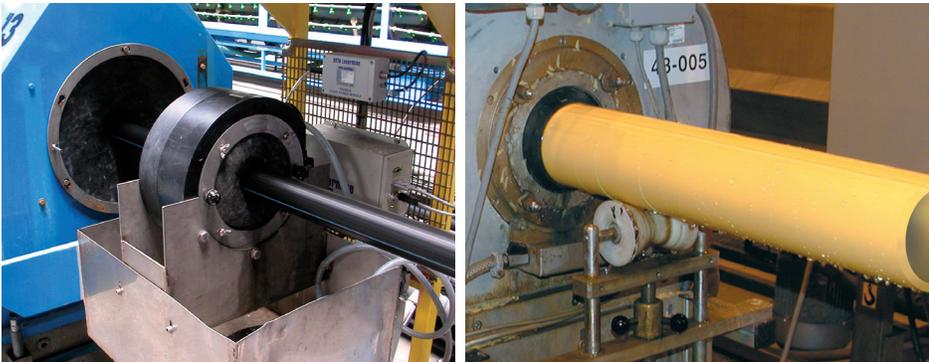
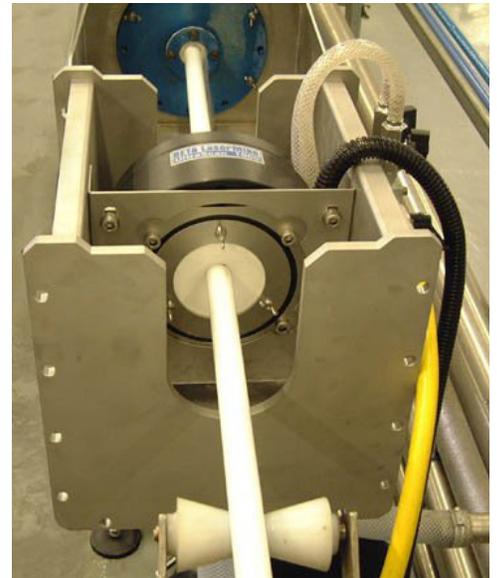


## ULTRASCAN SERIES



- ▶ Increase production efficiencies and reduce material costs by better controlling product wall thickness and concentricity
- ▶ Produce the highest quality products in less time with maximum precision, multi-point measurements
- ▶ Eliminate operator error with advanced “Snap Technology” automatic set-up, search, and tracking capabilities
- ▶ Maximize productivity with simple-to-operate system

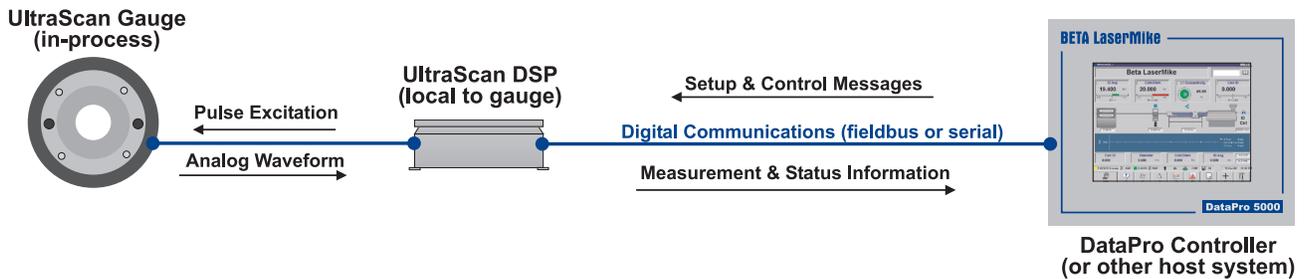


Ultrasonic wall & concentricity measurement systems with unmatched precision and performance for plastic pipe production

# UltraScan Measurement System

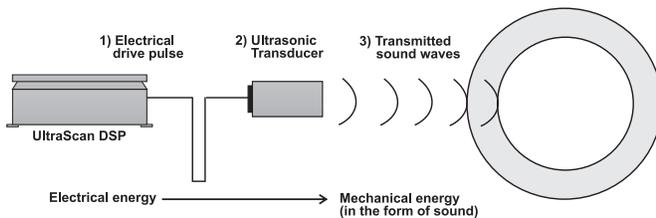
## Most Powerful and Advanced Ultrasonic Solution in the World

1. The **UltraScan 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 **UltraScan DSP**, the ultrasonic intelligence module, 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.



## UltraScan Wall & Concentricity Measurement Principle

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



The UltraScan DSP calculates the wall thickness as:

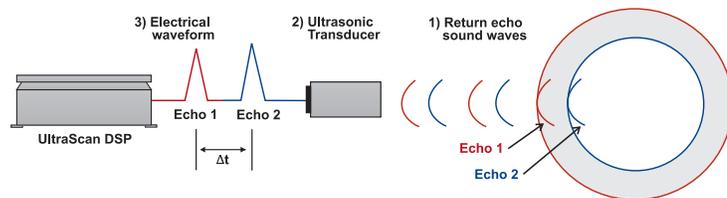
$$\text{Wall} = (\Delta t * s) / 2$$

$\Delta t$  = time between echoes

$s$  = speed of sound through the material<sup>1</sup>

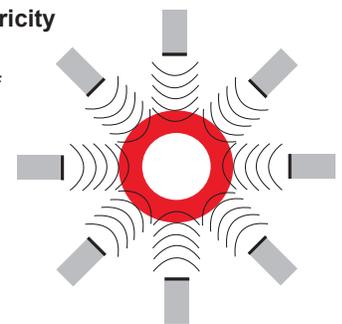
<sup>1</sup>The Beta LaserMike DataPro 3000 and 5000 controllers provide a feature that allows the UltraScan DSP to determine the speed of sound through the material on line.

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.



### 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

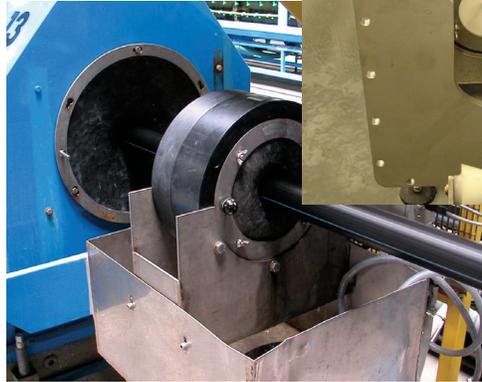
Profibus

# UltraScan 1000 Series

The UltraScan 1000 series of ultrasonic gauges hold the ultrasonic transducers in a static position around the pipe. UltraScan 1000 gauges are available to cover a variety of pipe diameter and wall thickness sizes. UltraScan 1000 gauges support 4, 6, or 8 transducers (depending on the model), each capable of measuring multiple layers. Each UltraScan 1000 fixed-distance gauge model has a water seal on either side of the gauge to allow installation in spray tanks or outside of cooling tanks.

## Specifications (all models):

- ▶ Wall measurement accuracy to  $\pm 0.001$  mm ( $\pm 0.000040$  in.)
- ▶ Concentricity accuracy to  $\pm 0.1\%$
- ▶ Diameter and ovality measurement accuracy to  $\pm 0.050$  ( $\pm 0.002$  in.)



## Fixed Transducer Distance Gauges

	UltraScan 1063	UltraScan 1125	UltraScan 1175
<b>OD range</b>	7.5 – 63 mm (0.30 – 2.5 in.)	10.5 – 125 mm (0.413 – 5.0 in.)	30 – 175 mm (1.181 – 7.0 in.)
<b>Minimum Wall Thickness<sup>1</sup></b>	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	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	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
<b>Transducers</b>	4, 6, 8	4, 6, 8	4, 6, 8
<b>Transducer Frequency</b>	1 MHz, 2.25 MHz, 5 MHz, 10 MHz	1 MHz, 2.25 MHz, 5 MHz, 10 MHz	1 MHz, 2.25 MHz, 5 MHz, 10 MHz

	UltraScan 1305	UltraScan 1510	UltraScan 1660
<b>OD range</b>	375 – 305 mm (2.95 – 12.0 in.)	150 – 510 mm (5.9 – 20.0 in.)	225 – 660 mm (8.86 – 26.0 in.)
<b>Minimum Wall Thickness<sup>1</sup></b>	2.540 mm (0.100 in.) @ 1 MHz 1.125 mm (0.044 in.) @ 2.25 MHz	2.540 mm (0.100 in.) @ 1 MHz 1.125 mm (0.044 in.) @ 2.25 MHz	2.540 mm (0.100 in.) @ 1 MHz 1.125 mm (0.044 in.) @ 2.25 MHz
<b>Transducers</b>	4, 6, 8	8	8
<b>Transducer Frequency</b>	1 MHz, 2.25 MHz	1 MHz, 2.25 MHz	1 MHz, 2.25 MHz

<sup>1</sup>Maximum wall thickness is dependent on type of material.

# Unique Ultrasonic Technology

## Snap Technology

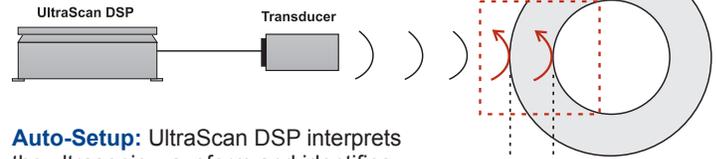
**So simple, it's always being used.**

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.

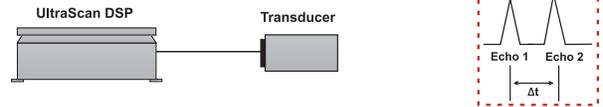
But the UltraScan DSP, with its unique and powerful patented **Snap Technology**, is the world's only ultrasonic system that is capable of completely setting up its own ultrasonic waveforms instantly and automatically. The intelligence of Snap Technology provides fully automatic ultrasonic measurement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

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

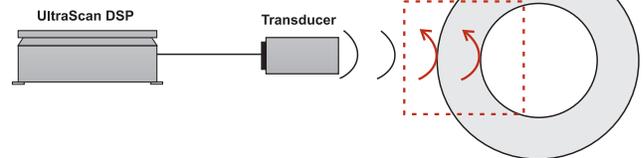
**Auto-Search:** UltraScan DSP finds the echoes and sets a "window" around them.



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

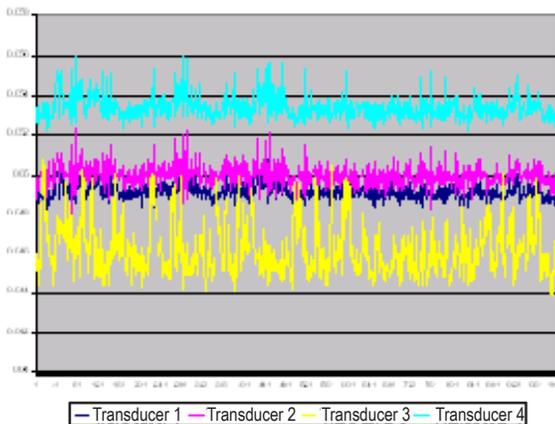


**Auto-Tracking:** UltraScan DSP locks onto the proper echoes and tracks them as the product moves.



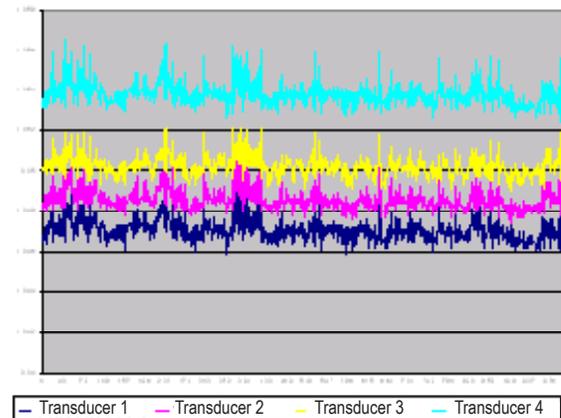
## Highest Achievable Ultrasonic Accuracy

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**

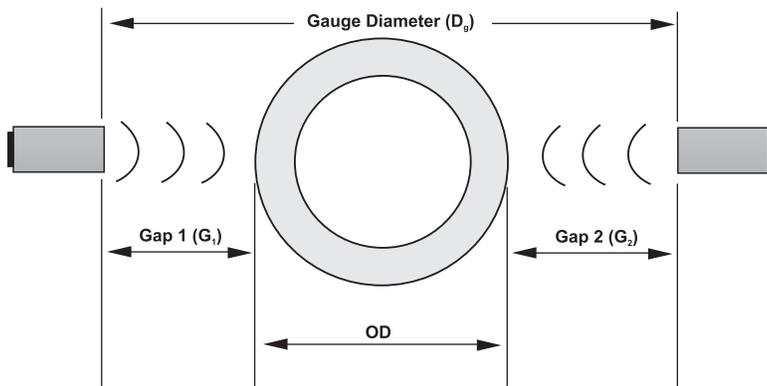
The four on-line wall measurements all follow the wall changes precisely the same, due to Snap Technology's automatic setup and tracking software.

# Ultrasonic Diameter & Ovality Measurement

The **UltraScan OD Option** provides fast, easy-to-understand information about the outer diameter of the hot pipe. 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 pipes.

## How it works

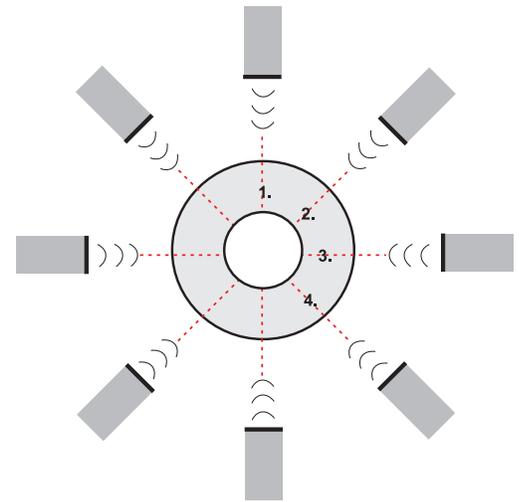
To measure pipe diameter, the distance between the two transducers is determined at calibration and the gap\* between each transducer and the outer wall of the pipe is measured by UltraScan DSP. The diameter of the pipe is determined with these three pieces of information.



$$OD = D_g - (G_1 + G_2)$$

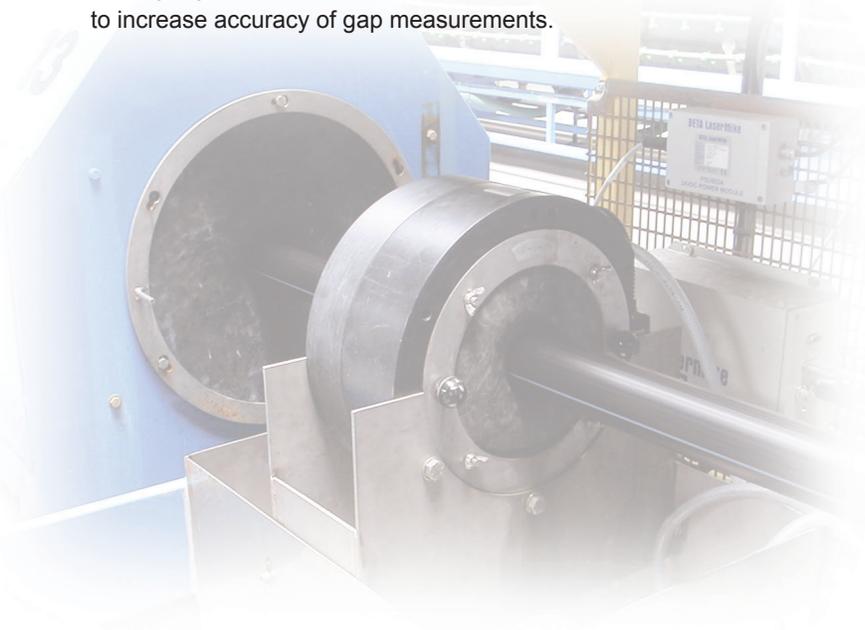
where  $D_g$  is the distance between transducers and  $G_1$  and  $G_2$  are the gaps between the transducers and the outer wall of the pipe.

\*UltraScan gauges include a water temperature sensor to increase accuracy of gap measurements.



## Multi-Point Diameter & Ovality

Using multiple transducers (or reversing the transducers) provides full measurement of the product. This allows the calculation of ovality and the determination of the minimum and maximum diameter.



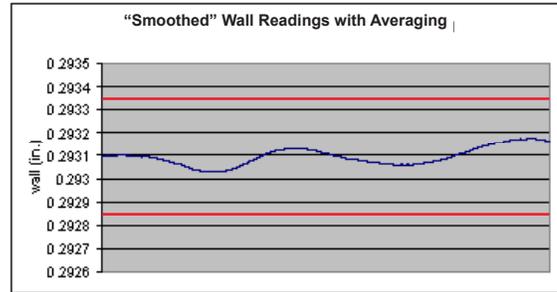
# Advanced UltraScan Options

## High-Speed Tolerance Checking

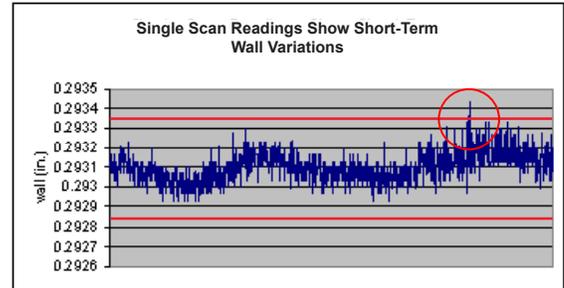
*Detection and notification of short-term wall variations*

Ultrasonic systems are often implemented in pipe 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 pipe.

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



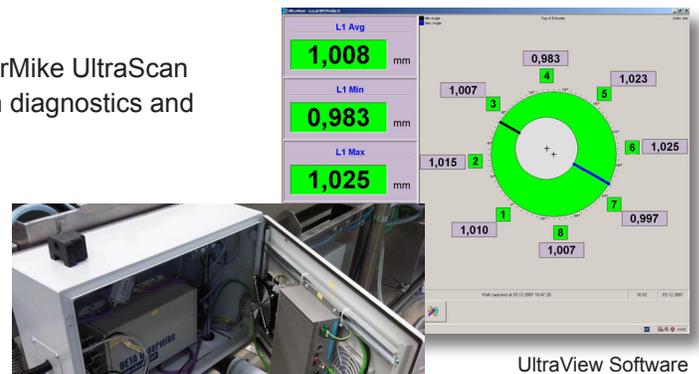
High-speed tolerance checking compares individual scans against tolerance limits

## 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 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 pipe 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.



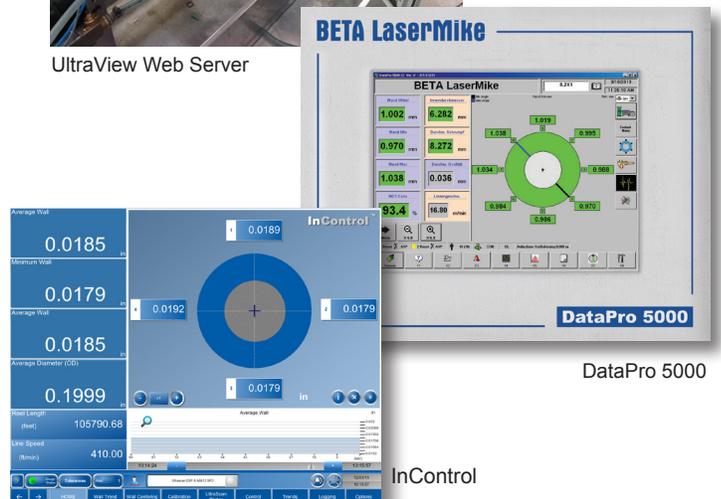
UltraView Software



UltraView Web Server

## Beta LaserMike Process Controllers & Data Management Systems

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

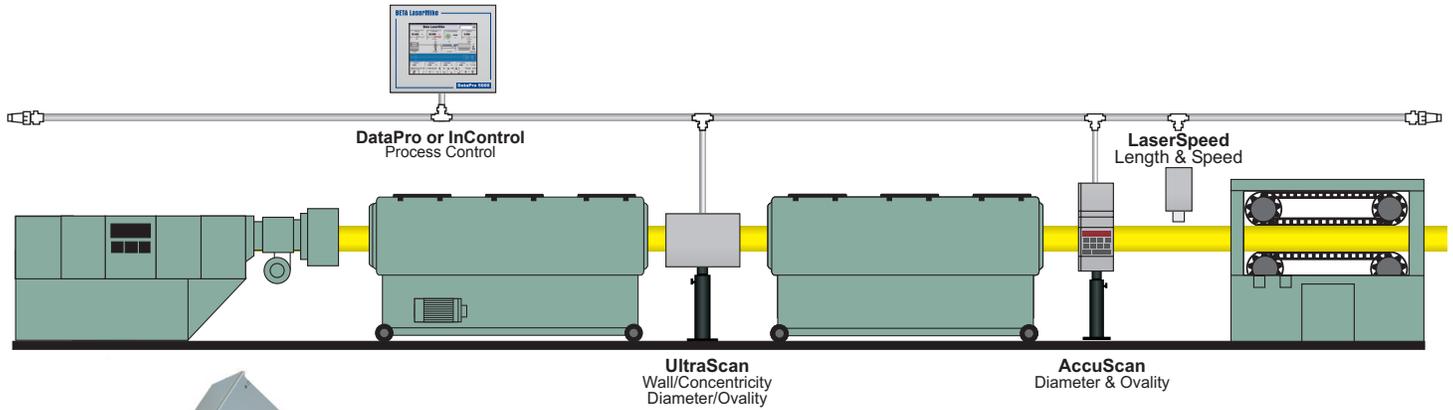


DataPro 5000

InControl

# Pipe Production Systems Solutions

The UltraScan gauge can be combined with the Beta LaserMike AccuScan diameter and ovality gauge, LaserSpeed length and speed gauge, Data Pro or InControl process controllers and integrated into your production line for a complete measurement system solution. The result is high-precision dimensional monitoring at all points in your process for the production of superior quality pipe products and significant manufacturing savings.



**AccuScan**  
*High-Speed Diameter and Ovality Measurement Systems*

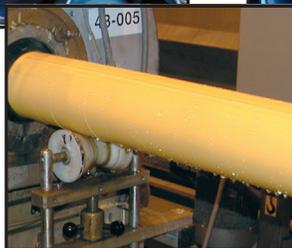
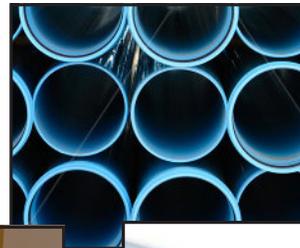


**LaserSpeed**  
*Non-Contact Length and Speed Measurement Systems*

## Applications

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

- ▶ Water supply (hot and cold)
- ▶ Cable ducting
- ▶ Chemical pipelines
- ▶ Construction
- ▶ Drainage and sewer
- ▶ Gas lines
- ▶ Heating and cooling systems
- ▶ Irrigation
- ▶ Process lines
- ▶ And other plastic pipe applications



## Precision Measurement & Control Solutions

The Beta LaserMike line of measurement and control solutions from NDC Technologies is designed to increase productivity, 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, tube and pipe, and other manufactured goods. Every system is backed by NDC's world-class service and support organization. With offices around the globe, we're committed to serving your unique measurement application needs.

NDC Technologies is represented in over 60 countries worldwide. [www.ndc.com/betalasermike](http://www.ndc.com/betalasermike)

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Document #: T-BROC-SCAN-UltraScan Pipe-EN-2016JUNE10  
Date of Issue: June 2016  
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