AUREX
The next dimension of ultrasonic wall thickness measurement
The production of plastic pipes is significantly influenced by the high demands on quality assurance, economic efficiency and profitability which can only be met by intelligent automation technology. AUREX is one of the leading systems in extrusion due to its high-end measuring and control technology.

AUREX is the answer to almost every measuring, control or documentation task for mono or multilayer pipes, cables or tubes. Specific demands by the customer or specific product and process features are all covered by this automation technology.

Thanks to the digital multi-channel ultrasonic technology this system offers a high flexibility. Measurement of wall thicknesses or diameters are carried out by static or electronically rotating sensors. The system is appropriate for a broad range of products, i.e. tubes, cables and pipes up to 2500 mm (98”). The measuring mechanics is specifically designed to suit the extrusion process. It can be combined with gravimetry, thermal centering or other automation modules. Accurate measuring values are guaranteed and an economical complete solution for geometry measurement between 0.5-2000 mm (0.020 – 78”) dia. is possible. Equally for 100 % wall thickness measurement or flaw detection up to 630 mm (24.8”) outer diameter (OD). ECCO is used for fast pipe centering.
AUREX ultrasonic systems

**AUREX MK**

AUREX MK measuring chambers are perfectly adapted to the extrusion process. They supply accurate measuring values, offer a minimum conversion time and stand for an economic complete solution for geometry measurement between 0.5 - 400 mm (0.02 - 15.75”).

Reliable and proven!

**AUREX AFM**

AUREX AFM measuring mechanics were developed for complex tasks. Within a broad working range the output is increased to a maximum level. The same applies to material savings.

Perfect measuring technique, full documentation included!

**AUREX M-LINE / X-LINE**

AUREX m-line and x-line use very little water during operation. Sensors are pneumatically adjusted to the pipe. In turn, the equipment does not need to be converted when produced pipe dimensions need to be changed. AUREX x-line reliably measures the wall thickness of large pipes and increases efficiency.

Reliable and maintenance-free, also for large diameters!

**AUREX ERS**

AUREX ERS - to be used for a 100 % high-quality production. The system is based on the patented iNOEX measuring principle featuring an Electronically Rotating Scanner. Full measurement in lengthwise and circumferential direction.

100 % high-quality production guaranteed by AUREX ERS!

**AUREX OBF**

AUREX OBF is an easy-to-operate optical 360° surface inspection system for the production of plastic pipes. Perfect addition to AUREX ERS flaw detection.

360° surface inspection!

**ECCO**

ECCO - efficient system offered to ensure the fast pipe centering. Very early during the process thin points or thick points are identified and corrected through adaptation of the die setting.

Fast centering for pipes with a large diameter!

THE NEXT DIMENSION IN ULTRASONIC WALL THICKNESS MEASUREMENT
DIGITALIZATION FOR AN OPTIMUM DATA BASE.

iNOEX has implemented a high-precision ultrasonic evaluation electronics into the market-leading AUREX system. The used signal evaluation feature provides reliable measuring results for layer thickness sizes down to 0.02 mm.

Based on this technology, AUREX records and evaluates digital ultrasonic signals on the wall thickness progression and analyses the entire information content. The high measuring accuracy, the detailed signal information and an intelligent mathematical analysis permit a reliable determination of individual signals or layer thicknesses in the progression of the total wall thickness of the pipe. Typical signal distortion or overlapping signals which may occur during the measurement of very small wall thickness ranges will be detected by this technology and suppressed when signals are further processed.

LATEST HARDWARE FOR MAXIMUM OUTPUT.

As the system accuracy needs to be adapted each time to the measured wall thickness size, the high computing performance required to master the involved algorithms call for specific processors and memory units. Accordingly, AUREX is equipped with the latest high-capacity electronics components.

The ultrasonic system is specifically designed to generate, receive and process ultrasonic echoes at the required accuracy.

Result: The combination of high-end electronics and innovative AUREX measuring technology is able to evaluate 7 layers, starting at 0.02 mm wall thickness.

HIGH-PRECISION MEASUREMENT!

SELF-OPTIMIZING.

Only an evenly running, continuous and thoroughly stable extrusion process ensures that the production process is cost-efficient and competitive in the plastics market. This requires a technology which is able to master the interplay of “Measurement & Control”, to provide full production data and to convert this data into automated processes. Modular components, flexibility and self-optimization are needed to be able to automate also existing extrusion lines or to respond to new market demands.

An important task is the consistent leveling off of all components involved in the extrusion process. AUREX technology is based on “Measurement & Control”, which means that the system recognizes variations from set values without delay and compensates them through control loops in the classic extrusion process. This offers the manufacturer an option for full automation, including the analysis of the extrusion process, its continued performance and finally the documentation of all process data.

Measuring accuracy and reproducibility are at the base of all further functionalities. In order to be able to regulate the process, measuring values must be recorded continuously and directly during the extrusion process. Consequently, calibration of the measuring devices must be operational also during process changes. Extensive automatic functions such as the self-optimizing measuring value recording, the automatic ultrasonic calibration, integrated compensation of shrinkage and temperatures as well as the reciprocal sensor control ensure a maximum measuring accuracy.

MEASURE:

- Wall thickness
- Layer thickness
- Diameter
- Eccentricity
- Ovality
- Flaws
- Mass throughput
- Haul-off speed
- Temperature
- Pressure

CONTROL:

- Speed / haul-off
- Weight per length (haul-off / extruder)
- Thin points (wall thickness / haul-off)
- Wall thickness profile
- Thermal centering
- Diameter (vacuum)
- Working point (extruder / haul-off)
- Component dosing
- Co-extrusion
AUREX MK guarantees with its process-adapted measuring chambers highly precise measuring values, minimum conversion times and a cost-effective complete solution for the measurement of geometries from 0.5 to 400 mm.

The required measuring accuracy and functioning are provided by a proven measuring mechanics. Water is supplied through the existing cooling system. An integrated water filter keeps the system clean. For the best possible performance, measuring chambers for diameters up to 125 mm are designed with guide shells (for each dimension) which guide the pipe through the chamber. The ability of these two-part shells to self trigger is needed for a continuous production process in order to prevent any product tear-off. Measuring chamber of more than Ø 125 mm are centered by an easily adjustable double cone guidance.

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of sensors</th>
<th>Pipe dimensions [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK 20</td>
<td>4 / 8</td>
<td>0.5 - 20</td>
</tr>
<tr>
<td>MK 32</td>
<td>4 / 8</td>
<td>0.5 - 32</td>
</tr>
<tr>
<td>MK 63</td>
<td>4 / 8</td>
<td>10 - 63</td>
</tr>
<tr>
<td>MK 125</td>
<td>4 / 8</td>
<td>10 - 125</td>
</tr>
<tr>
<td>MK 160</td>
<td>4 / 6 / 8</td>
<td>16 - 160</td>
</tr>
<tr>
<td>MK 250</td>
<td>4 / 6 / 8</td>
<td>40 - 250</td>
</tr>
<tr>
<td>MK 400</td>
<td>8</td>
<td>32 - 400</td>
</tr>
</tbody>
</table>

AUREX MK is available in the following sizes:

- Comprehensive product information (wall thickness, diameter, eccentricity, ovality)
- Control of wall thickness, thin points, weight per length, mass throughput
- Production process on a continuous and reproducible standard through constant wall thickness and accurate centering
- Material savings of 5% or more through better centering and systematic start-up
- Optimum support for the operator
- Documentation available for customer
- Measurement of up to 7 layers, smallest wall thickness 0.02 mm (0.0008”)
- Measurement also possible for high-speed production
- Optionally available: hinged version
- Profinet, Profinet, Ethernet, CANopen

MEASUREMENT / CONTROL / EVALUATION MODULES OF AUREX MK:

- Wall thickness and diameter measurement
- COEX measurement
- Thin layer measurement
- Alarm handling
- Wall thickening
- In combination with gravimetric systems:
  - Automated ultrasonic calibration
  - Thin point control
  - Mass throughput control
  - Weight per length control either by haul-off or by extruder
  - Guide parameter control
  - Bleeding function
- Option: Documentation and inoTREND

MEASUREMENT / CONTROL / EVALUATION MODULES OF AUREX MK:
AUREX AFM is available for the following working ranges:

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of sensors</th>
<th>Pipe OD [mm]</th>
<th>Extended measuring range [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFM 400</td>
<td>8 / 16 / 24</td>
<td>160 - 400</td>
<td>32 - 160</td>
</tr>
<tr>
<td>AFM 500</td>
<td>8 / 16</td>
<td>250 - 500</td>
<td>63 - 250</td>
</tr>
<tr>
<td>AFM 630</td>
<td>8 / 16 / 24</td>
<td>315 - 630</td>
<td>75 - 315</td>
</tr>
</tbody>
</table>

**FEATURES:**

- Large measuring range, extended range retrofittable
- Proven measuring and control loops
- Detailed production data
- Regular and reproducible production process due to constant wall thickness and correct centering
- Material savings of 5% or more due to improved centering and systematic start-up process
- Production output increases following to reduced weight per length based on thin point control
- Easy maintenance
- Integration into extruder control
- Individual data evaluation by inoTREND on demand
- Profibus DP, Profinet, Ethernet, CANopen

**PERFECT MEASURING MECHANICS, FULL DOCUMENTATION!**

32:630 MM (1.26 - 24.80") – MEASUREMENT WITHOUT LIMITS.

AFM measuring chambers are flanged directly to the outlet of the vacuum tank. Its sensors perform a dependable ultrasonic measurement and equally guide and center the pipe.

For the diameter range of 32:630 mm (1.259 – 24.803") AUREX AFM measures on 8 – 96 spots around the pipe circumference. Wall thickness sizes and diameters are simultaneously measured. Minimum wall thickness tolerances are obtained through subsequent control loops for weight per length and thin points and the thermal die centering unit. All measurements can be automatically documented and evaluated. Product settings are managed and stored under recipe or product numbers to make parameters available fast and reliably when pipe dimensions have to be changed.

This measuring and control system was designed to fulfill the specific tasks of standard pipe extrusion:

- Maximum increase in output, maximum material savings
- Modular product for gradual retrofitting
- Simple handling and operation
- Process protocols

**MEASUREMENT / CONTROL / EVALUATION MODULES OF AUREX MK:**

- Wall thickness and diameter measurement
- COEX measurement
- Alarm handling
- Wall thickening
- In combination with gravimetric systems:
  - Automated ultrasonic calibration
  - Thin point control
  - Mass throughput control
  - Weight per length control either by haul-off or by extruder
  - Guide parameter control
  - Bleeding function
  - Option: Diameter control
  - Option: Documentation and inoTREND
AUREX m-line, AUREX x-line

EASY, SAFE AND MAINTENANCE-FREE!

**RELIABLE AND MAINTENANCE-FREE.**

AUREX m-line sets a high standard. The ultrasonic measuring mechanics is maintenance-free and needs only small water quantities for ultrasonic coupling. This is due to the flexible and interlocking connection between the sensor holder and the measured pipe. The correct pipe/sensor coupling is supported by spring tension. The specific combination of the sensor/sensor holder results in a unique flexibility of both. Thanks to a collar piece and spring loaded pressure elements which provide a maximum flexibility, the sensor holder can independently fold up or down when thicker pipe sections pass through.

**THE SOLUTION FOR LARGE PIPES.**

AUREX x-line reliably measures large pipes with a diameter of up to 2500 mm (98.425”). Its ultrasonic sensors are mounted on pneumatically operated carrier arms which are attached to a support frame. When dimensional changes are required, the sensors can be pneumatically adjusted to the required pipe diameter.

**WALL THICKNESS MEASUREMENT, OPTIONALLY DIAMETER MEASUREMENT.**

AUREX x-line and AUREX m-line measure the wall thickness and optionally the diameter of a pipe. Subsequent control loops for weight per length and thin points reduce wall thickness tolerances to a minimum and optimize the production process. The improved centering of the pipe results in substantial material savings, especially when large pipes are produced. Measuring accuracy is ± 0.1 mm (0.004”).

**FEATURES AUREX m-line:**

- Excellent cost-performance ratio
- Pneumatic pipe adjustment
- Fast readiness for measurement after line starts or dimensional changes
- Stainless steel housings such as they are used in full bath scanners are not required
- Dimensional accessories, e.g. reducing rings, guide or sealing rings are not required
- Low water consumption
- Automatic sensor coupling supported by spring tension
- Very easy operation
- User-friendly and self-optimizing software based on digitized evaluation electronics
- Profinet, Profinet, Ethernet, CANopen
- Automated sensor opening

**FEATURES AUREX x-line:**

- Large measuring range with a retrofittable measuring range extension
- Proven measuring and control techniques
- Comprehensive production data
- Production process runs evenly and is reproducible due to constant wall thickness sizes and an optimum start-up process
- Material savings of 5 % or more due to a better centering and a systematic start-up process
- Increased production capacity due to reduced weight per length based on thin point control
- Very simple sensor exchange
- Integration into extruder control
- Individual data evaluation on demand
- Profinet, Profinet, Ethernet, CANopen

**MEASUREMENT / CONTROL / EVALUATION MODULES OF m-line AND x-line:**

- Wall thickness measurement
- Coex measurement
- Alarm handling
- Wall thickening
- In combination with gravimetric systems:
  - Automated ultrasonic calibration
  - Thin point control
  - Mass throughput control
  - Weight per length control either by haul-off or by extruder
  - Guide parameter control
  - Bleeding
- Option: Documentation and inoTREND
- Option: Diameter measurement

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of sensors</th>
<th>Pipe OD [mm] / [inch]</th>
</tr>
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<tbody>
<tr>
<td>m-line 500</td>
<td>8</td>
<td>125 - 500 / 4.92 - 19.69</td>
</tr>
<tr>
<td>m-line 630</td>
<td>8</td>
<td>250 - 630 / 9.84 - 24.80</td>
</tr>
<tr>
<td>x-line 800</td>
<td>8</td>
<td>200 - 800 / 7.874 - 31.496</td>
</tr>
<tr>
<td>x-line 1000</td>
<td>8</td>
<td>200 - 1000 / 7.874 - 39.370</td>
</tr>
<tr>
<td>x-line 1200</td>
<td>8</td>
<td>250 - 1200 / 9.84 - 47.244</td>
</tr>
<tr>
<td>x-line 1600</td>
<td>8</td>
<td>630 - 1600 / 24.803 - 62.992</td>
</tr>
<tr>
<td>x-line 2000</td>
<td>8</td>
<td>1000 - 2000 / 39.370 - 78.740</td>
</tr>
<tr>
<td>x-line 2500</td>
<td>8</td>
<td>1500 - 2500 / 59.055 - 98.425</td>
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**SPECIFICATIONS:**

- **Profinet, Profinet, Ethernet, CANopen**
- **Automated sensor opening**
- **User-friendly and self-optimizing software based on digitized evaluation electronics**
- **Stainless steel housings such as they are used in full bath scanners are not required**
- **Dimensional accessories, e.g. reducing rings, guide or sealing rings are not required**
- **Low water consumption**
- **Proven measuring and control techniques**
- **Comprehensive production data**
- **Production process runs evenly and is reproducible due to constant wall thickness sizes and an optimum start-up process**
- **Material savings of 5 % or more due to a better centering and a systematic start-up process**
- **Increased production capacity due to reduced weight per length based on thin point control**
- **Very simple sensor exchange**
- **Integration into extruder control**
- **Individual data evaluation on demand**
- **Profinet, Profinet, Ethernet, CANopen**

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100 % HIGH-QUALITY PRODUCTION WITH AUREX ERS!

ELECTRONIC ROTATION FOR A 100 % HIGH-QUALITY PRODUCTION.

AUREX ERS guarantees a 100% high-quality production and thus the additional plus to achieve excellent results in the market and for the company. Process variations which normally occur during the production process are identified and compensated so that it becomes possible to run a controlled flow production which will in turn generate a plus in quality and efficiency. This exactly where iNOEX comes into the picture!

ERS MEASURING TECHNOLOGY.

This iNOEX measuring technology uses the principle of the Electronically Rotating Scanner (ERS) for touch-free measurement and a full scan of the pipe. The technology is based on active/passive measurement. The patented measurement of electronically rotating ultrasonic signals does not leave a single spot of the pipe unchecked. Full measurement in lengthwise direction and around the circumference identifies hidden product defects.

THE OPERATING PRINCIPLE.

Sensor B (active) transmits and receives ultrasonic signals whereas sensors A and C are in passive mode and only receive ultrasonic signals. This is followed by a rotation to the next measuring cycle.

In this measuring cycle sensor C is switched to active mode. It transmits and receives ultrasonic signals. Sensors B and D are now passive and only receive signals. The rotation then continues to the next measuring cycle.

Measuring cycles rotate electronically around the measuring object for a 100 % scan.

FEATURES:

- Sensors scan 100 % of the pipe wall
- Evaluation of vertical and angular signals reflected by the pipe based on the activation of adjacent sensors
- Parallel sensor communication for the highest measuring resolution and the identification of even the smallest variations in production
- Integrated self-diagnosis of the sensors
- Optimum adaptation of the sensors (frequency, diameter) to the variety of measuring tasks
- Electronic rotation up to 6000 r.p.m. achieves a 100 % scan in lengthwise direction, given a line speed of up to 100 m/min
- 100 % wall thickness measurement for pipe dimensions of up to 630 mm dia.
- Integration into extruder control
- Profbus DP, Profinet, Ethernet, CANopen

MEASUREMENT / CONTROL / EVALUATION

MODULES OF AUREX ERS:

- Wall thickness and diameter measurement
- Diameter control
- COEX measurement
- Alarm handling
- Wall thickening
- In combination with gravimetric systems:
  - Automated ultrasonic calibration
  - Thin point control
  - Mass throughput control
  - Weight per length control either by haul-off or by extruder
  - Guide parameter control
- Bleeding function
- Option: Documentation and inoTREND

100 % wall thickness measurement
- Flaw detection
- Surface scan when combined with AUREX OBF

Type | No. of sensors | OD (mm) | OD (inch) | Measuring range extension (mm) | Measuring range extension (inch)
---|---|---|---|---|---
ERS 32 | 18 | 1 - 32 | 0.039 - 1.259 | - | -
ERS 63 | 24 | 10 - 63 | 0.393 - 2.480 | - | -
ERS 125 | 36 | 10 - 125 | 0.393 - 4.922 | - | -
ERS 160 | 30 | 32 - 160 | 1.259 - 6.299 | - | -
ERS 250 | 36 | 40 - 250 | 1.574 - 9.842 | - | -
ERS 800 | 76 | 400 - 800 | 15.749 - 31.492 | 160 - 800 | 6.299 - 31.492
OPTICAL INSPECTION OF PIPE SURFACES.

With AUREX OBF, INOX offers a simple optical 360° surface inspection system for pipes. AUREX OBF is based on IOS (Intelligent Optical Sensor), features a PowerPC (CPU with 400 MHz) and an intelligent line scan camera which are both mounted in a housing. 3 IOS systems are optionally linked to an AUREX OBF terminal or to an AUREX ERS system. Very small surface flaws can be detected

- 0.27 mm² (0.0004 sq inches) for pipes with OD range 10 - 32 mm (0.39 - 1.26")
- 0.40 mm² (0.0006 sq inches) for pipes with OD range 32 - 63 mm (1.26 - 2.52")

Flaws are automatically recognized by the IOS and the corresponding flaw image is transmitted to the master terminal. 360° surface inspection is guaranteed for line speeds of max. 48 m/min (157 ft/min) for outer diameters up to 32 mm (1.26") and 30 m/min (98 ft/min) for outer diameters up to 63 mm (2.52”). Activation of the alarm lamp, the saw or other downstream equipment is carried out by the IOS.

PERFECT COMBINATION WITH AUREX ERS.

AUREX OBF combined with AUREX ERS perform the optical detection of smallest surface flaws and the ultrasonic detection of inclusions such as structural flaws in the pipe wall. Both systems combined represent the currently most comprehensive system available for flaw detection in the pipe extrusion industry. Various options for visualization assist the operator in documenting detected flaws faster and more clearly. In favour of a more easy handling, the control units of both AUREX ERS and AUREX OBF are encased in a single operation terminal.

Detectable surface flaws:
- dots
- dents
- scratches
- foreign bodies
- streaks in surface gloss

AUREX OBF IOS

FLAW DETECTION IN SECTION 1.

Surface flaw detection is based on optical measurement. In such case, the AUREX ERS is additionally equipped with min. 3 intelligent cameras of AUREX OBF.

System functions:
- Automatic surface inspection
- Automatic exposure setting
- Flaw documentation in a log-book including date, time and flaw image
- Activation of alarm lamp, saw or other downstream equipment in case a flaw was detected
- Easy „teach-in“ based on flawless pipe samples
- „Surface Inspection Value“ (SIV) for quality assessment of the pipe

FLAW DETECTION IN SECTION 2.

Digitalization permits to record the full signal of a measurement which optimizes signal evaluation and makes fast processing possible. Full recording of the signal shape is required for flaw management and provides complete information on the product. AUREX ERS flaw management recognizes 2 flaw types. Based on this recorded information (flaw type I / flaw type II), it automatically decides either for the intervention of adequate control systems or for the release of an alarm message. All activities of the flaw management are automatically documented in an online protocol.

Due to the full signal identification of the digitalization, ultrasonic curves with or without flaws are compared. In case that between the entry and the rear wall echoes there are significant deviations above the tolerance of the compared ultrasonic signals, then a flaw is most probable. At the same time an alarm is released and logged.

FLAW TYPE I IN SECTION 2.

Such a flaw type was caused by coincidence. Flaws which are in the middle of the pipe are recognized. Such flaws are:
- Inclusions in the pipe-wall, e.g. air bubbles caused by moist material or by gas inclusions
- Structural flaws in the pipe wall

FLAW TYPE II IN SECTION 2.

This is a process engineering flaw which is controlled in very narrow limits through alternative control loops. Such flaws are:
- Thick and thin points
- Eccentricity
- Ovality
FAST CENTERING OF LARGE PIPES!

FAST PIPE CENTERING FOR AN ECONOMIC PRODUCTION OF LARGE PIPES.

The start-up process of thick-walled large pipes is difficult and requires time. The centering of the pipe is a special challenge as different temperatures in the extrusion die have an influence on the melt flow which leads to an irregular wall thickness distribution around the pipe circumference.

As line speed is at a low rate and mass throughput is high, it takes a lot of time and raw material until the pipe can be measured and the centering of the extrusion die can be carried out. A centering aid used at a very early stage is worth hard cash as it supplies immediate information on the wall thickness distribution which in turn is required for the fast centering of the extrusion die.

THE WINNING FORMULA: EARLY MEASURING VALUES – RECORDED DIRECTLY ON OR SHORTLY AFTER THE PIPE CALIBRATION UNIT.

ECCO by INOEX represents an efficient solution for a fast centering of the pipe. For the first time the wall thickness distribution can be measured during or shortly after the pipe calibration. The ultrasonic sensors of ECCO i-line are mounted on a pneumatically operated carrier arm attached to a frame ring which is located closely after the calibration sleeve. After the line start the ultrasonic sensors are pneumatically adjusted to the pipe. Then measurement starts. The ultrasonic sensors of ECCO m-line are fixed directly on the calibration sleeve. Both systems are equipped with high-resolution electronics which evaluates measuring data and displays the information on a 10-inch monitor. The display runs automatically, triggered by the entry of set values for wall thickness and diameter. Any differences in wall thickness distribution are visualized. The early control permits to center the pipe after a few produced feet. Accurate values are available to be used for compensating thin or thick sections by adjusting the die head settings.

RETROFITTING POSSIBLE AT ANY TIME.

The centering aid ECCO m-line can be retrofitted with sensor holders on the calibration sleeve. Equally, the centering aid ECCO i-line is retrofittable with sensor holders in the vacuum tank. INOEX offers the complete engineering package including detailed technical drawings for assembly, water supply and power supply.

FEATURES:
- Fast positioning of the line after the production start
- Optimum pipe centering
- Easy operation
- Significantly reduced start-up scrap
- Regular wall thickness distribution
- Amortization within a few months
- ECCO i-line: no mechanical sensor conversion required
- ECCO i-line: adjusting range of each sensor arm is 215 mm, special types on request

TECHNICAL DATA:
- Suitable for PE, PVC and PP
- Exterior diameters larger than 250 mm
- Wall thickness range 5 - 140 mm (0.196 - 5.510”)

ECCO is available with 8 sensors for the following OD ranges (other ranges available upon demand):

<table>
<thead>
<tr>
<th>Pipe OD [mm]</th>
<th>Pipe OD [inch]</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 - 630</td>
<td>9.842 - 24.803</td>
</tr>
<tr>
<td>250 - 800</td>
<td>9.842 - 31.96</td>
</tr>
<tr>
<td>400 - 1200</td>
<td>15.748 - 47.24</td>
</tr>
<tr>
<td>630 - 1600</td>
<td>24.803 - 62.99</td>
</tr>
<tr>
<td>1000 - 2000</td>
<td>39.370 - 78.74</td>
</tr>
<tr>
<td>1500 - 2500</td>
<td>59.055 - 98.43</td>
</tr>
</tbody>
</table>

Variable screen display.

Receive information on the overall eccentricity or the measuring values of each sensor in %. During the production process and when the system is manually calibrated, wall thickness values are available either in mm or inches.
NEW VISUALIZATION CONCEPT.

The cross-platform concept headed for the future permits the visualization as a Website by way of an easy integration through a browser. This way the INOX user interface can be visualized on all systems, which are Internet enabled. The multi-touch surface permits an intuitive operation by gesture command (zoom, swipe). Operation is carried out through installed Widgets, which can be freely configured by the user, independent of their size or information, they can be added or removed as required. This allows the user to have permanent access to the most important applications (favorites).

FAST CUSTOMER SUPPORT WITH TEAMVIEWER.

- Worldwide support via remote control
- Easy configuration, no VPN gateways
- In accordance with the highest safety standards

IDM – THE INOX DATA MANAGER.

IDM for the centralized recording of the process and quality data of all extrusion lines. The analysis and the creation of reports are carried out by the integrated inoTREND function. Secure data storage via RAID in a SQL database.

- Access to all relevant production data via SQL database
- Database server and centralized data storage, NAS (Network Attached Storage)
- Visualization + data evaluation via inoTREND

INO TREND.

With the software option inoTREND production data and process values can be recorded and visualized in diagrams. The displayed process data and time periods can be individually configured by the user. Besides the pre-defined diagrams individual configurations are possible with the user-friendly software. inoTREND further offers the option to generate and file reports. Protocols can be stored in common formats such as PDF or .csv-data files for Excel. Data can then be exported by USB stick, e.g. for documentation by the customer. Operation of inoTREND is intuitive via multi-touch screen on the terminal. Alternatively, the software can be accessed through a web browser.
SUCCESS IS MEASURABLE!

Ultrasonic systems by iNOEX provide you with the option to submit a measurable quality to your customers. Moreover, measurable cost savings are available to you. Your production process runs not only consistently and reproducibly due to constant wall thicknesses and good centering. With AUREX ultrasonic systems material savings of 5 % or more are possible through better centering and a systematic start up. Especially in combination with SAVEOMAT gravimetric systems, payback periods are very short.

**AUREX MK (Ø 2.5” PE-pipe)**

<table>
<thead>
<tr>
<th>Output</th>
<th>Production time</th>
<th>Savings</th>
<th>Material costs</th>
<th>Savings p.a.</th>
</tr>
</thead>
<tbody>
<tr>
<td>550 lb/h</td>
<td>16 hrs/day x 350 days/year</td>
<td>2.0 % (Ultrasound)</td>
<td>0.70 $/lb</td>
<td>$ 43,120</td>
</tr>
<tr>
<td>550 lb/h</td>
<td>16 hrs/day x 350 days/year</td>
<td>3.0 % (Gravimetry)</td>
<td>0.70 $/lb</td>
<td>$ 64,680</td>
</tr>
<tr>
<td>5.0 % total</td>
<td></td>
<td></td>
<td></td>
<td>$ 107,800</td>
</tr>
</tbody>
</table>

**AUREX x-line (Ø 30” PE-pipe)**

<table>
<thead>
<tr>
<th>Output</th>
<th>Production time</th>
<th>Savings</th>
<th>Material costs</th>
<th>Savings p.a.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,000 lb/h</td>
<td>16 hrs/day x 350 days/year</td>
<td>2.0 % (Ultrasound)</td>
<td>0.70 $/lb</td>
<td>$ 235,200</td>
</tr>
<tr>
<td>3,000 lb/h</td>
<td>16 hrs/day x 350 days/year</td>
<td>3.0 % (Gravimetry)</td>
<td>0.70 $/lb</td>
<td>$ 352,800</td>
</tr>
<tr>
<td>5.0 % total</td>
<td></td>
<td></td>
<td></td>
<td>$ 588,000</td>
</tr>
</tbody>
</table>

**AUREX AFM (Ø 24” PE-pipe)**

<table>
<thead>
<tr>
<th>Output</th>
<th>Production time</th>
<th>Savings</th>
<th>Material costs</th>
<th>Savings p.a.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,500 lb/h</td>
<td>16 hrs/day x 350 days/year</td>
<td>2.0 % (Ultrasound)</td>
<td>0.70 $/lb</td>
<td>$ 196,000</td>
</tr>
<tr>
<td>2,500 lb/h</td>
<td>16 hrs/day x 350 days/year</td>
<td>3.0 % (Gravimetry)</td>
<td>0.70 $/lb</td>
<td>$ 294,000</td>
</tr>
<tr>
<td>5.0 % total</td>
<td></td>
<td></td>
<td></td>
<td>$ 490,000</td>
</tr>
</tbody>
</table>

**AUREX ERS (Ø 10” PE-pipe)**

<table>
<thead>
<tr>
<th>Output</th>
<th>Production time</th>
<th>Savings</th>
<th>Material costs</th>
<th>Savings p.a.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,700 lb/h</td>
<td>16 hrs/day x 350 days/year</td>
<td>2.0 % (Ultrasound)</td>
<td>0.70 $/lb</td>
<td>$ 133,280</td>
</tr>
<tr>
<td>1,700 lb/h</td>
<td>16 hrs/day x 350 days/year</td>
<td>3.0 % (Gravimetry)</td>
<td>0.70 $/lb</td>
<td>$ 199,920</td>
</tr>
<tr>
<td>5.0 % total</td>
<td></td>
<td></td>
<td></td>
<td>$ 333,200</td>
</tr>
</tbody>
</table>

**AUREX OBF** significantly reduces product complaints and the costs involved.

**ECCO (Ø 24” PE; weight per length 34 lb/ft; recycling costs 0.25 $/lb)**

<table>
<thead>
<tr>
<th>Produced pipe length up to sellable pipe</th>
<th>Scrap</th>
<th>Recycling costs per line start</th>
<th>Cost for energy, personnel, etc.</th>
<th>Cost per line start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without ECCO 2 x 30 ft = 60 ft</td>
<td>2040 lb</td>
<td>$ 510</td>
<td>$ 414</td>
<td>$924</td>
</tr>
<tr>
<td>With ECCO 6 ft</td>
<td>204 kg</td>
<td>$ 51</td>
<td>$ 23</td>
<td>$ 74</td>
</tr>
</tbody>
</table>

Savings due to ECCO 728 € per line start.