

**On-line production control systems
for viewing the internal structure**

TwinEye measuring system for pre-insulated pipe production



TwinEye measuring system on a production line

On-line production control

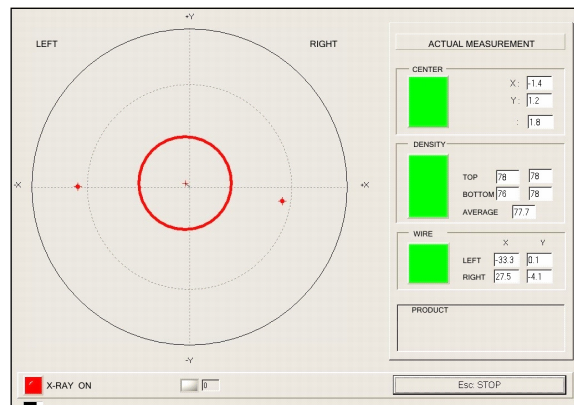
Production of high-quality pre-insulated pipe systems requires accurate and close product control in order to ensure product quality and reduce consumption of raw materials. Non-destructive control systems working on-line improve product quality and facilitate automatic production regulation. Such features reduce total production costs.

Application

The TwinEye measuring system is designed for non-destructive on-line control of foam insulated pipe systems.

The TwinEye measuring system maps and scales the cross sectional position of service pipes and alarm wires. In addition, TwinEye measures the foam density in cross sectional zones.

TwinEye locates the position of service pipes made of metal or plastic.



Screen picture of a pre-insulated system with a single service pipe and two alarm wires

Advantages

- Uniform production quality
- Continuous quality control
- Feed-back signals for production adjustment
- Materials saving
- Automatic quality documentation
- Reduced start-up time
- Customers will only meet quality products.

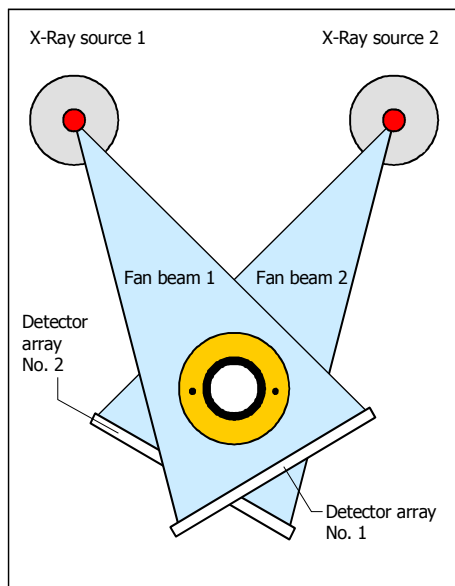
Description

The TwinEye measuring system is housed inside a chassis covered with metal plate. The measuring system includes:

- Guide-tube to direct the foam coated pipe system through the measuring gate in the middle of the guide-tube.
- Central measuring system with two X-ray sources and two opposed detector arrays.
- Gauging and data processing unit that also controls X-ray sources and detectors.
- Extensive and userfriendly software package.
- PC with monitor for generation of product library, selection of product data and presentation of results in numerical and graphical form.

Features

- User specified product library.
- Position of service pipe and wire relative to centre of pipe (X- and Y-coordinates). The position of up to four internal service pipes can be located.
- Presentation of foam density in cross sectional zones and deviation from product specifications.
- Identification of voids.
- Identification of service pipe joints.
- Alarm signal when out of limits.
- Out-put signals intended for automatic production regulation.



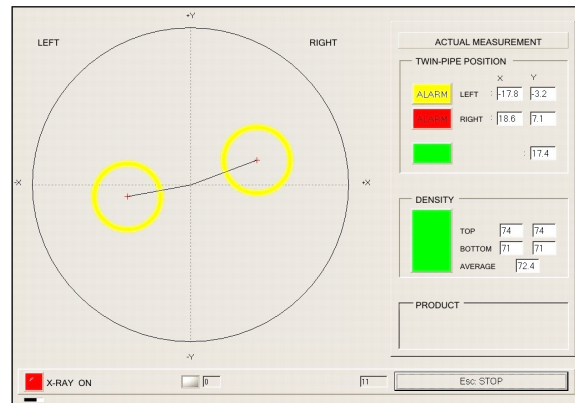
Measuring principle outlined

Measuring principle

The pre-insulated pipe system is exposed to fan shaped beams emitted perpendicular to pipe axis from two low-energy X-ray sources. The intensity of radiation transmitted through the cross section is detected by two sensor arrays mounted opposite the sources. The sensor signals are processed to give a detailed mapping of the density and the structures inside the pipe casing.

Calibration

The extensive software package includes functions for automatic calibration and programs to guide system calibration procedures.



Screen picture of a pre-insulated system with two PE service pipes

Physical specifications

Depend on installation conditions.

Chassis (Example)

Length: 1200 mm
Width: 750 mm
Height: 1700 mm

Guide-tube (Example)

Length: 1400 mm
Diameter: \varnothing 180 mm

Radiation source: Low-energy X-ray

Detector array resolution: 0.4 mm

Performance

Operating up-date time is user specified.

Range: 0.03 - 1 second

Accuracy

Position of service pipe \pm 0.5 mm

Position of wire \pm 0.5 mm

Optional applications

A modified version of the measuring system has been designed for on-line control of concentricity and thickness of layers in flexible multilayer pipes and hoses.