

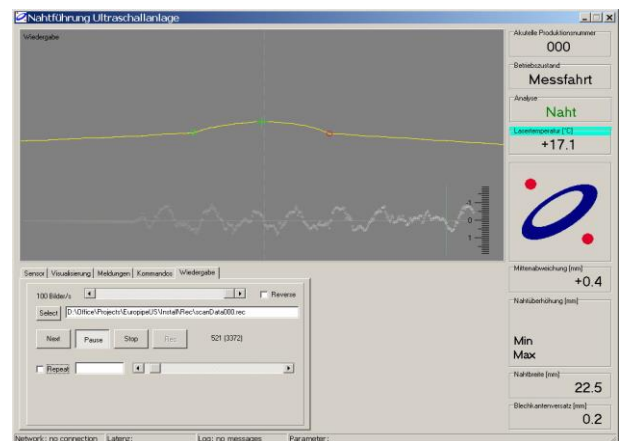


## Application Report

# Laser Optical *Seam Tracking System* on a Ultrasonic Testing Equipment for Weld Seams of Large-Diameter Pipes



- ✓ Reliable detection, even of extremely flat weld seams
- ✓ High rate of measuring and low latency
- ✓ Convenient process visualisation



for  
**EUROPIPE GmbH, Mülheim**

## The Client

More than 30 million tons of large-diameter pipes were produced by **EUROPIPE** and their preceding companies over the years – enough for a pipeline which goes twice around the equator.

With an annual capacity of more than 1 million tons (more than 3,000 km of pipeline), EUROPIPE is one of the leading pipe making companies worldwide.

Their large-diameter pipe production site in Mülheim an der Ruhr/Germany includes two lines for longitudinally welded pipes: a 12/18 m line based on the UOE procedure and a 12m line based on the pyramid roller bending method.

## The Task

Europipe operates two ultrasonic testing facilities for inspecting weld seams of finished pipes in the large-diameter pipe production line.

For measuring, ultrasonic transducers of the equipment must precisely follow the weld which due to manufacturing tolerances does not correspond to a perfect straight line. The array of inductive sensors used in the past for transducer positioning was to be replaced by the new laser optical seam tracking system.

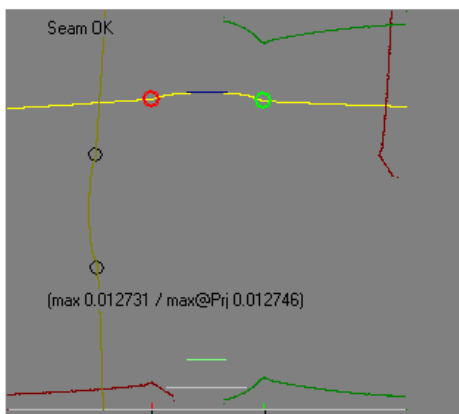
## The Solution

The core of the seam tracking system consists of the laser and the evaluation computer. A visualisation software makes sure that the pipe surface profile including the weld reinforcement can be represented in relation to the position of the transducer.

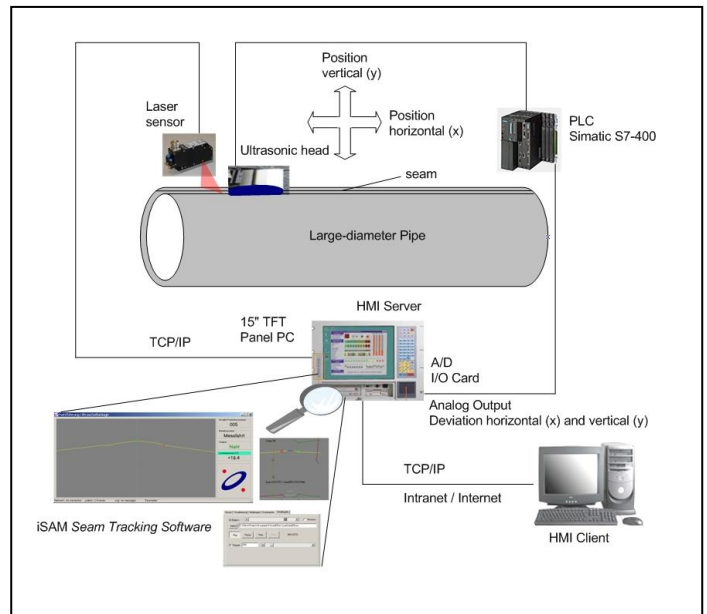
The sensor transmits profile data and receives control commands to and from the evaluation computer. The seam tracking software analyses the profiles and determines the weld position on the pipe surface. The result of evaluation is made available by digital and analogous interfaces as well as network telegrams (TCP).

Digital and analogues result values are issued with a low constant latency (40 ms) to the measuring process and a frequency of > 50 Hz. They are used for guiding the transversal support of the UT equipment accordingly. Network telegrams contain additional analysis results and are sent to the PLC in adjustable cycles (typically: 100 ms).

Due to the intensive phase of planning and excellent co-operation between EUROPIPE and iSAM, **commissioning** on the highly available UT equipment could be finished **within two days only**.



*Seam significance from statistic analysis – a measure for the quality of detection*



*Seam tracking system components*

## The Benefit

Proven system components as well as the seam tracking software developed by **iSAM** ensure a high and constant degree of reliability and accuracy of detection, even of the smallest seam reinforcements. Furthermore, the quality of detection provided by the computer- and laser-supported seam tracking system has contributed to an improvement of quality assurance.

## Further Advantages

- Due to the chosen client/server structure further clients can be easily added if needed
- Improved quality assurance due to the recorder function, i.e. parallel recording of measuring sequences and repeatable operations
- Increase of availability of the UT equipment

## Facts:

Client/Location: EUROPIPE GmbH, Mülheim

Industry: Pipe Mills

Software: iSAM Seam Tracking Software

Hardware Configuration: 1 panel PC, IP 65  
1 light section sensor 2D, laser class 2M  
1 client computer  
1 Simatic S7-400

Network: Ethernet TCP/IP

Visualisation: - Graphical presentation of weld seam profiles  
- Numerical display of measured results  
- Temperature monitoring of the light section sensor  
- Message / diagnostics logging  
- Recorder function

Finished: January 2006