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Gesellschaft
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Kybernetik

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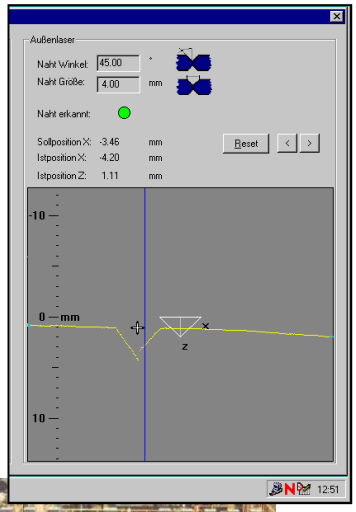
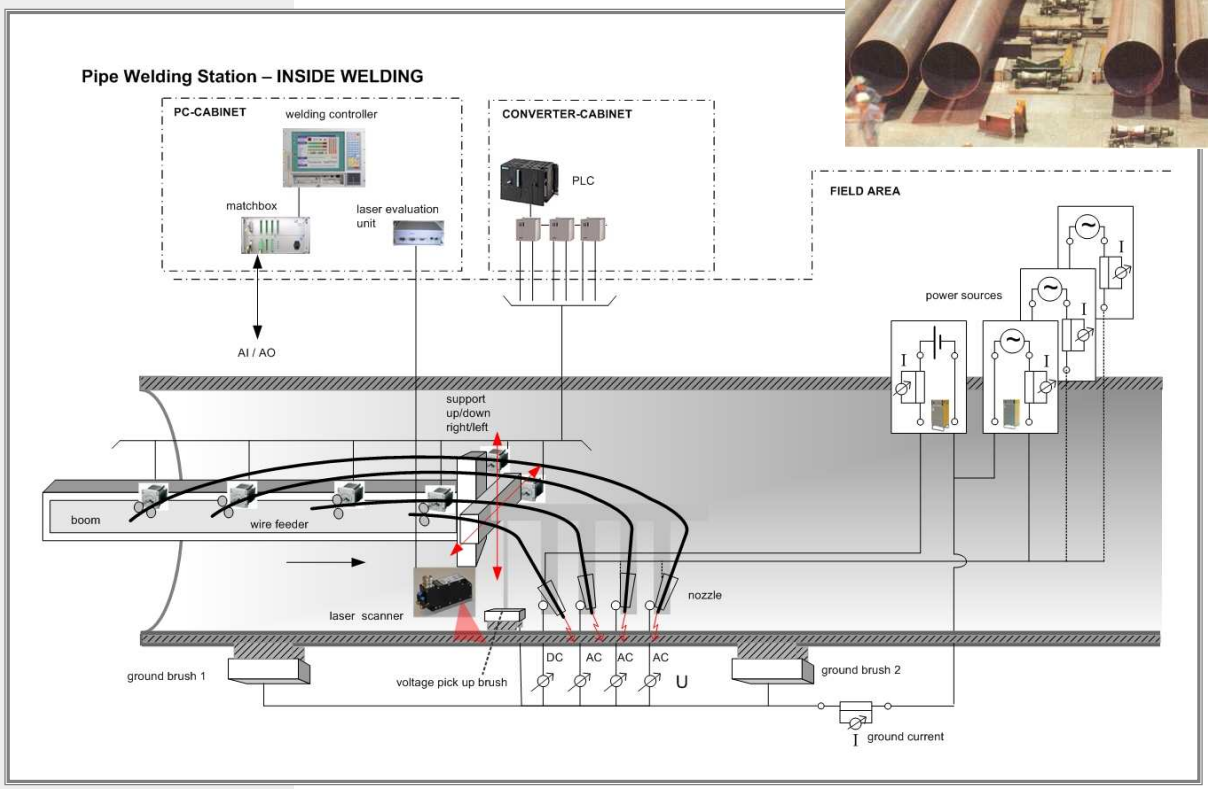
Application Report

Combined Arc Control and Seam Tracking System for SAW Welding





for
ESAB Welding Automation, Sweden

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The Client

ESAB manufactures welding consumables and welding equipment for any welding and cutting process anywhere in the world. More than one hundred years of research, development, global manufacturing and dedicated client support have made ESAB the world leader in welding and cutting equipment, systems and supplies. ESAB is part of Charter plc, and achieved an overall turnover of 720.1 million GBP in 2005 and employs 6507 people worldwide.

The Task

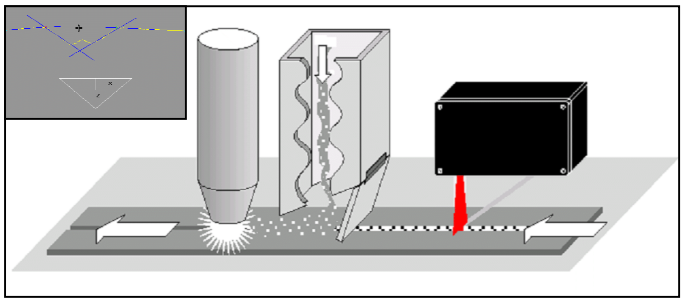
ESAB signed a large contract with a major steel producer in China, Baoshan Iron & Steel Co., Ltd., to supply automated welding technology. The manufacturer produces around 20 million tons of steel a year and ESAB will supply automated systems, equipment and consumables.

The Solution

For SAW welding on 9 welding stations iSAM supplies a unique solution for

- Welding control
- Seam Tracking
- Operation and Monitoring
- Quality Assurance

By means of a high-resolution laser light section sensor (2D) the joint is reliably detected and transmitted via TCP/IP to the evaluation computer. The latter then sends the commands required for positioning the welding heads to a PLC. Based on that information, the welding heads are exactly guided above the joint of the seam to be welded.



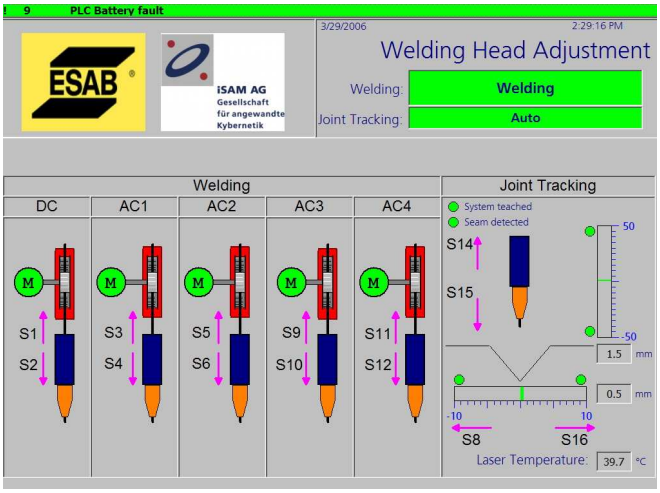
Laser light section sensor for seam tracking

The iSAM *Welding Automatics* is based on solid signal pre-processing by means of the *measX* signal connection unit in 19“ rack technique. Each single measuring channel is optically and galvanically separated.

The integrated isolating amplifiers present optimised transmission behaviour at sampling frequency of ≥ 10 kHz. Internally all measured data are processed according to the True RMS method.

Signal connection unit measX (Matchbox)

That digital acquisition of actual values provides for an accurate recording of welding current and welding voltage disregard of the curve form.



HMI System – appropriate handling and diagnostic possibilities

The Benefit

For ignition, the two-level controller release is used. This allows a **better ignition performance** at the start without short-circuit of the wire. That means that a very homogenous weld is achieved right from the beginning of the welding process. Furthermore, shorter welding tabs may be used.

The digital wire feed controller ensures a high degree of constancy of the inner closed control loop (voltage for descending characteristic line, current for constant power sources). **Constant weld quality** results in significant savings in terms of rework and repair.

Automatic limitation of wire feed presents the advantage that **short-circuits are avoided** after short-time malfunctions. Therefore, minor welding defects are prevented or significantly reduced.

The high quality of control of the outer closed control loop (current for descending characteristic line, voltage for constant power sources) ensure a very uniform heat input. Consequently, a **high metallurgical quality** of the weld (notched impact test) is achieved.

The system used allows a higher welding speed. That means an optimised throughput and an **increased productivity**.

Facts:

Client/Location:	ESAB Welding Automation, Sweden
Market Segment:	Pipe Mills
Software:	iSAM *Welding Automatics* iSAM *Seam Tracking System* SIMATIC Step 7 and ProTool
Hardware Configuration:	1 central data server including a SQL database For each of the 9 welding stations: 1 panel PC (welding control) 1 panel PC (visualisation) 1 embedded PC (laser evaluation unit) 1 measX signal connection unit 1 Simatic S7-300 including position control 1 laser scanner 2D
Network / Bus System:	Ethernet TCP/IP and Profibus
Database:	Coupling and data traffic to the SQL database
Visualisation:	~ 15 screens Welding plans Follow-up of parameters Setup mode Message system

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