

ULTRASEN-BIRD

ULTRASEN[®] system for automatic inspection of Billets and RoDs

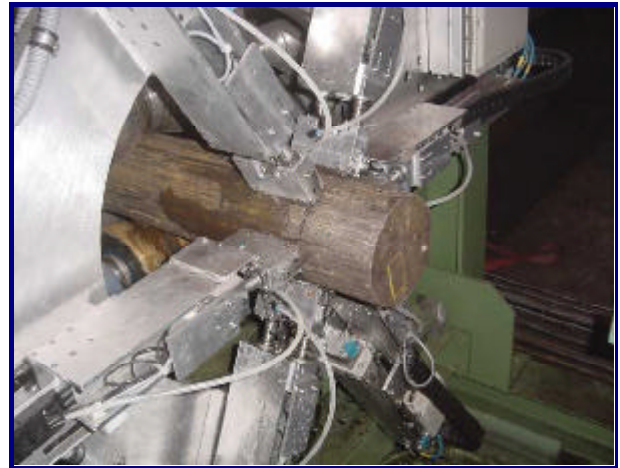
PRODUCT HIGHLIGHTS

- Fully Automatic inspection of billets and rods.
- Inspection time: 1 m/s minimum.
- A common processor mainframe can be combined with different ultrasonic transducer assemblies for different part shapes, sizes or inspection levels.
- Software tools include storage, management and hardcopy reports of calibration, reference blocks, and parts inspected.
- Connectivity to factory computer network via FTP client on Ethernet.
- Based on ULTRASEN[®] modular ultrasound data processor architecture.

PRODUCT DESCRIPTION

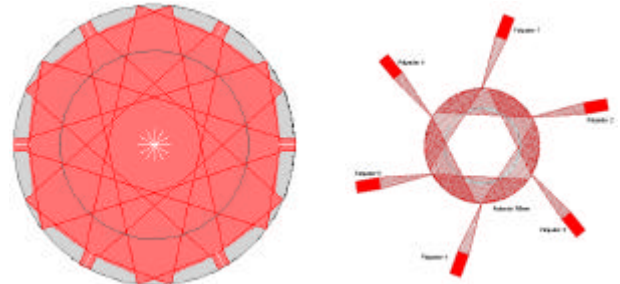
Current trends in the steel industry set up exacting demands on quality control, including complete inspection of a 100% of the production (i.e. full volume and surface inspection for each and every part produced), availability of thorough inspection reports, compliance with different quality standards (depending on customer requirements) and, of course, increased productivity (i.e. minimum inspection time per part and minimum recalibration time when switching between different parts).

ULTRASEN-BIRD is designed to cope with the seemingly contradictory requirements stated above in the inspection of steel billets and rods for potential flaws. This system is able to examine pieces of variable size (diameters ranging from 20 to 300 mm), made of 0.10 –0.90 %C steels, and with or without machined external surfaces. Inspection is performed in-line, and different ultrasonic transducer assemblies can be added to the main system, so that the same processor mainframe and mechanical subsystem can be adapted to different inspection levels (centre inspection, subsurface inspection, full inspection), and to different part shapes (billets, rods, and other prismatic shapes, such as hexagonal, upon demand).



Ultrasonic transducer assemblies

Different transducer assemblies are available, adapted to different part shapes and quality requirements. All of the assemblies include water coupling between the transducers and the part surface, and a mechanical subsystem to scan the transducers along the part.



Six-transducer assemblies for core (left) and surface (right) inspection of rods

Transducer assemblies can be combined within the same system to inspect different part shapes (billets or rods) or provide different coverage levels (rod core, surface or complete inspection).

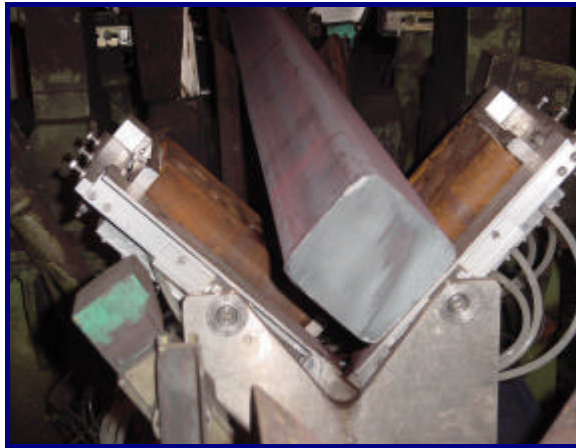
Ultrasonic processor and control module

Based on proprietary *ULTRASEN[®]* architecture, it carries out the following tasks:

- Generating the trigger pulses for the ultrasonic transducers.

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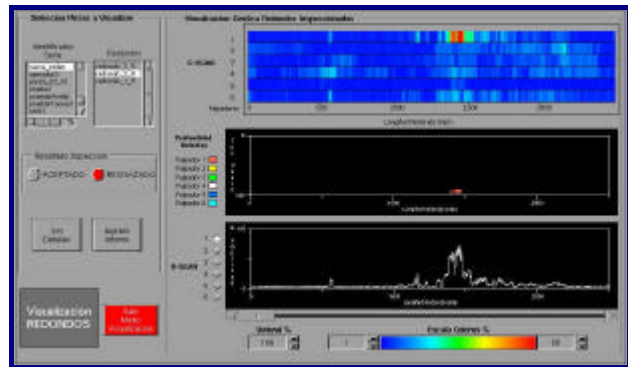
Billet inspection transducer assembly

- Synchronising signal acquisition to transducer position over the inspected link.
- Real time ultrasonic data acquisition and signal processing.

Processing computer

Host to the Human-Machine Interface (HMI), which displays real time inspection results in a C-

Scan Image format, and includes a variety of auxiliary tools to store, transfer and check the results of previous inspections. Inspection results are stored in a standard format and integrated in the plant computer network, so that inspection reports can be generated, reviewed and printed both locally and remotely. This application is developed using Linux Red Hat 6.1, running on an industrial computer built in the system mainframe.



HMI: Display of inspection results

TECHNICAL CHARACTERISTICS

• Inspection technique:	Pulse-echo system, with water coupling
• Number of channels:	4 to 24 Depending on number and type of transducer assemblies
• Rod diameter range:	User-specified, typical values are 25 to 100 mm and 70 to 220 mm.
• Billet side range:	User-specified, typical value is 70 a 220 mm.
• Inspection Rate:	>1 m/s
• PRF:	Up to 10 pulses per mm, measured over the length of the part
• Differential transducer gain and delay compensation range:	Independently programmable 0 to 40 dB gain for each channel. Independently programmable delay for each channel up to 320 mm.
• Digital Filters:	Real-time Digital Signal Processing Tools using dedicated FPGA
• Distance-amplitude compensation curve (DAC) :	Fully Programmable between -10dB and +30 dB in 256 steps
• Excitation pulse level:	Adjustable up to -350 V.
• Excitation pulse width:	Up to 350 ns programmable with 12.5 ns steps.
• Depth (TOF) resolution:	0.125 mm.
• Connectivity to factory computer network:	Using Ethernet, through a FTP client

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