



**SURFIN**  
SURFACE INSPECTION

# On line Surface **Automated** **Inspection** and Quality Control

The Surfin´ system is an automated surface inspection system created to carry out 100% quality control in hot (1.100° C) continuous line processes for round sections but also in cold ones and allows to detect surface defects such as cracks, folds, scratch marks, holes, roll marks, etc.

# General Features



## ◆ INSPECTION PORTICO

This water cooled structure is placed in the rolling mill line and is composed of three cameras at 120 degrees for the complete inspection of the part (could be more if necessary), illumination and feed/supply sources. This structure has been redesigned based on knowledge acquired in earlier projects and customer suggestions.

## ◆ CONNECTION BOX HOUSES,

The system is provided with necessary auxiliary electronics (relays, etc.) and the GigaEthernet output converters of the fiber optic communications of the system - Optical fiber shall be used for data transfer from the inspection portico to the main computer, avoiding any noise problem. The cameras employed shall include a series of digital inputs and outputs (for alarms, light signals, etc.) which provides an advantage in that they can also be transmitted by fiber optics to the computer along with the images.

## ◆ COOLING SYSTEM

Considering cameras shall be placed near the red-hot steel parts, it is necessary to keep the temperatures of the different elements in their usual functioning range ( $< 40^{\circ}\text{C}$ ).

## ◆ CONTROL COMPUTER

Located remotely in a control room. Should be connected to an uninterrupted power system (UPS). A connection box converts the fiber to GigaEthernet.



## ◆ SOFTWARE

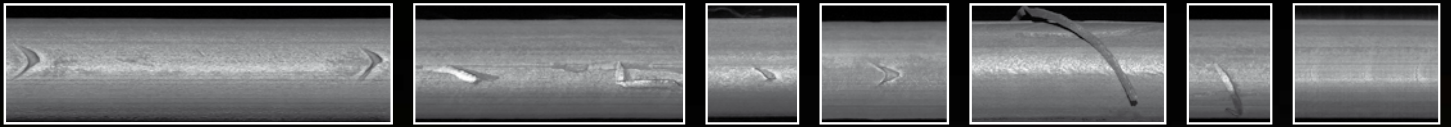
In order to carry out the control, the system shall capture images during the passing of the bar, performing a pre-processing to identify problematic areas. The bar images shall be stored in the disk. A posterior intelligent processing based on SVM algorithms, in the time that is available between bars, shall establish whether these possible defects are truly so, and when positive, shall establish the type of defect and its position. This intelligent processing is based on an interactive training that shall take place remotely from previously stored images. This progressive training shall allow to gradually increase the efficacy of the system.



The system is informed on the bar speed and the associated production data (production data shall be received in the change of batch in the rolling mill). The system must be capable of independently detecting the arrival of a bar with the support of the speed signal and one infrared sensor. As the bar passes, images are captured of the entire surface and a preproces-sing takes place (by each camera) that establishes the areas deemed as potentially defective.

Once the bar has completely passed by, its three images are stored along with the potentially defective areas and other data of interest.

# Problem Description

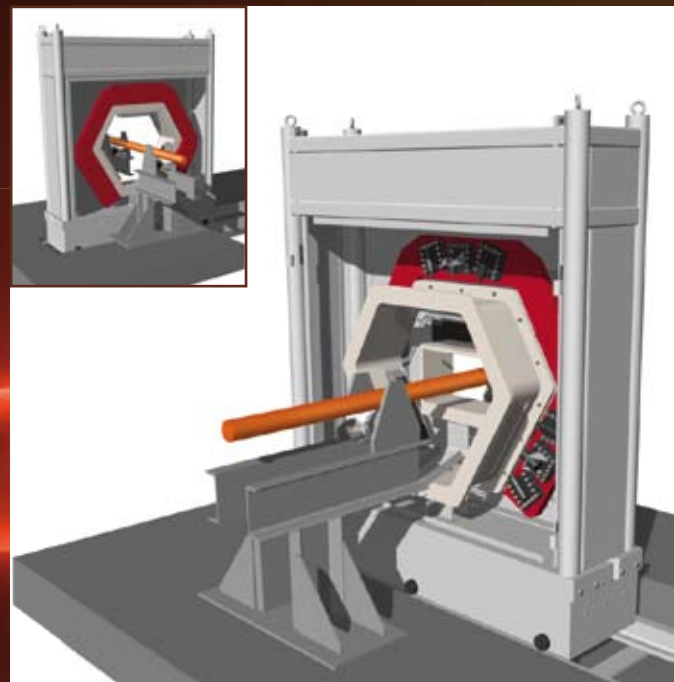


Real defect images captured in the line

- The metallurgy industry uses difficult and complex industrial processes.
- Specially, hot rolling usually generates specific defects (roll marks, cracks, holes, folds, scratch marks etc.) which are repetitive in nature and indicate maintenance problems in the rolling mill.
- Large amounts of worthless defective material could be produced if the process is not inspected correctly.
- High temperature ( till 1200°C) and speed conditions( till 10 m/seg) difficulties the quality control work.
- Surface defect inspection of every kind of steel grades.

## System Highlights

- This system is 50% more efficient than comparable inspection systems
- Market presence and successful implementation in important enterprises throughout Southern Europe.
- Rapid return on investment, far sooner than the average return for automated quality control systems. Customer saves big amounts of processed steel, thus saving scrap waste every time a repetitive mistake is detected.
- Flat or complex geometries inspections like profiles are under development.
- Patented system Europe EP2341330 and Spain ES2378602



## Technical Data

### ◆ GENERAL FEATURES

- High speed high resolution linear image capture.
- Illumination adapted to application (Hot 1000° C, cold...).
- Defects detected (Cracks, roll marks...) from 0.3 mm.
- Artificial Intelligence based defect learning system.
- Adaptable and re -designable to existing lines.

### ◆ SOFTWARE FEATURES

- Windows 7® compatible
- Remote client: interface the application, training the system can be performed remotely.

### ◆ INTERFACES

- “Made to measure“ Graphical user interface.
- PC based processing.
- Optical image transfer: electrical isolation between image acquisition and processing modules: robustness.
- Ethernet interface 10/100 with optical fiber for communications with line control and other systems.

### ◆ MISCELLANEOUS

- Hardware / Software customization upon request.
- Additional Information requires the signing of a Non Disclosure Agreement (NDA).

- ◆ SURFIN has been successfully delivered to companies such as Tubos Reunidos ([www.tubosreunidos.com/](http://www.tubosreunidos.com/)) and Aceros Inoxidables Olarra ([www.olarra.com/](http://www.olarra.com/)) and provides a market-proven solution to detect production issues at early stages in the hot process production. Sartech and Tecnalía form a team that can deliver SURFIN anywhere in the world, leveraging Tecnalía's R&D profile and more than 60 years of industrial development know-how and expertise from Sartech.



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