



Quality & Yield Optimization for Flat Steel Production

Passion for Steel –
Driven by Competence.
Powered by Innovation.
BEYOND INSPECTION

ISRA
VISION
parsytec

MORE Than Just Surface Inspection:

The Challenges

Diverse quality challenges in the flat strip steel processing are not unusual in the steelmaking industry. The various applications, from casting and hot rolling to coating and finishing, all require reliable process and quality control – at each processing step.

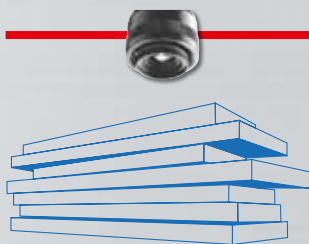
Flat rolled steel products are characterized by a broad range of requirements with highest demands for surface quality. Manufacturing challenges vary: from food industry and can production to automotive, factory buildings, storehouses or rail production. In addition, coils are designated to specific end products. The quality of their surface must be optimized to match with concrete applications or subsequent processing. This is the challenge for reliable steel strip producers.

The challenges at a glance:

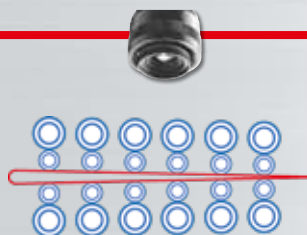
- A wide range of process specific applications
- Late identification of upcoming disasters with non-automatic visual inspection
- Highest quality requirements of high-end products
- No visual inspection possible due to hot material or highspeed production
- Continuous development of new materials, such as shock absorbing steel, demand new quality specifications
- Unrealized defects may lead to disaster downstream



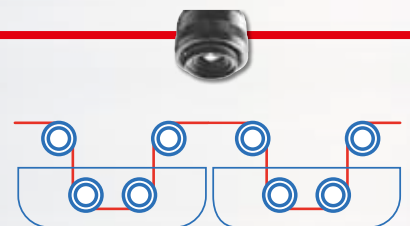
Leading the Way to Process Optimization



Slab



Hot Rolling Coils / Plate



Pickling

Production **Optimization** Along the Process Chain



The Benefits

ISRA PARSYTEC provides solutions for the full range of surface inspection tasks for continuous strip products with a unique and most complete product portfolio. Our goal is to provide advanced solutions along the entire steel production chain. Hundreds of successfully installed systems confirm the benefit of many years of experience and technological competence. Whether it be casting, hot or cold rolling, pickling, annealing, galvanizing, coating or the finishing process – all are covered, as well as end products such as rails.

One of ISRA PARSYTEC's key objectives is that our solutions help make manufacturing both more productive and more costeffective. By employing leading-edge inspection systems and the tools for both process monitoring and yield optimization, not only are the defects being recognized, but the solutions can also help pinpoint where and why the defects occurred. In this way, manufacturers are given important information enabling them to significantly improve their production and thereby achieve greater success. All systems integrate seamlessly into any process environment, providing perfect inspection and yield monitoring at all stages of production, leading inevitably to unbeatable product quality.

The benefits at a glance:

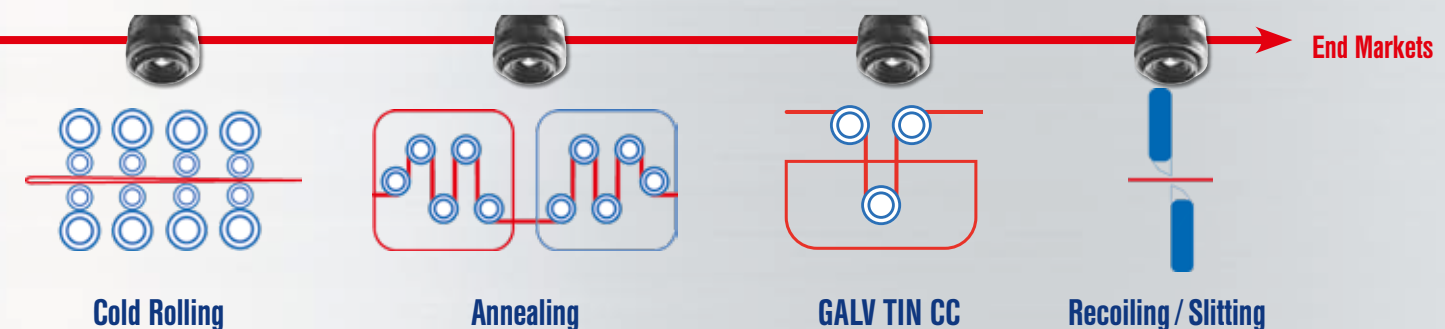
REDUCE ...

- Claims using quality control with accurate and reliable surface defect recognition from earliest production steps to coil finishing
- Manufacturing costs by increasing line yield
- Waste dramatically

OPTIMIZE ...

- Process malfunctions and manual maintenance
- Processes using production monitoring for analysis and disaster avoidance
- Process improvement using upstream feedback
- Validation against defined quality rules
- Automated quality grading

Reduce Scrap, Save Money



We Empower Flat Steel Production

Increase process reliability and productivity

By incorporating innovative automated inspection combined with tools for process optimization, the rate of return is maximized and ensures that its users are ahead of the competition in the global market.

Surface Inspection:

Reliable defect recognition prime quality & process optimization

Detecting roll marks during hot rolling leads to immediate implementation of corrective measures in order to minimize defective batches of coils. Precise information on critical defects and their location on the coil is absolutely necessary to avoid defects in subsequent production steps such as coating steel. Surface inspection enables process optimization by:

- Monitoring 100% of the coil surface: optimum defect recognition
- Identification of 100% of critical defects by analyzing each defect
- Easy defect root cause determination by analyzing any relevant defect data
- Quality validation by documenting and archiving the coil quality data



Automated surface inspection with its superior defect classification helps to improve production quality and reduce scrap significantly. It increases the overall process knowledge, which leads to minimized production costs.

Advanced surface defect recognition.

Quality Yield Management Software:

Process Analysis – Trends and causes at a glance

Supports steel manufacturers in the analysis of their production processes and decision making by using:

- Surface inspection data from casting to finishing
- Product and process data from any gauge

Software architecture simplifying the handling of complexity.

Ready-to-use software modules make it easy to create individual surface quality yield management applications, while integrating surface quality data with process data. These highly competent 'software experts' cover all aspects of metal inspection leading to significantly higher yield.



Implementing the Enterprise PROduction Management Intelligence architecture EPROMI and the simple-touse EXPERT modules help to analyze each processing step at different production lines and sites. Knowledge is transformed to decisions: local, global, and company wide.

Advanced technology for the improvement of steel production.

Event Capturing:

Optical process and quality control along the process chain –

using newest automated process monitoring with automated alarming. Reliable recording, detailed analysis of critical machine events that lead to production failure are integrated at any production step.

Fully automated – for fast action

- Process monitoring and root cause analysis coupled to surface inspection
- Reduction of critical events and machine downtime
- Root cause analysis for fast corrective action

Advanced process monitoring & quality grading.



Standards in Optical Surface Inspection ...

Slab, hot rolling of coils and plate

Automated optical quality control system for red hot strips at high speed processing – conceived for harshest production environment. The highlight: White light inspection with proven performance for all hot rolling defects.

- Early detection of periodical defects like roll marks
- Fully enclosed - easy to install and maintain
- Avoid disaster events due to improved roll changes
- Minimize scrap due to reduced tail-end inspection

Slab inspection

Slab producers, gain reliable 2 or 4 sided surface defect recognition even under the harsh conditions between de-scaling devices and the first mill stand.

- Reliable recognition of relevant defects very early in the process before rolling
- Savings in production time, effort and material

3D slab inspection - combined visible light and infrared channel

Unique system feature: by combining a white light camera and a standard camera equipped with special infra-red-passing-filter, the same section of the slab surface can be observed with two pairs of eyes.

- Defect recognition made possible with infra-red channel
- Significant improvement in crack detection and classification
- Reduction of false alarm rate, even on heavy structured material



Plate Inspection

100% top and bottom side inspection for each hot and cold plate assures the required surface quality. Based on reliable defect recognition, localization and reporting is available for each plate to help in the event of customer claims.

- In-line surface quality inspection for plate mills ensures required quality optimization of additional processes like trimming distance or defect related grinding
- Efficient defect evaluation for optimum repair

Pickling, cold rolling and pickle-tandem cold rolling

Leading inspection system for pickled and cold rolled strip. Powerful solution based on inspection for pickled and cold rolled strip, suitable for applications like sulfuric and hydrochloric pickle lines, tandem or reversing cold mills and hot temper mills.

- Tandem warning to avoid coil breaks
- Extremely compact and robust
- Very fast commissioning, line integration and system ramp-up

Bright annealing and electrolytic galvanizing lines

Extremely small topological defects detectable on clean surfaces using advanced single direct light inspection solution.

- Can be used on all materials such as: reflectors, plated material, coated and colored paint
- Reliable detection and classification by using sophisticated, state-of-the-art line scan cameras

Annealing, skin pass mill, galvanizing, tinning, color coating

Inspection systems for harsh production environments to provide reliable, comprehensive information about all relevant critical surface defects. The highlight: a unique Dual Sensor™ configuration which provides a complete, stable detection of very different types of critical surface defects.

- Unique combination of line scan and matrix cameras for best performance
- Direct illumination to enhance topographic surface defects
- Diffuse illumination to allow detection of low contrast defects

Recoiling

Cost effective, compact 100% surface inspection systems equipped with a complete set of tools for process automation and optimization. Advantage: Diffuse IR illumination for optimum contrast and detection of all surface defects.

- Reliable and broad detection of all surface defects
- Extremely robust, universally applicable
- Fastest commissioning, line integration and system ramp-up



Surface **Quality** Control & Management

Targeted strip stoppage on recoiling, continuous annealing and colour painting lines

This tool is used for the analysis of inspection results and strip stopping at the exact position of severe defects for verification. Being able to stop the line, enables the operator to examine the defect and to take countermeasures, if necessary.

Defect marking for continuous annealing lines

When coil repair is not the ideal solution, strip marking identifies drop-out sections. The rule-based software includes interactive review terminals and direct control of markers. The result: Maximize material usage by marking defective parts on high quality steel, such as in automotive manufacturing

Automatic sheet sorting for cut-to-length / slitting lines

Rule-based software to reduce customer claims by analyzing inspection results for critical defect conditions, including direct control of sorters.

Live view for e.g. hot strip mills

The "live view" tool allows a review of the entire strip surface at any time, even for defect-free sections. It presents the entire strip surface side-by-side to the "normal" inspection screen. The advantage: outstanding quality control

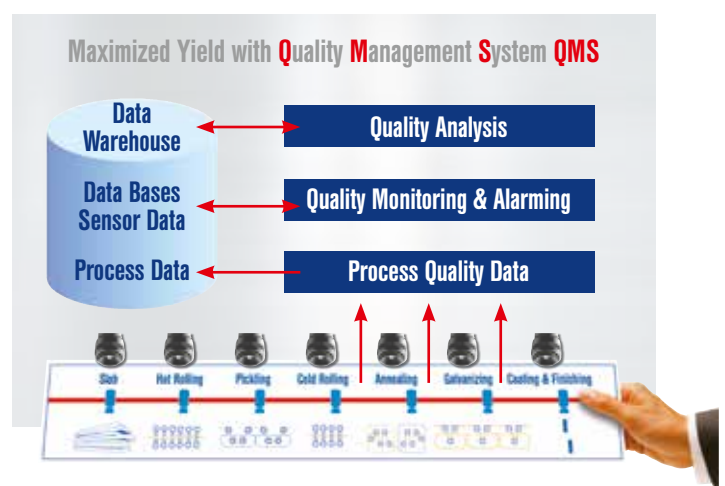
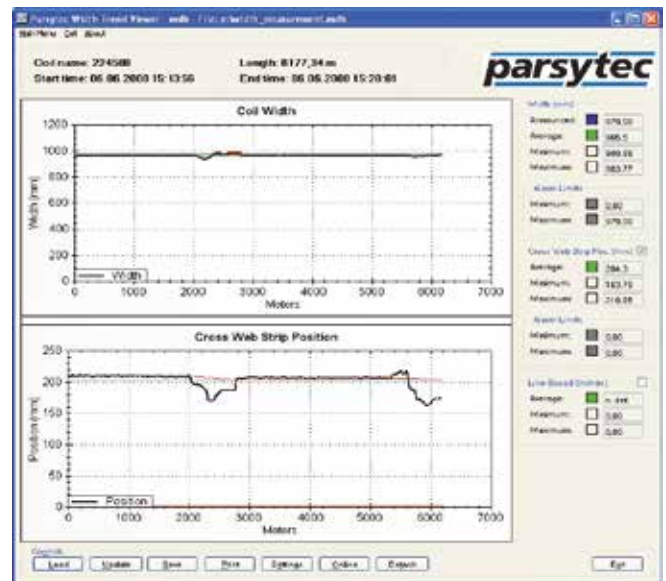
- Full width imaging in high definition quality provides easy estimation of the process status
- Analyze suspicious strip areas easily with the help of zoom and pan functionalities

But that is not all – Quality becomes plannable!

To get more out of production and make economic decisions easier, the **Quality Management System QMS** based on ⁵PROMI (**E**nterprise **P**ROduction **M**anagement **I**ntelligence) architecture encompasses a company-wide umbrella for production, planning and quality management. QMS leads to significant process optimization and optimal production planning by:

- Collection & processing of all quality relevant actual & historic production data, customer requirements & enterprise target data
- Monitoring of this data, comparing against internal & external tolerances, alarming in case of transgression & support release decisions
- Calculating of statistics, trends & correlations out of the quality data to recognize

QMS for highest productivity and maximized yield.



EXPERTS – Sustainable Decisions Made Easy

All information is utilized – To make a decision, the modules access all the available production-relevant data of the product (surface, thickness, width, flatness, etc.) via standardized quality databases. The same applies to the order, resource and planning data, as well as information about material logistics and personnel planning from the MES and ERP systems. The EXPERT 5i modules analyze and weigh all of this information according to specific criteria and generate knowledge based suggestions for the decision makers.

CoilRelease provides a quality analysis of the coils and issues a release suggestion for the next process or for the end customer.

CoilReassignment reassigns blocked material to different customer orders with matching requirements, thereby ensuring improved material utilization and higher profit.

ProcessAnalysis provides a visual correlation of process parameters with the resulting surface quality, offering concrete analysis of the cause of the defects. Process problems can then be quickly identified.

CoilPreview shows defects from one or several previous production processes, issues warnings and reduces processing defective material, repairs and downtime. The throughput is optimized.

DefectTracking isolates the origin and cause of defects and tracks the defects through the entire production process. Defect causes are quickly resolved, reducing scrap while optimizing repair decisions.

DrossMonitor warns of increased density of dross defects. Result: Process optimization in the galvanization area and avoidance of inferior quality.

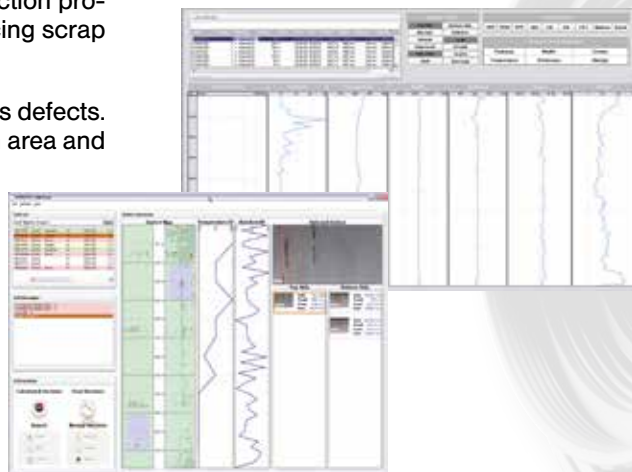
CoilRepair evaluates the quality of repair measures that have been taken and frequently prevents the downgrading of coils. The advantage: Improved material utilization and higher profit.

DefectTrend calculates the defect densities of the last coils and displays trends graphically. Alarms on trends allow to react more quickly to eliminate defective product quality.

PickleProcessTuning generates suggestions for an optimal pickling speed, provides a visualization of the degree of scaling and the temperature of the coil from the previous hot rolling process, thereby optimizing the throughput while reducing overpickling and residual scale.

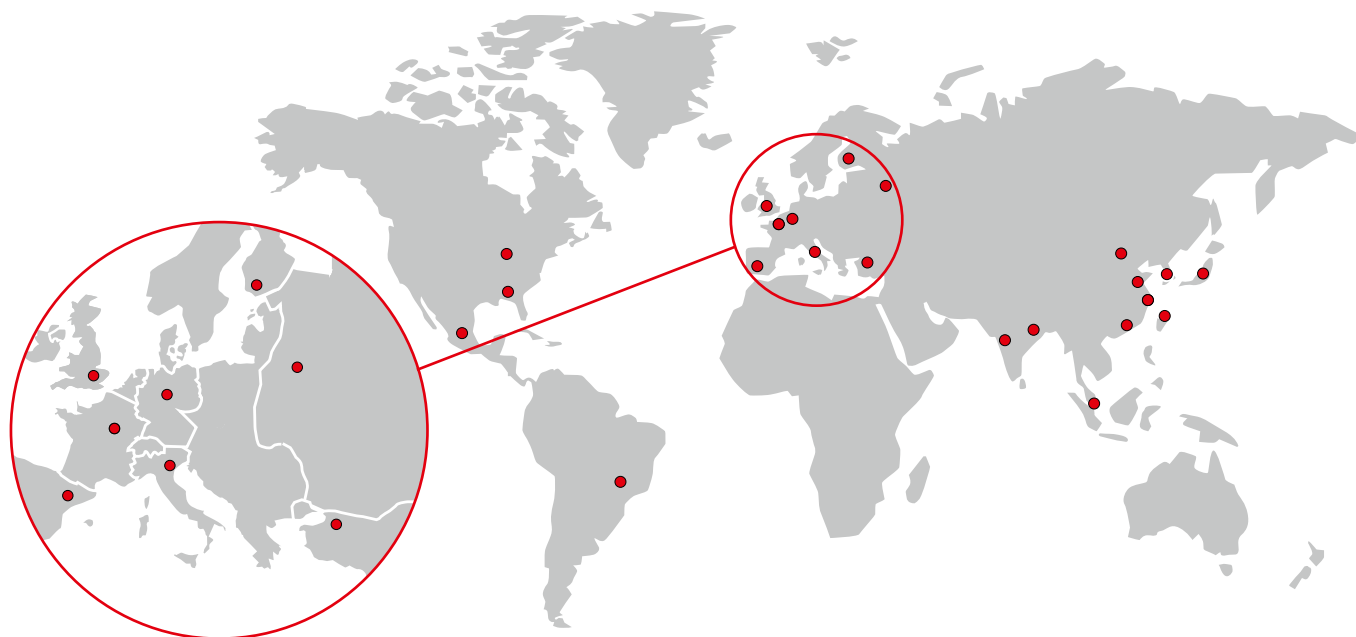
SlittingOptimization uses the surface quality data and flexible quality rules to optimize the slitting plan to achieve the highest yield.

TandemProtection alerts the mill operator of specific defects (defect image, location and type) that could cause a coil break and damage to the cold rolling mill and makes suggestions to avoid this type of serious process incident.



EXPERT ⁵ⁱ	Slab	Hot Rolling	Pickling	Tandem	CAL	CGL	EGL	Tinning	Finishing
SlabAnalysis	.								
CoilRelease		.	.	.	.	.	.	.	.
CoilReassignment	.	.	.		.	.	.	.	
PlateAnalysis		.							
ProcessAnalysis	.	.	.		.	.	.	.	
CoilPreview			.	.	.	.	.	.	.
DefectTracking		.	.	.	.	.	.	.	
DrossMonitor						.			
CoilRepair			.		.	.	.	.	.
DefectTrend	.	.	.	.	.	.	.	.	.
RollMonitor		.		.					
PickleProcessTuning			.						
SlittingOptimization									.
TandemProtection			.	.					

Innovations for Automatic Surface Inspection



Your competent partner

A business relationship with the ISRA VISION group is the beginning of a long term partnership.

Our clients benefit from the experience of our highly qualified team of experts, who work with them to design and implement solutions for the quality inspection applications of the future.

The ISRA VISION group is a global enterprise that guarantees its customers excellence in every aspect: from consulting, service, and confidentiality, to complete solutions and worldwide support.

- We can make your business more competitive and productive
- We view ourselves as a partner and supplier of application oriented standard systems for selected industrial sectors

Challenge us.

**24/7
Support & Service**

On the safe side ... with ISRA **VISION** PARSYTEC

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