



SIAS DeepLearning

Increase the range of your
Surface Inspection System

The SIAS DeepLearning solution is made for you!



Your business is to manufacture continuously, with hot or cold rolling, process steel sheet (raw, rolled, galvanized or painted) for the dedicated markets automotive industry, construction, appliances, packaging and other industries.

To meet the different and high quality requirements of your customers in the automotive, construction, household appliances... who will have to shape the steel strip you deliver to them, you want to:

- Guarantee quality by being sure of the results you advertise
- Optimally control and reduce your steel production costs
- As well as deciding on the level of quality of steel coils produced with as few coils as possible to downgrade or scrap

To do this, you need to control in real time the tape that scrolls on your manufacturing line, to look, to qualify the surface finish of the belt and to detect the slightest visible surface defect on the finished product.

You need a reliable solution that secures your process and helps you make the right decision at the right time:

- Clecim presents an innovative surface inspection solution that you can implement in a new process line or adapt to an existing process line: Continuous Galvanizing Line (CGL), Continuous Annealing Line (CAL), Continuous Pickling Line (CPL), Hot Strip Mills (HSM), Endless Strip Production (ESP)...

SURFACE INSPECTION TO CONTROL THE QUALITY OF THE MANUFACTURED PRODUCT

A surface inspection system is essentially a use of machine vision to give a computer a view of what is happening on a steel strip processing line: the absence or presence of surface defects. This allows control over 100% of the manufactured products, to improve repeatability and to increase productivity.

An operator watches the entire width of the strip that moves at high speed by at high speed and tries to see the defects. It is a 100% manual task, tiring, tedious, inaccurate, not very fast and without any guarantee of satisfactory results.

Replacing the human observer with a machine with the ability to see, automates control tasks and increases performance, reliability, quality, traceability and safety



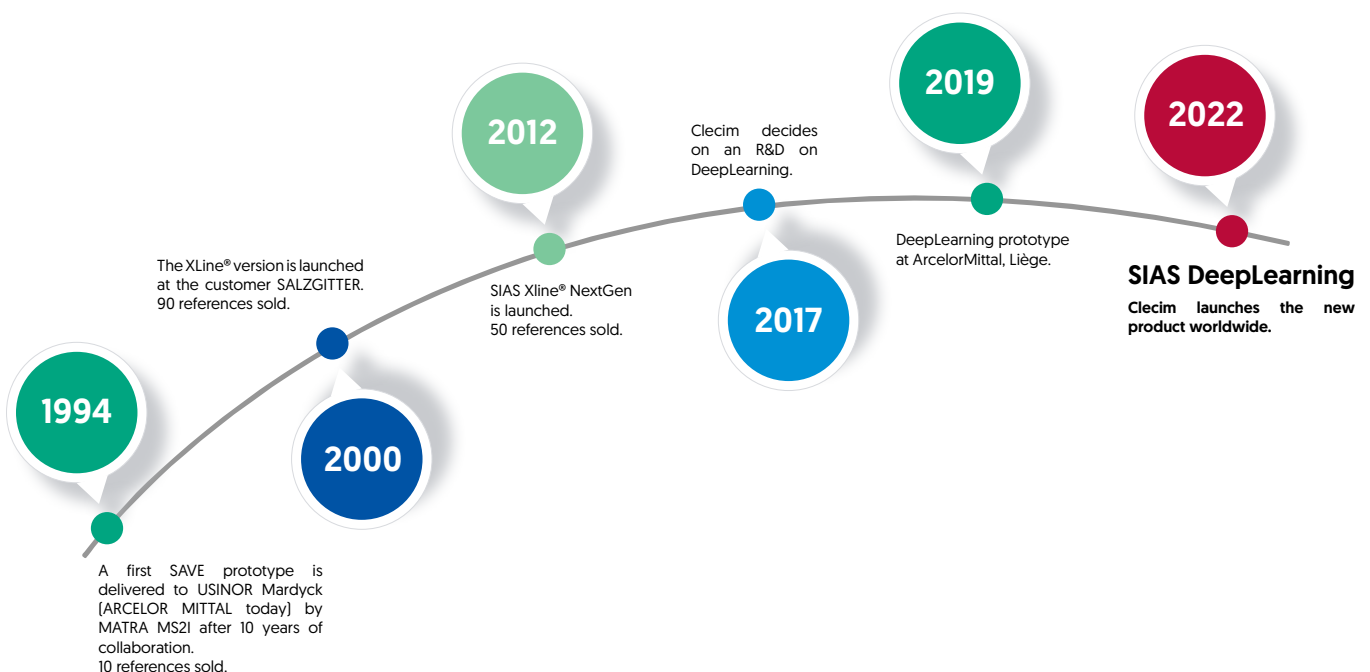
Why would you trust Clecim?

FOR ITS KNOW-HOW RECOGNIZED FOR 30 YEARS

Clecim's technical experts have been developing know-how for more than 30 years, and have been offering the world's steel manufacturing industry an automated, proven and customized solution that can be easily installed on a process line or on a rolling mill to watch the steel strip run by; detect surface defects, analyze them, classify them and deliver an analysis report.

FOR ITS WILL TO INNOVATE CONTINUOUSLY

Since the SAVE prototype in 1994, the X-Line® solutions in the 2000s and SIAS X-Line® Next Gen in the 2010s, and more than 10 international patents filed, Clecim engineers have since 2017 developed a powerful technology based on Artificial Intelligence (AI): the new SIAS DeepLearning solution is the latest technological breakthrough now available. It enables unequalled performance to be achieved.



For the benefits that bring the SIAS solution.

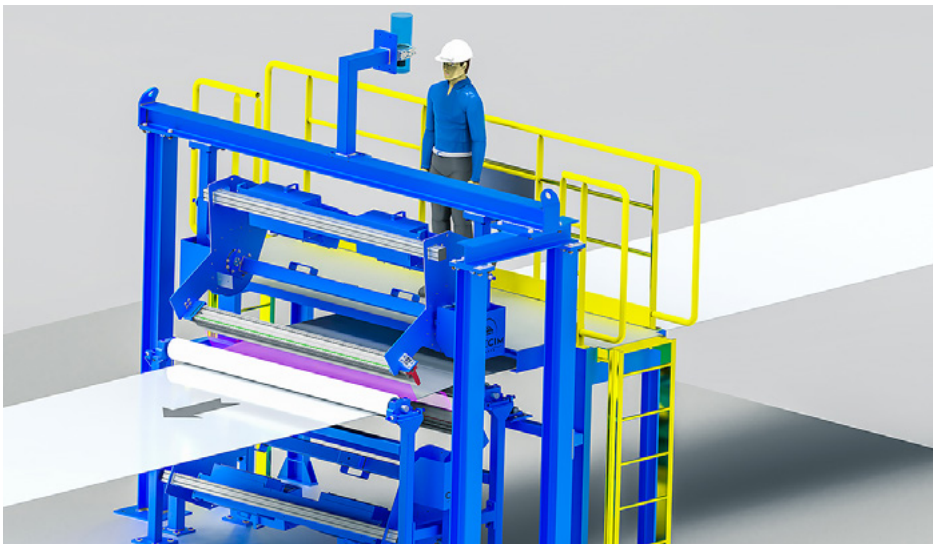
THE RIGHT INFORMATION AT THE RIGHT TIME

On the surface quality of the strip you deliver to your customers:

- Fast, simple and reliable
- A modular architecture
- A tailor-made solution in response to your specifications
- A classification tool that provides repeatability
- A solution that does not disrupt the production speed of your line



Standard mechanical mounting of the SIAS DeepLearning on rollers for both sides



Standard mechanical mounting of the SIAS DeepLearning on a tensioned strand for both sides

who are we?

For more than 100 years, Clecim has been a recognized expert and a world reference in flat steel manufacturing processes.

In order to provide its customers with the best possible service, Clecim integrates a Design office, significant machining, assembly and testing equipment on the same industrial site.

Clecim designs, manufactures, tests and supports the entire on-site installation and commissioning of technological equipment, turnkey steel production lines and associated services.

It relies on a Research and Innovation capacity as well as 4.0 expertise in Virtual Reality, Data management and Artificial Intelligence.

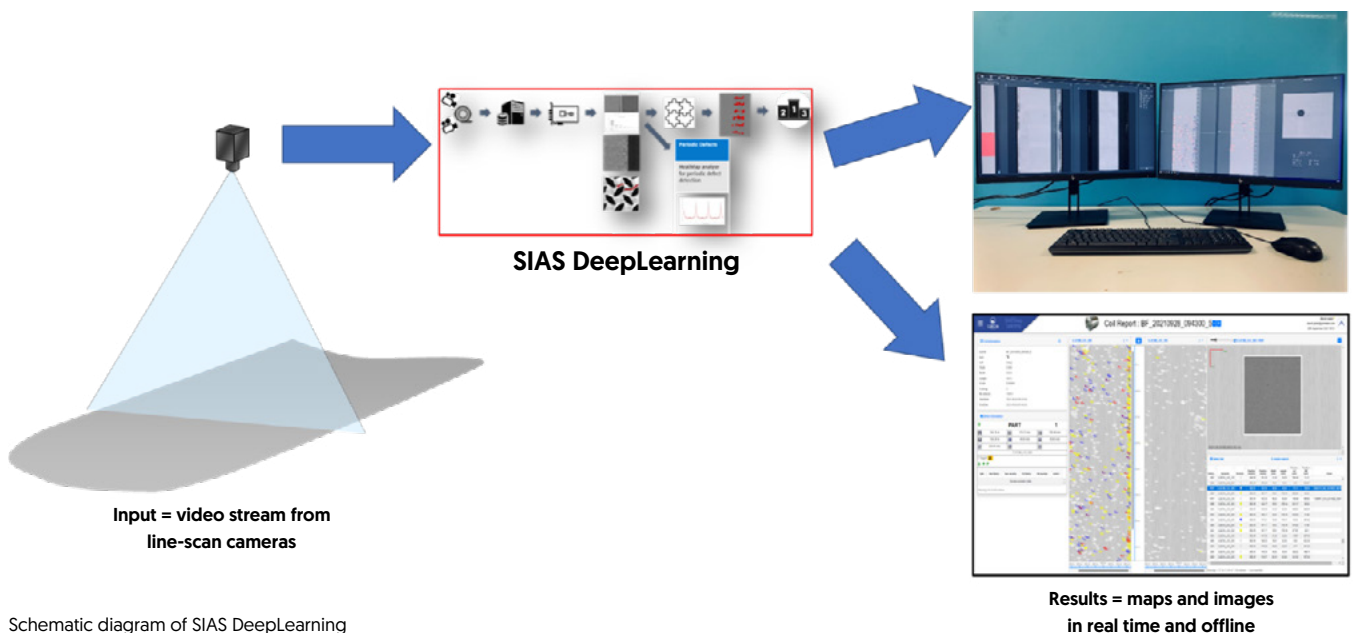
At Clecim, quality, security and confidentiality are paramount. The company is certified ISO 9001 v2015, ISO 14001 v2015, ISO 45001 and meets the requirements of OAE (Authorised Economic Operator) customs simplifications.

SIAS SOLUTION WHAT IS IT?

SIAS (Automated Surface Inspection System) consists of a hardware and software architecture developed by Clecim to process and analyze the data.

The incoming data is the strip produced by the line where the system is installed. To obtain a computer view of the strip, SIAS creates an infinite image of both sides of the strip. The image of each side can be made up of one or more images depending on the number of fields installed (light, dark, lateral, backlighting fields, etc.).

These images are processed to detect defects on the web, classify them, and create a map of these defects on each side of the web. SIAS displays this map and the defects in real time (for the production teams) and in delayed time (for quality teams).

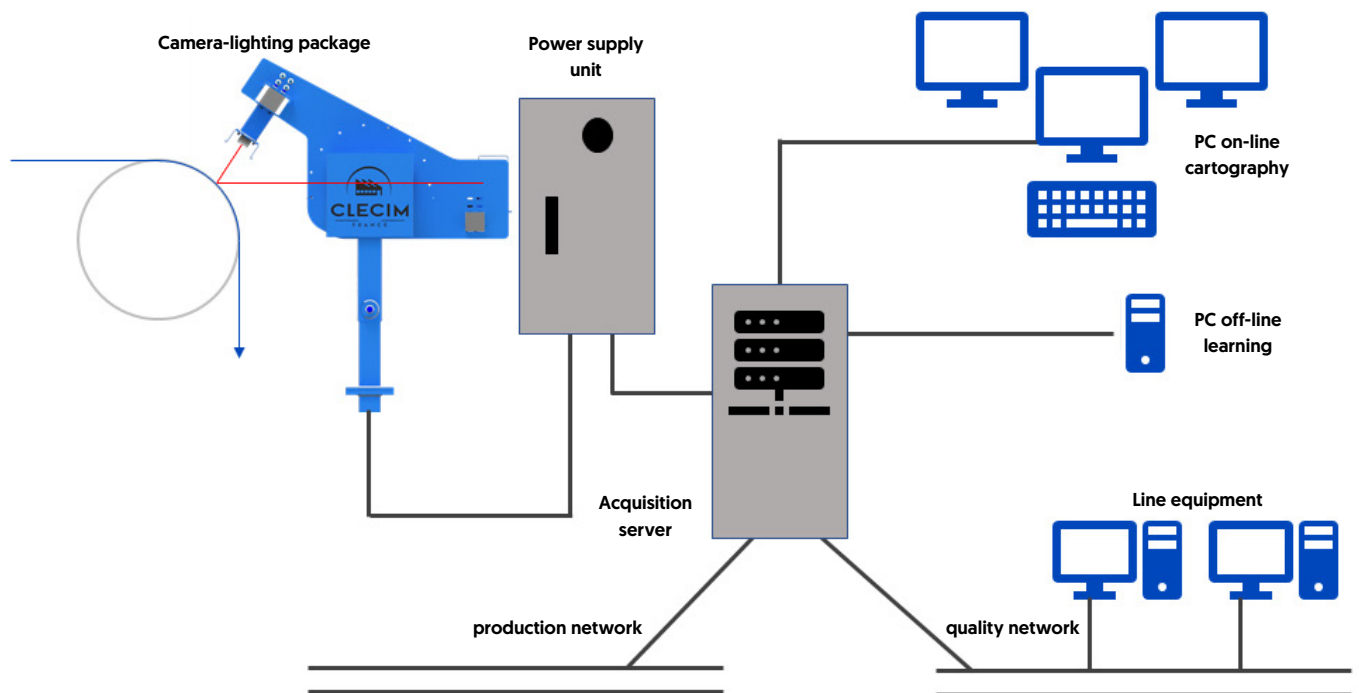


Schematic diagram of SIAS DeepLearning

Basic equipment.

Performance, reliability, ease of use, maintainability: high-end line-scan cameras, optics (lens) and illumination (light strips) that give a fine and precise image resolution of the web surface. Everything is integrated in a housing that guarantees the durability of the settings over time.

The IT part consists of a server, an on-line station for an operator with visualization of the fault map and an off-line learning station. All hardware is HP/HPE. Additional stations are possible according to your needs.



IT architecture of the SIAS DeepLearning

A customised solution for your your application, with options.

IMAGE PROCESSING

Our software specialists have selected the most efficient data acquisition and processing cards and interfaces to digitize, store and process the images that will eventually constitute your knowledge base.

A single server acquires all camera feeds, manages them, detects and classifies defects, sends and stores the results.

A solution that you can customize for your application/use with twenty software options at your disposal.

For learning, an interface and engine are provided through a web-based solution. This allows the fault knowledge base to be built so that SIAS DeepLearning knows the faults in the line.



User interface for learning and enriching the knowledge base

Clecim Value Proposition

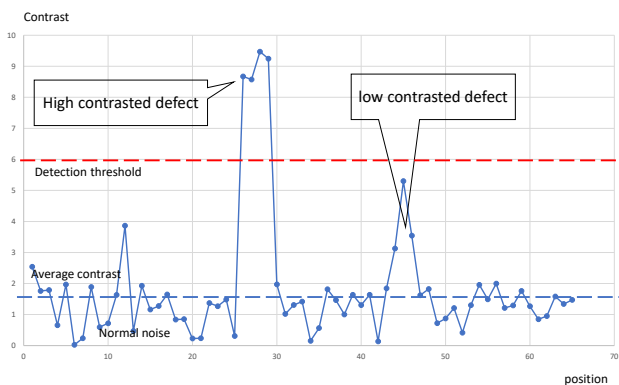
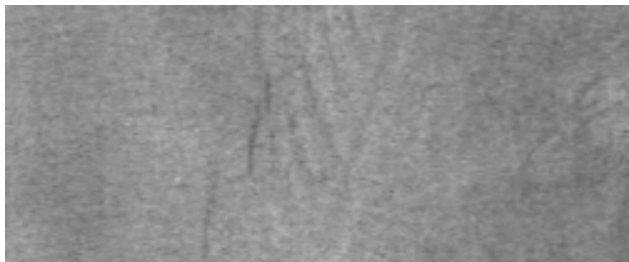
what do AI and DeepLearning bring to SIAS solution?

In just one step, SIAS DeepLearning allows you to detect and classify defects over the entire surface of the steel strip. You will be able to inspect up to a strip speed of 1400 m/ min.

Thanks to DeepLearning technology, the neural networks implemented by Clecim in its SIAS DeepLearning system will enable a technological leap forward in terms of detection, for :

DEFECTS WITH LOW CONTRAST

These are typically the defects held on uniform backgrounds. Typical examples are **low contrast** defects on automotive lines [galvanizing lines but also hot trains]. These defects are features, such as skinpass marks or

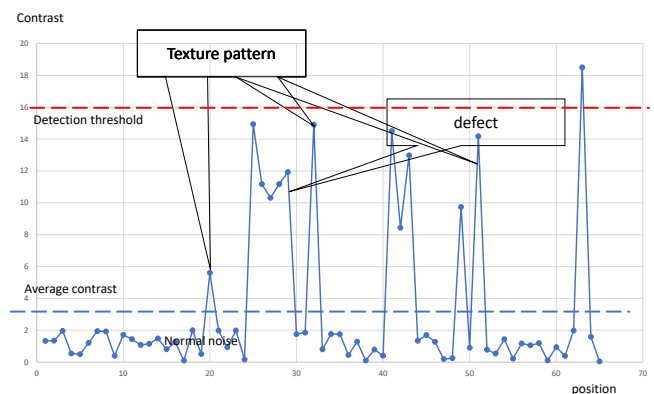
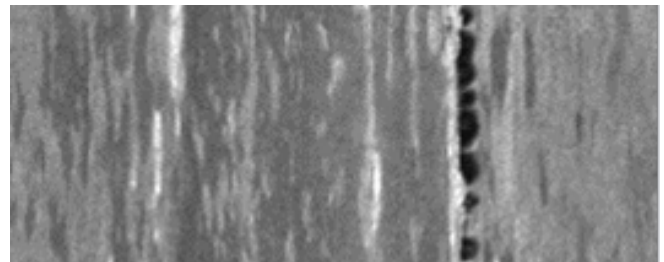


«worms». But any type of defect can be in this category as long as it is of lower intensity.

With a conventional system, these defects are not detected because at the scale of the defect, the defects do not have a higher contrast than the background.

DEFECTS DROWNED IN A STRONG TEXTURE

Typical products are those of a hot train such as those with high silicon content, the start and end of casting on ESPs [Endless Strip Production]. There are also galvanized products such as floorage which gives a crystal-like appearance.

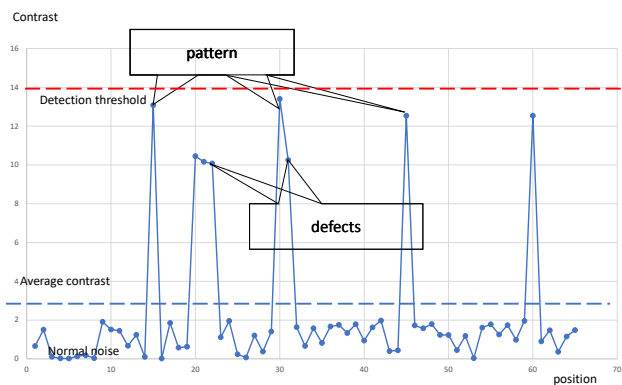


With a conventional system, these defects are not detected because at the pixel scale they do not have a higher contrast than the background, although they are much higher contrast than low contrast defects.

If we try to detect these defects with a traditional contrast method, we also detect all the features of the texture, which is not acceptable.

DEFECTS IN A PATTERN

The pattern printed on the bottom is regular, as intended by the process. The typical case is the treaded sheet metal on hot mills. Patterns can also be found on stainless steel sheets.

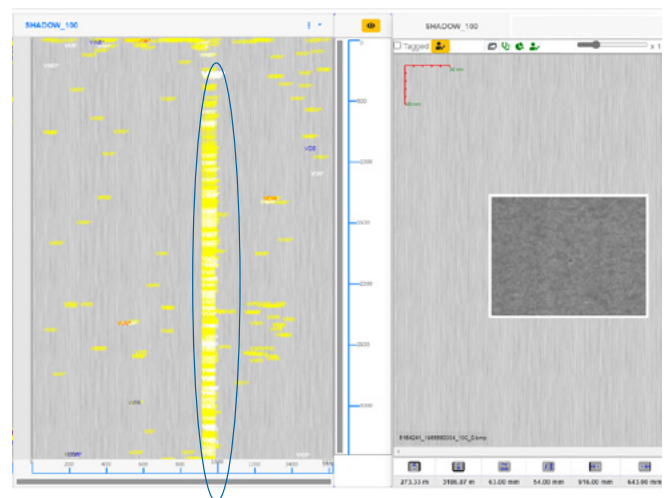


A conventional system cannot distinguish between contrast due to pattern and contrast due to a defect.

DEFECTS WITH PERIODIC FOOTPRINT

Coupled with at least one of these advances offered by SIAS DeepLearning, the periodic defect detection module now makes it possible to detect defects in the image that are barely detectable by the naked eye:

- By means of an advanced statistical analysis, the module locates the least information provided by the neural network.



Lifecycle management

BDA way of working.

As a partner, we support you all along the lifecycle of your equipment through our BDA way of working:



- **Before:** define improvements and optimization solutions through Consulting Services
- **During:** deliver on our commitments with premium quality equipment and services to enable our customers reaching their targets
- **After:** support the operations and maintenance activities with on-site assistance and spare parts

LIFECYCLE SERVICES

As a SIAS DeepLearning user, you have conflicting needs.

On the one hand, your performance is measured each quarter against short-term profitability expectations. On the other hand, you have to think on a totally different time scale compared with the capital market

Depending on the lifetime of your SIAS DeepLearning, you have to take 15 years or more into account. At the very least, that's 60 full quarters.

But thanks to our comprehensive expertise and integrated approach to solutions, you benefit both short-term and long-term from our lifecycle services.

In the short term: backed by our extensive experience with many reference plants, we provide you with the certainty of fast, dependable production start-up and shorter amortization periods..

In the long term: our master plan guarantees competitive performance for your plant and your SIAS DeepLearning in every phase of its lifecycle.

Whether we are providing technical support, optimizing maintenance, or making permanent plant improvements, we are always working to ensure the cost effective operation of your plant and products.

Thanks to our lifecycle supports organized in clusters [Europe, America and Asia], you will benefit from our worldwide presence.

OUR TEAM OF EXPERTS PROTECTS YOUR SIAS OR SIAS DEEPLARNING INVESTMENT WITH A DEDICATED SERVICES PORTFOLIO

- Supply and stock management of **SPARE PARTS** - ask for our yearly spare parts catalogue
- **Access to an annual maintenance contract with:**
 - **REMOTE ASSISTANCE or HOTLINE CONTRACT:** 98% of problems are solved with this service with a connection to your system. You have direct access to our best experts and can significantly reduce the cost of downtime and repairs to your equipment
 - **PREVENTIVE MAINTENANCE VISITS**, scheduled in agreement with you in agreement with your maintenance team to prevent or detect any loss of efficiency of your equipment
 - **ON-SITE CORRECTIVE INTERVENTION IN CASE OF EMERGENCY**, please call our customer satisfaction service to know the intervention time for France and Europe
 - Standard or customized **TRAINING** to increase the knowledge, skills and experience of your team. Your staff will be more familiar with your equipment and will be able to operate it to its full potential
 - Step by step **UPGRADE** of your SIAS equipment studied by our experts according to your budget and the specificity of your production site - ask for our SIAS Options catalogue

Excellence from experience

SIAS, more than 150 installations worldwide.



| EUROPE*

Aperam Châtelet - Aperam Genk - Aperam Gueugnon - Aperam Imphy - ArcelorMittal Avilés - ArcelorMittal Basse-Indre - ArcelorMittal Bremen - ArcelorMittal de Saint-Chély-d'Apcher - ArcelorMittal Desvres - ArcelorMittal Eisenhüttenstadt - ArcelorMittal Etxebarri - ArcelorMittal Florange - ArcelorMittal Fos Sur Mer - ArcelorMittal Gent - ArcelorMittal Liège - ArcelorMittal Montataire - ArcelorMittal Mouzon - ArcelorMittal Sagunto - ArcelorMittal Sestao - Arvedi - Liberty Steel Dudelange - Liberty Steel Liège - Salzgitter Flachstahl GmbH - TataSteel Europe IJmuiden - TKES Rasselstein - TKES Ugo Isbergues

| ASIA*

Baosteel/NSC Automotive Steel Sheets Co. - Borçelik - Erdemir - Fujian Desheng Iron & Steel - Handan Iron & Steel - HBIS - HYUNDAI HSM - Laiwu Iron & Steel - Maanshan Iron & Steel - NLMK - Rizhao Iron & Steel Co. Ltd. - TataSteel Jamshedpur - VAMA - Wisco

| NORTH AMERICA

AM/NS Calvert - ArcelorMittal Dofasco - ATI - Nucor Berkeley - Ternium Pesqueria

*SIAS DeepLearning installed and in progress

| SOUTH AMERICA

Aperam South America - ArcelorMittal Vega do sul

REFERENCE LINES WITH SIAS:

- Automotive exposed galvanizing line
- Galvanizing line for Industry
- Electrolytic galvanizing line
- Pickling Lines (coupled with tandem or not)
- Tandem Cold Mill
- Stainless Steel
- Electrical silicon steel
- Electrolytic tinning line
- Continuous Annealing Line
- Color Coating Line (combined or not)
- Hot Strip Mill
- Endless Strip Production
- Inspection line



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