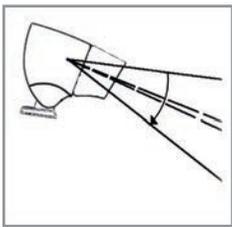


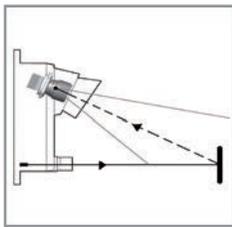
DELTA provides a wide range of high performance sensors and measuring systems for continuous casters, hot rolling mills, processing lines and other extreme condition applications.

With over 70 years of experience in the severe steel mill environment, DELTA has a deep understanding of the specific requirements of this industry and the know how to bring the latest technologies and to satisfy the most demanding applications.

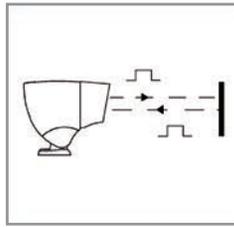
Technologies



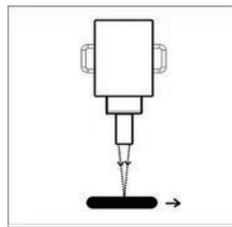
SCANNING



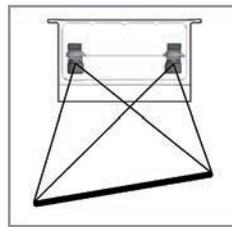
TRIANGULATION



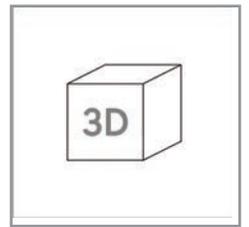
TIME OF FLIGHT



DOPPLER



STEREOSCOPY



3D VISION

The core technologies used at DELTA include: infrared scanning (Rota-Sonde) and fibre optic technology for detection and position control of hot products, laser triangulation (Trilas TL) and laser/LED time of flight (Dilas FT, VFT1) for distance and dimensions measurement, Doppler effect (Velas) for speed measurement, stereoscopic vision (DigiScan) for width and centerline measurement and 3D-Vision (StereoVision) for non-contact accurate measurement of hot products shape and dimensions.

Sensors

- Hot Metal Detectors
- Infrared Loop Scanners
- Optical / Laser Barriers
- Proximity Switches
- Laser Measuring Sensors

Measurement Gauges

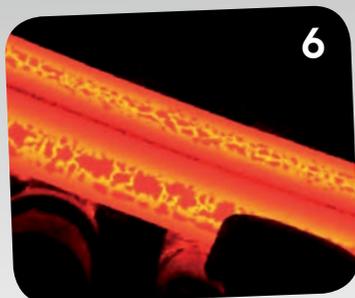
- Stereoscopic Width Gauge
- 3D Vision

These technologies are optimized for extreme conditions and particularly for non-contact detection and measurement of products at very high temperature.

Industrial communication 'Industry 4.0' : DELTA measuring sensors and gauges are available with different communication protocols: Modbus-TCP, EtherNet/IP, Profibus-DP, Profinet...

Typical Applications

Continuous Caster



Bloom / Billet Reheat Furnace



Long Product Rolling Mill



Application oriented

DELTA has the expert ability to determine the appropriate sensor to meet the unique demands within the steel industry.

DELTA's design engineers expand sensors capabilities and features to keep pace with the ever changing modern industrial processes.

Accuracy and Reliability

DELTA has invested years of experience creating reliable and accurate sensors that stand the toughest conditions created by modern steel production. The scanning infrared and laser sensors from DELTA are the reference in the metal industry for detection, positioning of the edges and dimension measurement of product at very high speed and at temperature from cold to 1350 °C.

Each sensor consists of waterproof cast aluminium body and electronics that exceed most stringent specifications. Many sensors utilize self diagnostics with tests and alarms that insure proper operation and provide the necessary inputs essential in modern processing.

The design is made in order to propose a repairable sensor. All spare parts can be replaced by end user to increase lifetime of sensor.



DELTA, the Reference for Sensors and Measuring Gauges for the Steel Industry

Slab Reheat Furnace



Hot Strip Mill & Plate Mill



Measurement Gauges



Cold Rolling Mill



Sensors for steel mill automation The end result of over 70 years of experience !

DELTA's state-of-the-art features include:

- Special designs to withstand severe steel mill environmental conditions
- Rugged construction with cast metal housing, water cooling and air purging
- Sensors designed for easy installation, maintenance or replacement
- Innovations such as back panel display, laser line or cross, draw latch, flip cover... allow simple operation and maintenance.
- DELTA can provide genuine spare parts to let users repair their sensors.
- Industry 4.0: digital communication protocols, web browser interfaces, wifi...



Hot Metal Detectors (HMD)

The scanning optical system, in association with state-of-the-art infrared photocell technology, is the optimal solution for accurate, fast and reliable detection of product, whatever its size and its temperature and even in presence of water, steam, dust or scale. The latest generation of Rota-Sonde DC HMD integrates new features: bargraph with level of signal and threshold setting, laser line to show the detection area, an improved photocell to increase sensitivity... It is particularly well adapted to applications where the change of the process results in a significant variation of the temperature of the product or a variation of its emissivity factor. Static HMD, with or without fiber optic, are available as alternative, depending on conditions and process data.

Infrared Loop Scanners

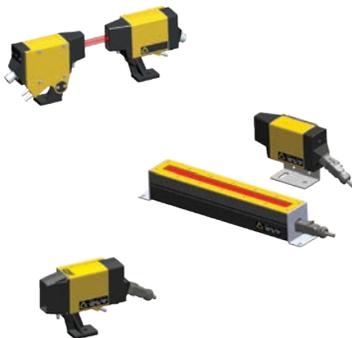
The Infrared Loop Scanner Rota-Sonde TS optically scans the field to be controlled and does not need any optical adjustment. It accurately measures the size of the loop on wire, rod and profile mills, even for special metals, and in the presence of steam and fumes. It can also help for centering purpose in strip or plate mills. The latest models are equipped with bargraph, laser line, mechanical improvements, adjustable scanning angle, improved sensitivity and dynamics... for easier setup and maintenance.



Optical / Laser Barriers

DELTA offers heavy duty Optical barriers, designed for the harsh environment of steel mill, including air purging and water cooling. This wide range of sensor includes:

- Long range retro-reflective and through-beam laser or LED optical barriers with high operating margin. It includes high temperature glass reflector working up to 400°C.
- The VLP21/VRH is specially designed for the detection inside reheat furnace.
- Diffuse reflective barrier VFT1, based on an innovative LED time of flight technology, can ensure reliable detection of product with very dark surface or very hot products up to 1250 °C, without reflector.
- Weld Hole Detectors are designed for the detection of weld hole in Cold Rolling Mill & Processing Lines. Its wide field of view permits a reliable detection with a wide variation in the position of the hole.
- Light grid sensors can detect any product, cold or hot, in the field of view between receiver and linear emitter.



Proximity Switches

These robust sensors are designed for the difficult conditions of the steel industry. The High Temperature Inductive Proximity Switches IH can work in ambient temperatures up to 180 °C. The MHM Magnetic Proximity Switches detect a variation of the magnetic field and are used in conjunction with a magnet. They are used for position control of mechanics in high ambient temperature.



Laser Distance Measuring Sensors

The Trilas TL series and Dilas FT series are digital, high resolution, non-contact laser distance meter sensors. The target may be hot (up to 1300 °C) or cold, stationary or moving.

By combining several sensors, dimensional measurements and shape readings can be achieved. They deliver directly distance measurement on standard analogue outputs, and also on industrial field bus or digital communication protocols. Typical applications include width and length measurement on continuous caster; slab, bloom, billet positioning; measurement on forging machine; bloom, billet length; diameter measurement; strip loop control.



Doppler Speed Measuring Sensors

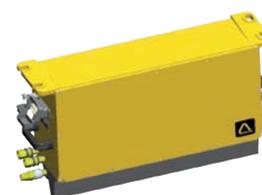
The Velas DL directly replaces traditional, high-maintenance, problematic contact wheel and rollers type devices, by accurate «state-of-the-art» laser Doppler technology. The Velas DL is easy to install and use. It delivers speed and length measurement, on standard pulse outputs, and also on industrial field bus.



Measurement Gauges

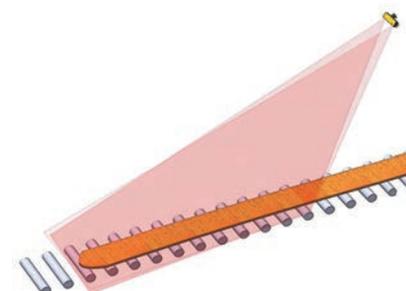
Stereoscopic Width Gauge

The DigiScan XD4100 is designed for very high accuracy and reliability in the extreme conditions of hot mills. Two high resolution and high speed digital cameras are mounted on an optical bed for stereoscopic measurement of width and centerline. Advanced filtering and algorithms make the sensor insensitive to the hot rolling mill environment (water, variation of temperature of the product edges...). Possible options: thermal profile and CropView. Compact and robust, with sealed aluminium housing, easy to install and maintain, available with frontlight or backlight, the gauge is delivered calibrated ready to install. The system includes verification fixture for automatic accuracy confirmation. For cold mills & processing lines, the DigiScan XD500 is very innovative and easy to install and use.

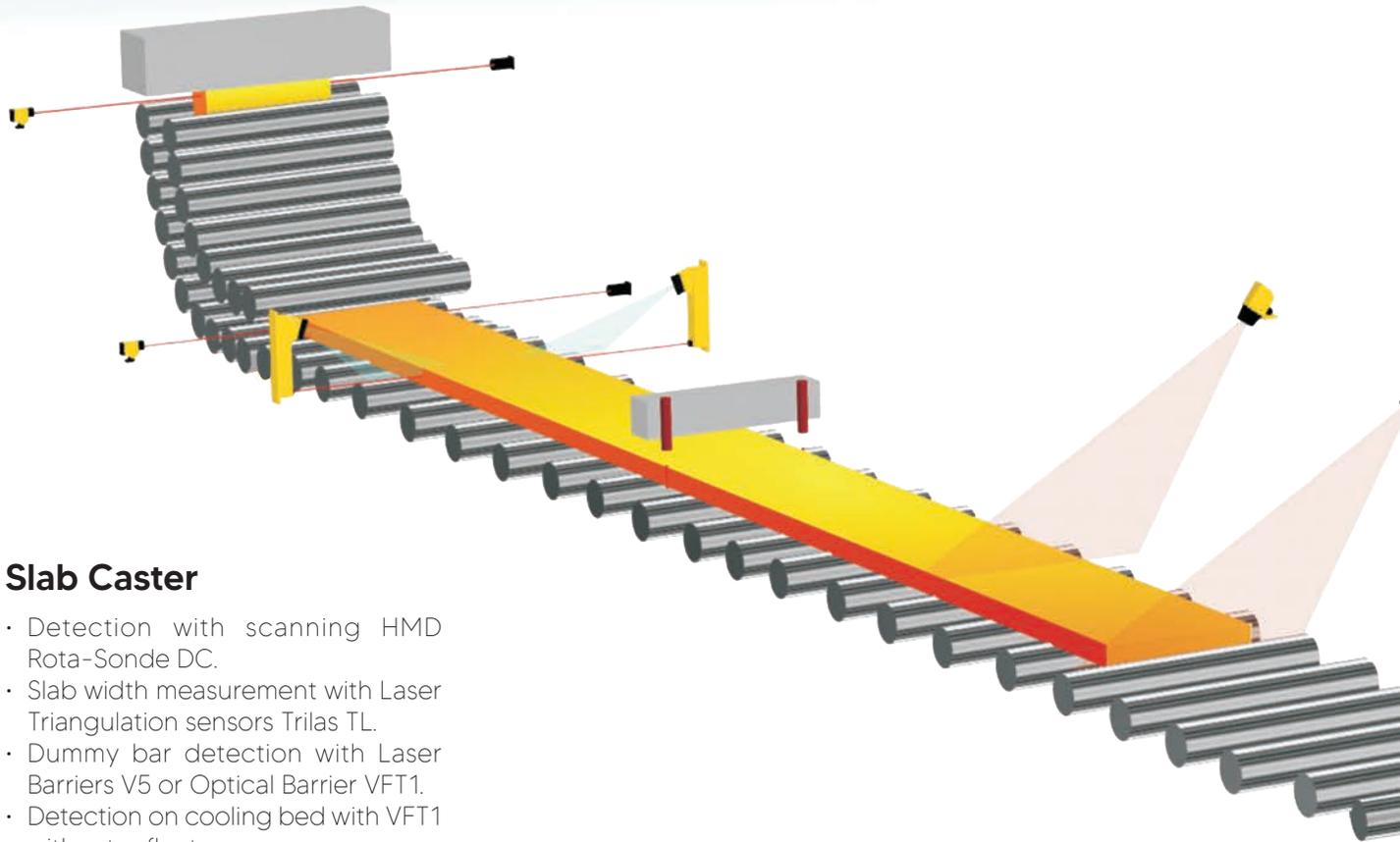


3D Vision

The StereoVision SV6000 integrates 2 cameras capturing images in a fraction of second, making it insensitive to speed variation of the bar. Advance image analysis software calculates the position of every pixel in the 3 dimensions. This system is thus able to measure width, camber, head and tail shape on field up to 8m...

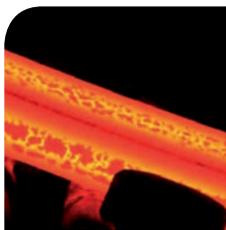


CONTINUOUS CASTER



Slab Caster

- Detection with scanning HMD Rota-Sonde DC.
- Slab width measurement with Laser Triangulation sensors Trilas TL.
- Dummy bar detection with Laser Barriers V5 or Optical Barrier VFT1.
- Detection on cooling bed with VFT1 without reflector.



In order to deliver the right products to the hot rolling mills, it is important to measure the dimensions of slabs, billets or bloom produced in the continuous caster. DELTA has designed special laser sensors able to make non-contact measurement with high accuracy on hot products and to withstand the difficult environment of the continuous caster. Typical applications of DELTA sensors include the detection of the product at different locations such as before marking machine or deburring machine.



Key products



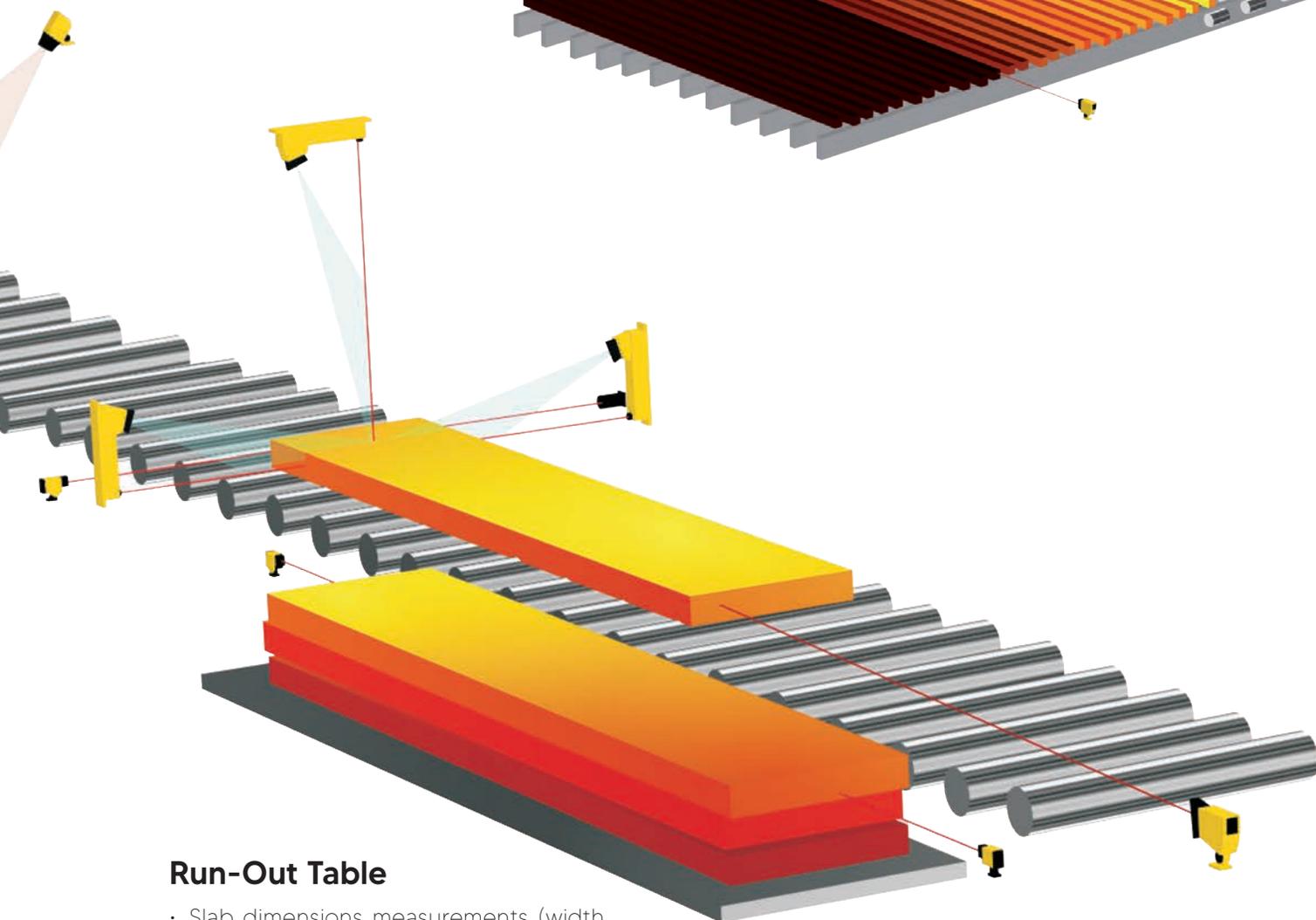
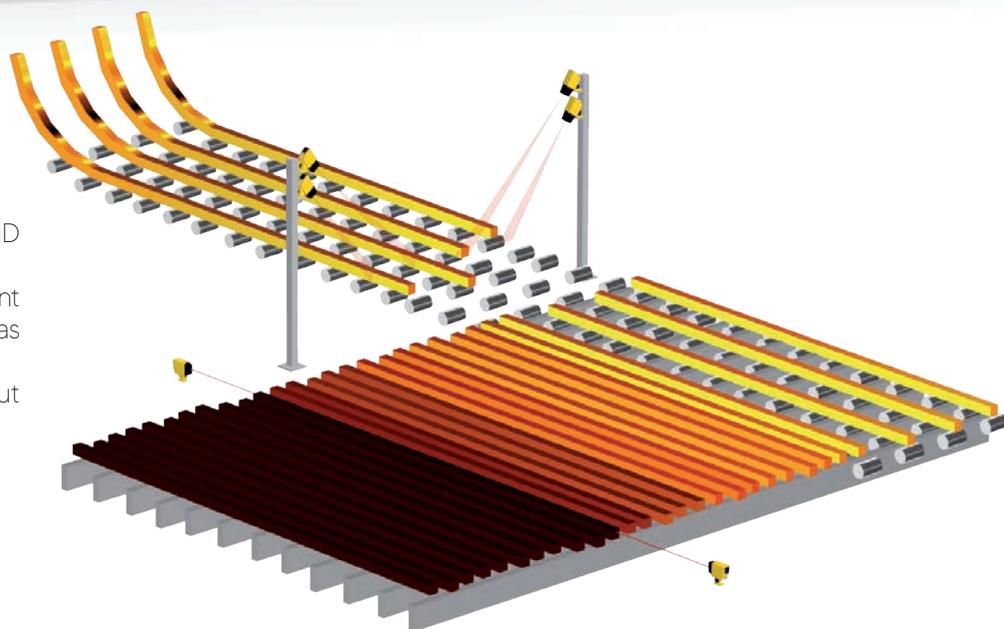
DC series

TL & FT series

V series

Bloom / Billet Caster

- Detection with scanning HMD Rota-Sonde DC.
- Bloom / Billet length measurement on the cooling bed with two Dilas FT sensors.
- Detection with VFT1 without reflector.



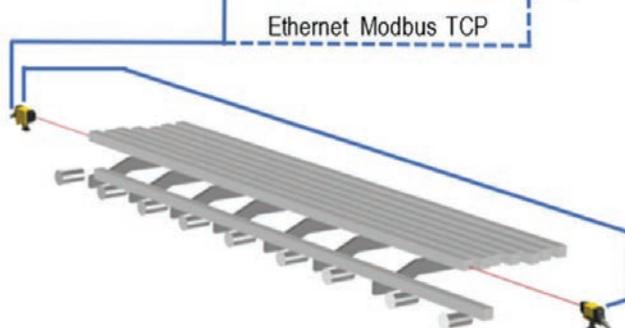
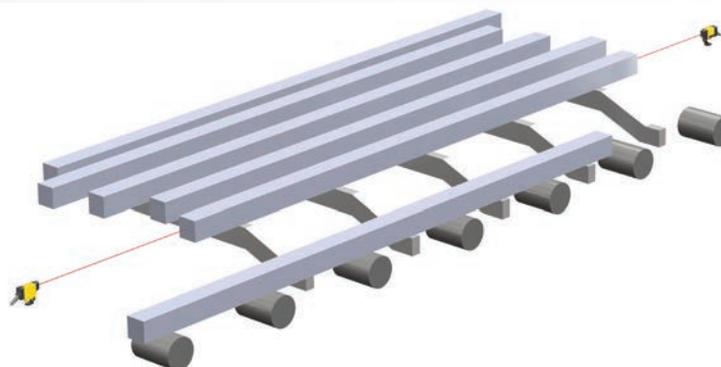
Run-Out Table

- Slab dimensions measurements (width length - thickness) on the run-out table just before the marking machine with laser triangulation sensors Trilas TL, time of flight Laser Sensor Dilas FT and Laser Barrier V5 or Optical Barrier VFT1.
- Control of the slab pile level with high power Optical Barrier VE/VR.

BLOOM / BILLET REHEAT FURNACE

Length measurement

- Length measurement with two Laser Sensors Dilas FT.
- Dimensions calculation with Dilas FT and MXP processing unit.



The charging operation is critical. It is important before moving the billet or bloom into the furnace to know the length and the position of the head and tail in order to avoid any damage.

On the discharging side, it is also important to detect the product and to know its position and eventually the skew.



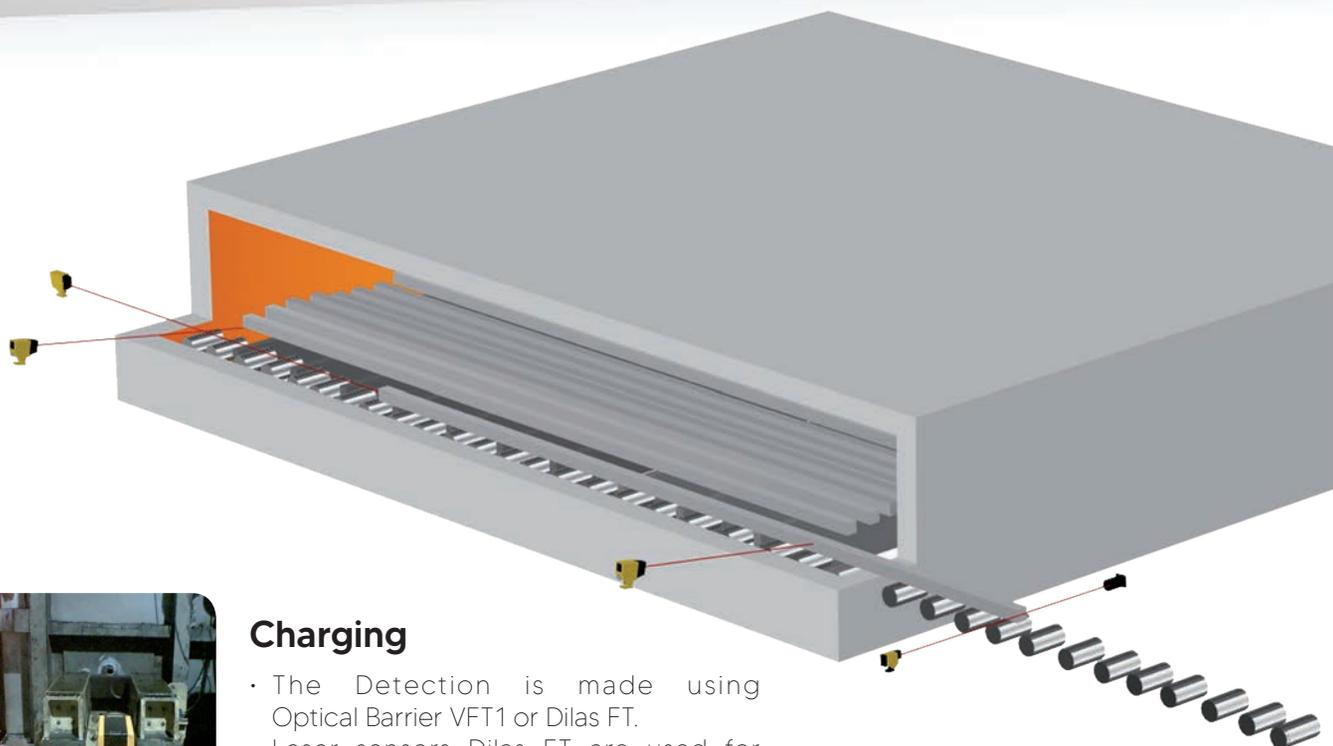
Key products



TL & FT series

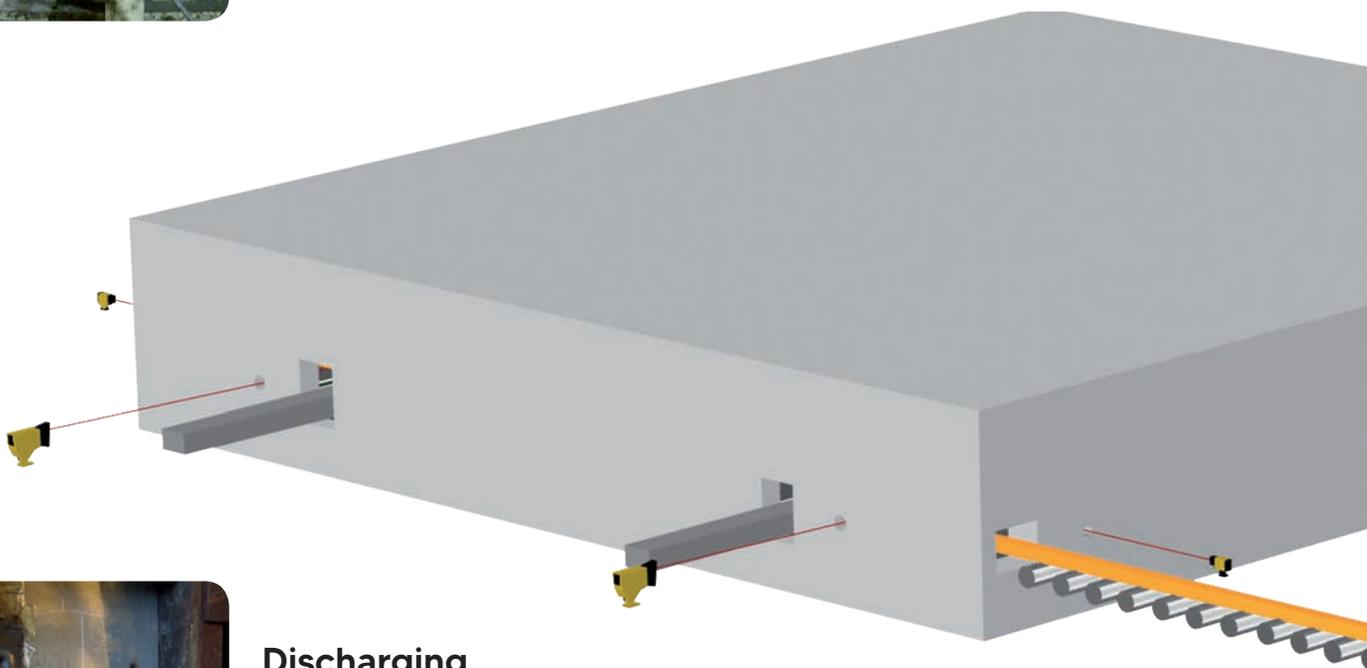
VLP21/VRH series

V series



Charging

- The Detection is made using Optical Barrier VFT1 or Dilas FT.
- Laser sensors Dilas FT are used for positioning and in combination with a Laser Barrier V5 or Optical Barrier VFT1 for length measurement.

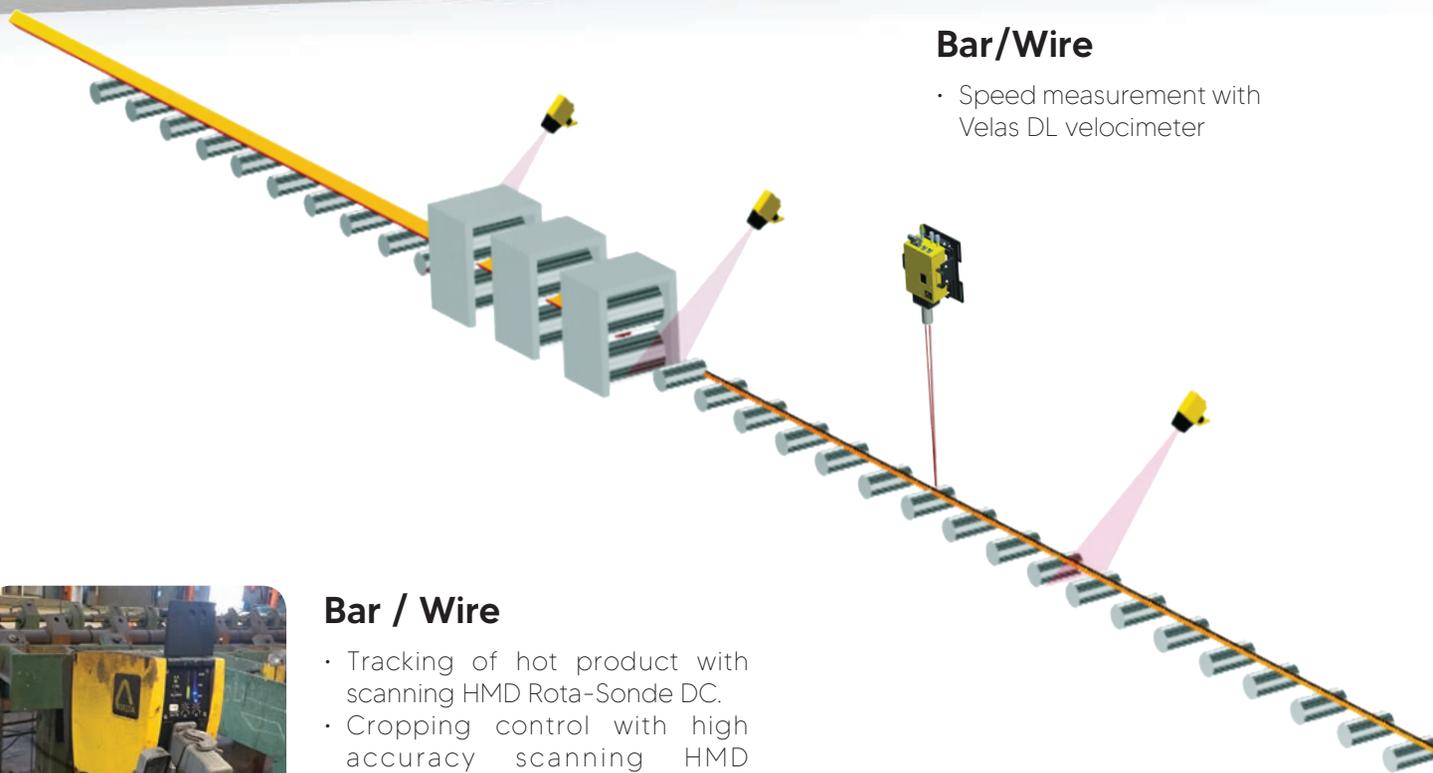


Discharging

- Detection of bloom / billet inside reheat furnace with high power Laser Barrier VLP21/VRH.
- Measurement of the position and skew of the billet / bloom with Laser Sensors Dilas FT4200.



LONG PRODUCT ROLLING MILL



Bar/Wire

- Speed measurement with Velas DL velocimeter



Bar / Wire

- Tracking of hot product with scanning HMD Rota-Sonde DC.
- Cropping control with high accuracy scanning HMD Rota-Sonde DC.
- Detection of a bar with the scanning HMD Rota-Sonde DC or Stato-Sonde Z50/Z56/Iris Z6500.



Hot Metal Detectors (HMD) are designed for tracking hot products at the different stages of the hot rolling process. In critical operation such as for the control of the shear (head/tail crop, or cut to length) it is important to rely on accurate sensors which will detect in less than 1 ms the head and tail, independently of the position, size or temperature of the bar. The use of the latest technology of infrared detector allows the detection of products as low as 180 °C, especially for locations like after water quenching.



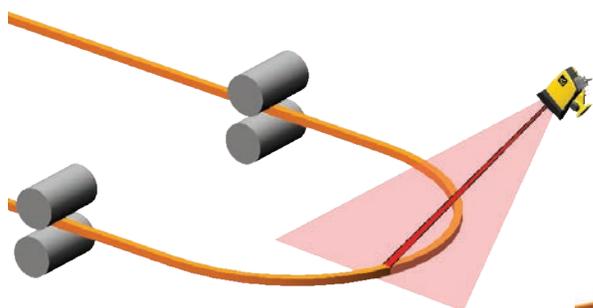
Key products



DC series

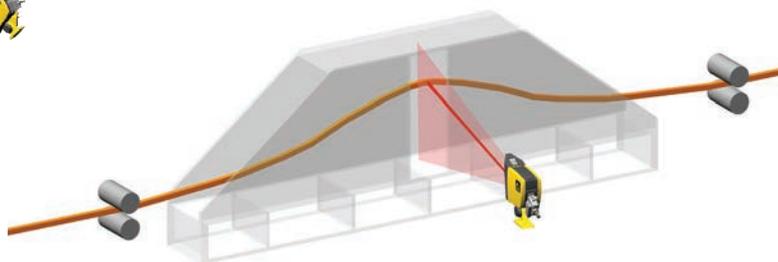
TS series

DL series



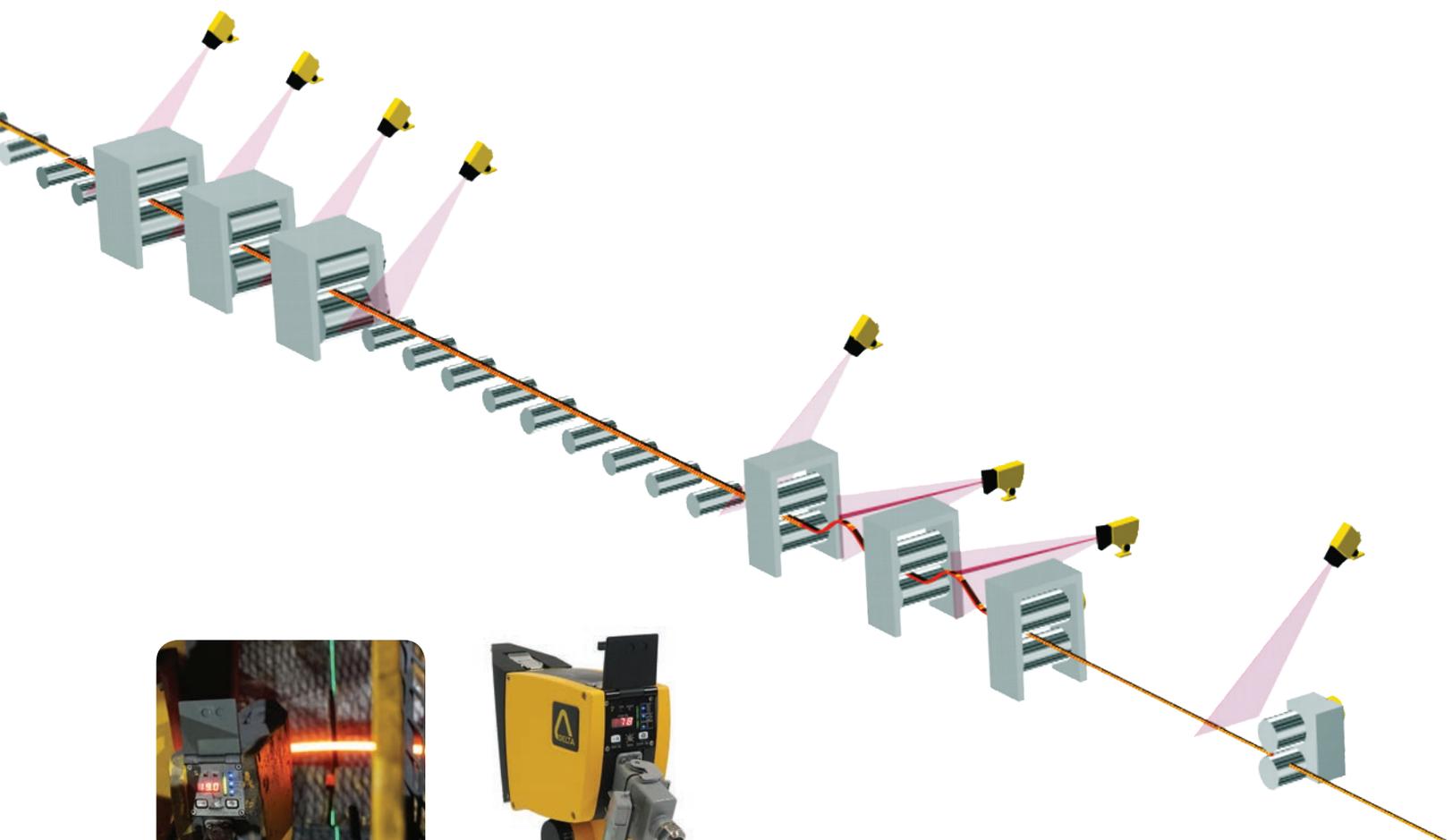
Horizontal loop

- Horizontal loop measurement with the Infrared Loop Scanner Rota-Sonde TS.



Vertical loop

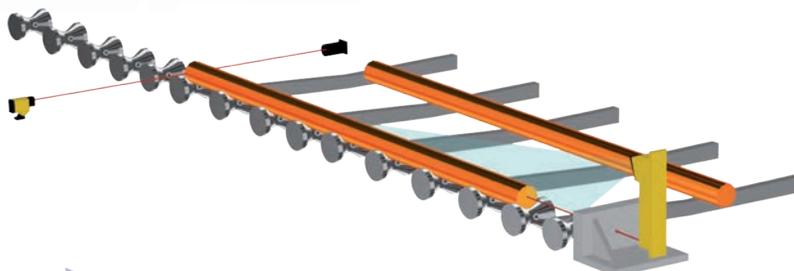
- Vertical loop measurement with the Infrared Loop Scanner Rota-Sonde TS.



LONG PRODUCT ROLLING MILL

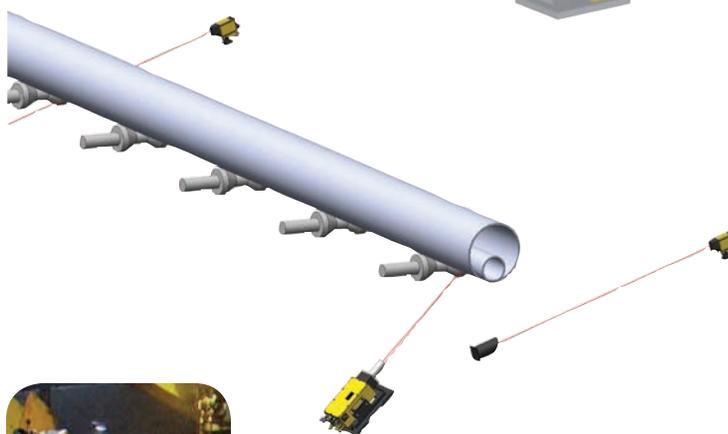
Length measurement

- On the fly length measurement with Laser Sensor Trilas TL and Laser Barrier V5 or Optical Barrier VFT1.



Tube

- On the fly length measurement
The Velas DL measures the speed of product and, by integration in the time, measures the length. For more accuracy, Laser Barrier V5 detects head and tail.



Tube

- Detection of the exact position of head/tail with Rota-Sonde DC4500-F equipped with special Flame Filter.



The optimization of hot rolling processes requires the use of accurate and reliable sensors for detection and measurement. DELTA has developed a range of non-contact sensors able to survive the extreme conditions of the steel mills environment: high ambient temperature, high infrared radiation level, dust and steam.



Key products



DC series

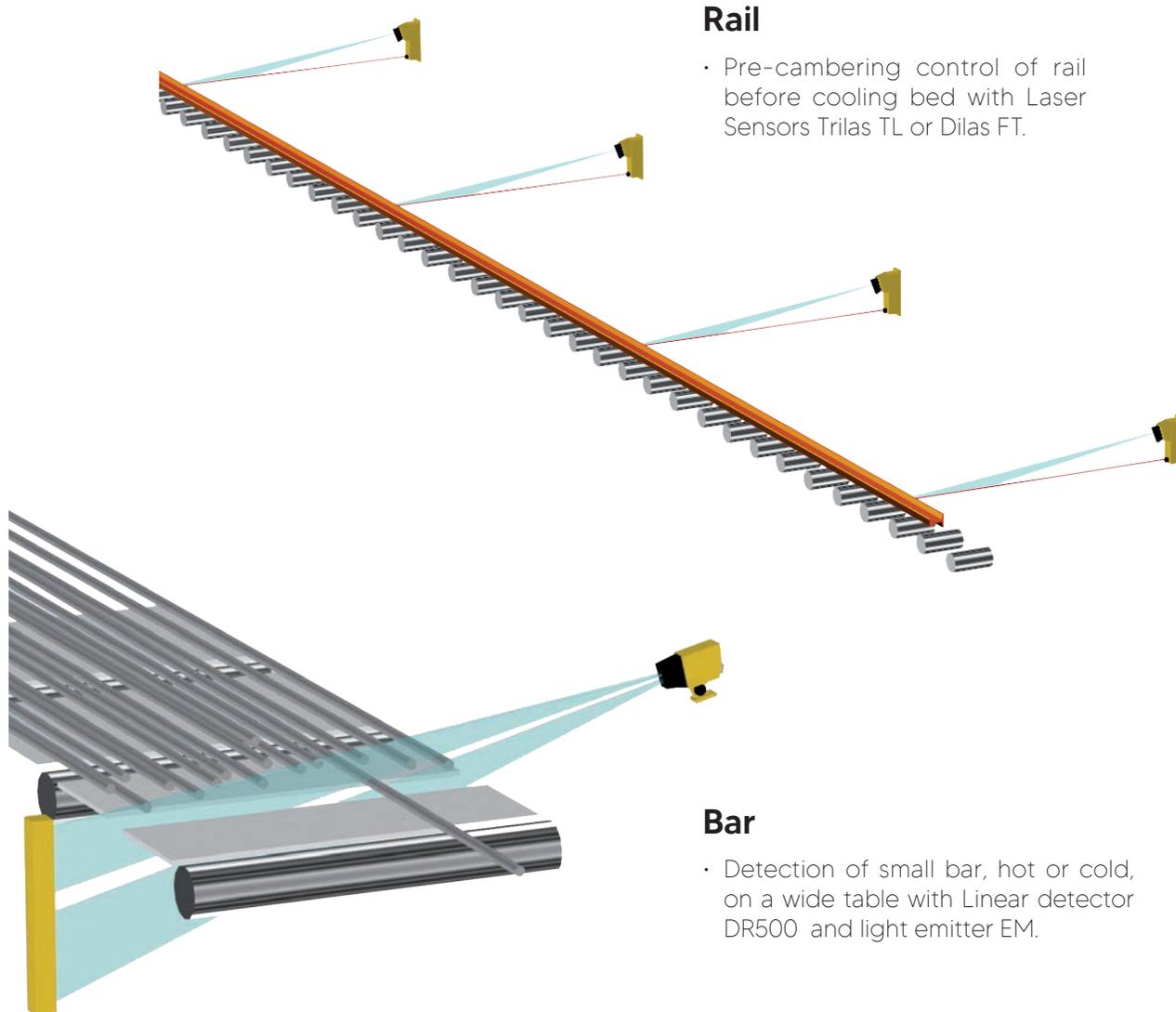
TL & FT series

V series



Bloom

- Bloom width measurement after blooming mill with Laser Sensor Trilas TL.



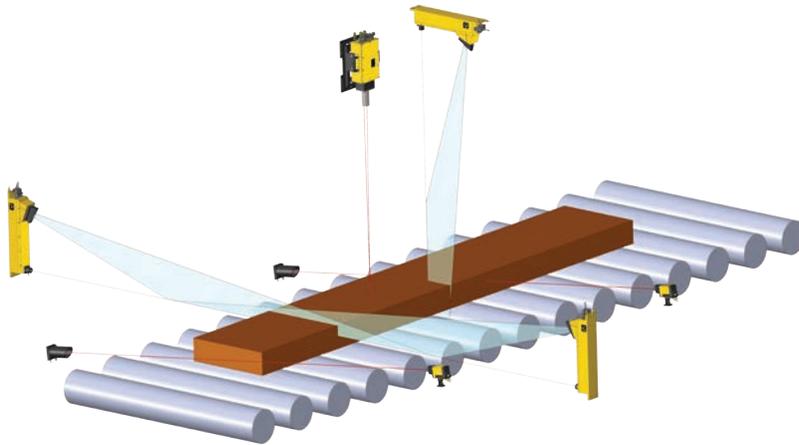
Rail

- Pre-cambering control of rail before cooling bed with Laser Sensors Trilas TL or Dilas FT.

Bar

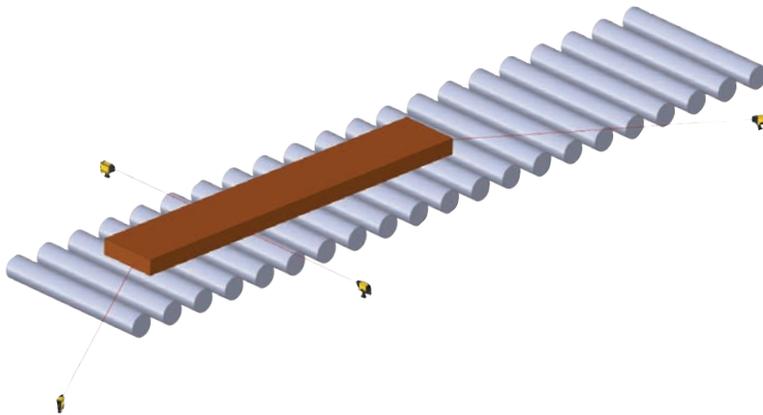
- Detection of small bar, hot or cold, on a wide table with Linear detector DR500 and light emitter EM.

SLAB REHEAT FURNACE



Transfer table

- Slab Length - Width - Thickness measurement on a transfer table with a combination of Laser Sensors Trilas TL and Velas DL.



- Slab Length - Width measurement using 4 Laser Sensors Dilas FT.



Typical applications in slab reheat furnace include detection, positioning and measurement of slabs on the charging table. DELTA sensors are able to work even on the very rough surface of slabs and to survive to the vibration and the heat especially in case of hot charging. DELTA has also developed some unique sensors for detection of slabs inside reheat furnace and at discharging side.



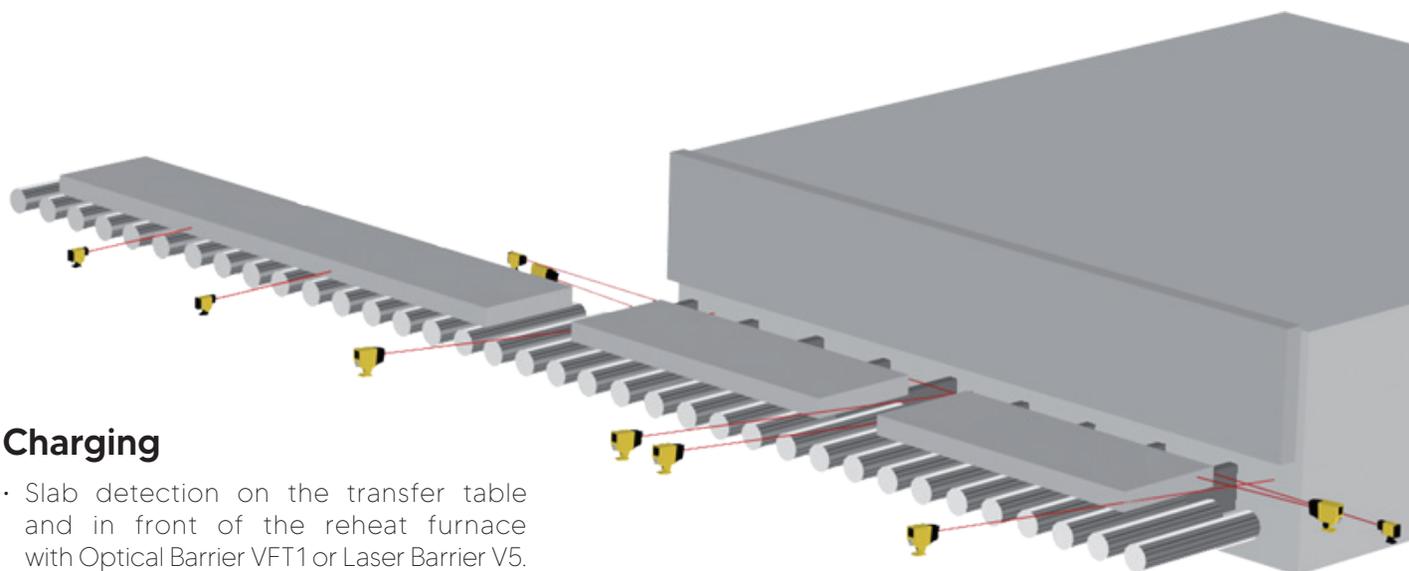
Key products



TL & FT series

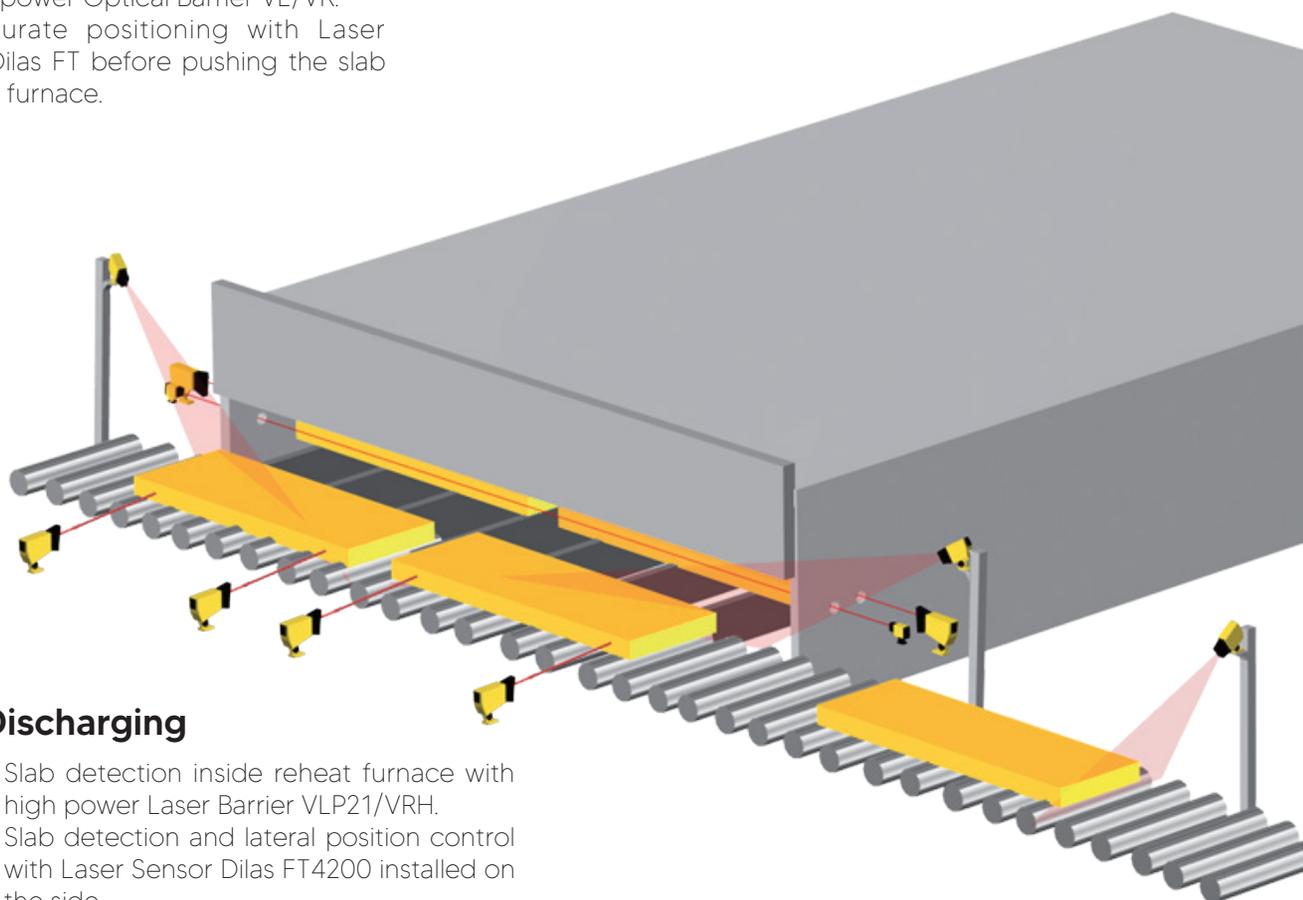
V series

DL series



Charging

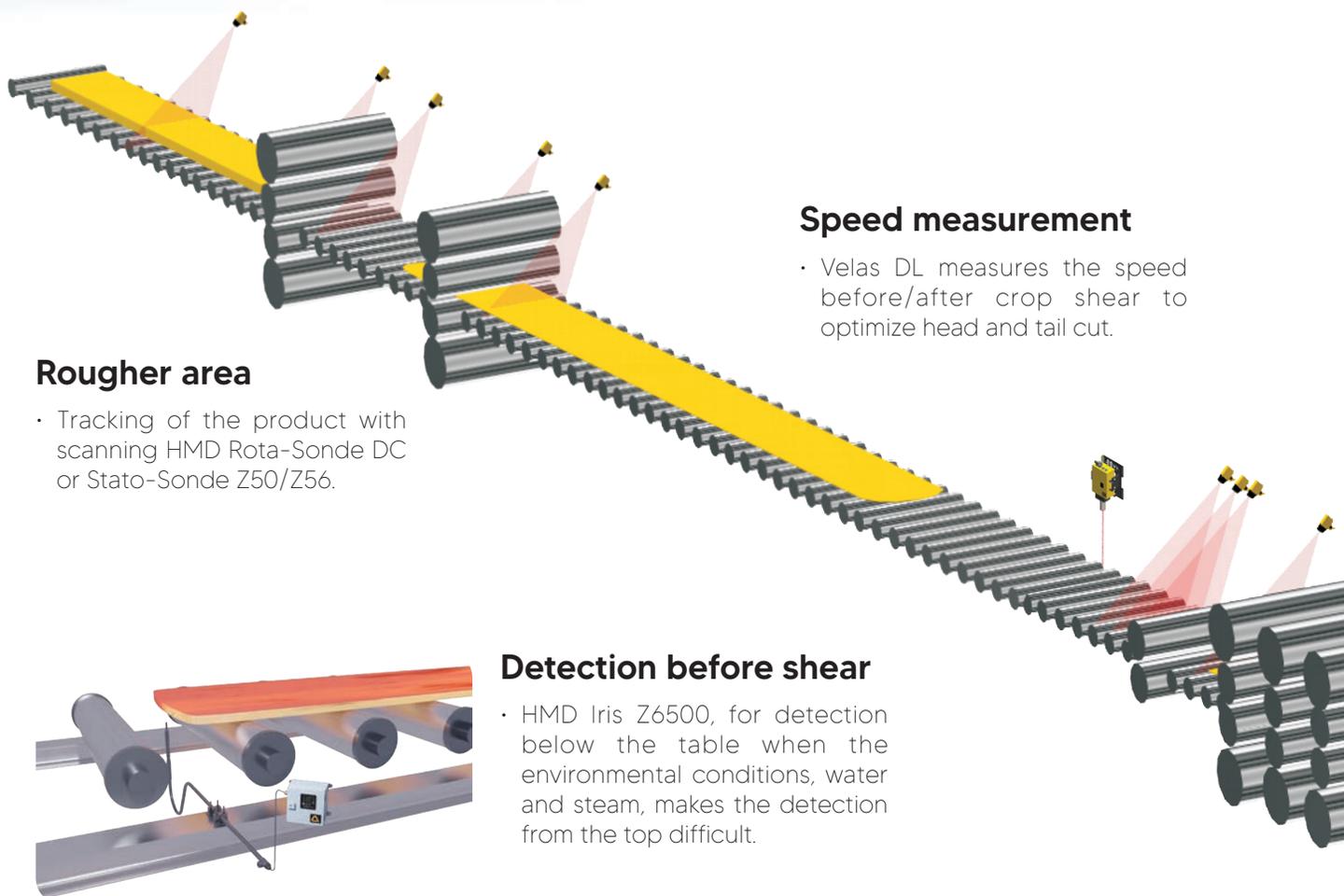
- Slab detection on the transfer table and in front of the reheat furnace with Optical Barrier VFT1 or Laser Barrier V5.
- Slab detection and width confirmation when pushing the slab with high power Optical Barrier VE/VR.
- Slab accurate positioning with Laser Sensors Dilas FT before pushing the slab inside the furnace.



Discharging

- Slab detection inside reheat furnace with high power Laser Barrier VLP21/VRH.
- Slab detection and lateral position control with Laser Sensor Dilas FT4200 installed on the side.
- Slab position control before discharging with Laser Sensor Dilas FT4200 installed in front of exit door.
- Slab detection on the discharging table with scanning HMD Rota-Sonde DC.

HOT STRIP MILL & PLATE MILL



Rougher area

- Tracking of the product with scanning HMD Rota-Sonde DC or Stato-Sonde Z50/Z56.

Speed measurement

- Velas DL measures the speed before/after crop shear to optimize head and tail cut.

Detection before shear

- HMD Iris Z6500, for detection below the table when the environmental conditions, water and steam, makes the detection from the top difficult.



From the exit of reheat furnace to down coiler, DELTA hot metal detectors, infrared scanner and laser measuring sensors are extensively used for detection, edge positioning and measurement. They are able to work with high accuracy and reliability in the harsh environment of hot mills: high ambient temperature, heat radiation, steam, water, dust...



Key products



DC series

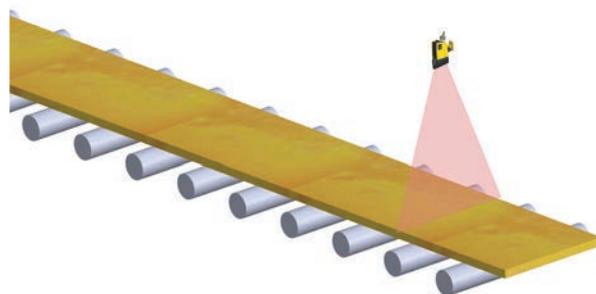
Iris series

TL & FT series



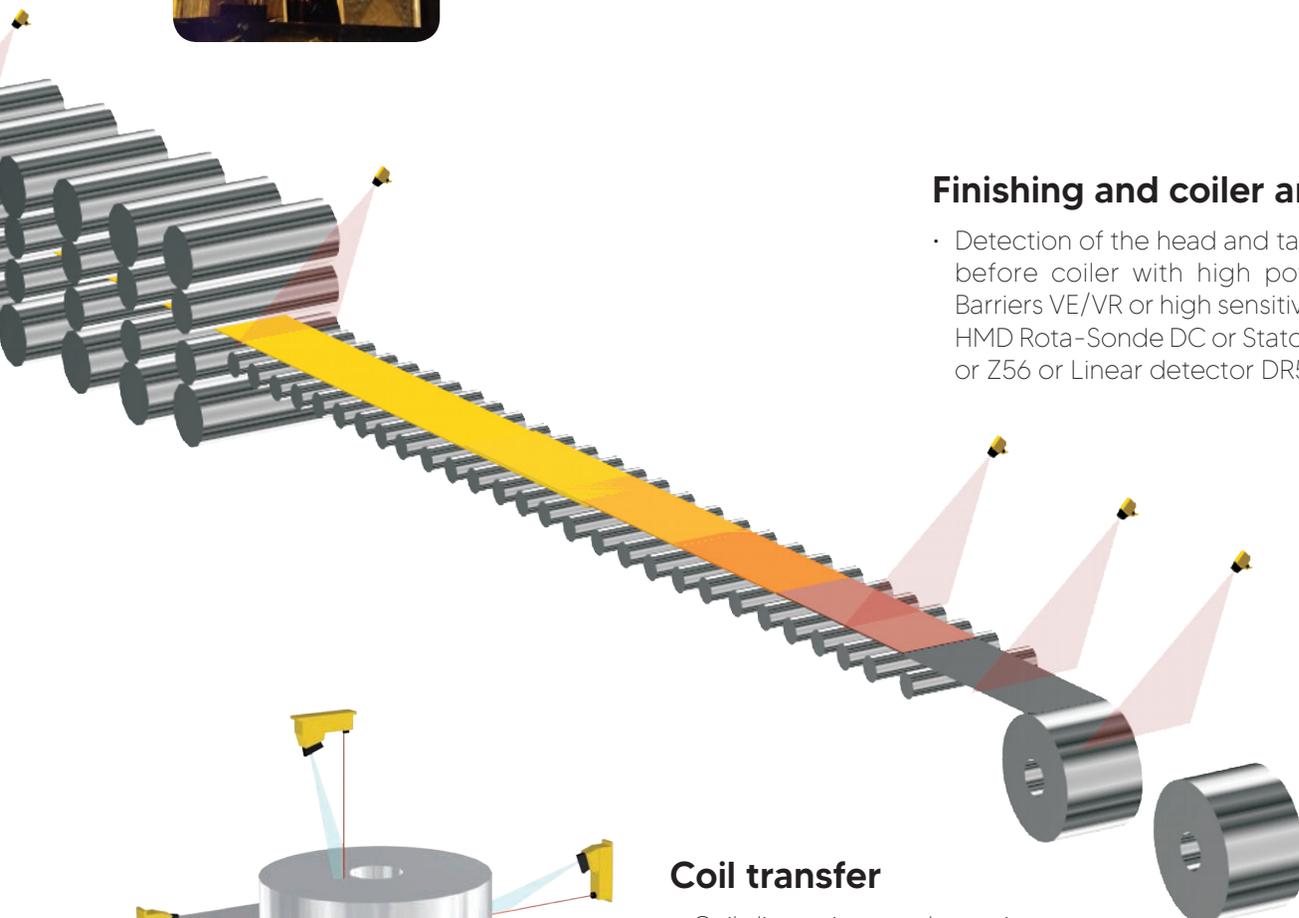
Centring

- Strip centring with Infrared Loop Scanner Rota-Sonde TS.



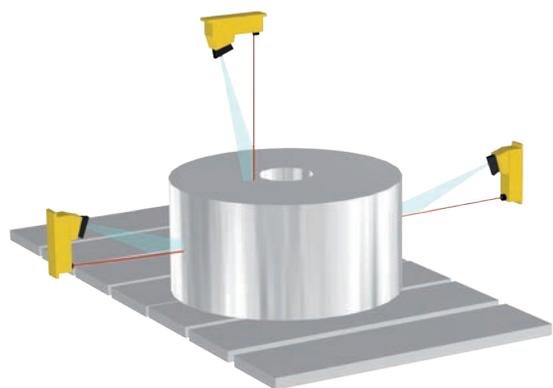
Crop detection

- Detection of the crop with HMD Rota-Sonde DC when it slides after the shear.



Finishing and coiler area

- Detection of the head and tail of the strip before coiler with high power Optical Barriers VE/VR or high sensitivity scanning HMD Rota-Sonde DC or Stato-Sonde Z50 or Z56 or Linear detector DR500/EM.

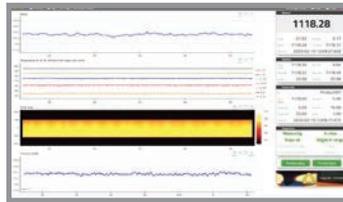


Coil transfer

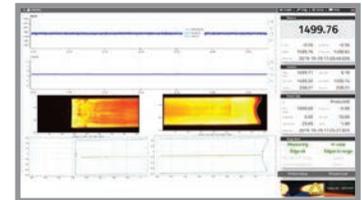
- Coil dimensions and centring with Laser Sensors Trilas TL.
- Coil detection with Optical Barrier VFT1.

MEASUREMENT GAUGES FOR HOT STRIP MILL AND PLATE MILL

Width + Thermal Profile



Width + Camber + CropView



Stereoscopic Width Gauge

• The Stereoscopic Width Gauge DigiScan XD4100, designed for installation above the roll tables in hot mill is state-of-the-art technology for measuring the width of strip / plate. It can also deliver additional graph and data such as Thermal Profile on different points along the width, or CropView to determine optimal cutting line of heads & tails. For use in the roughing mill or finishing mill exit, the self-emitted optical radiation provides enough contrast for width determination. In areas where the product is below 600 °C, an optional backlight or frontlight is available.

3D Vision

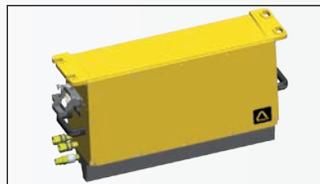
• The StereoVision SV6000 is a high resolution stereo camera 3D gauge that provides width measurement, camber, head/tail shape... Installed after rougher stand, it can analyse field of view up to 10 m.



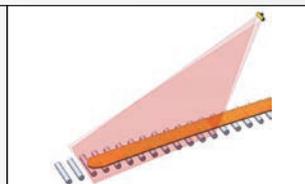
The ability to precisely measure the strip and plate dimensions during the hot rolling process is essential for the production of high quality steel and for achieving an optimum yield. DELTA has developed a range of measurement systems for installation in the extreme environmental conditions of the metal industry using the latest technologies with high resolution and high speed digital cameras.



Key products



XD4100 series

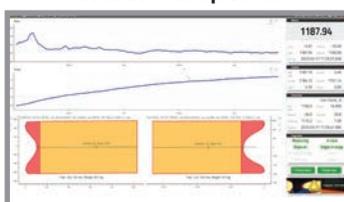


SV6000 series

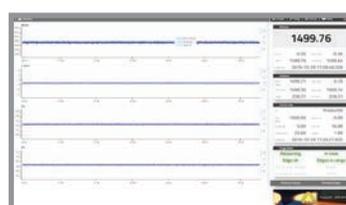
Architecture

- The gauges from DELTA can be directly connected to Ethernet network and are based on a Client - Server architecture. The different gauges (servers) on the network produce the measurement data and different clients (operator pulpit HMI, maintenance and diagnostic, quality) can access these data for display or recording.
- The gauges have a built in Web server and wifi access point to display measurement data and to access the gauge parameters and for diagnostic.

Width + CropView



Width + Centerline



Installation

- The gauge can be quickly installed: just one electrical connector (power supply and internal I/O), one Ethernet connector, 3 quick connectors (water and air). A 3 axis mounting stand allows alignment in all directions thanks to built-in cross laser.
- The DigiScan XD4100 or StereoVision SV6000, can easily be interfaced to any automation system and host with communication possibilities such as Modbus TCP, OPC UA, Profibus-DP, Profinet...



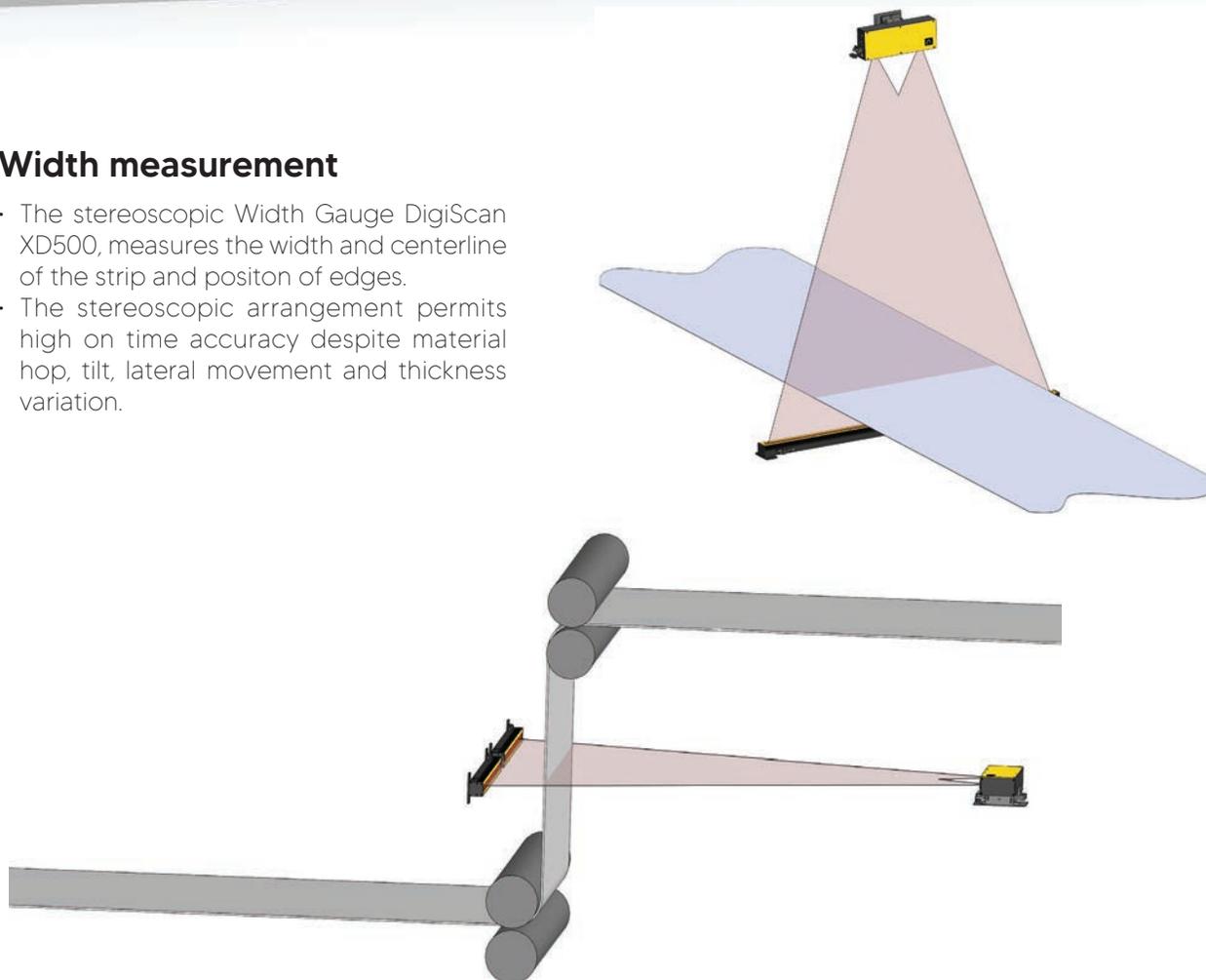
Key features

- Very high accuracy and reliability in the extreme conditions of Hot Strip/Plate Mills.
- Integrated Web Server - setup and diagnostic with Web Browser.
- Extended communication features including built in Ethernet and Wifi with Modbus TCP and OPC UA protocols.
- Optional industrial network protocols: Profibus-DP, Profinet.
- Plug-in principle for customizations: protocol, External I/O, configuration...
- Backlight and Frontlight mode.
- Designed for extremely harsh environment: compact water cooled sealed die-cast aluminium housing, heat shield, air knife...
- Simplicity of installation and maintenance, very easy replacement of the gauge.
- Quick accuracy verification with light and battery powered verification fixture.

COLD ROLLING MILL & PROCESSING LINE

Width measurement

- The stereoscopic Width Gauge DigiScan XD500, measures the width and centerline of the strip and position of edges.
- The stereoscopic arrangement permits high on time accuracy despite material hop, tilt, lateral movement and thickness variation.



DELTA has a range of non contact laser sensors for measurement of coil dimensions and positioning, strip width, centring. For the dedicated application of weld hole detection, DELTA proposes a special model, DTS240/EMR-M, based on LED technology.

The compact stereoscopic Width Gauge DigiScan XD500, with high accuracy, various communication protocols, web browser interface, easy to commission, helps customers to deliver product with the highest quality standards.



Key products



XD500
series

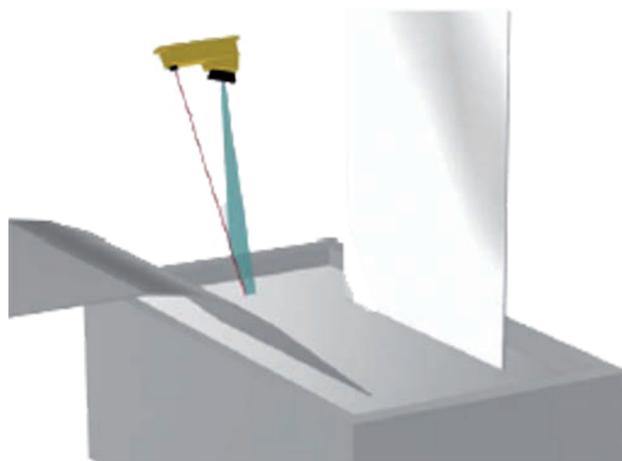
DTS
series

TL & FT
series



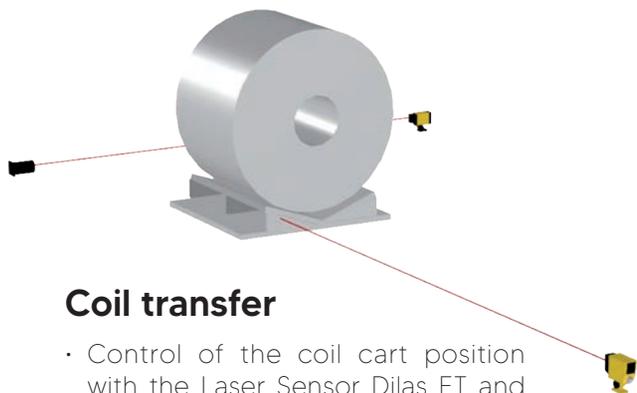
Weld Hole Detection

- Light barrier DTS240/EMR-M. or DTR540/EMR-C



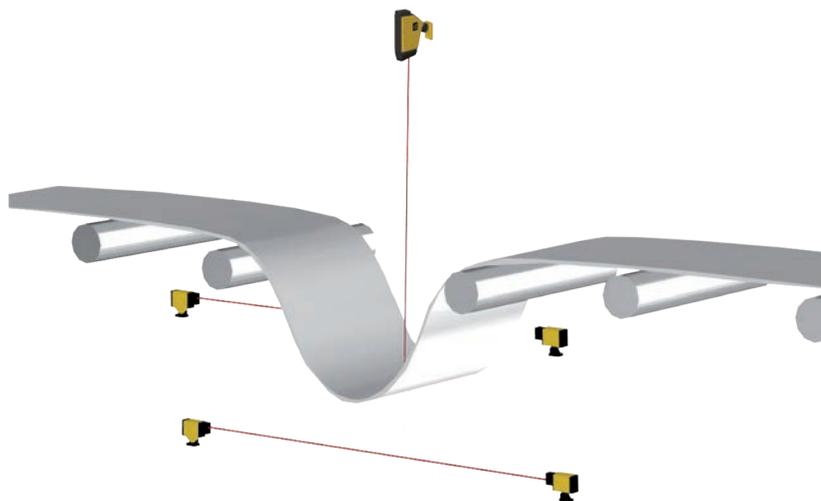
Galvanization bath

- Zinc level measurement with Laser Sensor Trilas TL or Dilas FT.



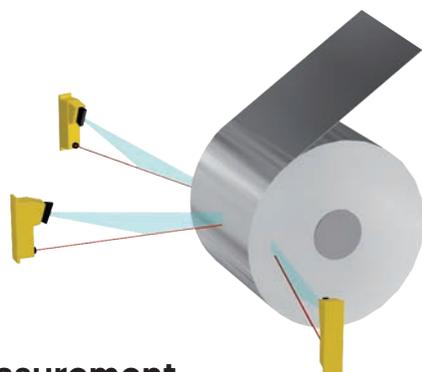
Coil transfer

- Control of the coil cart position with the Laser Sensor Dilas FT and Laser Barrier V5 or Optical Barrier VFT1.



Loop control

- Loop measurement with Laser Sensor Trilas TL or Dilas FT from top of the strip
- Loop position control with Optical/Laser barrier from below the strip.



Coil measurement

- The width of the coil is checked when it is transferred on the uncoiler, and the diameter is measured with Laser Sensors Trilas TL during coiling/uncoiling process.



OTHER APPLICATIONS



Aluminium Rolling

- Detection: The Rota-Sonde DC4500 is used for aluminium product at temperature over 300 °C. For other detection applications, the optical or laser barriers are used. In difficult environmental conditions such as dust, the use of sensors with very high margins such as VE/VR is recommended. All sensors include a protective hood with the possibility of air purging if required.
- Width measurement of aluminium slab with Trilas TL.
- Stereoscopic width measurement of aluminium plates or strips with DigiScan XD500.
- Coil diameter measurement with Dilas FT or Trilas TL laser distancemeter.

Copper Rolling

- Loop control with the Infrared Loop Scanner Rota-Sonde TS
- Slab and coil measurement.

Forging

- Ring forging: a laser triangulation sensor Trilas TL, able to work on target with temperature up to 1300 °C, measures the diameter during the forging process.



Iron and Steel making plants, Coke plants

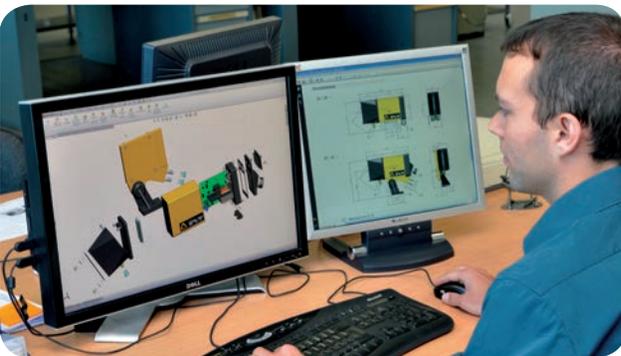
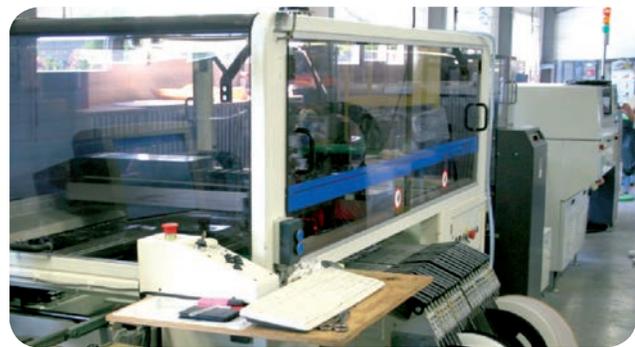
- Torpedo and ladle car positioning: the very robust design of DELTA laser distance meter make them a perfect solution for the difficult environment found in steel making plants.
- Hot coke detection.





DELTA, founded in 1954, has a global presence with headquarters in France near Strasbourg, four subsidiaries in China, Germany, India and North America and numerous agents around the world.

Research & Development investment are very important in DELTA: over 20% of the staff maintain and develop the product line. DELTA development teams, including electronic, mechanical and software engineers, are part of an international network with close contact with customers.



DELTA production team is highly qualified, and follows strict processes to insure the highest level of quality and long term support of our sensors. Some of DELTA products, which are installed in very difficult environmental conditions, are still in use after more than 30 years with indefectible support from DELTA.

Worldwide support

DELTA is committed to provide excellent support to its customers. DELTA believes that for this purpose local engineering support is important. With this driving philosophy, DELTA has set up facilities in Europe, USA, China and India to provide adequate support to its customers.

Over 100.000 sensors are currently in operation worldwide in more than 90 countries.

Quality

DELTA is committed to deliver the highest quality and the most reliable sensors. The strictest quality standards are applied to the design and manufacturing of every DELTA product. The company is certified ISO 9001:2015 N° 1995/4590.8 since 1995 by Afnor certification.

DELTA Group : a unique association of expertise and know-how

- POLYCAPTIL-FCE: design and manufacturing of electronics, optoelectronics and mechatronics products
- OPALES: industrial machine vision, camera inspection systems. The synergy with DELTA for Vision systems in steel industry provides new solutions for applications involving cameras.



