

INSPECTION LINE

Pipe, profile, bar, rail production



Inspection of the most complex sections, including rails, beams, angles, round bars, flat bars, squares, and tubes.



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The ever-increasing demands on quality and tight tolerances for achieving higher quality assurance in finished steel products have required a growing range of automated quality control technology in the steel production process.

Products have to be inspected according to set standards, and all test results have to be recorded. With the brand Knorr, Alpine Metal Tech is a leading provider of flexible, industry-proven, optoelectronic measuring and image processing systems for the contactless, fully automated inspection of the most complex sections, including rails, beams, angles, round bars, flat bars, squares, and tubes. Knorr's turnkey, nondestructive inspection lines encompass everything from design, engineering, supply, and installation to final commissioning of integrated

lines for products such as rails. The lines essentially comprise brushing machines for the removal of loose scales, measurement gauges, straightness measuring units, eddy current testing units for detecting surface defects, and ultrasonic testing units for internal defects. The integrated inspection lines include central processing and control units to generate quality reports, online color marking devices, and all necessary auxiliary systems. With successful reference installations across the globe for testing a variety of sections both in hot and cold condition, Alpine Metal Tech's brand Knorr offers optimal inspection solutions with different configurations together with system expandability for the gradual extension of facilities to meet future growth requirements.

YOUR ADVANTAGES

- » Turn-key solution: testing equipment from same vendor
- » Automatic size-adjustment
- » Short setup-time
- » High product velocities
- » More than 25 years experience with testing equipment

TECHNOLOGIES & UNITS

Eddy-current testing system

The online inspection system based on eddy current is used for the detection of longitudinal and transversal surface defects on the profile. The equipment includes the adjustments of several segment coils for edge testing (for transverse defects) and rotating probe systems for testing the planar surfaces mainly for longitudinal defects on different kinds of rolled profiles.

- » Defect recognition for lateral and longitude defects at high product velocity
- » Prepositioning and automatic hydraulic positioning of probes



Ultrasonic testing device

Ultrasonic testing is used for online detection of internal imperfections such as laminar effects, inclusions, tension cracks in rails and other rolled materials. The system is available as water-jet coupling or water-gap coupling solution. The machine provides a fully equipped evaluation system operating in multiplex mode for sections to be tested with a pre-adjusted threshold determining the flaw size.

- » Prepositioning and automatic hydraulic positioning of probes
- » Automatic adjustment at product change and closed water cycle



Straightness measurement system

Straightness measurement is a contact-less optical measuring method for measuring the straightness of profiles allowing faster and more precise quality checks. High measurement accuracy.

- » Simultaneous horizontal / vertical measurement through laser cut system
- » Tested products are able to move freely in lateral direction inside measuring field
- » Straightness Measurement is ensued from start to end of profile
- » Automatic adjustment at product change



Profile measurement

With the profile Measurement system utilizing light sectioning techniques, it becomes feasible to measure under all conditions with the highest accuracy. The techniques applied allow the complete measurement of nearly every kind of profile in fractions of a second. High measurement accuracy at high product velocity

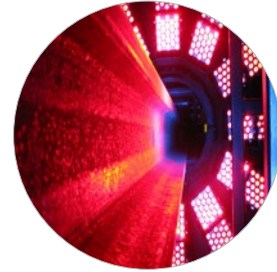
- » Presetable Measurement distances in longitude direction
- » Automatic adjustment at product change
- » Tested products are able to move freely in lateral direction inside measuring field



Surface inspection (3D high speed sensor)

The automatic Vision System allows automatic detection of defects on surfaces by means of image processing, even on surfaces with a big amount of scales. An image processing algorithm distinguishes defects like flakes, cracks, grooves or break-offs from other surface irregularities, such as stamp marks, engravings or scale.

- » High defect resolution
- » Contactless 3-D measurement through laser-cut system
- » Automatic adjustment at product change



Brushing machine

A brushing machine is used for the efficient removal of loose scale for a host of profiles for the improvement in surface quality and surface preparation prior the entry into the non-destructive testing line.

- » Optimal preparation of surface for inspection procedure
- » Uniform wear down of brushes through oscillation
- » Short setup-time after profile change
- » Strong dust exhaust system with fine and coarse dust precipitation



Security gate

For reasons of safety, the installation of a height and width measurement station is recommended. This station consists of a basis frame on which two infra-red light grids, one horizontal and one vertical, are installed-on. By means of this arrangement, which works with an accuracy of +/- 5 mm, a roller table stop can be generated, in case a rail profile enters the system which exceeds in dimension the profile which is intended to be the next to enter.



Demagnetisation unit

To ensure a good result at the Eddy-Current Testing Machine, the use of a demagnetization unit is recommendend, in case that the tested rails are handled by a magnetic crane before they enter the testing line area. Frame mounted demagnetising tunnels are principally used for continuous processing to enable the continual automatic throughput of long products. Demagnetising tunnels are available in a range of capacities, depending on the dimensions and shape of the product to be demagnetised.



TECHNOLOGIES & UNITS

Multi-colour marking

The multi-channel marking unit is installed at the end of the testing line. With the installed length measurement devices a location of the detected defects is possible. Each kind of straightness, profile, surface and internal defects is being marked using different colours.



Transport and guidance units

For the transport and guidance of the rails within the area of the testing line, 8 transport and guidance units are foreseen, which are installed between the different testing devices. These devices also serve for fixing the position of the rails, passing through in order to avoid undesired transverse movements of the rails.



Barcode applicators

The Bar Code Applicator is directly installed in the testing line. The rail ID as well as other data are transmitted to the system whether from the central computer system or directly from the mill computer system. This information is transformed to a bar code, printed and applied to the rail which passes the system with a speed of up to 2 m/sec.



Stamp readers

The task is the automatic reading of stamped codes as well as of brandings on the rail. The stampings and brandings are located on the web of the rail.



SERVICE & OTHERS

Finishing systems

Knorr offers various facilities for long products such as roller conveyors, cross transport devices, singling units, trough systems, etc. The systems are individually designed and compatible to your production process.



Handling systems

Knorr offers various handling systems for individual parts such as gripping devices for forged parts, gripping devices for work piece transport in the production process, etc. The handling systems are individually designed and compatible to your production process.



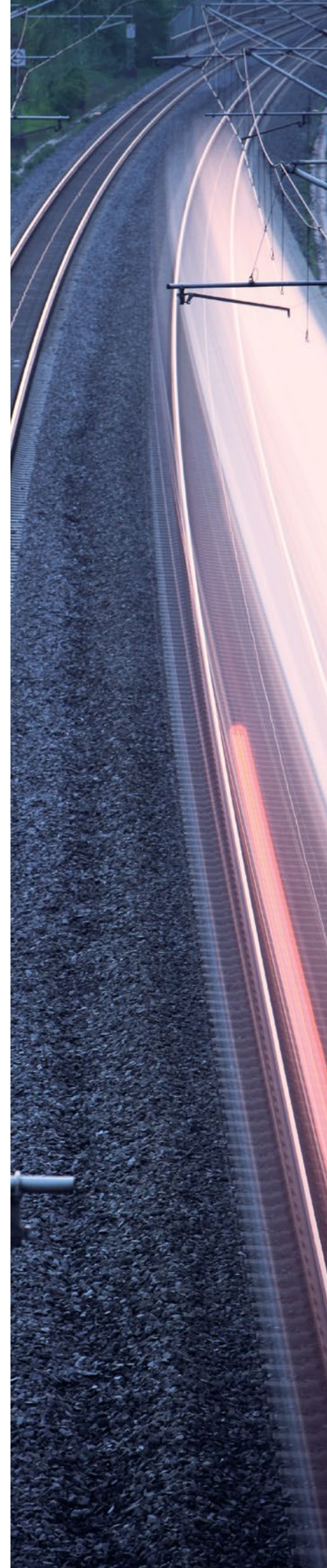
Special purpose machines

Knorr projects and builds machinery/systems according to your specific requirements such as cooling lines for forged parts, coil pressing units, etc.

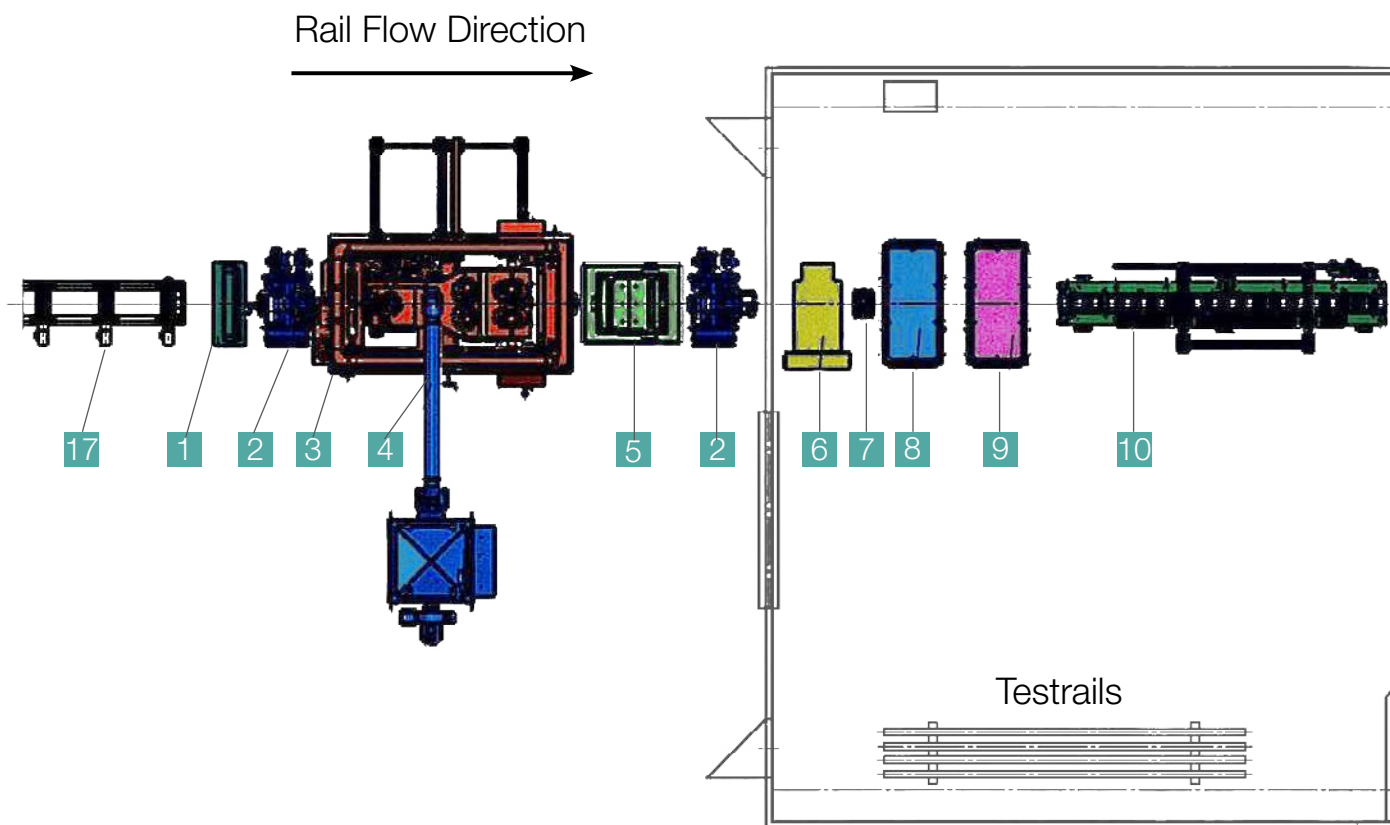


Factory planning

Knorr is also specialised and experienced in designing new rolling mills as well as in re-designing existing mills for optimization and increase of production.



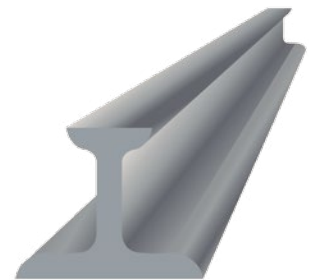
INSPECTION LINE FOR RAILS

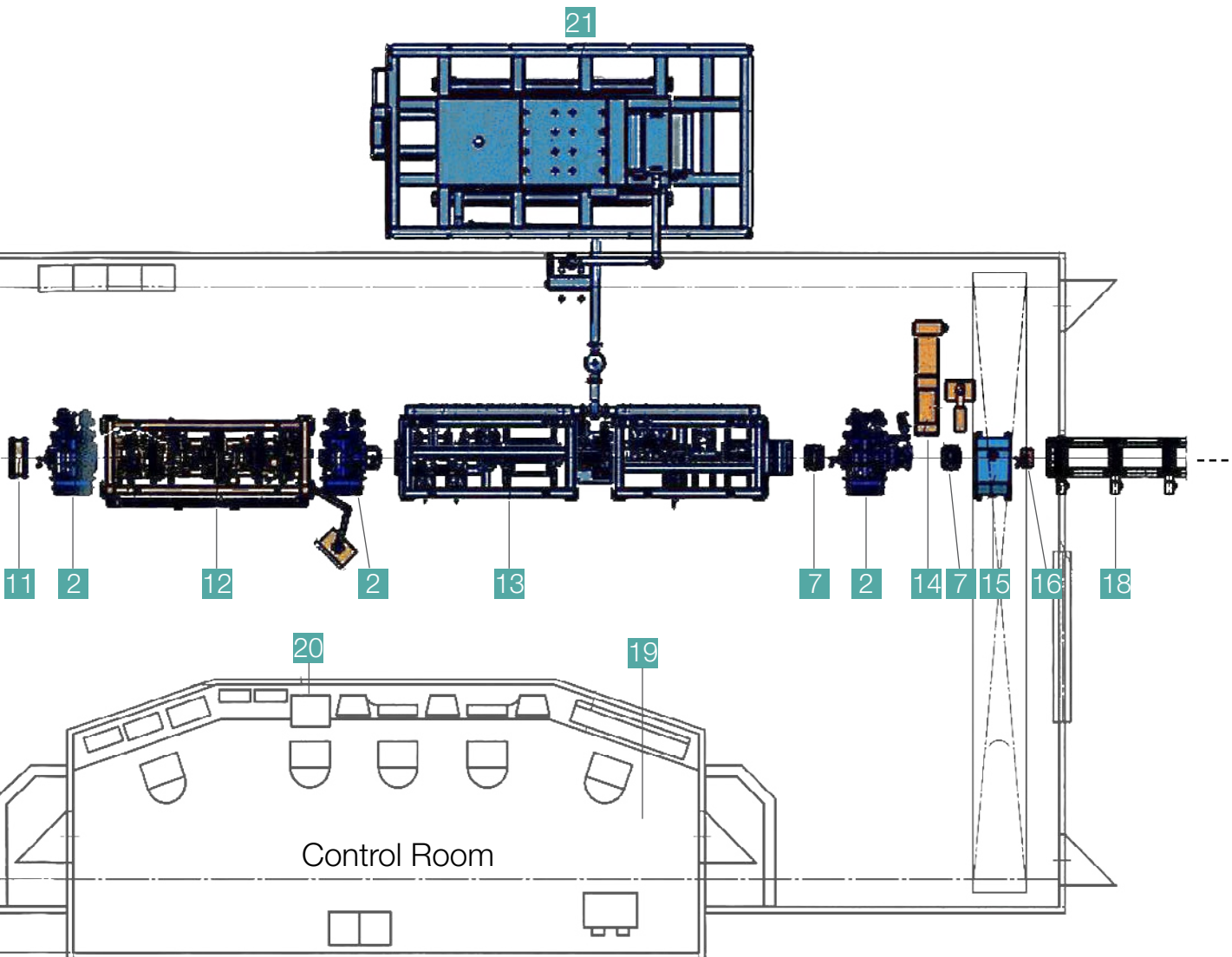


Components

- | | |
|------------------------------------|------------------------------------|
| 1 Height and Width Measurement | 12 Eddy-Current Testing Device |
| 2 Transport and Guidance Unit | 13 Ultra-Sonic Testing Device |
| 3 Brushing Machine | 14 Bar Code Printer and Applicator |
| 4 Dust Exhaust System | 15 Multi-Colour Marking Unit |
| 5 Security Stopper | 16 Length Measurement Unit |
| 6 Stamp Reader | 17 Entry Roller Table |
| 7 Support Roller | 18 Exit Roller Table |
| 8 Profile Measurement Gauge | 19 Control Room |
| 9 3D-Vision System | 20 Central Processing Unit |
| 10 Straightness Measurement Device | 21 Water Tank |
| 11 Demagnetization Unit | |

Products

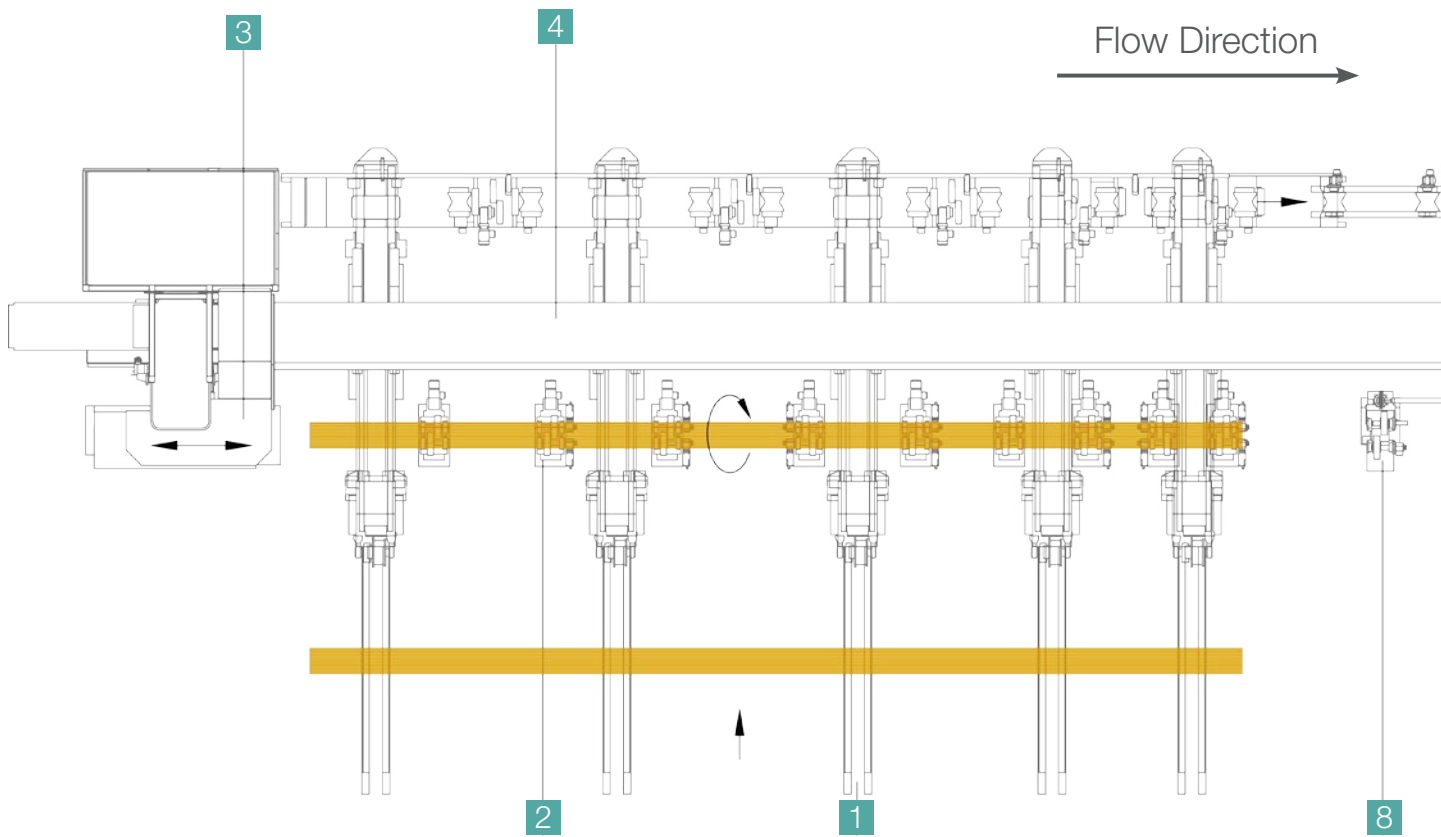




Technical data

Type	Various types of rails
Height	120 - 220 mm
Base width	110 - 180 mm
Head width	50 - 80 mm
Rail lengths	12 - 110 m
Speed of rails during testing	0.5 - 2.0 m/sec

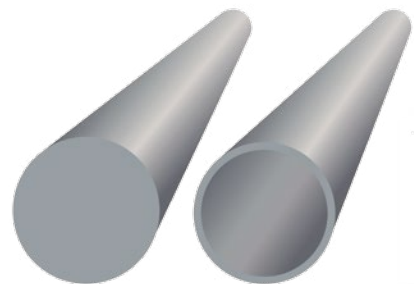
INSPECTION LINE FOR ROUND BARS & TUBES

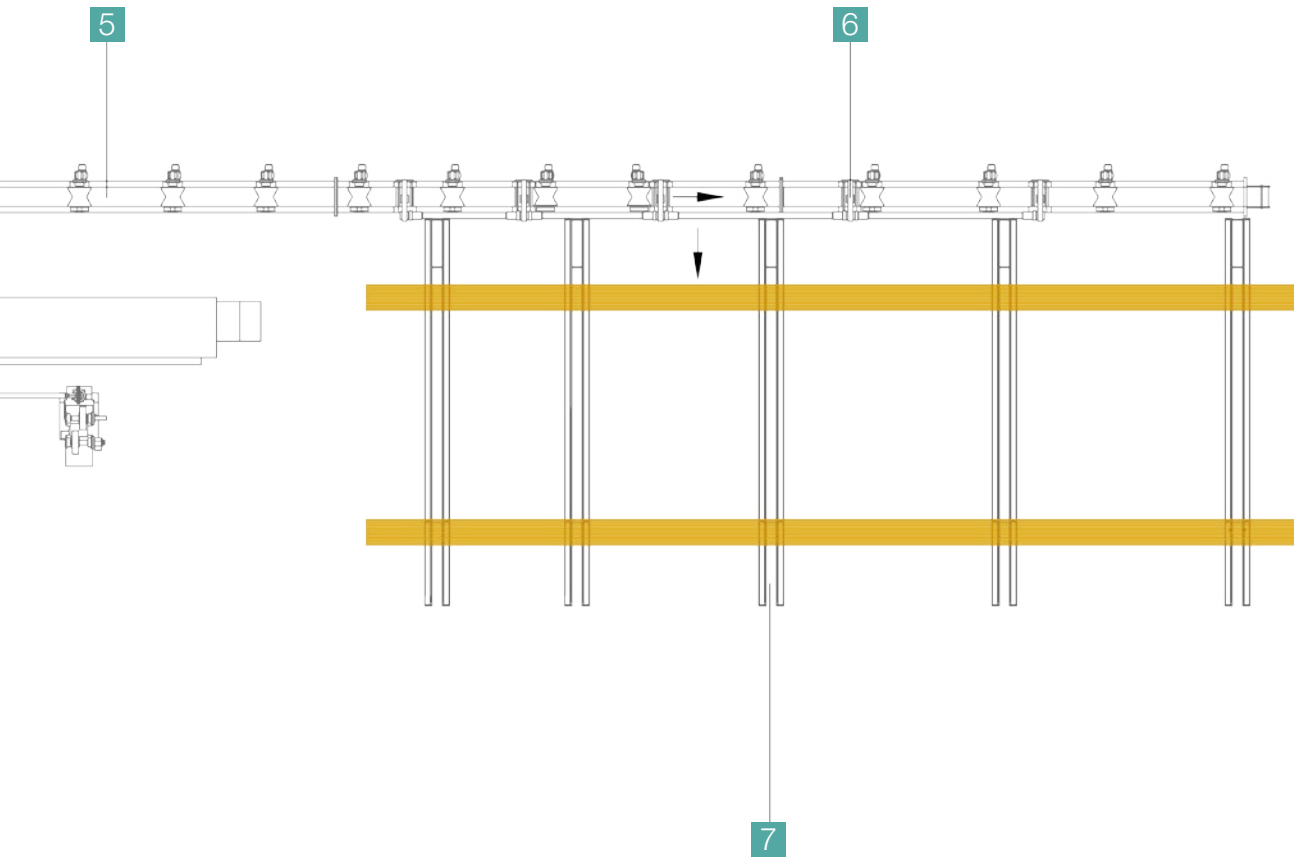


Components

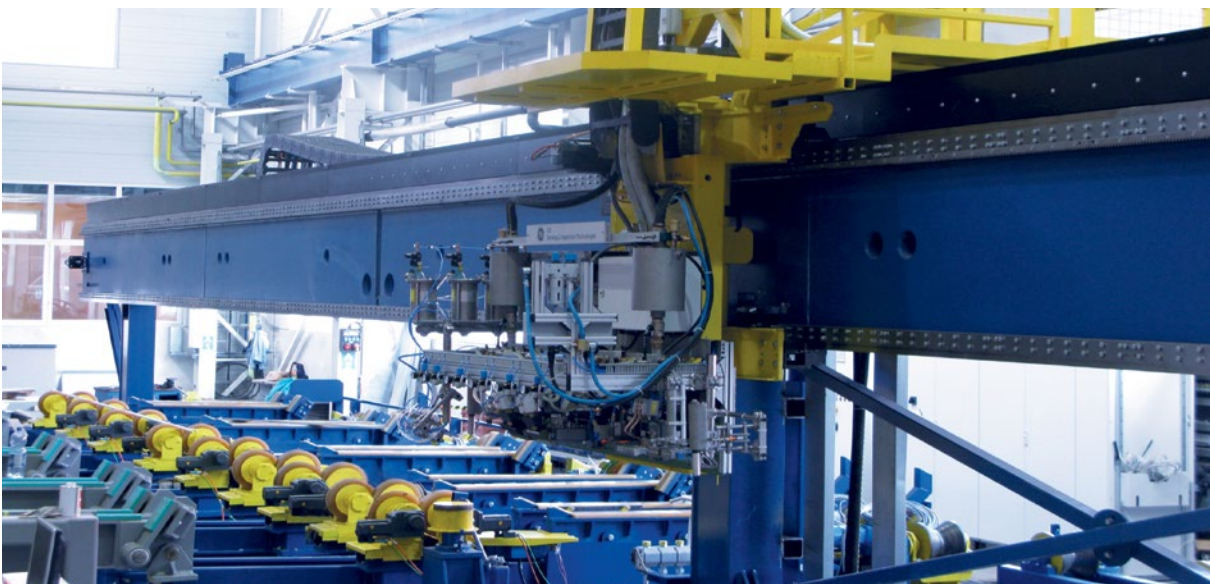
- 1 Feed table with crossconveyor
- 2 Testing position with material rotating device
- 3 Testing carriage equipped with Eddy-Current and Ultrasonic Unit
- 4 Traverse for the testing carriage
- 5 Exit rollertabel
- 6 Discharge system
- 7 Collecting table for the tested material
- 8 Calibrating position

Products

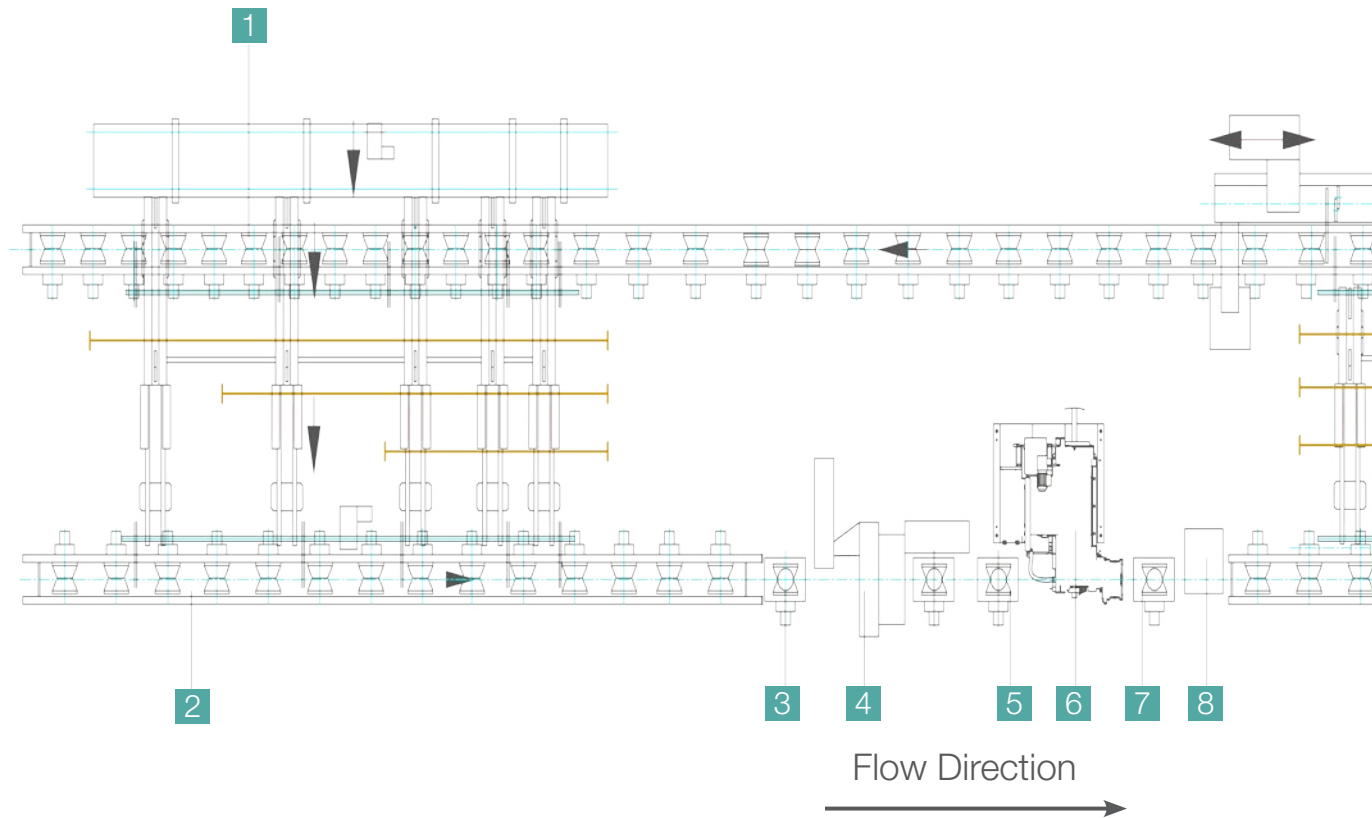




System example



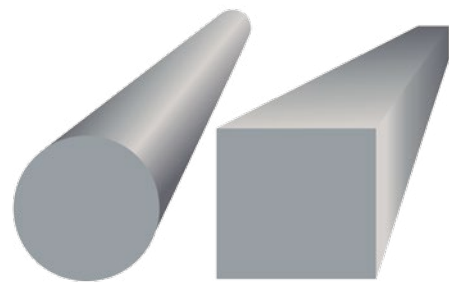
INSPECTION LINE FOR ROUND & SQUARE BARS

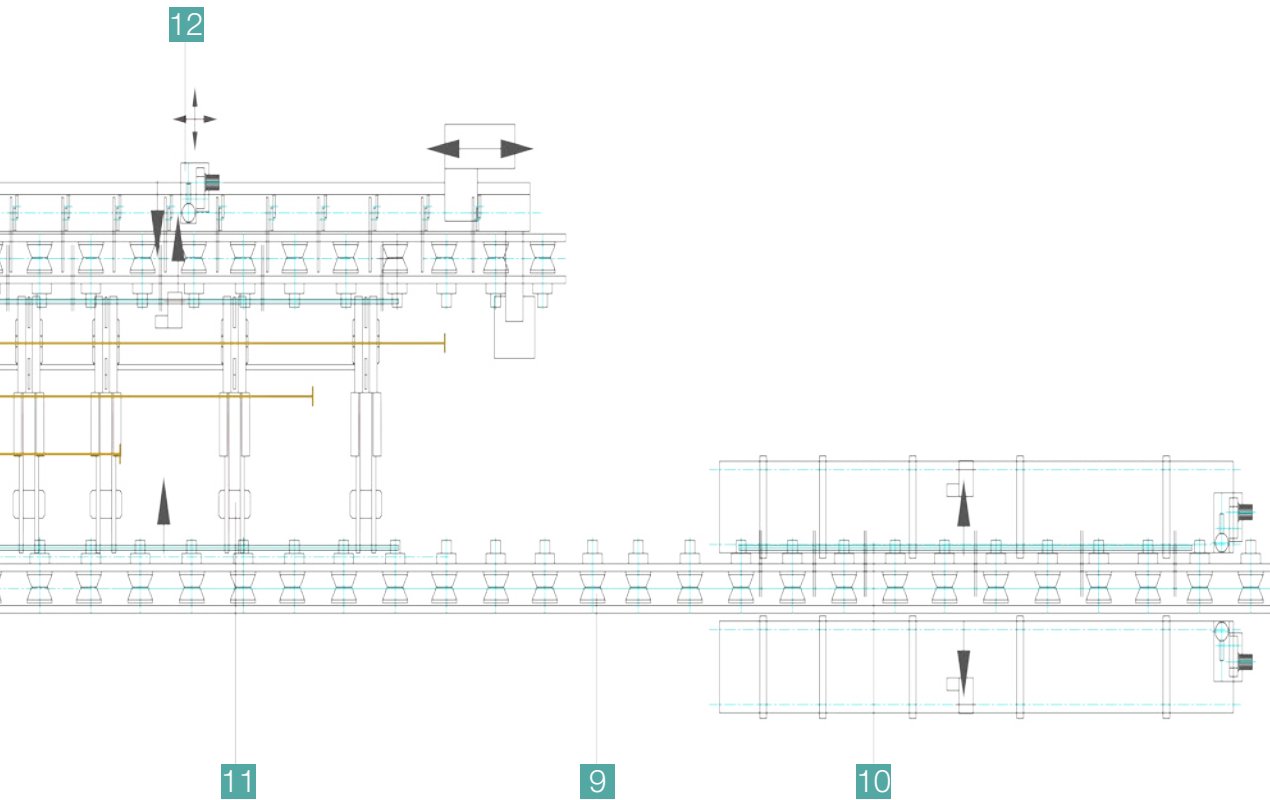


Components

- 1 Feed table with separation device and crossconveyor
- 2 Inlet roller table
- 3 Centering and transport unit
- 4 Surface testing equipment (Eddy-Current)
- 5 Centering and transport unit
- 6 Ultrasonic testing equipment
- 7 Centering and transport unit
- 8 Colour marking unit
- 9 Exit roller table including discharge system
- 10 Material throughs for good material
- 11 Cross conveyor to the re-checking station
- 12 Re-checking station including automatic fault grinding unit

Products

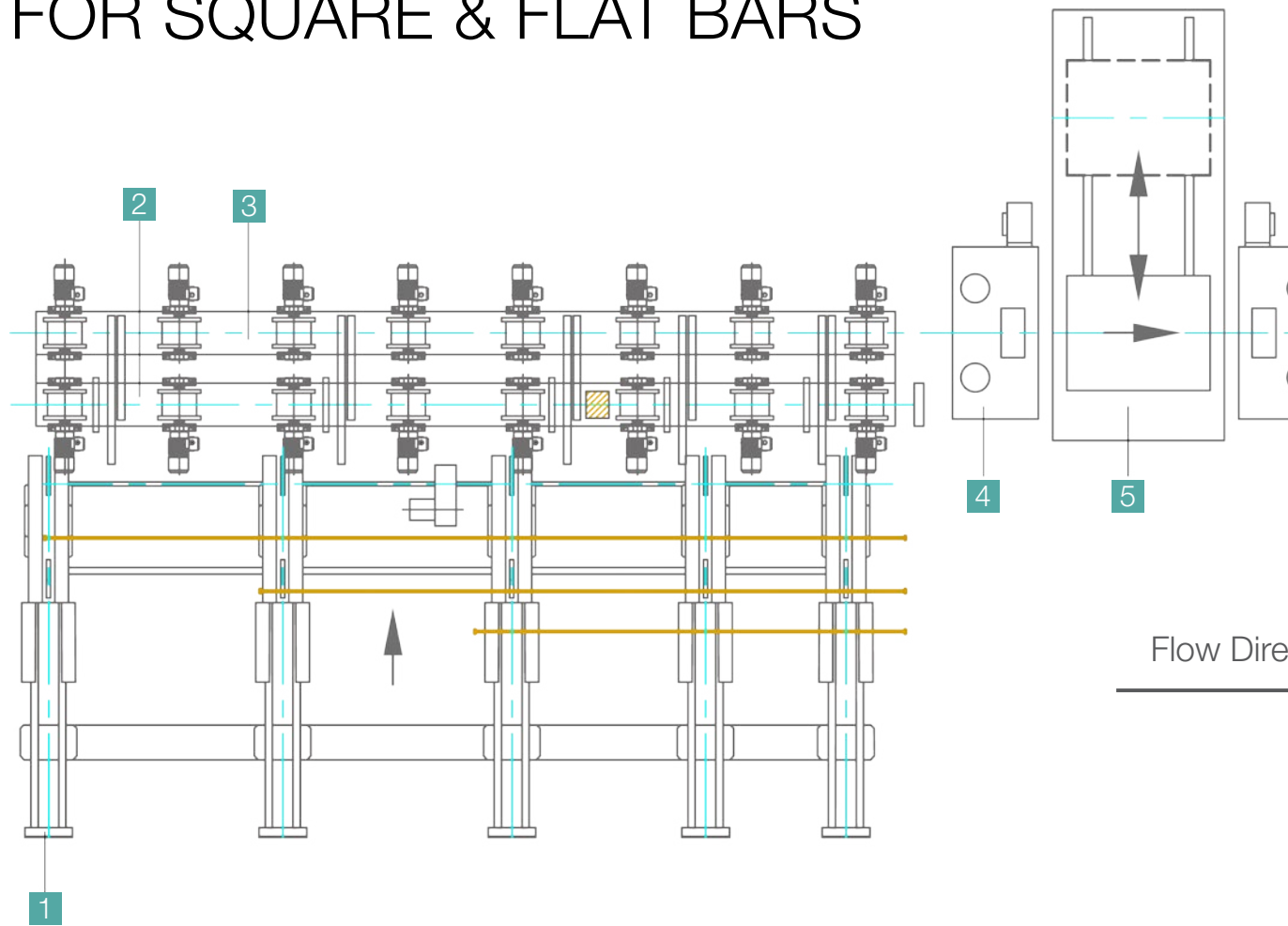




System example



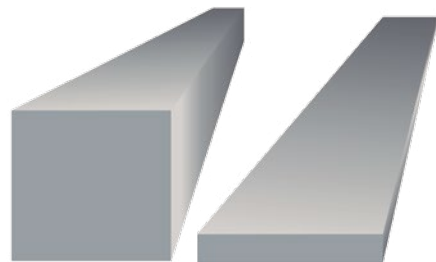
INSPECTION LINE FOR SQUARE & FLAT BARS

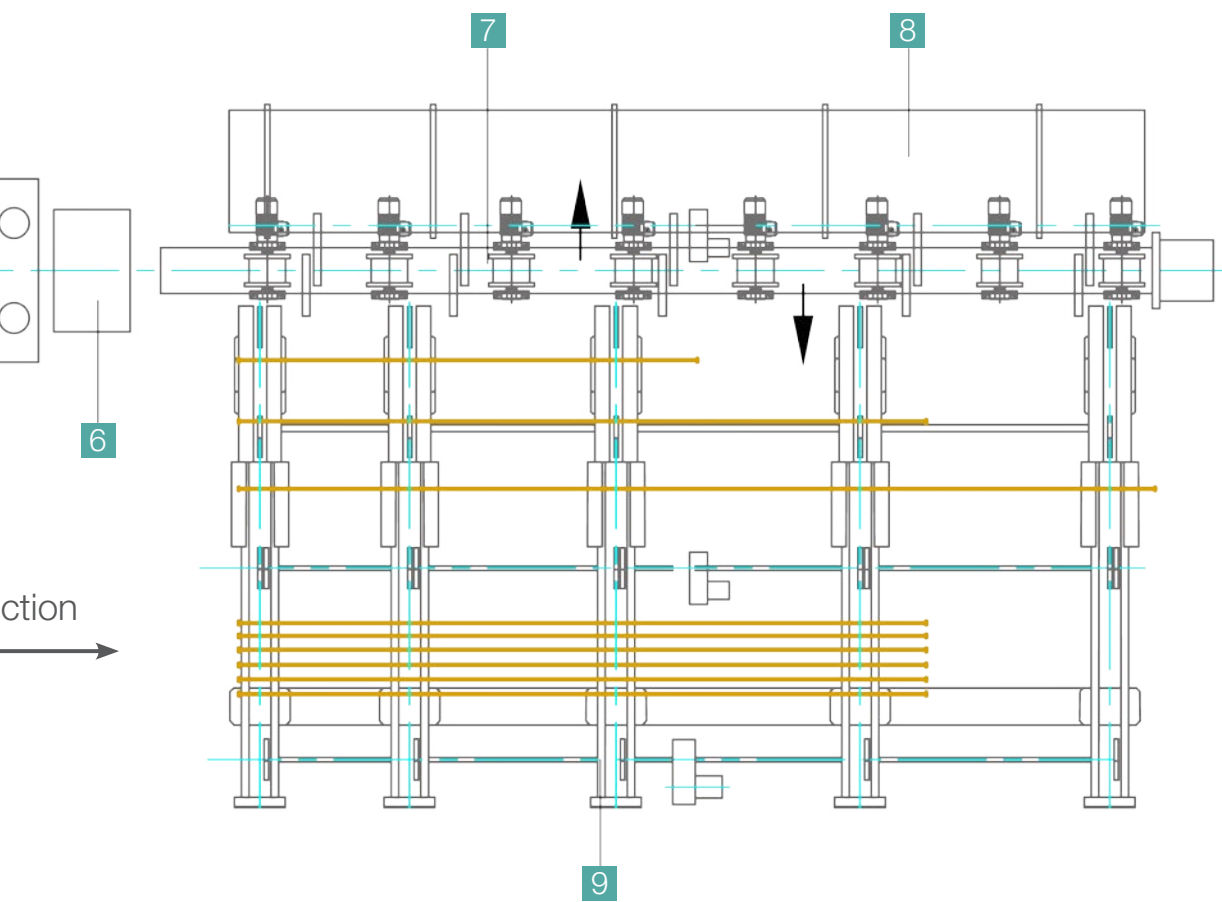


Components

- 1 Feed table including cross conveyor
- 2 Overturn roller table
- 3 Inlet roller table
- 4 Transport unit
- 5 Ultrasonic testing equipment
- 6 Colour marking unit
- 7 Exit roller table including discharge system
- 8 Material through for bad material
- 9 Collecting table for good material

Products





System example



Alpine Metal Tech GmbH

Buchbergstraße 11

4844 Regau, Austria

Tel.: +43 7672 78134-0

E-mail: office@alpinemetaltech.com

Web: www.alpinemetaltech.com

