

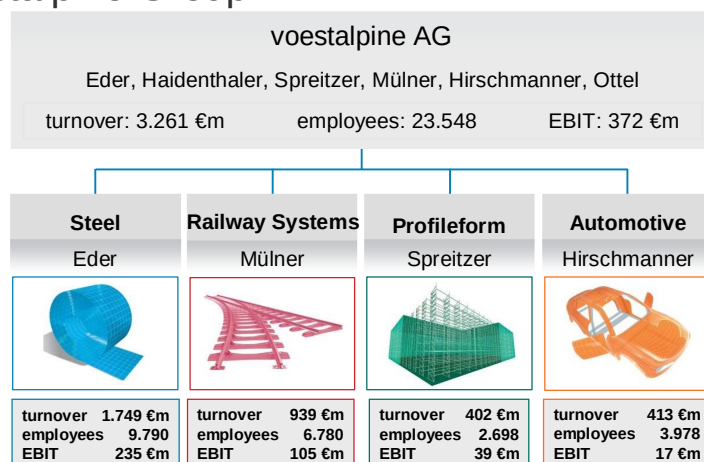
Welcome to voestalpine Schienen GmbH

Norbert Frank
Head of Technical Customer Service

Division Railway Systems
www.voestalpine.com

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voestalpine Group



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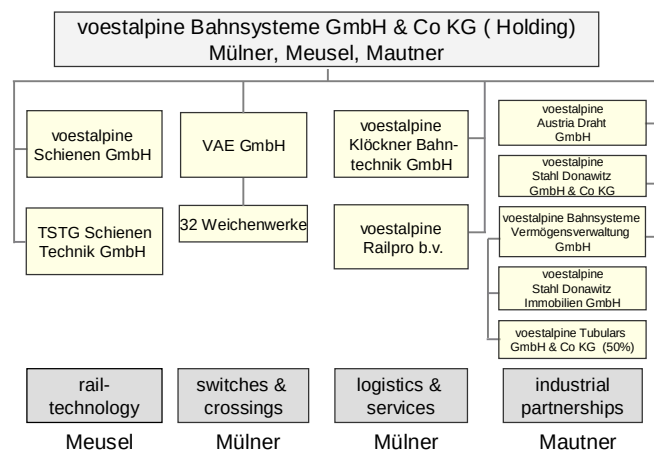
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voestalpine - Division Railway Systems our locations in Europe

- ★ BOF steel-mill and headquarters
- rolling-mills in Donawitz, Duisburg and Kindberg



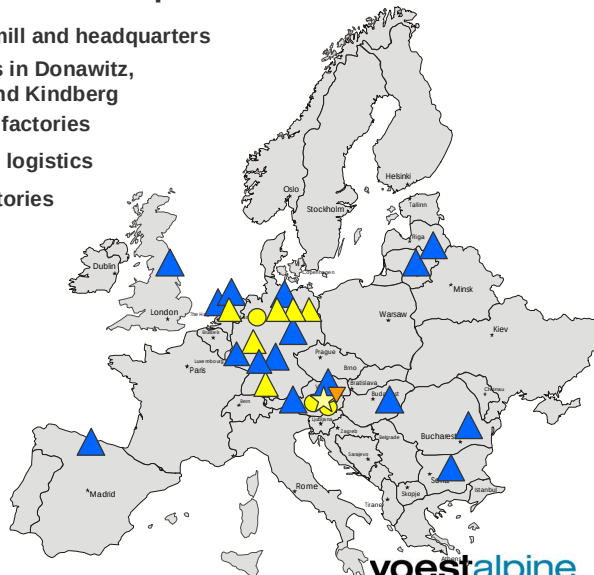
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voestalpine - Division Railway Systems our locations in Europe

- ★ BOF steel-mill and headquarters
- rolling-mills in Donawitz, Duisburg and Kindberg
- ▼ processing factories
- ▲ service and logistics
- ▲ turnout-factories



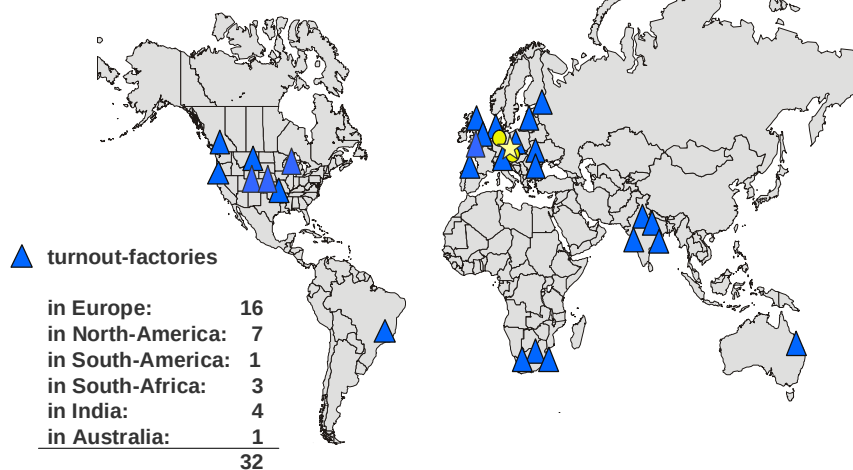
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voestalpine - Division Railway Systems our locations worldwide

- ★ BOF steel-mill and headquarters
- rolling-mills



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Business Unit Rail Technology

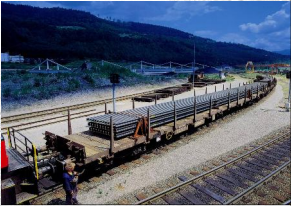
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voestalpine Schienen GmbH – Donawitz / Austria

- Europe's largest rail rolling mill
- Production BY 2004/05 ~ 350.000 mt



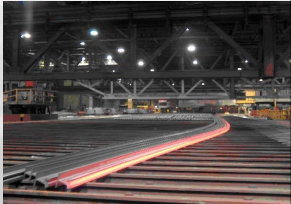
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TSTG Schienen Technik GmbH – Duisburg / Germany

- the biggest European producer of "ultralong" rails
- production BY 2004/05 ~ 280.000 mt



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Business Unit Special Trackwork Technology

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- the worldwide leading group in turnout-industry
- ~ 3.500 employees worldwide in 32 mills
- international technology-leader (more than 1.000 living patents)
- pioneer for “plug-and-play” turnouts and related HYTRONICS-Systems



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Business Unit Logistics / Services

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voestalpine Klöckner Bahntechnik GmbH

- J.I.T. – logistics-partner
- package-system-supplier
(rails, turnouts, other components)

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voestalpine Railpro b.v.

- our “one-stop-shop“-supplier in the Netherlands
- 18.000 products related to railway infrastructure
- top-modern rail welding plant (3x120m =>360m)
- 1.700 service-wagons (for ballast, sleepers, rails, etc.)



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Business Unit Industrial Partnerships

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voestalpine Austria Draht GmbH

- Europe's top-quality wire rod-specialist
- production BY 2004/05 ~ 530.000 mt

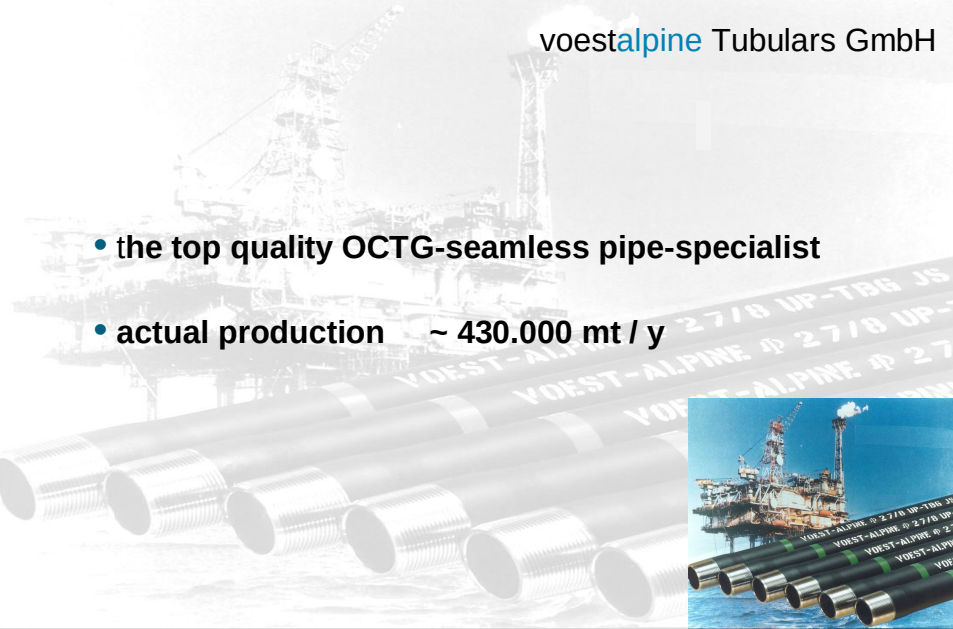


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voestalpine Tubulars GmbH

- the top quality OCTG-seamless pipe-specialist
- actual production ~ 430.000 mt / y



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Rail Production

voestalpine Schienen GmbH
Donawitz, Austria

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Who is voestalpine Schienen GmbH?

- n Europe's largest rail producer
- n 350.000 to/year
- n 430 employees
- n 250 Mio € turnover



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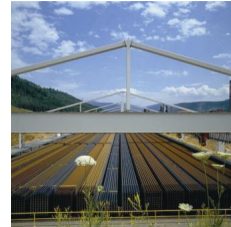
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From the Raw Material to the Track

steel production



finishing



unloading



rolling mill



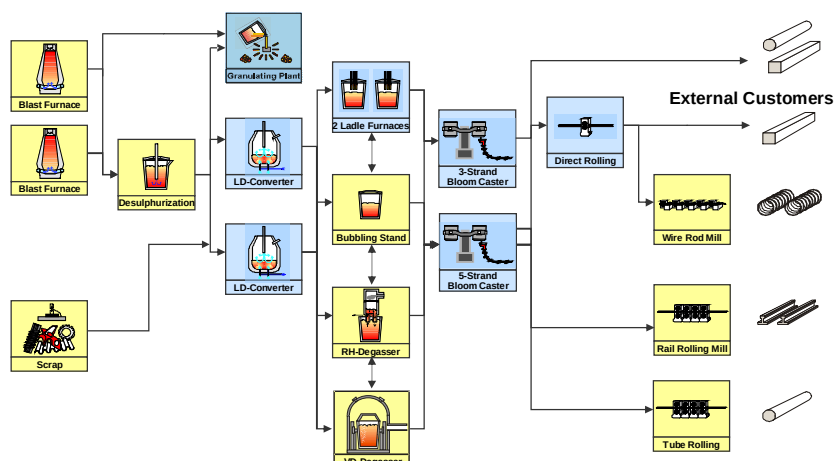
shipping

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Production Flow Steel-Mill



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melting crude iron



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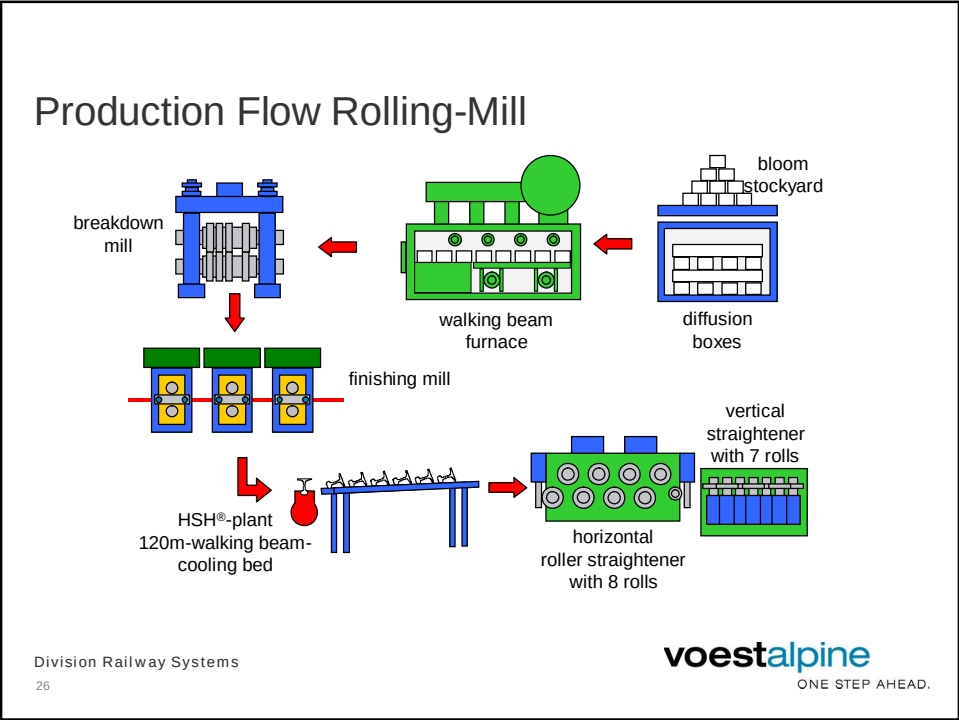
steel production



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Walking Beam Furnace

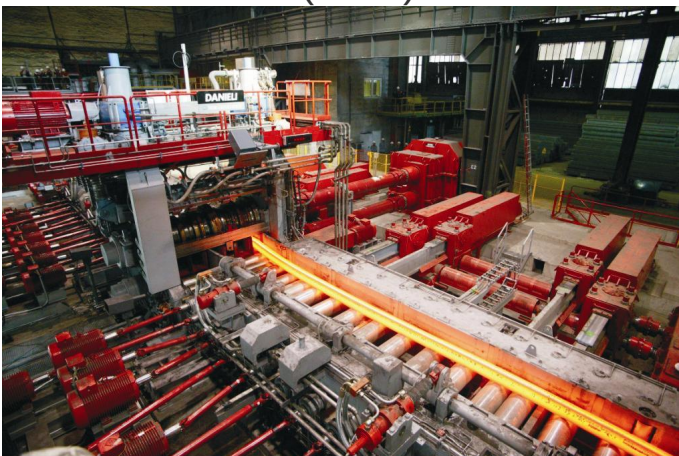


- n 185 to/h
- n 390 x 283 mm²
- n max. 9,1 m
- n 2,5 – 3 h heating time
- n 1250 °C rolling temperatur

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Break Down Mill (BDM)

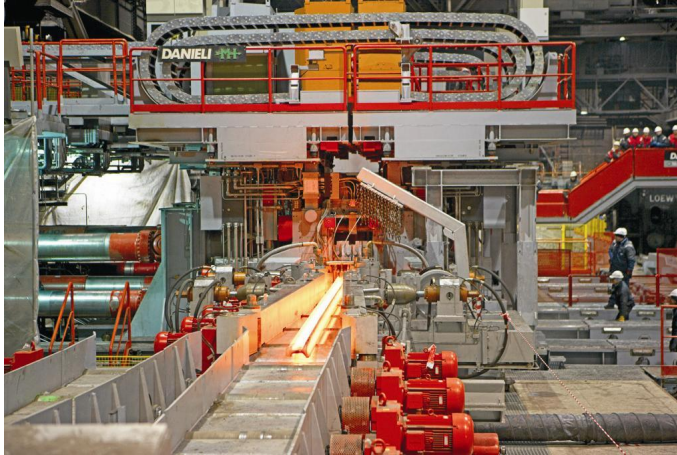


- n 1 x 4.000 kW
- n max. 1.000 U/min
- n ca. 1.000 mm Ø
- n fully automatic
- n 25 min. roll change

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Finishing Mill - Ultra-flexible Rail Mill



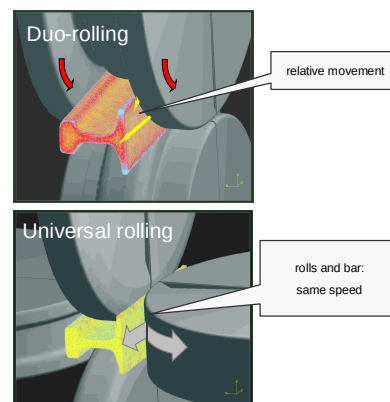
- n 3 x 3.000 kW
- n max. 1.000 U/min
- n ca. 1.000 mm Ø
- n fully automatic
- n 25 min. roll change

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Technological Improvements

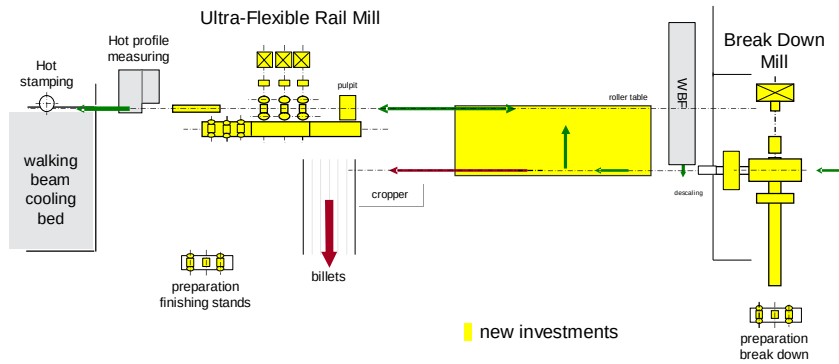
- n Universal rolling
- n simple calibration
- n longer roll life
- n higher automatization level
- n careful transportation of the hot rail
- n fully automated section change in shortest possible time



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Layout of the New Mill

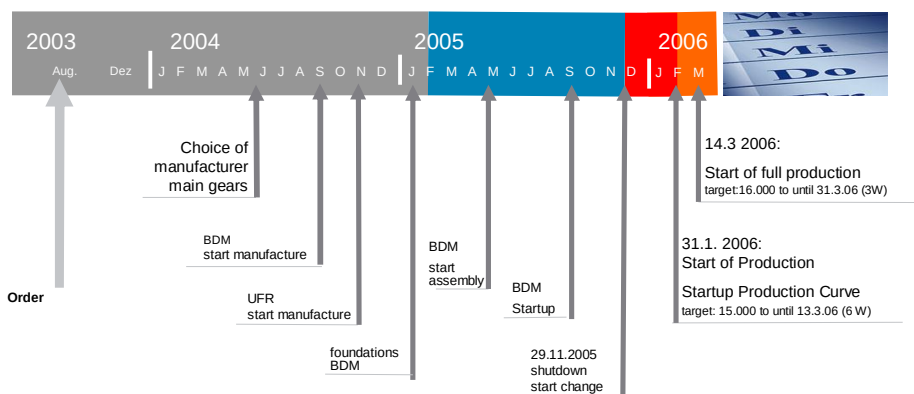


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History of Milestones



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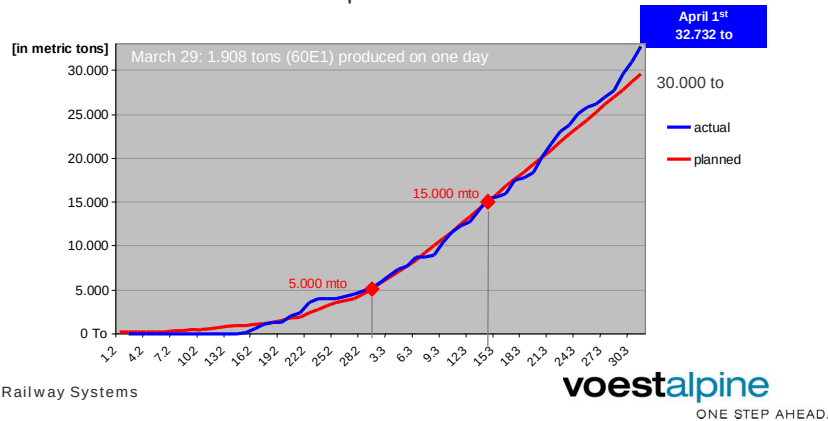
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Startup-Curve Ultra-Flexible Rail Mill

Now: more than 240.000 tons produced

More than 40 profiles available

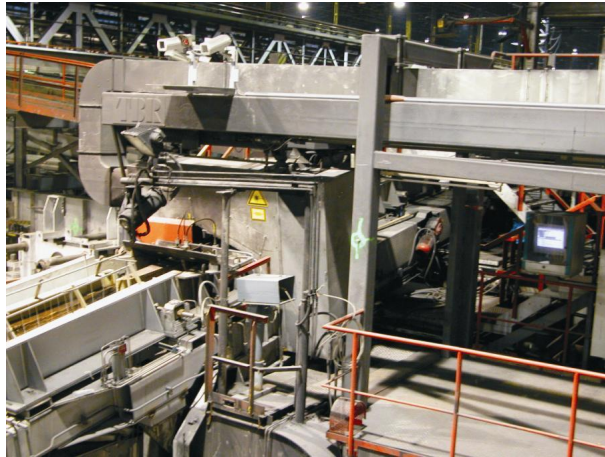


Investments of the Last 15 Years

- n 1990: 120 m walking beam cooling bed and HSH®-plant
- n 1994: finishing line, ultra-long stockyard 1
- n 1998: finishing line 2000, testing centre
- n 1999: roller straightener
- n 2000: capacity increase walking beam furnace (185 t/h)
- n 2001: visual surface testing
- n 2001: finishing line for grooved rails
- n 2003: ultra-long stockyard 2
- n 2006: ultra-flexible rail rolling mill
- planned investment:
- n 2007: capacity increase HSH®-plant, plant for DOBAIN®

total more
than
200 Mio €

Hot Profile Measurement



- n Laser-method
- n 8 Lasers installed

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Walking Beam Cooling Bed



- n 125 x 20 m
- n approx. 3 h cooling time
- n max. 50 °C before straightening
- n rail is carried
- n no dragging

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HSH®-Plant



- n 120 m long
- n 260.000 to/year

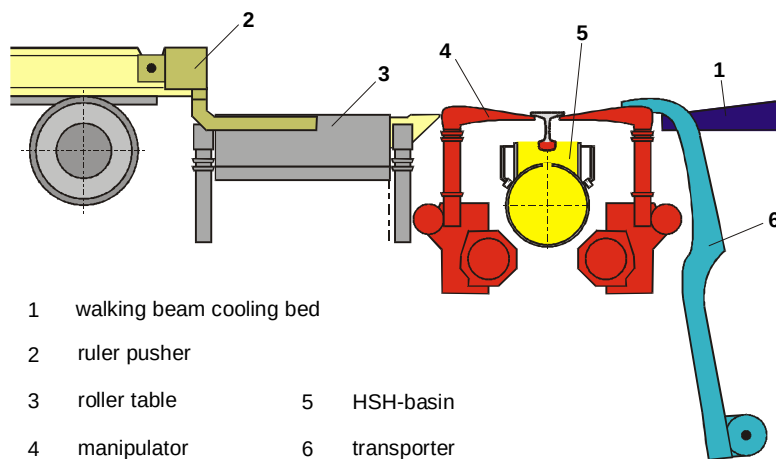
- n tee rails
- n tongue rails
- n grooved rails

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HSH® – Plant Scheme



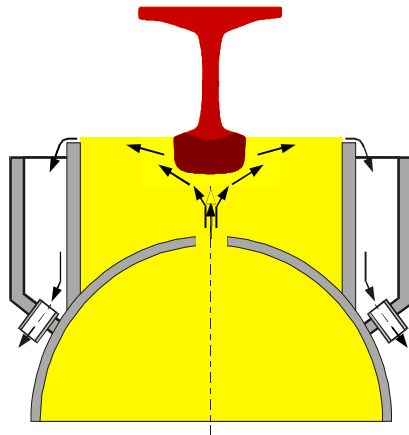
- | | |
|---|--------------------------|
| 1 | walking beam cooling bed |
| 2 | ruler pusher |
| 3 | roller table |
| 4 | manipulator |
| 5 | HSH-basin |
| 6 | transporter |

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HSH® – the Head Hardening Process



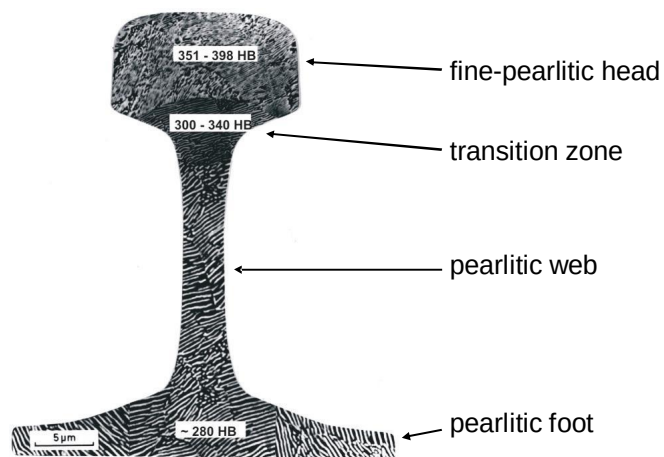
- n fine-pearlitic
- n highest quality
- n highest productivity
- n tee rails
- n tongue rails
- n grooved rails
- n more than 10 steel grades between 290-440 BHN hardness

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Microstructure of a HSH®-Rail

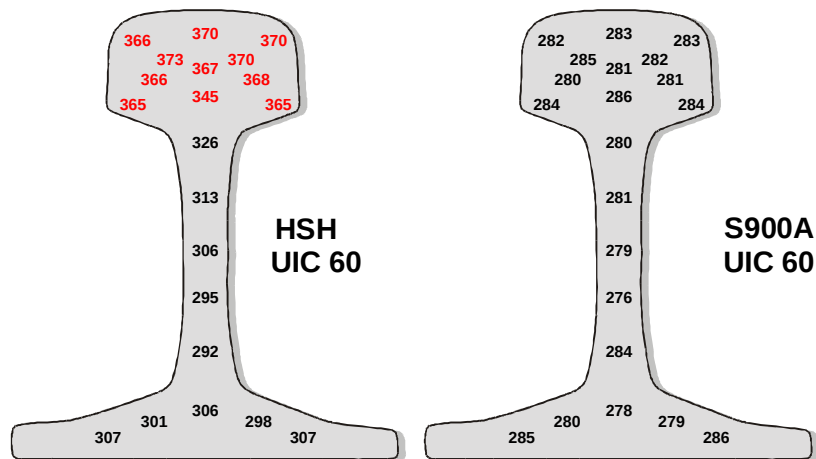


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HSH®-Tee Rail – Hardness Distribution



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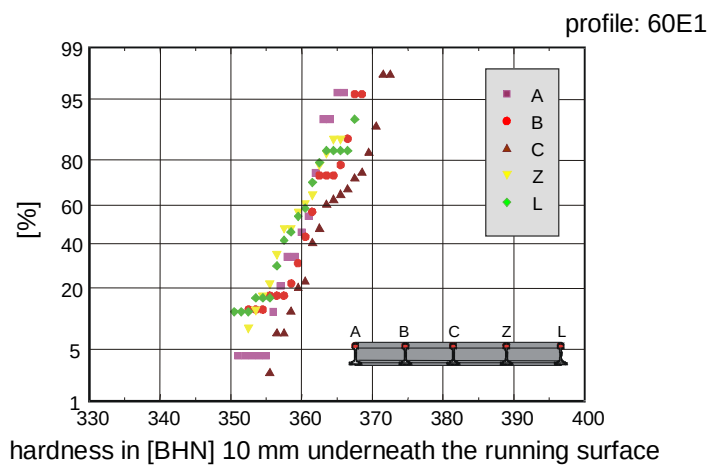
Hardness Characteristics HSH®-Rail



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Hardness – Statistical Data for R350HT

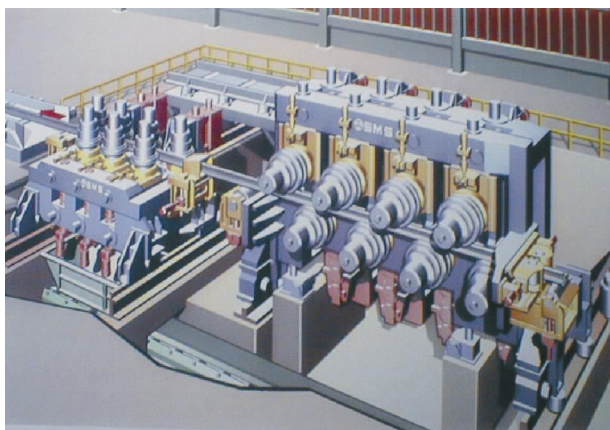


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Two-Stage Roller Straightener



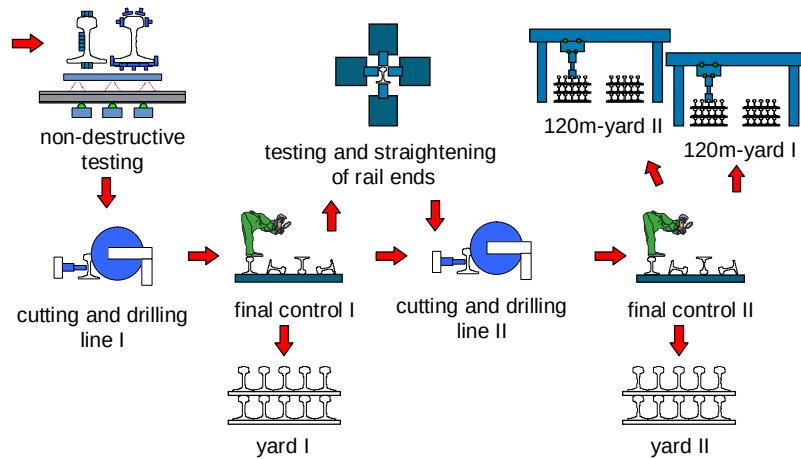
- n horizontal
8 rolls
- n 1.200 mm Ø
- n vertical
7 rolls
- n 650 mm Ø
- n vertical flatness
< 0,25 mm/3 m
- n horizontal
flatness
< 0,30 mm/3 m

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Production Flow – Finishing Mill

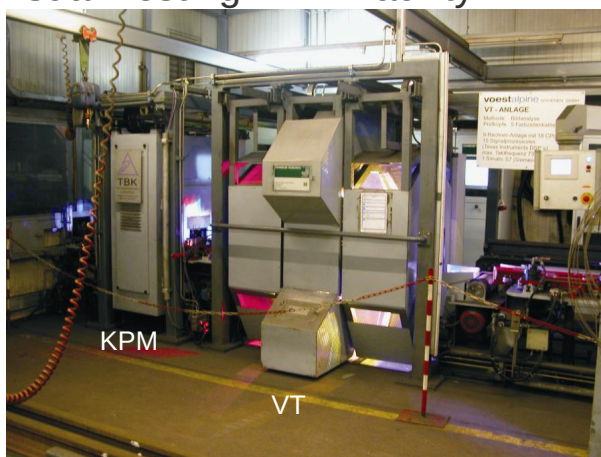


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Cold-Profile-Measuring – KPM-Facility and Visual Testing – VT-Facility



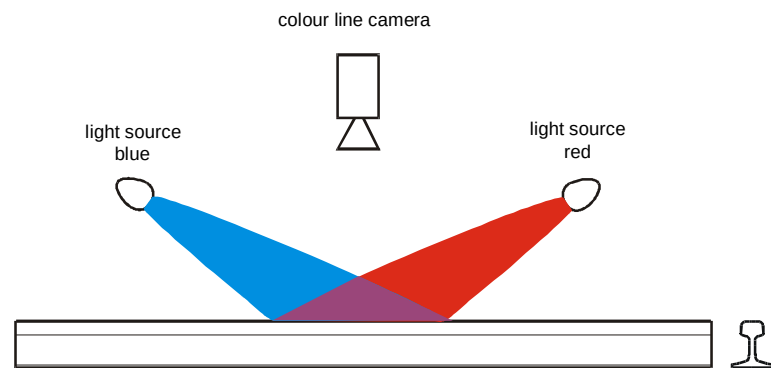
- n KPM-facility
 - n laser-cut method
 - n 8 lasers
- n VT-facility
 - n fully automated checks entire rail surface
 - n 9 PCs with 18 CPUs
 - n 15 signal processors

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VT-Facility – Principle

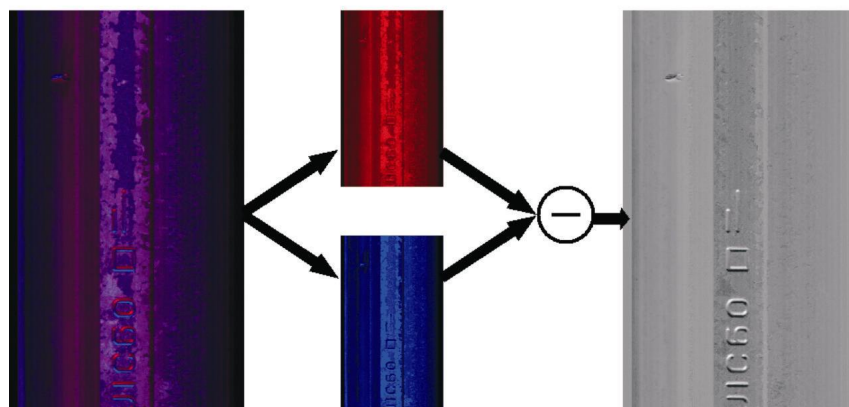


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Generation of the Differential Image

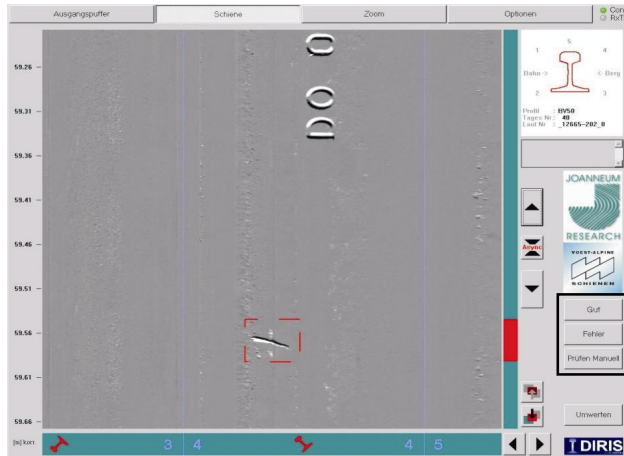


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VT-Facility – Testing Result



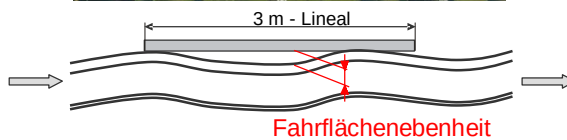
decision
on-site and
in the
production flow

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Surface Flatness Testing – FT-Facility



- n two sets of each five lasers
- n 0,01 mm precision
- n 0,5 – 3,0 m wave lengtht
- n 1,5 m/s
- n according to EN 13674

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Testing for Surface Cracks – ET-facility

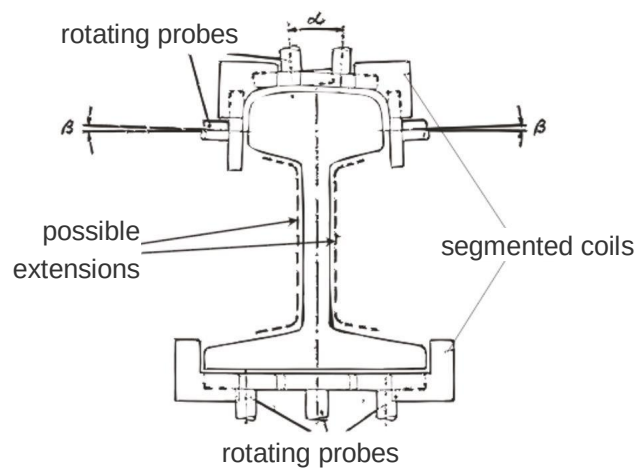


- n eddy current testing
- n rotating probes for foot and head
- n segmented coils for gauge corner and foot tips
- n 1,5 m/s
- n according to EN 13674
- n data coupled to VT results

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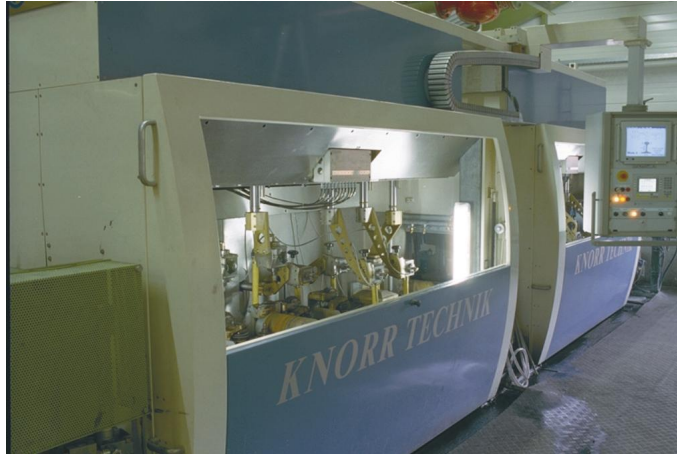
Eddy Current Testing – ET-Facility



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Testing for Internal Defects – UT-Facility

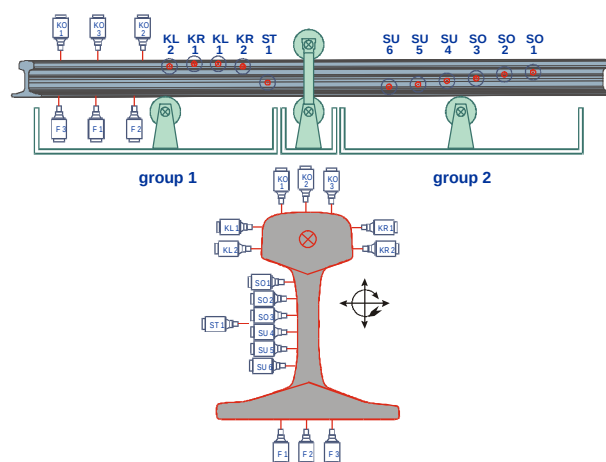


- n ultrasonic testing
- n 17 emitter-receiver probes
- n contact-free by water-jet coupling
- n 1,5 m/s
- n according to EN 13674

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Arrangement of the UT-Probes



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Ultrasonic Testing



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Checkpoints – Verification and Acceptance



- n automated stop at VT-, ET- and UT-defects
- n automated presentation of the VT-picture
- n verification and decision:
 - n accepted
 - n to correct
 - n reject
 - n short lengths

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Cutting and Drilling Line I



- n CNC-controlled
- n cutting plan pre-programmed
- n 25 s per cut
- n 6 drills
- n automated scrap disposal
- n automated sampling for destructive testing

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Destructive Testing – Acceptance Testing Lab

- n all tests in accordance with customer specification:
 - n tensile testing
 - n hardness testing
 - n Baumann prints
 - n metallographic checks (lab)
 - n special acceptance tests (e.g.: impact notch test)
- n acceptance testing lab - equipment:
 - n two tensile testing machines
 - n three hardness testing machines
 - n one pendulum impact testing machine
 - n metallographic lab with two microscopes and additional equipment for failure analysis and R&D work

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Four Side Gauge Press



- n two hydraulic presses
- n with de-twisting device
- n measurement vertical and horizontal with lasers
- n pre-positioning of the pistons
- n pre-adjusted pressure
- n re-check and acceptance

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Stockyard for Ultra-long Rails



- n two stockyards for 120 m
- n stockyard 1 for 6.000 to
- n stockyard 2 for 9.000 to
- n only one operator
- n fully automated
- n continuous operation

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Loading of Ultra-Long Rails



- n 3 h loading time for 36 pieces
- n different loading techniques
- n RIV-flatbed-wagons used regularly

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Long Rail Train



- n 60 % of production are long rails
- n 108 – 120 m
- n 36 pieces/load
- n 260 t/load
- n approved by all European countries
- n Just-In-Time logistics

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Unloading System – Railputler



- n developed in cooperation with Robel
- n precise positioning
- n no detrimental distortion
- n up to 1.700 m/h
- n down to 250 m radius
- n approved by all European countries

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Comprehensive Certification



n integrated management system:

- n ISO 9001 since 1992
- n ISO 14001 since 1999
- n risk management since 1999
- n OHSAS 18001 since 2001

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Who is voestalpine Schienen GmbH?

- n worldwide quality leader
- n technological leader:
 - n largest product portfolio
 - n inventor of long rails and pioneer of just-in-time logistics
 - n owner of the largest production capacity for head hardened rails
 - n research and development is steered by RAMS-criteria
- n result: products with highest reliability and safety
- n unique consulting competence on
 - n customer-specific product choice
 - n greatest RAMS-figures and
 - n optimized Life-Cycle Costs
- n We increase customer benefit – flexible, quick, precise!

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