

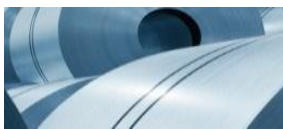


voestalpine Group R&D

voestalpine Steel Division
www.voestalpine.com/stahl

voestalpine
ONE STEP AHEAD.

voestalpine Group Organization of R&D



Steel Division



Special Steel Division



Metal Engineering Division



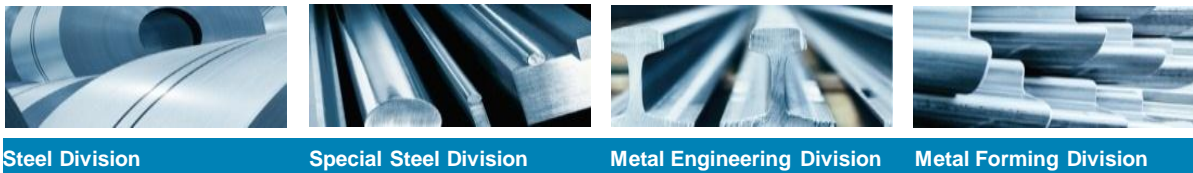
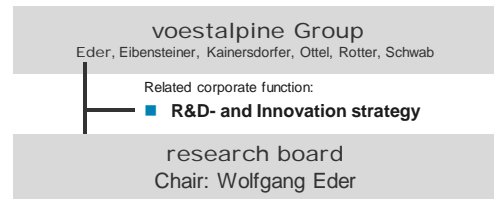
Metal Forming Division

- Generally, voestalpine has a decentralized R&D organisation
 - Each company/business unit has it own R&D group/department

voestalpine Steel Division
2 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

voestalpine Group Organization of R&D



research coordination and committee

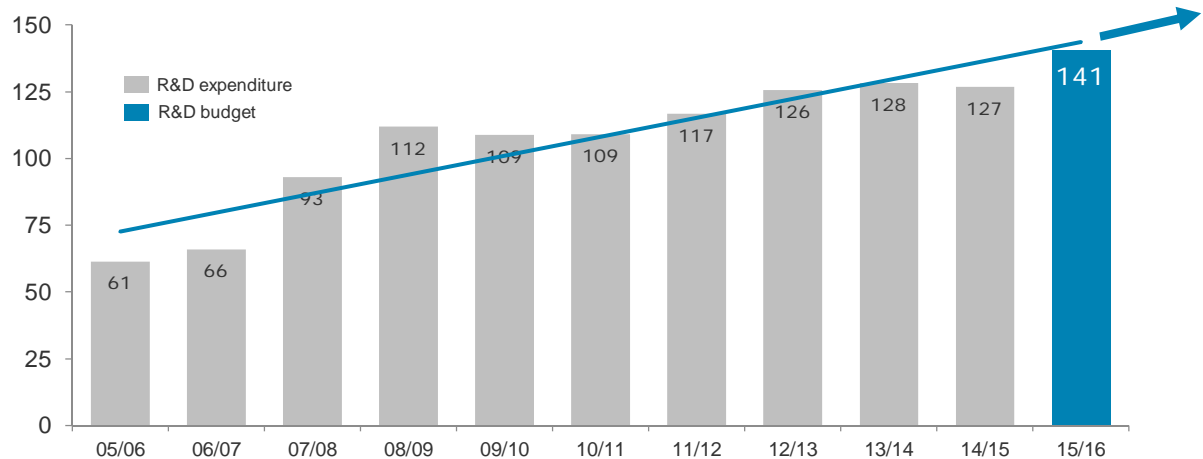
Steel	Franz Androsch (Chair)
Special Steel	Georg Reithofer
Metal Engineering	Thomas Starzer
Metal Forming	Karl Radlmayr

voestalpine Steel Division

3 | 30.09.2015 |



voestalpine Group R&D Expenditures in Mio. €

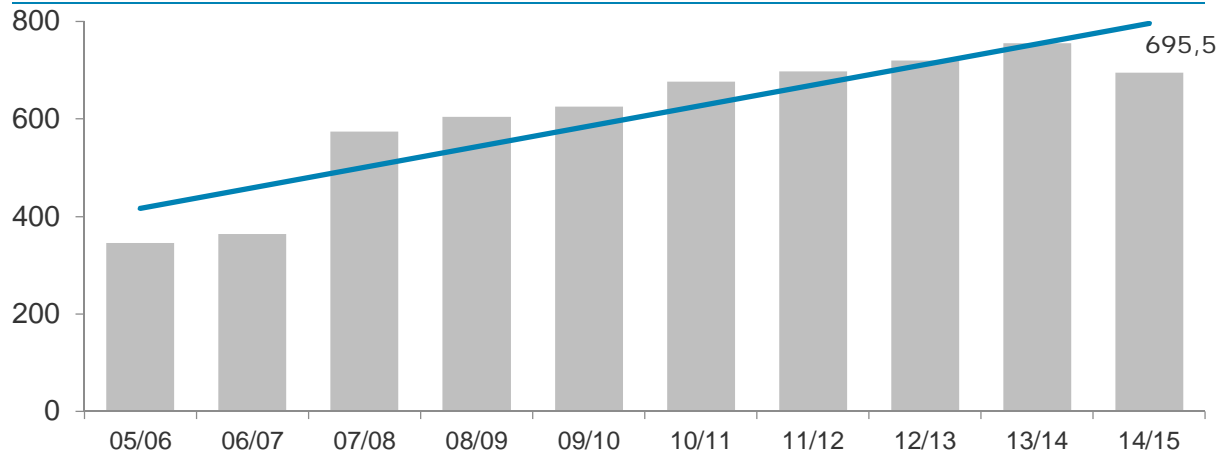


voestalpine Steel Division

4 | 30.09.2015 |



voestalpine Group R&D Personnel in py



voestalpine Steel Division

5 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.

voestalpine Group Strategic Innovation Guidelines

voestalpine - the next step ahead

Working **together** for success, from concept to market introduction

Decentralized R&D departments form a global voestalpine **network**

We promote the best ideas, **creating USPs** along the whole value chain

Only **the best** researchers work for voestalpine

Active know-how management, both on the inside and outside, is our key to success

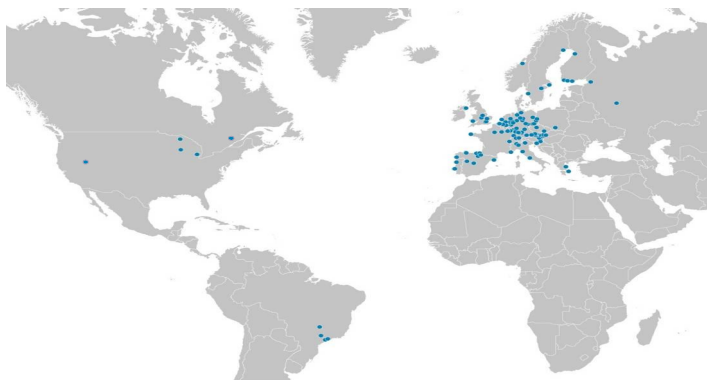
voestalpine Steel Division

6 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.

voestalpine Group Cooperation's with Scientific Partners



Scientific cooperations with

- Universities
- Research institutes
- Centres of competence
- CD-Labs

In following countries:

Canada, Belgium, Brasil, Germany, Finland, France, Greece, Great Britain, Italy, The Netherlands, Norwegian, Austria, Poland, Portugal, Russia, Sweden, Switzerland, Slovakia, Slovenia, Spain, Czech Republic, USA

voestalpine Steel Division

7 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.



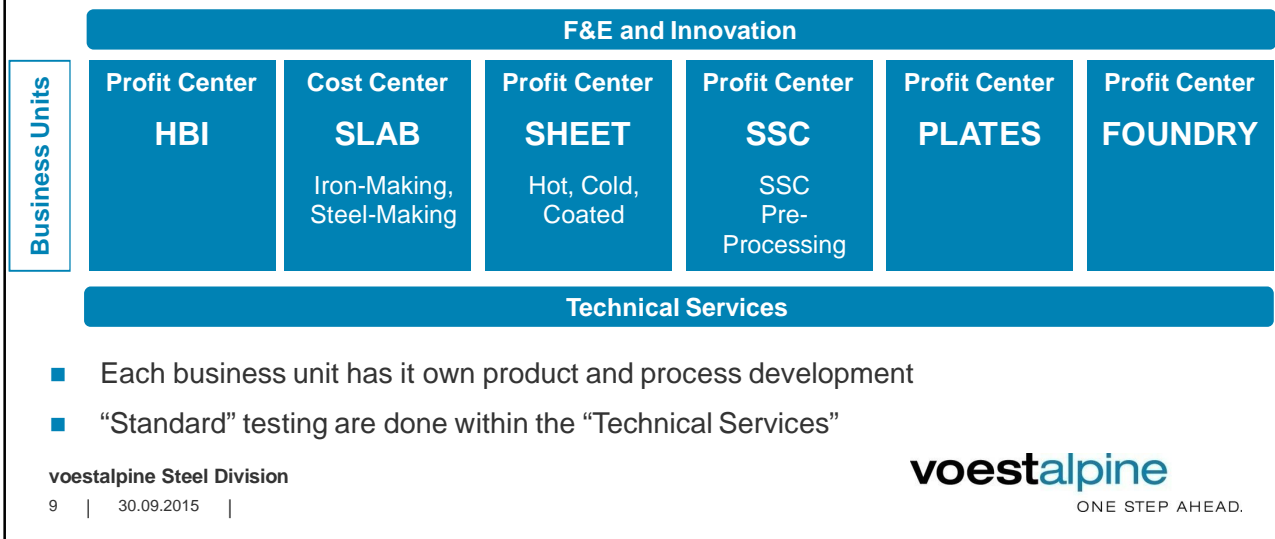
Steel Division R&D

voestalpine Steel Division
www.voestalpine.com/stahl

voestalpine

ONE STEP AHEAD.

Steel Division Organization of R&D



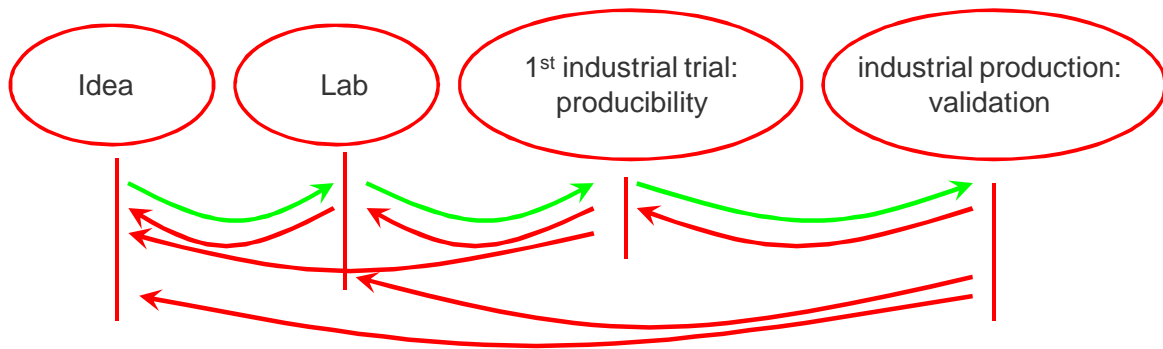
Steel Division Main Focus for the Product Development

- Advanced high strength steel grades for cold forming
- Zinc coated grades (cathodic corrosion protection) for press hardening
- Zinc-Magnesium coating for an improved corrosion protection
- New organic coatings for household application
- Chromate-free passivation
- **Electrical steel sheet with outstanding electro-magnetic properties**
- Special steels for deepest pipelines withstanding highest pressure
- Materials increasing efficiency in the energy sector

Steel Division

From Processing in the Lab to Industrialization

- Overview of the steps



voestalpine Steel Division

11 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.

Steel Division

Careful selection and Prioritization of R&D Topics

- Overview of the steps



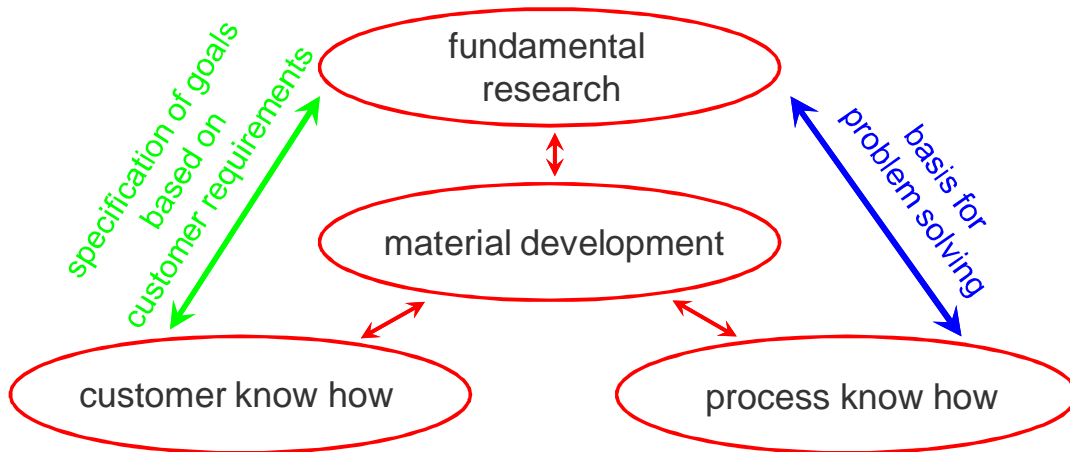
voestalpine Steel Division

12 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.

Material Development including Customer and Process KH and Fundamental Research



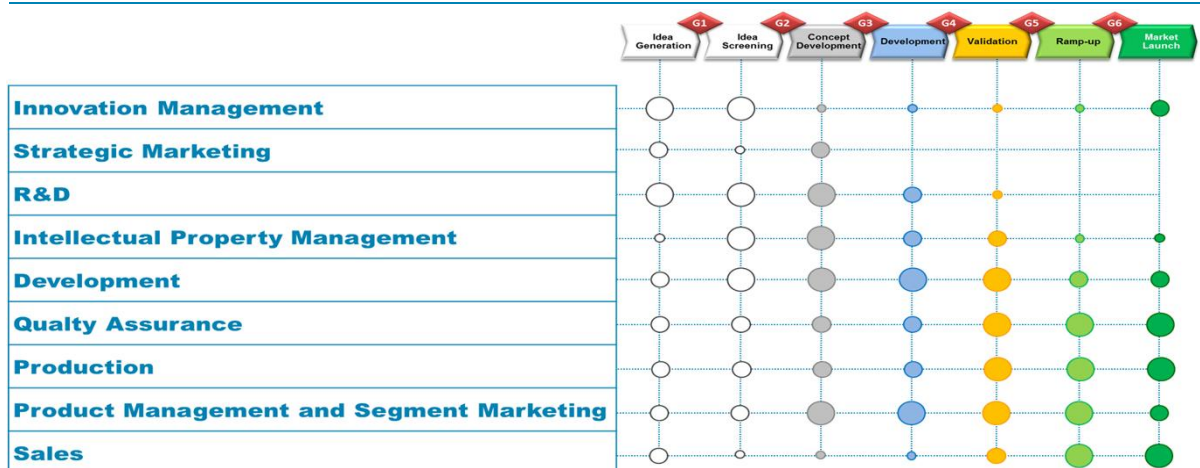
voestalpine Steel Division

13 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.

Product Innovation Process Involvement of Many Departments



voestalpine Steel Division

14 | 30.09.2015 |

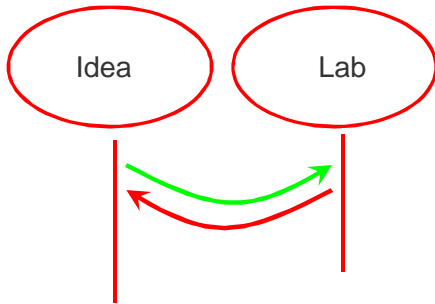
voestalpine

ONE STEP AHEAD.

Steel Division

Processing in the Lab

- Overview of the steps



voestalpine Steel Division

15 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.

Steel Division

Processing in the Lab

- Overall processing can be done in the lab

coking /
sintering
plant



blast furnace



LD converter



ladle furnace



RH vacuum
degassing



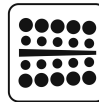
continuous casting



reheating



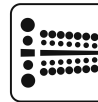
hot rolling



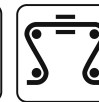
descaling



cold rolling



annealing



voestalpine Steel Division

16 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.

Steel Division

Lab Processing / Main Guidelines for the Simulators

- Lab processing must be inexpensive and fast
- The simulators are focusing on the most important process and are not pilot plants
- Simulators should have a modular design for using them for different industrial processes
- In comparison to industrial lines process parameters can be varied in a significantly wider range
- Evaluation and feasibility estimation of new technologies
- Process parameters can be adjusted and monitored in a more accurate way
- All simulators are designed and built by voestalpine

voestalpine Steel Division

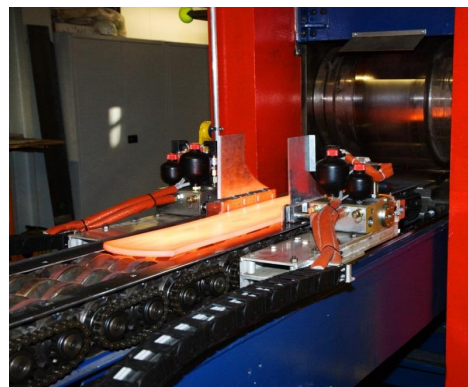
17 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Steel Division

Overall Processing Can be Done in the Lab

- Hot rolling



voestalpine Steel Division

18 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Steel Division

Overall Processing Can be Done in the Lab

- Annealing for Si grades



voestalpine Steel Division

19 | 30.09.2015 |

- Annealing high strength grades



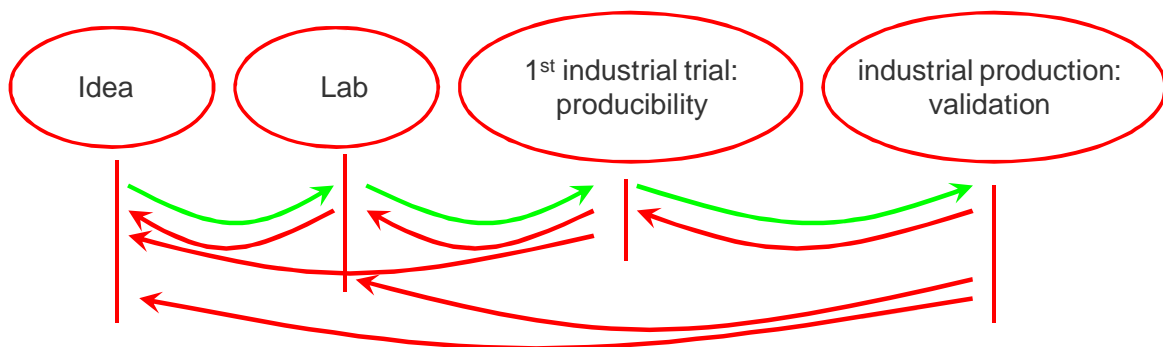
voestalpine

ONE STEP AHEAD.

Steel Division

Industrialization

- Overview of the steps



voestalpine Steel Division

20 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.

Steel Division

Industrialization

- Clear procedure for trial production
 - Chemical composition and process parameters are selected based on lab results
 - Plant engineers are involved
 - Plant material are transferred to the lab for further processing
 - Based on the results adjusted processing parameters are suggested
- Clear procedure for further industrial steps
 - Strict monitoring of the process parameters and obtained results
 - Fine tuning of the process parameters based on feedback loops
 - Transfer of the responsibility from the R&D to the quality department

voestalpine Steel Division

21 | 30.09.2015 |

voestalpine

ONE STEP AHEAD.



Steel Division Upgradings At Hot Rolling Mill



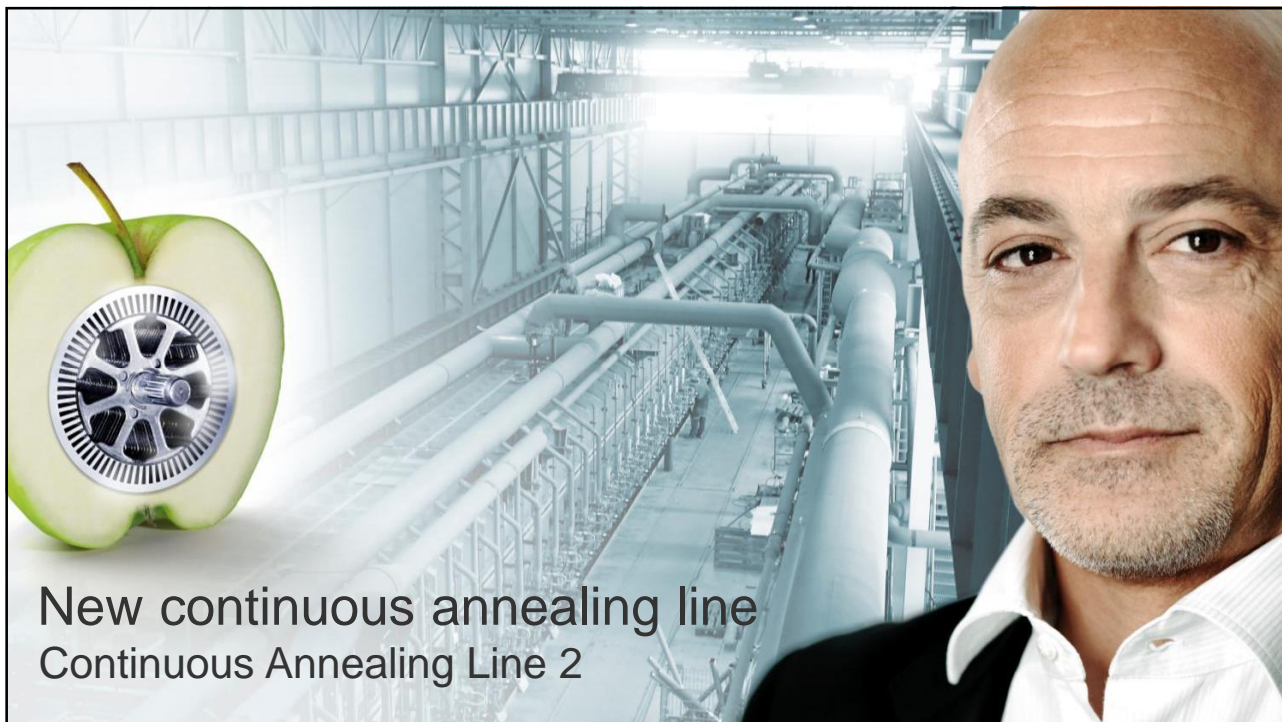
- 2006-2011 Total Replacement of Finishing Line

voestalpine Steel Division

25 | 30.09.2015 |

voestalpine

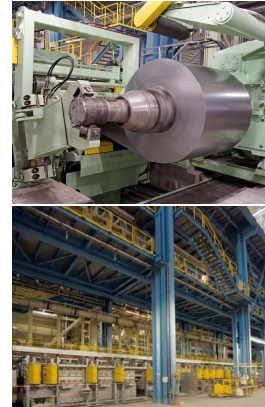
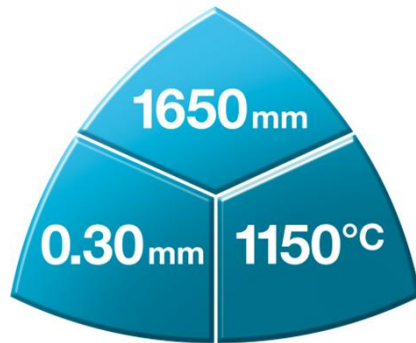
ONE STEP AHEAD.



New continuous annealing line
Continuous Annealing Line 2

Steel Division Continuous Annealing Line

- Investment volume: 150 Mio. EUR



voestalpine Steel Division

28 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Steel Division - Product Portfolio



HE high-efficiency HS high-strength HC high-conductivity HF high-frequency

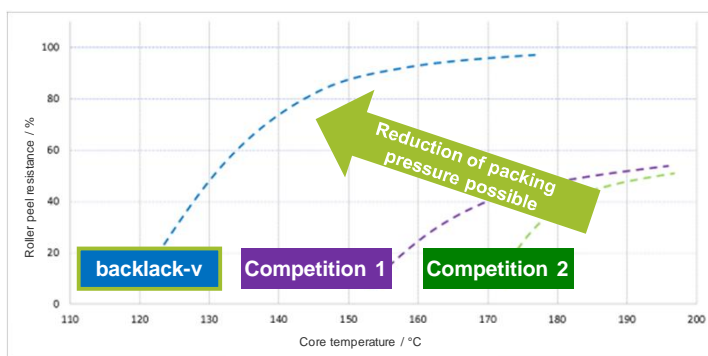
voestalpine Steel Division

30 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.



Steel Division The Innovation At voestalpine



Packing pressure: **1** MPa

Dwell time at core temperature = 1 h

“Hard” varnishes feature worse bonding forces at low pressures and high bonding temperatures → only partial contact

voestalpine Steel Division

32 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Steel Division

References With CERN

- MedAustron project (600 to):
 - isovac HP 1300-100A with Backlack coating
 - isovac HP 250-35A with Backlack coating

- ELENA project (150 to):
 - isovac HP 270-50A with Backlack coating

voestalpine Steel Division

33 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Steel Division

The Technical Challenge

- Guaranteed values in tenders are extremely strict

- Technical requirements are often diametrical to each other
 - chemical analysis restrictions vs. physical properties

- Technical requirements sometimes impossible to achieve
 - absolute value and tolerance of coercitivity values

voestalpine Steel Division

34 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Steel Division

The Documentation Challenge

- Extensive sampling for quality documentation lead to very long lead times
- Non standard sampling for quality documentation leads to an increased effort in issuing a material certificate

voestalpine Steel Division

35 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Steel Division

The Main Point

**“Amendments to tender lead to disqualification,
changes impossible”**

voestalpine Steel Division

36 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Steel Division

How To Improve Business Relationship with CERN

- Earliest possible **involvement** of voestalpine in definition of the material for a project

- Technical **discussion before** the issuing of tenders

voestalpine Steel Division

37 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.

Thank you.

voestalpine Steel Division

38 | 30.09.2015 |

voestalpine
ONE STEP AHEAD.