# FAST TRACK TAILOR MADE WIRE SOLUTIONS

by voestalpine Wire Technology



voestalpine Wire Technology www.voestalpine.com/wiretechnology



# FAST TRACK TAILOR MADE WIRE SOLUTIONS

Our world is the world of wire. As a flexible and innovative partner with a unique research infrastructure, we guarantee you highquality solutions in your market environment. Based on our core values of quality, flexibility, innovation and sustainability, we live "Performance in Wire" in all process steps.



### QUALITY

We guarantee maximum consistency in mechanical properties, metallurgical structure, geometry and surface quality by bringing the entire value chain, from steel to wire rod through to drawn wire under one roof. This focus on quality, supported by digital tools,

enables maximum cost efficiency for our customers. ISO 9001, 14001, 18001, 50001, and IATF certifications 16949 are proof of our focus: **Performance in Quality**.



### INNOVATION

With our individually tailored wire solutions we can meet your demands and your customers' requirements. As well as digital product simulations, our unique R&D set-up means we can offer the option of individual product development with substantially

reduced development times. By carefully considering material and process development from steel to the drawn wire, our R&D team guarantees optimized product properties for the subsequent processing and use of your products. That complete package guarantees you **Performance in Innovation**.



### FLEXIBILITY

Our added-value chain starts right from own Iron ore, continues through our steelworks, rolling mill and drawing shops, and even extends beyond our customers' factory gates where necessary. That means we can offer maximum flexibility in every stage of the

process, customized solutions for surface treatment, packing and shipping, including of course, just-in-time delivery in consignment warehouses and for coil sizes up to 3 tons. That is what we understand by **Performance in Flexibility**.



### **SUSTAINABILITY**

We take responsibility for our society and our environment. Our corporate culture stands for the development of long-term partnerships and dependability at many levels. Right from the product development stage, we take account of the carbon footprint and maximum sustain-

ability of our products. In that way we can guarantee Performance in Sustainability.

# CUSTOMIZED SOLUTIONS FOR DEMANDING APPLICATIONS

### OUR EXPERTISE AND HOW YOU CAN BENEFIT FROM IT

- » Expansion of the product portfolio
- » Joint material development
- » Individual alloy concepts
- » Acceleration of time-to-market for product developments
- » Casting formats as in industrial-scale systems
- » Seamless transition to series production
- » Customer sampling in the form of utility models

### FOUR STEPS TO CUSTOMIZED SOLUTION

- **1. VIRTUAL PRODUCT DEVELOPMENT**
- 2. STEEL DEVELOPMENT
- 3. TEST AND MEASUREMENT TECHNOLOGY FOR WIRE APPLICATIONS IN THE TECHNICAL CENTER WIRE
- 4. APPLICATION TECHNOLOGY AND BASICS





### FROM THE CUSTOMER REQUIREMENTS TO THE PRODUCT SOLUTION

### ONGOING FURTHER DEVELOPMENT OF MATERIALS, SURFACE & FORMING TECHNOLOGY

### NEW PRODUCT REQUIREMENT

### 1 MATERIAL AND FORMING SIMULATION

Simulation of material properties of new alloys and simulation of the forming process at the customer

### 2 METALLURGY LABORATORY

50 kg melts for material characterization

### **3 PROCESS SIMULATION**

Clarification of process parameters for new alloys

### 4 TECHNICAL CENTER METALLURGY

5t batches produced similar to the large-scale route

### 5 WIRE ROLLING MILL

Rolling of pilot plant batches in large-scale billet format

### 6 TECHNICAL COMPETENCE CENTER WIRE

Customer-specific special tests and wire post-treatment in the technical center

### **PRODUCT APPLICATION**



## 1. VIRTUAL PRODUCT DEVELOPMENT

### WE THINK HOLISTICALLY

In many cases, a new alloy concept is created virtually on the computer. The design tools can be used from the atomic level upwards to forming processes and end-properties.

Cooperation with universities and research institutions also ensures the access to up-to-date knowledge.



MATERIAL SIMULATION



PROCESS SIMULATION





PHYSICAL SIMULATION

FORMING SIMULATION



# 2. STEEL DEVELOPMENT

### UNIQUE IN THE WORLD: METALLURGY LABORATORY AND METALLURGY PILOT PLANT

With the Metallurgy Laboratory and the Metallurgy Technical Center, you have two unique research facilities at your disposal with which new alloys can be designed and tested on the smallest scale. Customized chemical compositions are possible in a short time. The MetLab provides you with laboratory samples for preliminary tests from 8 kg to a maximum of 50 kg.

Based on this, individual batches can be cast in the Tech-Met, with which the processability is tested using a 3-ton billet in the wire rolling mill and initial customer samples are provided. With the Technical Center for Metallurgy (TechMet) and the Metallurgy Laboratory (MetLab), we have installed new research facilities with which we can efficiently develop new products and materials with our customers very flexibly, on a small scale and with short time-to-market - in addition to the large-scale facilities.





## 3. WIRE DEVELOPMENT

### THE RIGHT BALANCE

The development of our high-quality wires includes the coordination of material and surface properties.

In addition, we continuously optimize wire forming in our rolling mill, in the drawing mills and at customers who process the wires into complex products. Another focus of our development work is to generate the right balance between processing and performance properties depending on your requirements.



## 4. TECHNICAL COMPETENCE CENTER WIRE

### CUSTOMER NEEDS DOMINATE THE SYSTEMS

Our team of experts in research & development and application engineering has a deep understanding of the material properties and the physical and chemical requirements of your products.

Our own testing facilities and our extensive research network help us to overcome these challenges.

Systems tailored to customer requirements dominate the wire technology center. Here, material, surface and forming form a framework within which the product is further developed and optimized.





### 4.1 HEAT TREATMENT

Our heat treatment capacities offer near-production conditions for simulating classic heat treatment processes for quenching and tempering. Other types of heat treatments such as Q&P and Bainitic are possible with isothermal temperature control using a salt bath.

Chamber furnace: for simple heat treatment processes without atmospheric requirements up to 1250  $^{\circ}\mathrm{C}$ 

Oil and neutral salt quenching baths: for controlled sample cooling

Retort furnace: for inert and reactive gases with comprehensive gas analysis and batch temperature control for the heat treatment of materials up to 1150 °C under closely controlled atmospheric conditions

#### Application examples

- » Targeted microstructure adjustment in material development
- $\,$  > Process optimization of the annealing and austenitization treatment of wires under  $N_{\rm 2},$  Ar or  $H_{\rm 2}$  atmospheres

### 4.2 SERVO-HYDRAULIC TESTING SYSTEM

Our high-speed forming press in combination with an ultra-modern tool and die assembly makes it possible to determine the forming limit and work hardening properties of materials under the typical, demanding cold heading forming conditions.

#### Application examples

- » Assessment of surfaces, coatings and lubrication concepts
- » Investigation of crack initiation
- » Derivation of measures for efficient and optimal formability of our cold extrusion (KFP) materials



### 4.3 STEP-LOAD-TEST

The newly developed corrosion cell makes it possible to test the hydrogen sensitivity of critical alloys under simulated operating conditions in which corrosion and hydrogen diffusion play a significant role in terms of product quality and service life.

### Application examples

- » Assessment of hydrogen-induced stress corrosion cracking by in-situ hydrogen loading using a specially developed corrosion cell in the stepload test
- » Assessment of different corrosion mechanisms such as pitting or passivation kinetics



### 4.4 TEST DRAWING UNIT

Our test drawing line is used for targeted testing of wire rod up to 12 mm in diameter without having to interrupt the ongoing production process in the drawing shop. The drawing line is also equipped with measuring technology, such as force measurement and media monitoring.

#### Main applications

- » Tests on new materials
- » Characterization of coatings
- » Drawing surface-agent tests
- » Draw die variations

### 4.6 X-RAY FLUORESCENCE ANALYZER (RFA)

A mobile XRF is available for rapid and non-destructive determination of the material composition. Mass percentages of the elements from magnesium to uranium are output. It is therefore not possible to determine the alloying element carbon using this method.

#### Application examples

- » Confusion check/element determination (e.g. on wire sections, billets)
- » Component testing (e.g. to determine the material for purchased parts that are to be manufactured internally in the future)
- » Incoming inspection (purchased parts mechanical engineering, wire samples)
- » Process (e.g. galvanizing bath composition)

### 4.5 COATING ROBOTS

A fully automated coating robot is available for the optimization of surface properties, which can apply a multi-stage laboratory coating or carry out pickling and cleaning tests. The main applications include, for example, the development of alternative coating systems for specific applications and the optimization of existing wet chemical processes.



### 4.7 THERMAL CAMERA

The thermal camera is used for mobile and contactless temperature measurement in a range from 150 to 1200 °C. In addition to direct measurements, recordings (temperature and time curve) can also be made for up to 15 minutes. The software can also be used to output limit value violations via a digital signal.

### Application examples

» Process & research (determination of the laying temperature on the cooling conveyor, recording of the ring cooling behavior and the temperature after the cold rolling process)



# R & D TASKS AND COMPETENCIES

### MATERIAL AND PROCESS DEVELOPMENT FROM STEEL TO DRAWN WIRE

In addition to arranging and organizing standard tests and summarizing the resulting findings, our department uses the modelling and simulation facilities and materials databases within the research service company.

In addition, the department offers the conception, controlling and subsequently the data backup of projects within the R&D program.

- » Developing and expanding basic knowledge together with customers, external and internal partners
- Optimization of steel composition and control of processes to achieve certain properties
  - Heat treatments, phase transformations and metallographic structures
  - Wire straightening, residual stresses
  - Surface treatments (coatings, zinc, lubricants, wire cleaning, descaling, pickling)
- Development of new methods for inline crack detection on the wire (optical inspection and AI-supported evaluation)





# WHY voestalpine WIRE TECHNOLOGY?

We offer stable product quality in a wide range of products, experienced material and product developers, maximum flexibility in packaging, logistics solutions and packaging requirements. We guarantee customized wire solutions:



Consistent quality across our entire value chain



Shortest product development times thanks to advanced R&D facilities and the use of digital development tools



Customized surface and heat treatment



Flexible batch sizes up to 3 tons



Customized packaging and transport solutions, protected storage



Sustainable products

# OUR LOCATIONS

## FROM OUR PRODUCTION SITES, MOST OF WHICH ARE LOCATED IN EUROPE WE SUPPLY A GLOBAL CUSTOMER NETWORK.

#### voestalpine Wire Rod Austria GmbH

8792 St. Peter-Freienstein, Drahtstraße 1, Österreich T: +43 50304 27 0 Delivery program: Wire rod

#### voestalpine Wire Austria GmbH

8600 Bruck an der Mur, Bahnhofstraße 2, Österreich T: +43 50304 22 0 Delivery program: Drawn wire (cold heading wire), Prestressing steel wire, profile wire

#### voestalpine Wire Germany GmbH

03238 Finsterwalde, Grenzstraße 45, Deutschland T: +49 3531 786 223 Delivery program: Drawn wire (cold heading wire, iron wire, free-cutting steel wire)

#### voestalpine Wire Italy srl

31040 Nervesa della Battaglia, Via Foscarini 44, Italien T: +39 0422 7244 Delivery program: Drawn wire (cold heading wire, Free-cutting steel wire, iron wire, profile wire, coated wire)

#### voestalpine Wire Suzhou Co. Ltd

215126 Suzhou, Jiangsu, 121 Xingpu Road, Suzhou Industrial Park, China Delivery program: Complete delivery program



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