# HOT WORK APPLICATIONS

**Products and Services for Hot Work Tooling**

voestalpine High Performance Metals North America

voestalpine
ONE STEP AHEAD.

# OUR PRODUCTS AND SERVICES

## TOOL STEELS

We offer premium hot work tool steels from renowned brands BÖHLER and Uddeholm, engineered to meet the most demanding industrial applications. These steels are the result of centuries of innovation, precision development, and continuous refinement—ensuring optimal performance, durability, and reliability in high-stress performance.

## HEAT TREATMENT ALLIANCE

To further enhance the value we provide, we've established a strategic alliance with world-class heat treatment specialists. This partnership ensures that our tool steels not only meet the highest quality standards but also benefit from the best-in-class heat treatment practices. This guarantees optimal mechanical properties and performance. For more details, please contact your sales representative.

## ADVANCED COATING SOLUTIONS

voestalpine eifeler Coatings, a global leader within the voestalpine group, specializes in high-performance thin film coatings. Our coating technologies utilize Physical Vapor Deposition (PVD) methods—both evaporating and sputtering—to enhance surface properties. We also offer Duplex processes, which combine plasma nitriding with advanced nano-layer coatings, delivering superior wear resistance, hardness, and longevity for tooling applications.

## ADDITIVE MANUFACTURING EXPERTISE

As a full-service solution provider, we collaborate closely with our customers to tailor tooling solutions to their specific production needs. Our team conducts failure analysis to identify root causes of tool performance issues and recommends effective solutions. Leveraging our deep expertise in design, materials, and 3D printing, we deliver customized, high-performance tools that maximize efficiency and productivity.

# INDUSTRY LEADERSHIP

**Delivering Premium Tooling Solutions Across North America**

At voestalpine High Performance Metals, we are a trusted global leader in premium tooling solutions, delivering unmatched expertise and innovation to the North American market. As part of the voestalpine Group, we proudly represent the legacy of BÖHLER and Uddeholm—two metallurgical pioneers with centuries of history supporting toolmakers around the world. Our offering spans the full spectrum of tooling applications, including plastics processing, hot work, and cold work. We supply the industries finest tool steels, advanced eifeler PVD coatings, precision machining and value-added services, and expert heat treatment support through our Heat Treatment Alliance. Whether it's injection molding, die casting, forging, stamping, or extrusion, our solutions are engineered to meet the toughest demands of modern manufacturing.


# TECHNICAL SUPPORT FOR HOT WORK TOOLING

## TECHNICAL SUPPORT

As a leader in specialty steels for demanding applications, voestalpine provides the technical expertise required to meet your performance expectations. Our experts in heat treatment, machining, polishing, and surface treatment are always available to assist with application issues or questions. In addition to this support, we can call on our world-wide resources to be there when and where we are needed.

## MATERIAL PROPERTIES

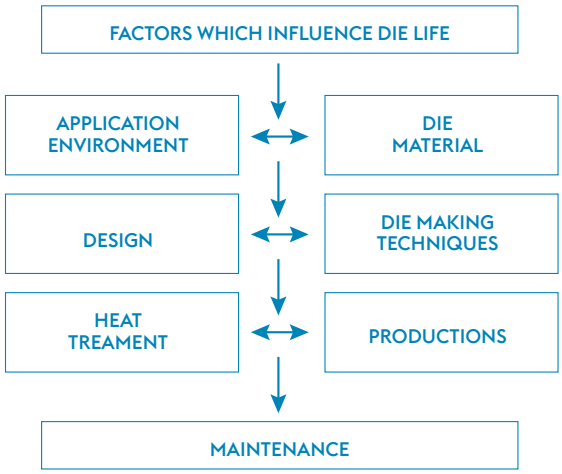
As a tool manufacturer you can expect economical production of die casting tools through:

- Outstanding machinability
- Excellent through-hardening properties
- Good dimensional stability during heat treatment

## DEMANDS ON HOT WORK TOOLING

As a tool user you can expect:

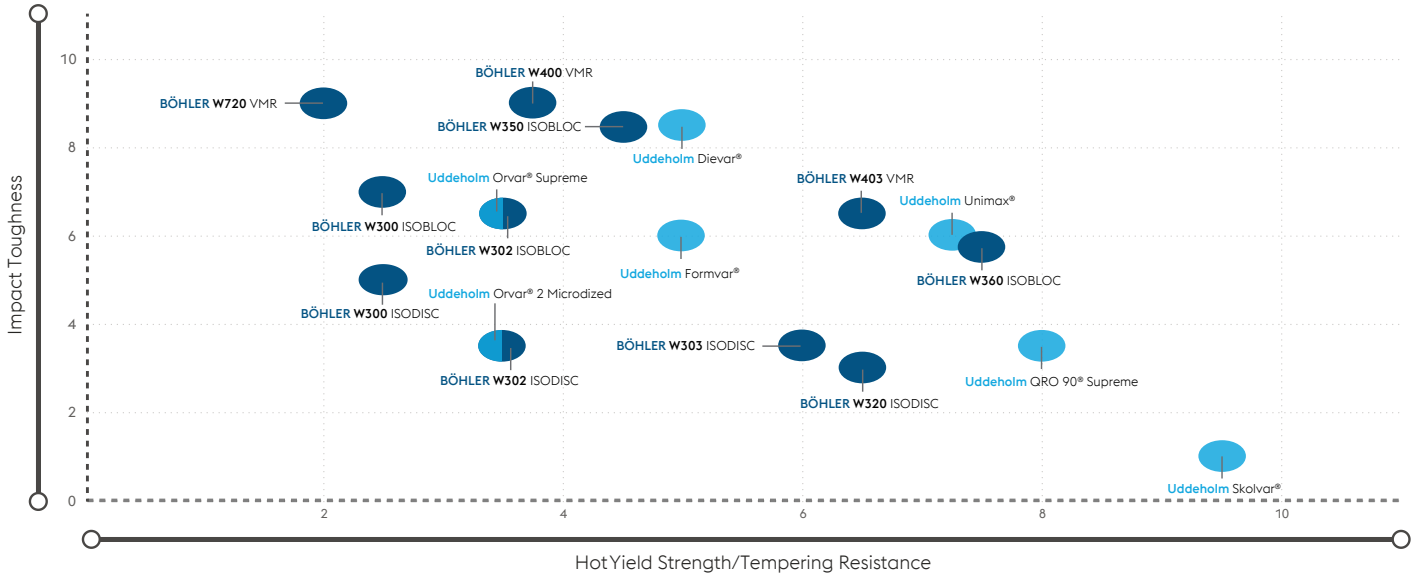
- Consistent and reliable tool life
- High level of resistance to thermal shock and thermal fatigue
- Excellent retention of hardness and resistance to erosion
- Maximum safety against failure during operation

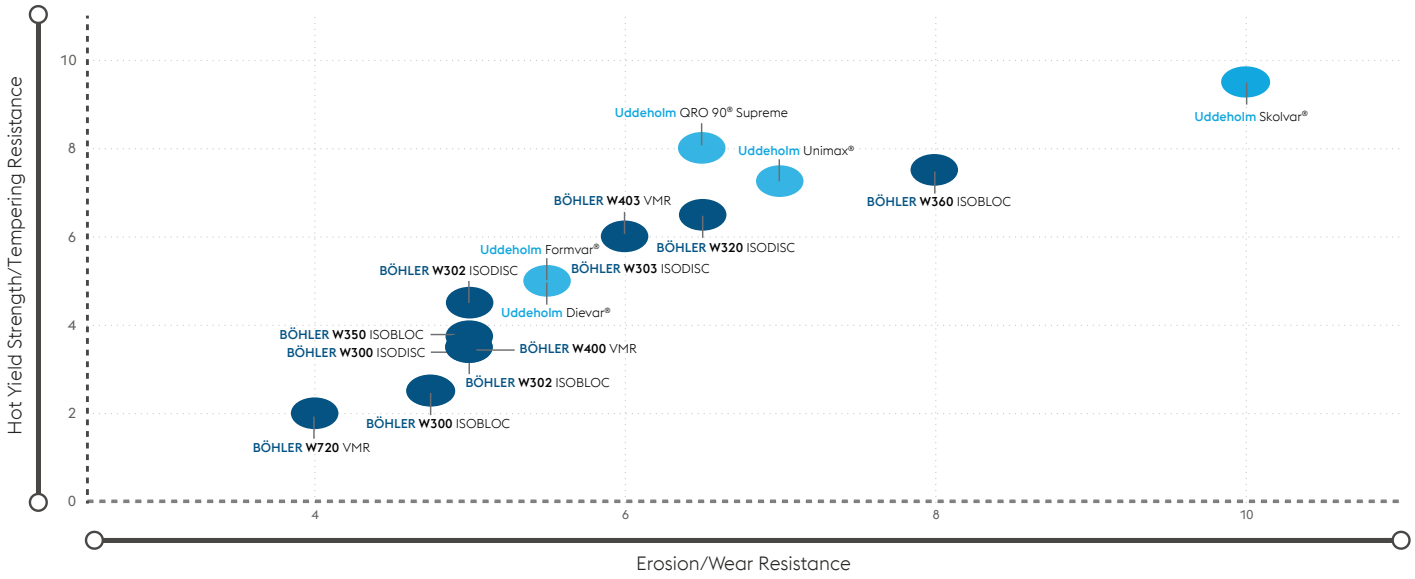



## CONTACT US TO DISCUSS YOUR APPLICATION

# OUR HOT WORK STEEL

| Hot Work Tool Steel | Standard Reference | Melt Process | Description | Applications |
|---|---|---|---|---|
| **Uddeholm** QRO® 90 Supreme | Proprietary Grade | ESR | Premium hot work steel engineered for superior high-temperature tooling. | High pressure die casting, hot stamping, extrusion, forging |
| **Uddeholm** Dievar® | W. Nr. 1.2367 Modified | PESR | Excellent resistance to heat checking and gross cracking. Charpy V-notch toughness 18.4 ft-lb min, 44-46 HRC. Matching TIG, MIG, and Laser weld rod available. Meets NADCA 207 Grade C. | High pressure die casting, large structural dies, forging, extrusion |
| **Uddeholm** Formvar® | Proprietary Grade | Conventional | High performance hot work steel. | Hot forging, extrusion |
| **Uddeholm** Orvar® 2M | W. Nr. 1.2344, AISI H13 | Conventional | General hot work and mold steel. | Die backers, liners, hot shearing, shrink rings |
| **Uddeholm** Orvar® Supreme | W. Nr. 1.2344, AISI H13 PESR | PESR | Very good gross cracking and heat checking resistance. Charpy V-Notch toughness 12 ft-lb min, 44-46 HRC. Exceeds NADCA 207 Grade B. | Dies, fixed inserts, nozzles, ejector pins (nitrided), plungers, die backers, die holders, forging, hot shearing |
| **Uddeholm** Skolvar® | Proprietary Grade | PESR | Excellent hot wear, temper resistance, and thermal fatigue up to 61 HRC with very good weldability. Can be coated. | Hot forging, hot stamping, die casting, shot sleeves |
| **Uddeholm** Unimax® | Proprietary Grade | PESR | Excellent toughness up to 58 HRC, excellent hot wear and heat checking resistance. Matching TIG weld rod available. | Extrusion, forging, hot stamping |
| **Superior H13 ESR** | Superior H13 ESR | ESR | Industry standard H13 remelted for very good gross cracking and heat checking resistance. Charpy V-notch toughness 10 ft-lb min, 44-46 HRC. Meets NADCA 207 Grade B. | Dies, fixed inserts, nozzles, ejector pins (nitrided) plunger, die backers, die holders, forging, hot shearing |
| **BÖHLER W300** ISOBLOC | W. Nr. 1.2343, AISI H11 | Conventional | Well-proven, remelted H11 commonly used for its good hot toughness and high hot hardness and resistance to heat checking. NADCA Grade D. | Extrusion, forging, low pressure die casting, hot stamping |
| **BÖHLER W300** ISODISC | W. Nr. 1.2343, AISI H11 ESR | ESR | This tool steel has a very high hot toughness as well as a good hot hardness and a very good resistance against heat checking. | Low pressure die casting, closed die and open die forging |
| **BÖHLER W302** ISOBLOC | W. Nr. 1.2344, AISI H13 | ESR | Industry standard H13 tool steel with good hot toughness and heat checking resistance. NADCA Grade B. | Extrusion, forging, low pressure die casting |
| **BÖHLER W302** ISODISC | W. Nr. 1.2344, AISI H13 | Conventional | Renowned hot work grade with 5% Cr and remelted for a good hot toughness and heat checking resistance. | Extrusion, forging, low pressure die casting |
| **BÖHLER W303** ISODISC | W. Nr. 1.2367 | Conventional | Hot work tool steel with higher molybdenum addition for better heat resistance and good heat checking resistance. | Extrusion, forging, high pressure die casting, low pressure die casting, hot stamping |
| **BÖHLER W350** ISOBLOC | Proprietary Grade | PESR | A premier hot work grade ideal for very large casting applications. Meets NADCA 207 Grade E. | Extrusion, forging , low pressure die casting, high pressure die casting, hot stamping |
| **BÖHLER W360** ISOBLOC | Proprietary Grade | ESR | Versatile high hardness hot work steel. | Warm forming, forging, cold forming |
| **BÖHLER W400** VMR | Modified AISI H11, VAR | VAR | Developed for tools with complex structures. Hot work tool steel with some of the highest reachable toughness values. | Extrusion, forging, low pressure and high pressure die casting |
| **BÖHLER W403** VMR | Modified W. Nr. 1.2367, VAR | VAR | Vacuum remelted steel featuring highest high-temperature strength, maximum resistance to cracking. Meets NADCA Grade C. | Extrusion, forging, low pressure and high pressure die casting, hot stamping |
| **BÖHLER W720** VMR | W. Nr. 1.6358, VAR | VAR | Not a classic hot work steel, but an ultra-high strength maraging steel. Ideally suited for many tool steel applications up to 420°C. | Extrusion, fasteners, high pressure die casting |


Impact Toughness
Hot Yield Strength/Tempering Resistance
0
2
4
6
8
10
BÖHLER W720 VMR
BÖHLER W400 VMR
BÖHLER W350 ISOBLOC
Uddeholm Dievar®
Uddeholm Orvar® Supreme
BÖHLER W300 ISOBLOC
BÖHLER W302 ISOBLOC
Uddeholm Formvar®
BÖHLER W403 VMR
Uddeholm Unimax®
BÖHLER W360 ISOBLOC
BÖHLER W300 ISODISC
Uddeholm Orvar® 2 Microdized
BÖHLER W302 ISODISC
BÖHLER W303 ISODISC
BÖHLER W320 ISODISC
Uddeholm QRO 90® Supreme
Uddeholm Skolvar®


Hot Yield Strength/Tempering Resistance
Erosion/Wear Resistance
0
2
4
6
8
10
Uddeholm QRO 90® Supreme
Uddeholm Unimax®
BÖHLER W360 ISOBLOC
BÖHLER W403 VMR
BÖHLER W320 ISODISC
Uddeholm Formvar®
BÖHLER W302 ISODISC
BÖHLER W303 ISODISC
Uddeholm Dievar®
BÖHLER W350 ISOBLOC
BÖHLER W300 ISODISC
BÖHLER W400 VMR
BÖHLER W302 ISOBLOC
BÖHLER W300 ISOBLOC
BÖHLER W720 VMR
Uddeholm Skolvar®

# PREMIUM TOOL STEEL PRODUCTION VS CONVENTIONAL

## CONVENTIONAL MELT PROCESS

Melting raw materials in a furnace such as an electric arc furnace. Refined to remove impurities and cast into ingots. May retain inclusions or impurities. Less control over micro structure compared to advanced remelting methods.

## PREMIUM TOOL STEELS

**ESR/PESR Production**

Produced using Electro Slag Refining (ESR) and Pressure Electro Slag Refining (PESR) for steels requiring high level of cleanliness, toughness, and uniformity. Produces cleaner, more homogeneous metal. Reduces non-metallic inclusions. Improves mechanical properties and surface finish.

**VAR Production**

Vacuum Arc Remelting (VAR) is an advanced remelting technique for high-purity applications. Molten metal solidifies in a vacuum, which prevents contamination. Exceptional purity and control over alloy chemistry. Ideal for critical applications like medical implants

# WHAT WE DO AT voestalpine HIGH PERFORMANCE METALS

At voestalpine High Performance Metals, we specialize in delivering premium tool steel solutions tailored to the most demanding industrial applications. Our offerings are backed by world-renowned mills—BÖHLER and Uddeholm —recognized globally for their metallurgical excellence, innovation, and reliability.

## HOT WORK TOOL STEELS: ENGINEERED FOR PERFORMANCE

For the hot work industry, we provide a comprehensive portfolio of tool steel grades produced through both conventional melt and powder metallurgical techniques. These grades are specifically designed to meet the rigorous demands of:

- Die casting
- Aluminum extrusion
- Forging applications

Whether your application requires:

- Resistance to erosion
- Superior heat checking
- Tight dimensional tolerances
- Or simply enhanced reliability

## ADVANCED MACHINING CAPABILITIES

To support our customers with ready-to-use solutions, we offer a full suite of value-added machining services, including:

- Duplex Milling: Achieves parallel surfaces with high precision, ideal for preparing blocks for further machining
- Surface Grinding: Ensures tight tolerances and smooth finishes, critical for high-performance tooling
- Milling and Squaring: Delivers accurate dimensions and clean edges, reducing setup time and improving tool fit

These services are performed in-house by experienced technicians using state-of-the-art equipment, ensuring consistent quality and fast turnaround.

# SURFACE TREATMENT
# PVD COATING

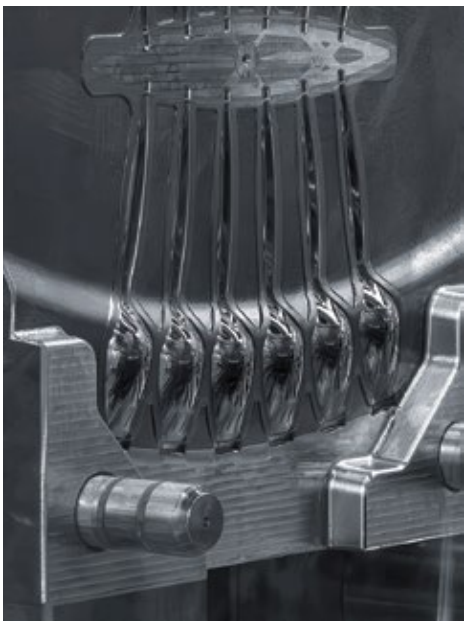
In hot work applications, tool steels face extreme thermal loads, wear, and chemical attack. eifeler's advanced PVD and DLC coatings enhance surface performance, reduce maintenance, and extend tool life—without compromising precision.

## COATING BENEFITS

- Higher production efficiency
- Longer tool life
- Lower scrap rates
- Improved dimensional precision
- Reduced total operating cost

## PVD COATING FOR HOT WORK

- **Duplex-TIGRAL®** pairs a hardened diffusion layer with a thermally stable AlCrTiN-type PVD topcoat to give hot-work tooling a step-change in performance: it delivers low friction and excellent release for easier demolding, superior abrasion and oxidation resistance for longer runs, improved surface smoothness and hot hardness to reduce defects, and enhanced resistance to thermal fatigue and crack propagation while preserving dimensional stability under high contact stresses—resulting in fewer stoppages, lower scrap, consistent part quality on complex geometries, and a refurbishable, cost-effective solution for demanding production environments.



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