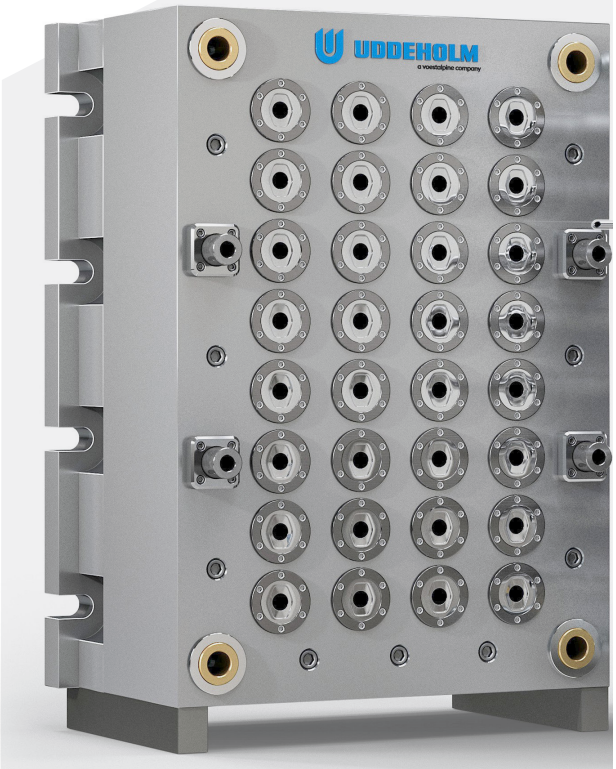
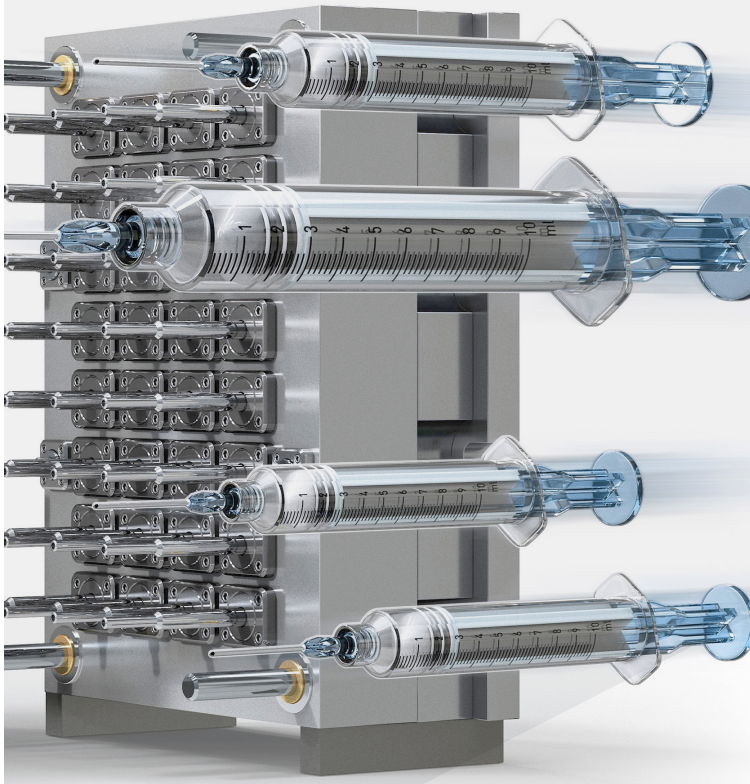
High performance steels

UDDEHOLM

MEDICAL INDUSTRY SOLUTIONS





UDDEHOLM
a voestalpine company

INTRODUCTION

Uddeholm produce and deliver tool steel to more than 100,000 customers in over 100 countries. As the world-leading supplier of tool steel we are continually investing in innovation.

Modern tool steels are increasingly complicated to machine by a cutting tool. Costs related to machining are often the major part of the total production cost for a tool. Working with Uddeholm reduces lead-time and increases productivity.

We offer a broad range of flexible customer-adapted machining solutions designed to reduce your consumption of resources whether it is time, money or skilled people in production and planning.

Our machining services extend the possibilities for increased value by offering a range of solutions from black steel to finished components. We also offer machining recommendations for all our steel grades.

Steel is one of the most essential construction materials in the world today. As part of our business, we aim to achieve a sustainable society and are convinced that technical innovations will play a major role in this goal. Our experience, know-how and values will be key in the continued development. The great challenge for Uddeholm is to make sure that the company's profitability is the result of striking a long-term balance between social, environmental and financial interests.

We want to make a difference. Together, our network of experts around the world strive constantly to create solutions that are sustainable, safe and long-lasting – for ourselves and our customers.

COMPLETE SOLUTIONS

ONE STOP SERVICE

TECHNICAL SUPPORT
TOOLING SOLUTIONS

ADDITIVE MANUFACTURING

COMPONENT SERVICES

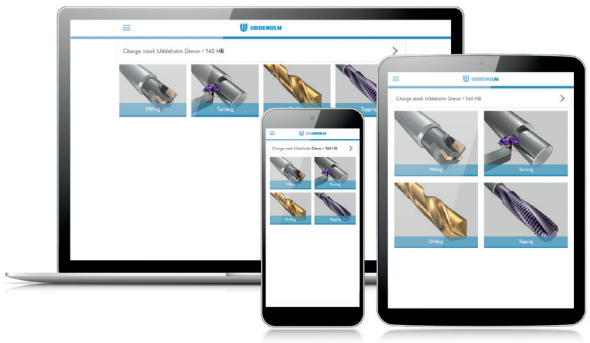
HEAT TREATMENT

MACHINING

PVD COATINGS

STEEL APPS

The Uddeholm Machining App contains information and recommendations on how you can use Uddeholm steel for different types of tools. Choose a steel, and the type of tool you are using, and you will get recommendations on which settings you should use for best results. You can save your calculations together with images so you can easily re-use them, or send them directly to Uddeholm or a colleague.



Download the free Uddeholm Machining Guideline & Uddeholm Steel book today.
Visit: www.uddeholm.com for the link.

HOT WORK

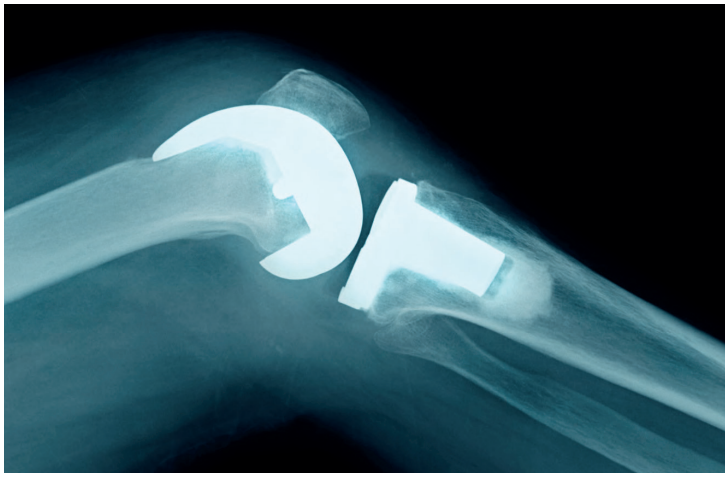
HIGH DEMAND APPLICATIONS

Medical forgings are typically formed from material grades such as Cobalt-Chrome, Stainless Steels and Titanium alloys due to the benefits they offer.

Beneficial though these properties may be in offering medical implants and other components they can present issues in production.

Forging dies often measure tool outputs in double digit figures before re-cutting.

Uddeholm high performance tool steels can increase tool life in these high demand applications and solve serious failure issues such as gross cracking by offering superior toughness.



QUALITATIVE COMPARISON OF RESISTANCE OF BASIC PROPERTIES

UDDEHOLM TOOL STEEL	HOT WEAR	PLASTIC DEFORMATION	PREMATURE CRACKING	HEAT CHECKING
Dievar				
Unimax				
Orvar 2 Microdized				
Orvar Supreme				
Vidar Superior				
QRO 90 Supreme				
Formvar				

The longer the bar, the better.

PLASTIC

STEEL SOLUTIONS FOR PLASTIC PRODUCTION

Polymer technology has advanced to a stage where conventional tool steels struggle to cope with increased demands placed on the tooling by advanced polymers. Increased wear and high temperature injection and curing can lead to a reduction in tool life. Corrosive gasses produced as a by product of production can also seriously damage the tool steel leading to premature failure.

Thermal hot spots can present a serious issue for high volume production, slowing down parts produced. When cycle times are measured in seconds every single one counts. Uddeholm Coolmould® offers superior thermal conductivity when conventional cooling isn't good enough. Additive manufacture can offer further significant reductions in cycle time and can be used as an alternative when Coolmould® is not appropriate.

PROPERTY	Impax Supreme	Caldie	Corrax	Orvar Supreme	Stavax ESR	Mirrax ESR	Tyrax ESR	Elmax SuperClean	Vanax SuperClean
Normal hardness HRC (HB)	(~310)	61	46	52	52	52	57	58	60
Wear resistance	1	7	3	5	5	5	6	8	7
Toughness	9	5	4	6	5	6	6	3	4
Compressive strength	4	10	6	7	7	7	8	9	9
Corrosion resistance	1	2	9	2	7	8	7	5	10
Machinability**	5	7	4	9	8	7	7	3	4
Polishability	7	8	7	8	9	9	10	8	8
Weldability	6	4	6	4	4	4	4	2	-
Nitriding ability	6	8	-	10	-	-	-	-	-
Etchability	8	9	8*	9	8*	8*	8*	8*	8*

PILL MANUFACTURING

PRECISION AND RELIABILITY

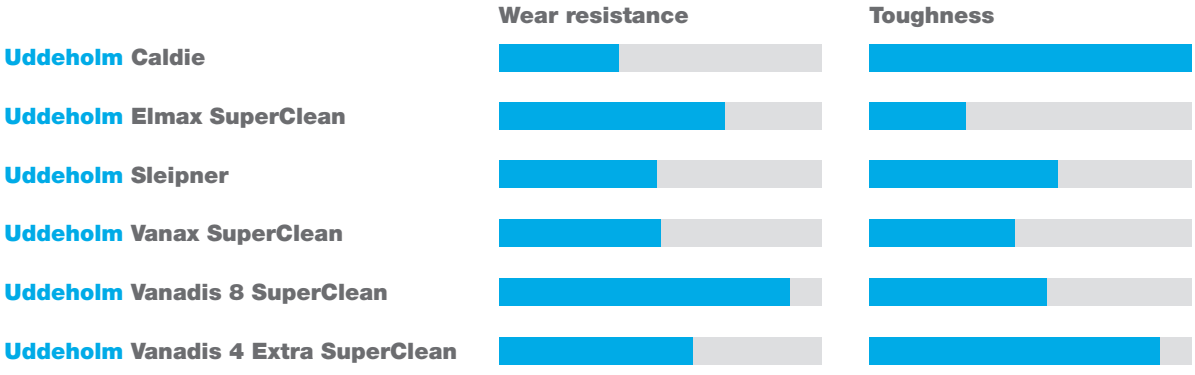
High volume production requires consistency and reliability. Minutes of downtime can result in major cost implications to production lines.

When the stakes are so high Powder Metallurgy grades are the best option. Our 3rd generation SuperClean PM steels offer superior resistance to wear, chipping and plastic deformation compared to conventional standard grades used in this application such as D2 and A2.

At Uddeholm, we pride ourselves on the quality of our steel and the subsequent benefits this offers to our customers. Responding to evolving market demand through close contact with our customer base, we are developing new steel grades and fine-tuning existing grades to provide solutions, which can deliver optimum results.

Increasing tool life, decreasing maintenance periods and removing post processing such as coatings can deliver significant savings to our customers.

PROPERTY COMPARISON



AUTOMATION

FOR EFFICIENT PRODUCTION

The automation of process within the medical sector can present a multitude of challenges.

Productivity is key in high volume production. Reliable steel selection can ensure downtime; maintenance and related costs are kept to a minimum.

Guide rails, location pins and loading components can often be overlooked as sacrificial elements, this doesn't need to be the case.

Speak to your Uddeholm technical expert about your process and they will assess any potential improvements in steel selection. We see a plethora of wide ranging and ingenious solutions every day and can help improve your process, reducing downtime and saving you money.

Improved machinability, increased stability in heat treatment and providing a good substrate for coatings can all offer reduced total tooling costs and improved productivity.

RELATIVE COMPARISON OF THE RESISTANCE TO FAILURE MECHANISMS

Uddeholm Grade	Hardness/ Resistance to plastic deformation	Machina-bility	Grindability	Dimension Stability	Resistance to		Fatigue cracking resistance	
					Abrasive wear	Adhesive wear	Ductility/ resistance to chipping	Toughness/ gross cracking
Arne								
Calmax								
Caldie (ESR)								
Rigor								
Sleipner								
Sverker 21								
Sverker 3								
Vanadis 4 Extra								
Vanadis 8								
Vanadis 23								
Vancron SuperClean								

The longer the bar, the better the resistance.
The Vancron and Vanadis steels mentioned in the table are Uddeholm PM SuperClean tool steels.

PVD COATINGS

COMPLETE SOLUTIONS FROM A SINGLE SOURCE

State of the art equipment, designed and manufactured by eifeler

A broad range of PVD coatings available

Exceptional lead times

Experienced Technical and application support

Coating solutions for Stamping and Forming, Aluminum Die Casting, Hot Forging, Plastic Injection Molding

DUPLEX-VARIANTIC®

A good coating for cold work applications such as drawing, stamping and punching. Also suitable for forming tools used to process advanced high strength steel.

TIGRAL®

The TIGRAL® Coating Process provides exceptional protection in higher temperature applications, with the ability to resist the propagation of micro-cracks that eventually occurs in the coating during the manufacturing process.

- High Hot Hardness
- Very High Oxidation Resistance
- Stable up to 1740 ˚F
- High Wear Resistance

DUPLEX-TIGRAL®

The Duplex Process is a Plasma Nitriding Process that increases the Tool's Surface Hardness when combined with a PVD coating.

- The harder substrate supports the PVD Coating while increasing Tool Life.
- Process temperature of 900 / 925 ˚F eliminates the risk of dimensional changes in the tool as long as the proper heat treatment process is followed and documented.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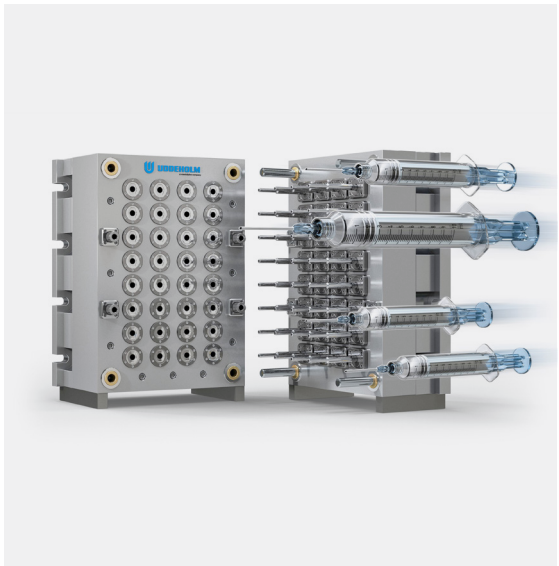
VACOTEC
alpha900P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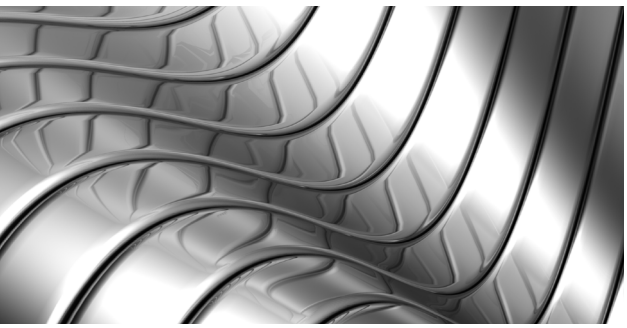
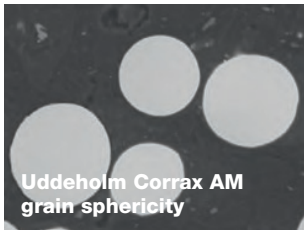
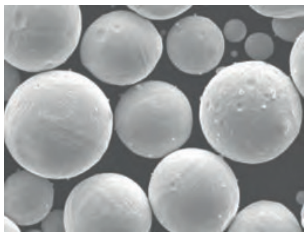






ADDITIVE MANUFACTURING

ONE-STOP-SHOP FROM POWDER TO FINISHED COMPONENT

Additive Manufacturing (AM), popularly known as 3D metal printing, is one of the most innovative and revolutionary manufacturing methods we see today.

At Uddeholm we are driven by the ambition to develop new materials and advance the printing parameters. We have a comprehensive understanding of each and every process in the value chain. Therefore we can provide AM solutions for your individual needs from start to finish. From design development, 3D modelling and simulation through to manufacturing and post processing, i.e. machining, heat treatment and coating of the finished components.

VALUE ADDED SERVICES

Value Added Services give our customers access to cutting, machining, beveling, testing, surface coating, heat treatment and other solutions to fit with their individual needs. First stage machining can be an expensive and time-consuming task, absorbing the resources of skilled machinists on basic operations.

Uddeholm offer a complete and comprehensive selection of products in a variety of pre-machined finishes from simple milled faces to precision ground pieces. Our breadth of capabilities allows us to handle a wide dimensional range.

We are able to offer three standard options or, if required pieces can be machined to your bespoke requirements with the option to include heat treatment and surface coatings.
As pressures to reduce costs continue to increase, our state of the art machines can produce parts in a fraction of the time it would take via conventional machining, saving time, resources and money.

SAWING SERVICE

We run a shift system with highly trained operatives to enable us to react quickly to customer demands.

Using both bi-metal and carbide blades gives us, the ability to cut basic stainless steels up to the hardest of alloys.

ONSITE TECHNICAL STAFF

Our well-trained staff provide tooling solutions based on your needs. We can also provide technical analysis on your tools.

MACHINING SERVICE

Machining of highly alloyed steel requires metallurgical expertise and specialist equipment. Our service is tailored to your needs and promises you professional and economical machining.

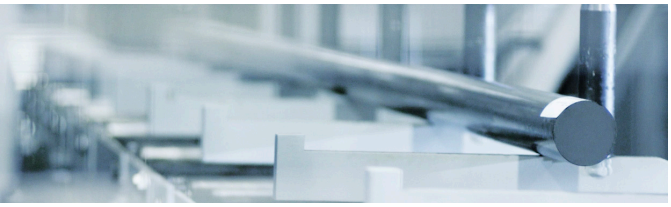
Capabilities range from standard operations to bespoke machining operations in line with client drawings.

STOCK FACILITIES

All high-performance special steel stocks are held by our, purpose-built warehouse facilities, located across the united states.

KASTO AUTOMATED STORAGE

With our state-of-the-art KASTO Automated Storage and Retrieval System, we can process orders efficiently and precisely.



SHAPING THE WORLD

Manufacturing solutions for generations to come

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