COMPLETE TOOLING SOLUTIONS

Shaping the world

UDDEHOLM
a voestalpine company

ONE WORLD, ONE UDDEHOLM, ONE GREAT IMPACT

Selecting a tool steel supplier is a key decision for all parties, including the tool maker, the tool user and the end user.

Uddeholm's position as the world-leading supplier of tool steel is secured by our superior material properties and our dedication to continuous development. Established in 1668, we have been producing high quality tool steel for over 350 years. Today we support over 100,000 customers in more than 100 countries. It is this forward-looking spirit that has built our reputation as the most innovative tool steel producer in the world.

Our products are designed to be state-of-the-art. Wherever you are in the manufacturing chain, you can trust Uddeholm to be your number one partner and tool steel provider for optimal tooling and production economy.

Quite simply, it pays to go for a better steel.

TOTAL TOOLING ECONOMY

FULL SERVICE

Uddeholm offers a complete programme of services to prepare and maintain tools close to our customers around the world, which include heat treatment, coatings and more. Call to discuss your requirements.

TAILOR-MADE SOLUTIONS

The selection of tool steel has an impact on the tool's performance and your profitability. Discuss your needs with our local representatives and let them help you find the steel that best suits your needs.

TECHNICAL SUPPORT

If you encounter tooling difficulties, our experienced customer service staff and technical experts will help you solve your problems. Call us to find the nearest Uddeholm contact in your area.

WORKING IN PARTNERSHIP

Whilst our production, research and development is based in Sweden, we have regional experts across the world. This structure enables us to provide our customers with expert solutions by working in partnership with them.

We invest extensively in product development and our services. Whether it is material properties, new steel grades or analysing customer tools to improve efficiencies, our technical teams at our production facility work closely with our UK division.

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.co.uk** for the link.

UNIQUE PRODUCTS COMPLETE SOLUTIONS

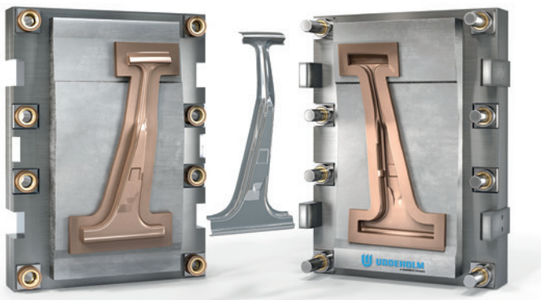
Uddeholm is the world's leading manufacturer of tool steel for industrial tools, and that is no accident. We put our heart into every piece of steel and every step of the process, from raw material to finished product. Technology is just as important as know-how and product development. Equally vital is our forward-looking spirit.

AUTOMOTIVE

Uddeholm has created a package specifically designed for the automotive industry which meets the need of the automotive OEM's for shorter delivery times.

The package focuses on optimal total economy, less downtime in production and shorter lead times, within the following areas:

In **cold work**, a new generation of presswork tool steels has been developed to tackle AHSS production materials. Within the **hot work** segment Uddeholm focus on long run die casting production, hot forging and hot stamping.



As the leading developer of high quality plastic **mould tool** steels, the tool life and performance can be maximized to achieve greater savings in productivity and total tooling cost.

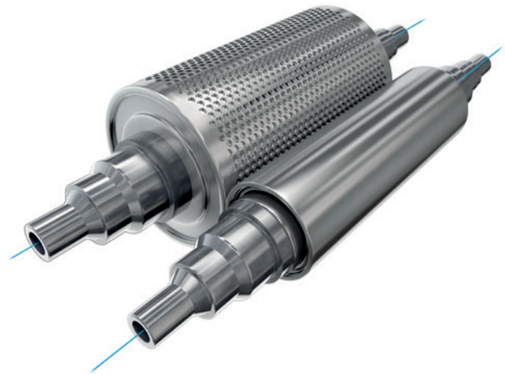
FOOD INDUSTRY

Safe, efficient production with minimal downtime is paramount in the international food processing industry. A demand that Uddeholm's unique product offering can meet.

As the world's leading manufacturer of tool steel, our high performance materials have been specifically tested for the food industry.

We work closely with our customers in the most demanding applications. Food processing companies, which have previously sacrificed wear resistance for corrosion resistance or vice versa, no longer have to settle for just one of these properties. With the products in the Uddeholm Stainless Concept, there is a solution for the most demanding working materials.

Uddeholm steel grades are all certified by Normpack for the requirements in the food industry, according to European Union legislation (1935/2004). They all meet the requirements for materials that come into contact with food. Examples of relevant components are various types of knives, rolls, screws, screw segments and barrels for the extrusion of food, hole plates for mincing meat, and pellet dies for the production of animal feed.

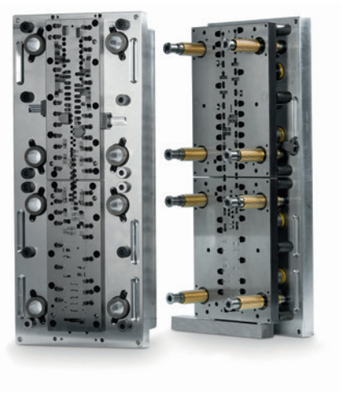


COLD WORK TOOLING

Choosing the right tool steel for the application becomes more and more important as the demands on the tool increase.

The tool must have sufficient wear resistance and reliability, and not fail due to premature chipping, cracking or plastic deformation.

At Uddeholm, we work with you to establish the optimal tooling economy for your application. We find the lowest possible tooling cost (including maintenance) per part produced, which can only be achieved if the correct tool steel for the application in question is used.



RELATIVE COMPARISON OF THE RESISTANCE TO FAILURE MECHANISMS

Uddeholm Grade	Hardness/ Resistance to plastic deformation	Machin-ability	Grind-ability	Dimension stability	Resistance to Abrasive wear	Resistance to Adhesive wear	Fatigue cracking resistance Ductility/ resistance to chipping	Fatigue cracking resistance 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.

PLASTIC MOULDING

Plastic moulding is a part of our everyday lives. Car parts, mobile phones, sunglasses and computer chassis are all manufactured in moulds.

However, the materials needed to make these moulds often require unique and demanding characteristics. Therefore, it is crucial to select the correct steel grade for your specific mould.

A moulder knows that the cost of excessive mould maintenance, e.g. major repolishing, cleaning, replanting and replacing of worn or broken parts must be taken into account. The costs of production and downtime, overtime payment, late-delivery penalties and loss of customer goodwill also need to be considered when specifying mould tooling.

PROPERTIES

PROPERTY	Impax Supreme	Nimax ESR	Nimax	Mirax 40	Corrax	Vidar 1 ESR	Orvar Supreme	Stavax ESR	Mirrax ESR	Tyrax ESR	Polmax	Unimax	Elmax	Vanadis 4 Extra	Vanadis 8	Vanex	Ramax HH	Roy Alloy	Holdax
Normal hardness HRC (HB)	(~310)	(380)	(380)	380	46	48	52	52	52	57	52	58	58	62	62	60	(~340)	~(310)	(~310)
Wear resistance	1	2	2	2	3	4	5	5	5	6	5	6	8	9	10	7	2	1	1
Toughness	9	10	10	6	7	8	6	5	6	6	5	6	3	5	4	4	3	4	4
Compressive strength	4	5	5	5	6	6	7	7	7	8	7	8	9	9	10	9	5	4	4
Corrosion resistance	1	1	1	6	9	2	2	7	8	7	7	2	5	1	1	10	6	6	1
Macinability**	5	5	5	6	4	9	9	8	7	7	8	7	3	4	4	4	6	7	7
Polishability	7	8	7	8	7	8	8	9	9	10	10	9	8	8	8	8	4	4	4
Weldability	6	7	7	5	6	4	4	4	4	4	4	4	2	2	2	-	5	4	6
Nitriding ability	6	5	5	-	-	10	10	-	-	-	-	8	-	8	8	-	-	-	5
Etchability	8	9	8	8*	8*	9	9	8*	8*	8*	8*	9	8*	8	3	8*	3	3	3

TYRAX® ESR

TOOL STEEL TO MIRROR YOUR NEEDS

Uddeholm Tyrax ESR has been specially designed for the manufacturing of long run production tools in the plastics industry.

Plastic materials are constantly evolving to meet the increasing demands for high strength, low flammability and sustainability. This has resulted in new materials which are very aggressive on the tool steel, leading to defects in the manufactured plastic parts. We recognised that although most plastic moulding applications demand a high-gloss surface finish, many tool steels are not optimised for the polishing process. So, we developed Tyrax ESR to deliver the winning combination of corrosion and wear resistance, easy polishability and good etchability; resulting in longer tool life and a reliable production of high-performance plastic parts.

PLASTIC APPLICATIONS:

- High performance plastics filled with glass fibres and corrosive additives.
- Corrosive plastics like PVC.
- Corrosive conditions like humidity.
- High surface finish.

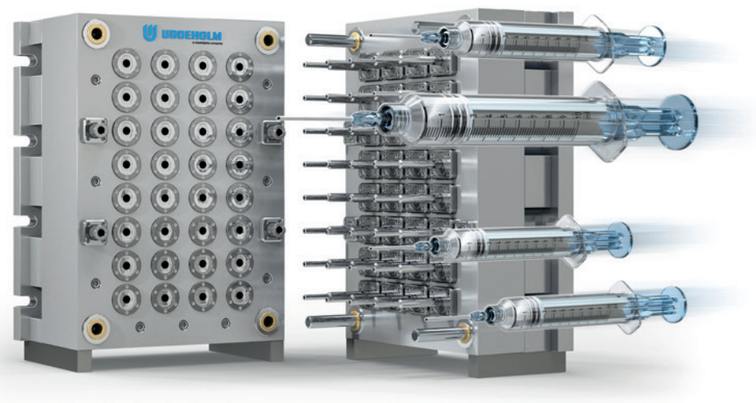
INDUSTRY APPLICATIONS

The medical, electronics, food, and automotive industries have extreme demands on tool reliability. They require dependable production with a minimum of maintenance and delays. In addition, the production conditions in these industries are unforgiving, with highly corrosive materials and composites, long-run productions, and humidity.

Uddeholm Tyrax ESR delivers productivity not possible with other tool steels.

PROPERTIES:

- Good corrosion resistance.
- High hardness.
- Good ductility and toughness.
- Good wear resistance.
- Excellent polishability.



INDUSTRY APPLICATIONS:

- Medical.
- Electronics.
- Automotive.
- Technology.
- Food.

TYRAX® ESR

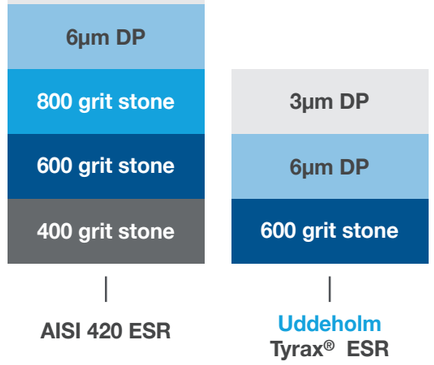
SUPERIOR TOOL LIFE AND EASY POLISHING

TYPICAL ANALYSIS %

C	Si	Mn	Cr	Mo	V	N
0.4	0.2	0.5	12.0	2.3	0.5	+

POLISHABILITY

The matrix-based microstructure of Uddeholm Tyrax ESR is designed to achieve a high-gloss surface by only a few polishing steps, dramatically reducing the tool lead time and enabling production of top-quality plastic parts.

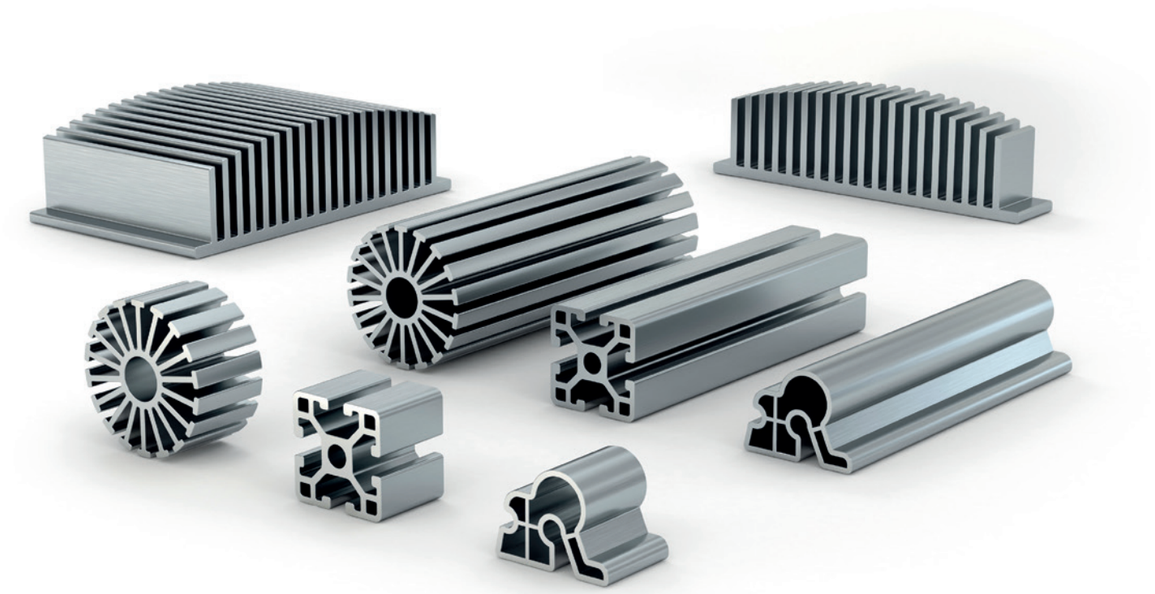


You are able to acheive a high-gloss surface (SPI A1) in three easy polishing steps, resulting in 40-50% less polishing time compared to standard tool steels such as AISI 420 ESR.

EXTRUSION TOOLING

The properties profiles required for the tool steel in different components of an extrusion press are fairly similar. However, the varying severity of the thermal environment means that the desirable heat-resisting properties of hot work tool steel are required to a greater or lesser extent in different press parts.

The requisite properties profile is essentially as follows: adequate resistance to wear at elevated temperatures (e.g. dies, liners, mandrels), enhanced hot yield strength and hot hardness, high level of temper resistance and resistance to softening at elevated temperatures, good compressive strength (e.g. dummy blocks and stems) and bending strength (e.g. dies, mandrels) at high temperatures, high creep strength and acceptable resistance to thermal fatigue cracking.



UDDEHOLM TOOL STEEL	TEMPER RESISTANCE	HOT STRENGTH HOT WEAR	CREEP STRENGTH COMPRESSIVE STRENGTH	DUCTILITY TOUGHNESS
ORVAR 2 M				
VIDAR 1				
QRO 90 SUP				
FORMVAR				
DIEVAR				
UNIMAX				

Qualitative comparison of critical steel properties (the longer the bar, the better).

UDDEHOLM TOOL STEEL	HOT WEAR	PLASTIC DEFORMATION	PREMATURE CRACKING	HEAT CHECKING
ORVAR 2 M				
VIDAR 1				
QRO 90 SUP				
FORMVAR				
DIEVAR				
UNIMAX				

Qualitative comparison of resistance to different tool failures (the longer the bar, the better).

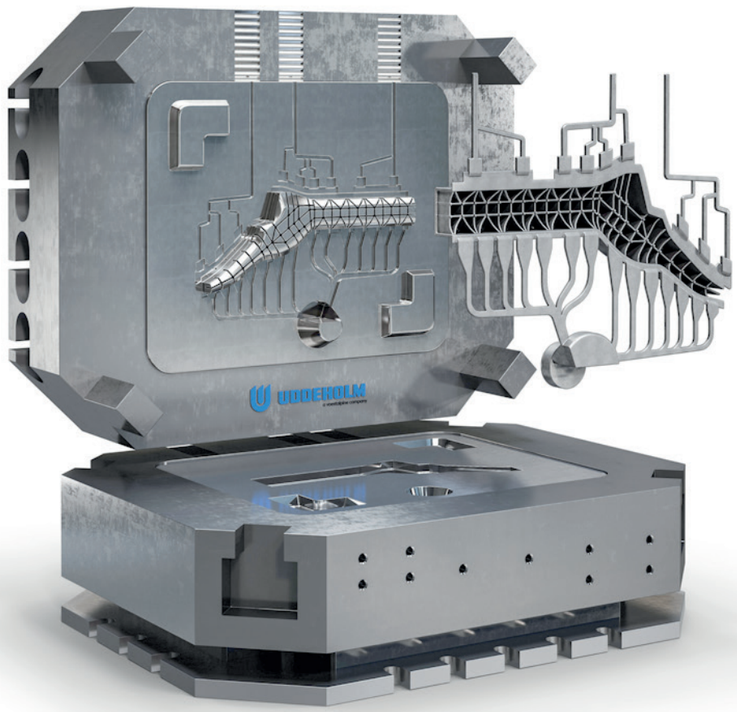
DIE CASTING

At Uddeholm we understand the increasing demands on die cast products, so continually invest in developing die casting alloys with higher strength and ductility, improved machinability, weldability and corrosion resistance.

We see trends in product design for larger components, thinner wall thicknesses, more complicated shapes and closer tolerances.

These factors favour the use of high pressure die casting over other casting methods like low pressure and gravity die casting. Many Uddeholm Hot Working steels adhere to NADCA specification for die casting.

Uddeholm UK is a proud member of international die casting associations.



QUALITY COMPARISON

UDDEHOLM TOOL STEEL	TEMPER RESISTANCE	HOT YIELD STRENGTH	DUCTILITY	TOUGHNESS	HARDEN-ABILITY
DIEVAR					
UNIMAX					
ORVAR SUPREME					
ORVAR SUPERIOR					
VIDAR SUPERIOR					
QRO 90 SUPREME					

Qualitative comparison of critical die steel properties.
All steel tested at 44–46 HRC except for Uddeholm Unimax where 54–56 HRC is used.

UDDEHOLM TOOL STEEL	HEAT CHECKING	GROSS CRACKING	EROSION	INDENTATION
DIEVAR				
UNIMAX				
ORVAR SUPREME				
ORVAR SUPERIOR				
VIDAR SUPERIOR				
QRO 90 SUPREME				

Qualitative comparison of resistance to different die failures (the longer the bar, the better).

FORGING APPLICATIONS

TYPICAL DIE FAILURES

The deterioration of forging dies is usually associated with several processes which may operate simultaneously. However, one of these normally dominates and is the ultimate cause of failure. In general, four distinct damage mechanisms can be distinguished: wear, mechanical fatigue and gross cracking, plastic deformation, and thermal fatigue cracking (heat checking). Different damage mechanisms can dominate in different parts of the cavity. Uddeholm high performance tool steels can increase tool life in these high demand applications.

Offering outstanding service is important to us. At Uddeholm we can save valuable manufacturing time for our customers by supplying pre-machined and heat treated die blanks to your individual specifications.

QUALITATIVE COMPARISON OF RESISTANCE OF BASIC PROPERTIES

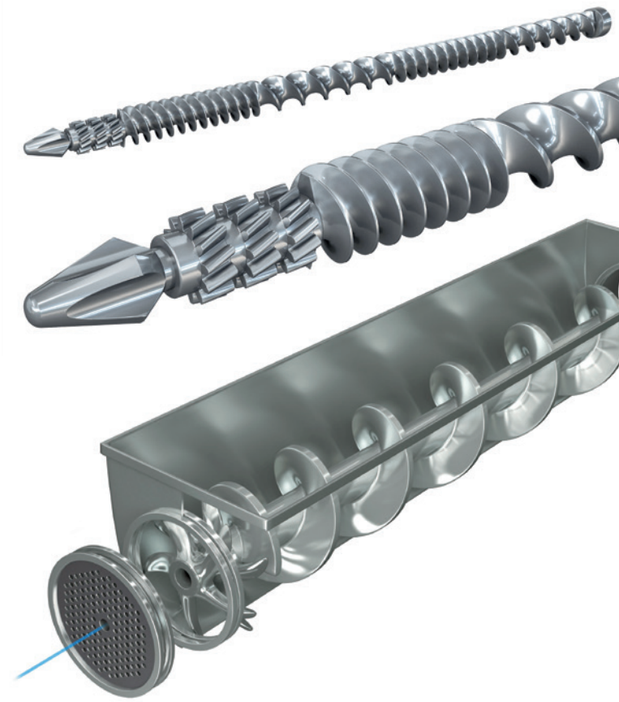
UDDEHOLM TOOL STEEL	HOT WEAR	PLASTIC DEFORMATION	PREMATURE CRACKING	HEAT CHECKING
Dievar				
Unimax				
Orvar 2 Microdized				
Orvar Supreme				
Orvar Superior				
Vidar Superior				
QRO 90 Supreme				
Formvar				

The longer the bar, the better.

COMPONENTS

Uddeholm Components offer a first-class tool steel solution in applications where conventional engineering and stainless steel is insufficient.

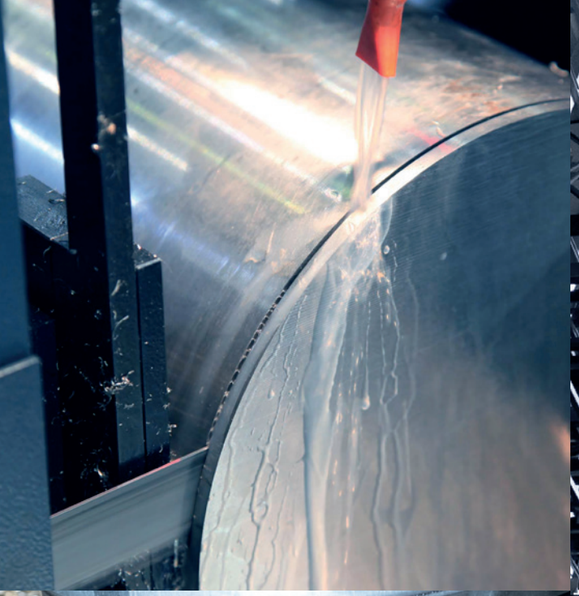
The qualities of Uddeholm tool steel contribute to an optimized design, increased performance, lower maintenance costs and the best overall economy. A high proportion of these costs can be avoided when selecting a steel grade with better material properties.

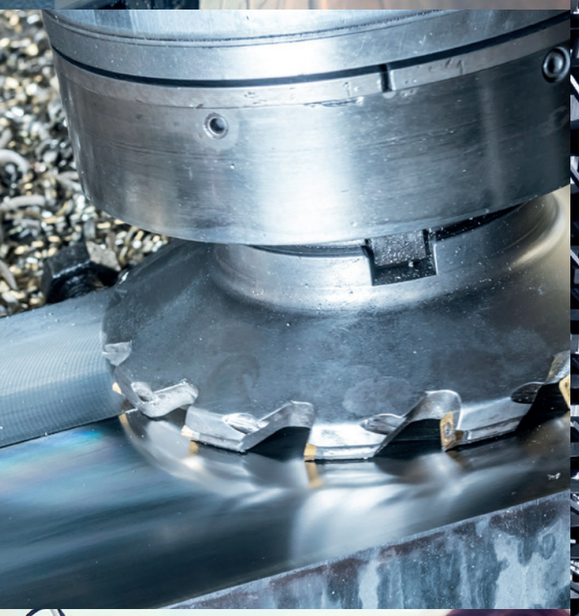


PROPERTIES

UDDEHOLM TOOL STEEL	DELIVERY HARDNESS ~HB	RECOMMENDED HARDNESS HRC	YIELD STRENGTH Rp0.2 (Mpa)	TENSILE STRENGTH (Mpa)
NIMAX[1)]	380	40	785	1265
MIRRAX 40	380	40	1020	1150
CORRAX	330	46	1400	1500
ELMAX SUPERCLEAN	250	58	2200	2900
ORVAR SUPREME	180	48	1350	1600
UNIMAX	185	56	1780	2150
CALDIE	215	60	2350[2)]	–
VANADIS 4 EXTRA SUPERCLEAN	230	62	2530[2)]	–
TYRAX	190	57	1460	2060
VANAX SUPERCLEAN	260	60	1920	2240

[1)] *Prehardened*
[2)] *Compressive strength*





VALUE ADDED SERVICES

Value Added Services give our customers access to cutting, machining, bevelling, testing and other services providing turnkey customer solutions. This includes an onsite testing service, used when customers require additional certification to that supplied by the Mill.

Our broad range of capabilities allows us to handle the simple jobs such as cutting/milling lengths and widths, to bespoke services, which includes machining to your specific requirements with the option to include heat treatment and surface coatings.

SAWING SERVICE

Twenty specialist saws are located onsite and next to our award-winning stock facility, so materials can be cut and despatched to individual customer specifications quickly and efficiently. We run a 2-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 nickel grade alloys. Our saws have various cutting capabilities with the largest saw being able to cut up to a maximum of 3000mm cutting width. Full batch traceability is guaranteed, and hard stamping, etching and labelling facilities are all available.

MILLING SERVICE

We use the latest tooling technologies to provide an efficient and accurate on-site milling service, that can be utilised across our entire product range.

Machining of highly alloyed steel requires metallurgical expertise and specialist equipment. Whether it is rough milling, fine milling or precision grinding our service is tailored to your needs and promises you professional and economical machining. Specialist CNC machines located in our dedicated on-site machine shop give us the capability to produce machine finished components from our extensive stock range upon request. Capabilities range from standard operations to bespoke machining operations in line with client drawings.

LABORATORY AND ONSITE TESTING SERVICE

Our specialist laboratory facility located at our UK Head Office and warehouse facility in Oldbury, allows the rapid testing of samples to your specifications. For example, chemical analysis, tensile, charpy and micro examination can all be done onsite. Ferritiscope testing of materials as well as Positive Material Identification (PMI) for all grades is also available.

STOCK FACILITY

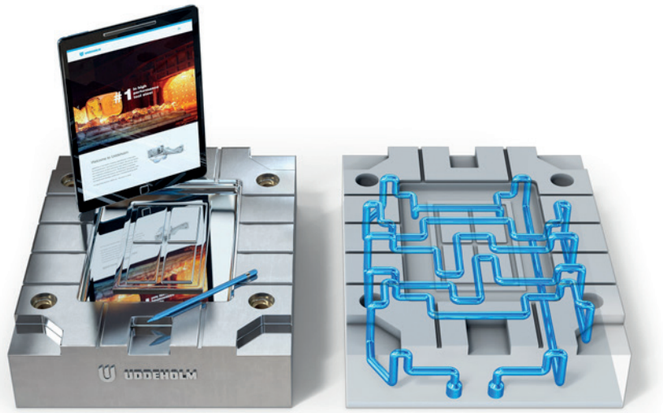
All high-performance special steel stocks are held by our award winning, purpose-built warehouse facility, located at our Headquarters in Oldbury, West Midlands. The new KASTO system is the tallest in the UK and one of the largest in Europe.

ADDITIVE MANUFACTURING

COMPLETE SOLUTIONS FROM A SINGLE SOURCE

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 bespoke 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.



WE CONSULT WITH YOU RIGHT THROUGH THE VALUE CHAIN

DESIGN

- Design for optimal printability
- Conformal cooling
- Topology optimisation

SIMULATION

- AM Process simulation
- Check AM productivity
- Cost calculations

MANUFACTURE

- Parameters and scan strategy
- Material selection
- Hybrid manufacturing

POST PROCESS

- Machining
- Surface finish
- Heat treatment / PVD coatings

QUALITY IS ASSURED AT EVERY STAGE

WEB SHOP

WE'RE AT YOUR SERVICE 24/7

Innovative sits at the heart of what we do at Uddeholm. This is true for our advanced materials and value added services. We understand the need to be reactive to your production environment whatever the time of day.

The introduction of the new Uddeholm web shop ensures we build on this commitment. Our web shop is open 24/7, providing you with the freedom to place and track orders online in just a few clicks, with complete access to order history and vital documents.

Experience a new level of service by registering online today at:

www.uddeholm.co.uk

SERVICES AVAILABLE AT THE TOUCH OF A BUTTON:

- Select materials and check specifications.
- Specify the dimensions you need.
- Place your order and track its progress.
- Full access to quotations, order confirmation and invoices.

BENEFITS:

- Convenience.
- Traceability.
- Tracking.
- Timesaving.

CONTACT US

For all enquiries and order progress queries please contact our internal sales team.

Sales Office: +44 (0)121 552 5511
Email: sales@uddeholm.co.uk

For more information, please visit www.uddeholm.co.uk

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#1 IN HIGH PERFORMANCE TOOL STEEL

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UDDEHOLM
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