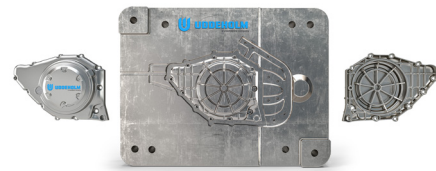


When consistency and reliability matters

Uddeholm Orvar[®] Supreme

**RAISE YOUR PRODUCTION
TO A HIGHER LEVEL**

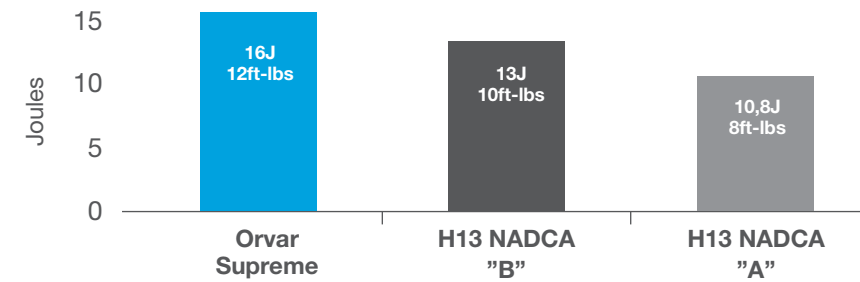


CONSISTENCY & RELIABILITY MATTERS

REMAKING A CLASSIC

ORVAR SUPREME

Today's world of hot applications is a very different place to when the original Orvar Supreme entered the market more than 40 years ago. New demands in application areas such as forging, high pressure die casting, hot stamping, extrusion and component are asking for materials which are cleaner, tougher and have more consistant performance.



Uddeholm Orvar Supreme has now been significantly developed into a very different material from where it was in the past. Using market leading metallurgy and production techniques this material is now reclassified as a cleaner "Superior H13" product. The new Orvar Supreme will be rated independently by Uddeholm as min/ avg 16J/12ft-lbs in the as delivered condition. Orvar Supreme will now sit in the North American Die Casting Association (NADCA) band B classification for all properties.



UDDEHOLM ORVAR SUPREME – TRUSTED PERFORMANCE

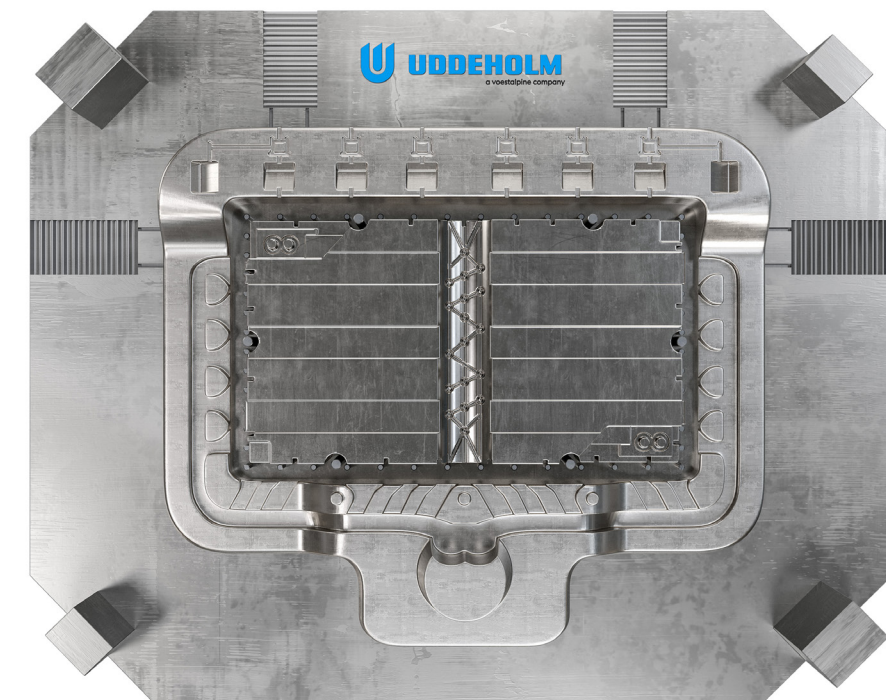
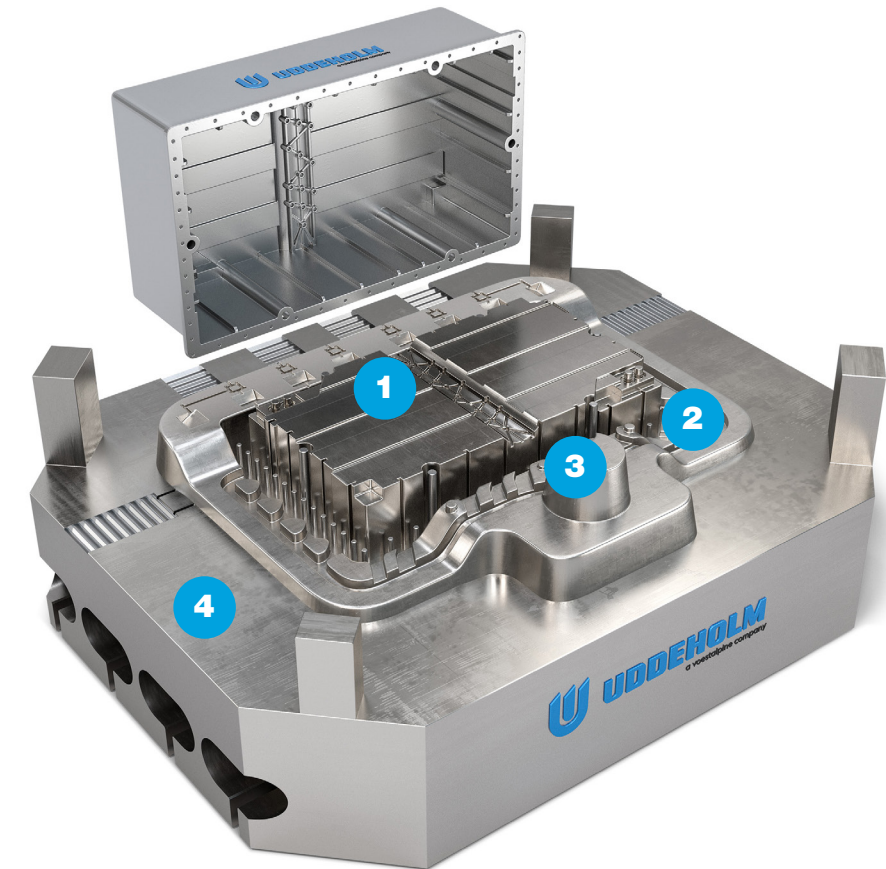
SETTING NEW STANDARDS IN HPDC

Uddeholm Orvar Supreme has been used for decades on customer tooling and has built a global reputation for reliability and consistent properties. Uddeholm has always driven new standards with materials like Uddeholm Dievar and it is no different with Orvar Supreme. Using new technologies and metallurgical advancements within Uddeholms production we have been able to develop this grade to meet NADCA B for cleanliness and exceed it for toughness rating.

No other manufacturer can offer this level of performance in the NADCA Premium/Superior H13 as a stock standard product with the advantage that brings of quick delivery and wide availability.

Uddeholm Orvar Supreme in short

- More reliable tooling
- Higher quality castings
- Reduced manufacturing costs
- Available across a wide size range
- Class leading toughness for H13 type
- Highest levels of cleanliness



1 INSERTS

The main insert is a critical part of the tool as its performance determines the quality of the part produced. Consistency and high quality are key properties here.

2 SPRUE

If Premium AISI H13 is used in these parts then the new Orvar Supreme offers better properties for cleanliness and a high quality microstructure. Use of advanced manufacturing technologies in Uddeholm make this possible.

3 MAIN INSERTS & SUB INSERTS

The main insert is a critical part of the tool as its performance determines the quality of the part produced. Consistency and high quality are key properties here.

4 HOLDER BLOCKS

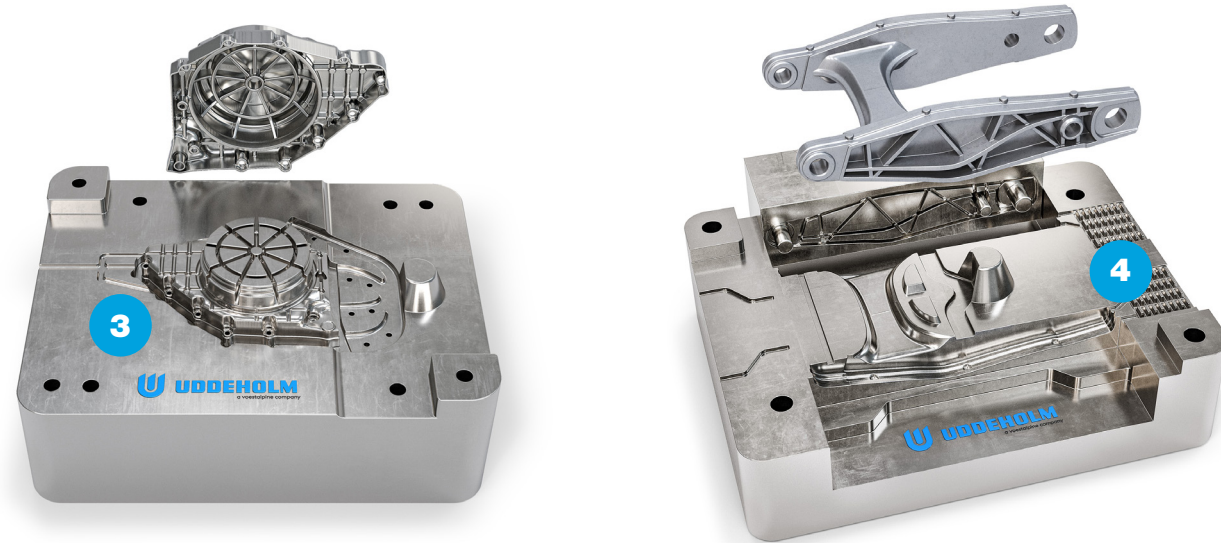
Some customers use H13 for this part of the die. Often exposed to high forces over time these blocks must last as long as possible due to the cost of replacing them early. The new level of toughness and cleanliness in Orvar Supreme applies to all large stock standard material from Uddeholm.

ORVAR SUPREME - A NAME YOU CAN TRUST

SPECIFIED FOR A REASON

WHY CUSTOMER USE AND SPECIFY ORVAR SUPREME

The motorcycle industry is just one of many segments where our tool steels are not just used but often specified. Why do companies specify a steel like Orvar Supreme when it is classed as an AISI H13/W-Nr. 1.2344 tool steel like many others? It is because Orvar Supreme has never been the same as these steels in performance and quality. With its new level of cleanliness and toughness results speak for themselves right across the production chain. Orvar Supreme has always been a name customers can trust with the reputation for consistency and reliability, which is why it gets specified.



QUALITY IS GUARANTEED WHEN USING ORVAR SUPREME

The toolmaker needs a steel that will be good to machine, reliable in heat treatment and be of the best quality. This is important so that their new tool can be accepted by the foundry and maintain their good name for quality tooling. The foundry needs a high quality material that performs even in conditions that are not ideal and can still give a product (casting) of the highest quality. The OEM, in this case a motorcycle company, needs its bikes to have the best aesthetically pleasing part surface possible. Engine covers, swing arms and detail parts all require defect clean surfaces. Depending on the die life required, they will choose either Uddeholm Orvar Supreme or Dievar!



1 MAIN ENGINE

These parts have large surface areas with thin and thick sections and demand a high quality surface finish. Parts cannot have heat checking damage on them, which is a challenge due to gate designs and production demands.

2 END COVERS

Large cast parts with high demands on quality, they can suffer heat checking damage, erosion and soldering in complex section areas.

3 TRANSMISSION/ CLUTCH COVERS

These dies can be large and have complex shapes. Heat checking damage is often not allowed on the outside faces and die life can be low, depending on multiple factors including steel quality. The NADCA standard helps set minimum quality levels on key properties such as toughness and cleanliness where Orvar Supreme excels.

4 SWING ARMS

The swing arm is a highly critical part on a motorcycle as owners view this part as a key look and feel of the bike. High detail swing arm parts are a good example where heat checking damage would not be acceptable.

DEVELOPMENT OF A CLASSIC

MORE RELIABLE AND CONSISTENT

DEVELOPED TO BE BETTER THAN THE REST

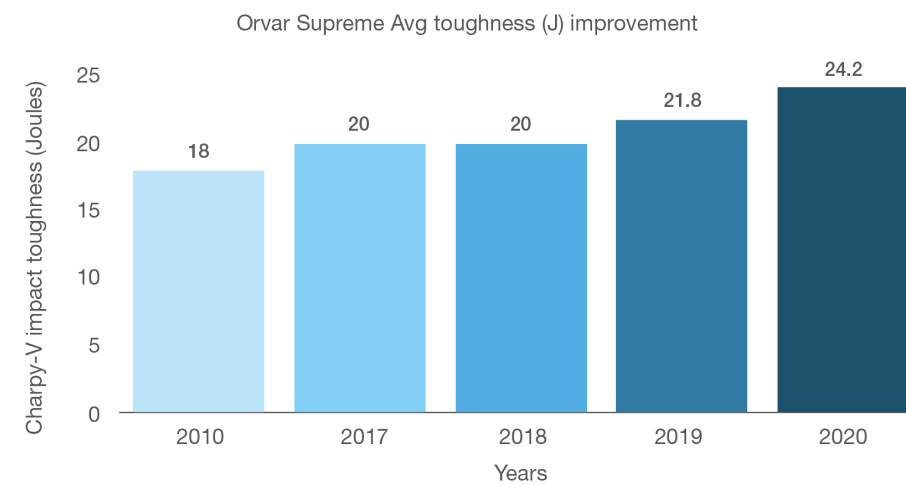
Uddeholm Orvar Supreme has always been a very clean material, but now it is cleaner than before. It is so clean we are confident to upgrade the toughness rating to NADCA B level set for AISI H13. This super cleanliness is also another reason why the product has better consistency in production as high impurity levels will lower a tool steels performance.

NADCA bands Microcleanliness	A (sulphides)		B (oxides)		C (silicates)		D (globular oxides)	
	Thin	Heavy	Thin	Heavy	Thin	Heavy	Thin	Heavy
Band A	1.0	0.5	1.5	1.0	1.0	1.0	2.0	1.0
Band B <i>New Orvar Supreme</i>	0.5	0.5	1.5	1.0	0.5	0.5	1.5	1.0

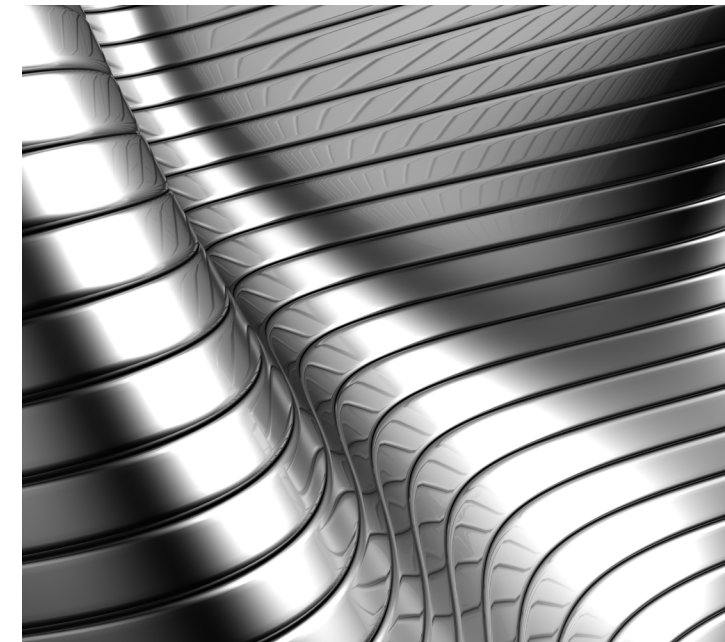
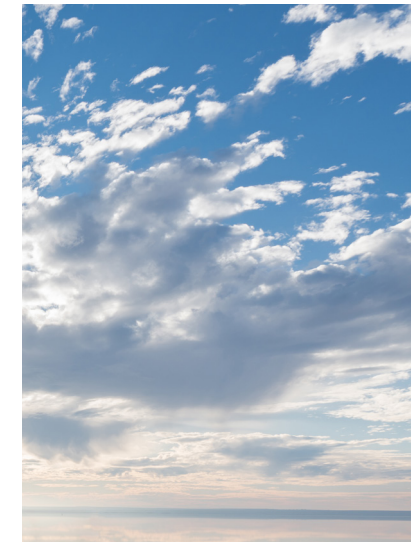


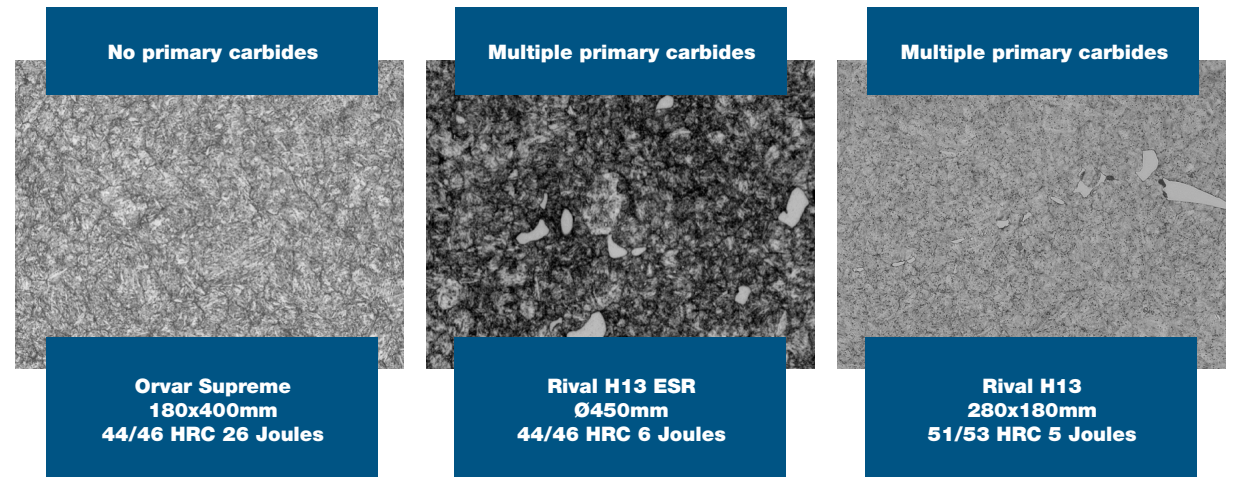
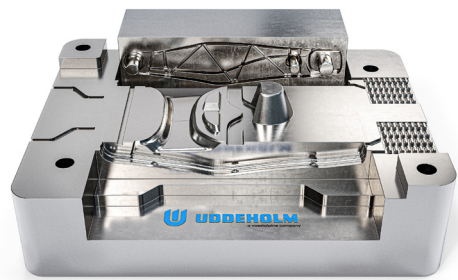
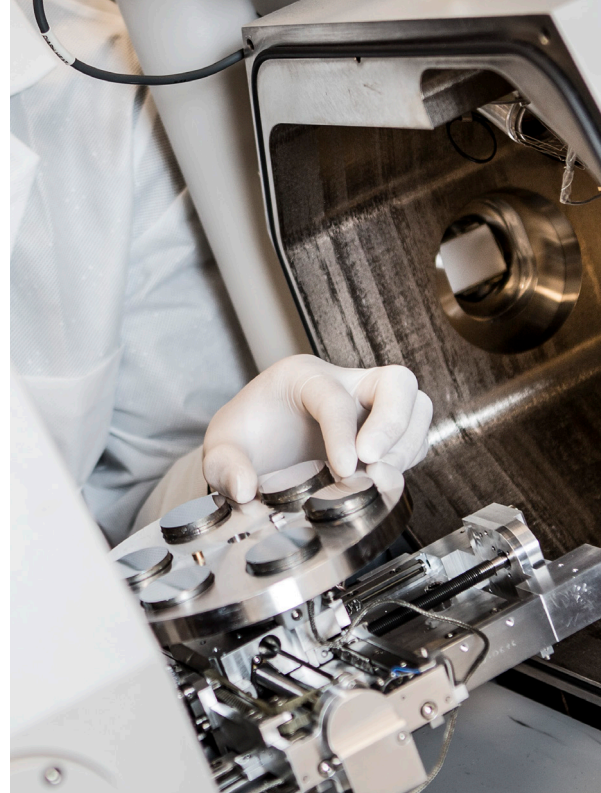
NADCA B states material must be remelted ESR/PESR

The NADCA B standard requires all products to be either ESR/PESR or VIM/VAR produced for higher levels of cleanliness. Tested to ASTM E45, Method A (latest revision) Plate I-r to obtain rating increments of 0.5. Orvar Supreme has a very high level of homogeneity and a low sulphur content. Combine this with the very latest ESR/PESR technology & technics and you have a very clean, consistent and highly capable material.



Using similar innovation steps that we used on Uddeholm Dievar we have been able to steadily increase the average test certificate result in production over recent years. In 2010 the average certificate value was 18 Joules and today it is >24 joules. These 2 properties of cleanliness and toughness now combine to make a steel without equal in the same chemistry group of H13/1.2344 materials.





Above we see 3 Microstructure all at the same magnification (x500) from a selection of profiles and sizes in the AISI H13 chemistry range. Picture 1 shows the microstructure from Orvar Supreme flat bar in the ST direction with excellent structure and no sign of primary carbides. Picture 2 shows the microstructure from a large diameter bar made in rival/competitor ESR H13/1.2344 in the CR2 direction with primary carbides in the microstructure. Picture 3 shows the microstructure from a small flat Non-ESR H13 with primary carbides in its microstructure. The secret of the high quality microstructure in Orvar Supreme is the combination of expertise in complex metallurgy, multiple process improvements, investments in new technologies and other production advancements.

IMPROVED TO SUIT MODERN NEEDS

QUALITY ACROSS THE RANGES

THE HIGHEST QUALITY PRODUCT

Uddeholm has always pushed to be the leader in new developments and standards. Orvar Supreme has now been developed to replace the Orvar Superior (NADCA B H13) grade but also to exceed its toughness to the new 16J/12ft-lbs standard. This expertise in the manufacture of superior ESR/PESR type materials is a high source of confidence and pride for Uddeholm. However, ESR/PESR manufacturing is not a guarantee of good quality by itself as, like any process, if you have bad processes at the start you will have bad results at the end.

TYPICAL CERTIFICATE VALUES

Throughout the size range of the upgraded Orvar Supreme the properties are excellent as we can see here with multiple cross section sizes as tested. The whole stock standard size range now benefits from this new level of cleanliness and toughness as these certificated results show. Please see the Uddeholm Orvar Supreme stock standard document to view the full size range available to customers.

	Width mm	Thickness mm	Cert as tested Joules	ASTM Grain size
Orvar Supreme	1000	350	25	8
Orvar Supreme	762	407	22	9
Orvar Supreme	610	305	26	9

Manufacturing solutions for generations to come

SHAPING THE WORLD

Since 1668 we have been providing a wide range of innovative cutting-edge solutions for our customers in demanding segments. Our dedicated employees work in almost ninety countries and together we deliver improved competitiveness to clients worldwide. Welcome to Uddeholm.