

The image shows the interior of a large industrial heat treatment furnace. The furnace is cylindrical with a thick, multi-layered metal wall. The interior is filled with various metal parts, including several large cylindrical components and a central component with a flange. These parts are arranged on a honeycomb-patterned metal tray. The lighting is bright, highlighting the metallic surfaces and the intricate details of the furnace's interior.

# ASSAB – YOUR COMPLETE SOLUTION PROVIDER

High Performance Heat Treatment



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# A WORLD OF TOOL STEEL

## ENHANCING YOUR COMPETITIVENESS

Tool steels are high-quality steels made to controlled chemical composition and processed to develop properties useful for working and shaping of other materials. For applications such as blanking, forming, plastic moulding, die casting, extrusion and forging, they form the world around us.

One of the key factors in developing tools or parts with the enhanced properties that only advanced tool steel can offer, is quality heat treatment. At ASSAB, we offer you proper heat treatment, customized for the material that best fits your needs.

Therefore, we do not only sell high performance tool steel; we also offer you other services. With a one-stop solution, we take care of the whole supply chain from order to fulfilment, enhancing your competitiveness.

Thanks to a wealth of experience, in-depth research and the continuous development of new processes, we are well equipped to resolve your heat treatment challenges. So let's talk about high performance heat treatment.



# THE HEAT TREATMENT CHALLENGE

## OPTIMISE YOUR TOOL STEEL PROPERTIES

When it comes to heat treatment, each step of the process is critical. Heat treatment modifies the distribution of alloying elements of tool steel to enable it to better withstand abrasion, ductility, toughness, corrosion resistance and impacts during applications. With the right heat treatment, you can optimise the properties of the tool steel that meet your needs.

At ASSAB, we work continuously with key industrial partners to develop cutting-edge solutions. We have perfected our heat treatment service and solutions down to a precision science. It encompasses carefully conducted thermal processing to bring about tool steel properties that match your needs. This includes not only calibrating the exact time, temperature and cooling for the material grade involved, but also employing the equipment best able to achieve superior tooling performance.

Our heat treatment solutions are wide ranging. Some of our main focuses include state-of-the-art recipes for large high-pressure Aluminium die-casting dies for the automotive industry, unparalleled vacuum heat treatment process for high precision stamping dies in cold work applications and a unique vacuum hardening process particularly suitable for development of Integrated Circuit Encapsulation Moulds (IC moulds).





# ONE-STOP HUB

**A CUSTOMISED TOTAL SOLUTION THAT GIVES YOU A BETTER TOOLING ECONOMY**

With our one-stop solution we offer you the security that comes with choosing our high performance tool steel combined with an ASSAB high performance service. Reducing lead time and giving you a better tooling economy, our products, services and competencies span the entire supply chain from initial concept to delivery of the final product. Our group of companies across Asia offer a supply of superior tool steel that is heat treated by ourselves for enhanced performance and durability by a team of highly experienced metallurgists, astute process specialists and fully trained operative staff.

In today's demands for process quality and legal compliance, efficient tracking and full traceability plays an important role in all industries. We address this challenge with our proprietary identification system that builds a comprehensive customer portfolio comprising documented histories from order to fulfillment. With industrial identification, each part or component leaves a digital trace that can be tracked as well as archived for reference in the future, allowing maintenance and improvement of product quality and properties.

# OUR HEAT TREATMENT OFFER

## A COMPREHENSIVE RANGE OF UNIQUE CAPABILITIES

As a leader in tool steel heat treatment, we offer you a comprehensive range of thermal and thermo-chemical processing services to yield optimum performance through increased hardness, toughness, ductility, corrosion resistance, heat resistance and surface properties. Whichever service you wish, ASSAB can meet your expectations and requirements to exacting standards.



## VACUUM HARDENING

Vacuum Hardening is carried out under a controlled vacuum environment to prevent oxidation and decarburisation on tool surfaces. Post-treatment work pieces stay metallically clear without any scaling on the surfaces or undesired decarburisation leading to low hardness and high risk of cracking. Vacuum technology is best used for high demands of clean bright surfaces, such as premium single and serial production tools as well as high-quality moulds and dies. For best results on enhanced material strength and toughness, vacuum hardened steel is cooled quickly by

quenching with a high pressure gas stream such as nitrogen using a nozzle system that can achieve the calibrated speed required for the final application of the work piece. Precise process control guarantees optimum reproducibility, minimum dimensional deformation and process safety. This includes the use of multiple thermocouples on the tool surfaces and at their core, as well as infrared cameras to ensure a homogeneous dimensional heating and cooling cycle for a longer tool life. This results in uniform hardness, ductility and toughness, an optimum performance.

## SUBZERO

For the highest demands on dimensional stability, sub-zero treatment using liquid nitrogen is highly recommended. The treatment is primarily to convert soft retained austenite into hard martensite, where high micro-stresses contribute to a significant increase in hardness. Subzero treatment leads to a reduction of unstable retained austenite content by exposing the tool to very low

temperature, the common range being  $-80^{\circ}\text{C}$  to  $-196^{\circ}\text{C}$  but typically at  $-150^{\circ}\text{C}$ . This, in turn, will result in a hardness increase of 1 to 2 HRC and more important stable dimension, when compared to non subzero treated tools. We deliver subzero treatment on a wide range of tools and components including gauges, high precision stamping dies and IC-moulds for integrated circuits.

## ABP

ABP (ASSAB Benefit Process) is a shot peening process that introduces compressive stress to the material surface to bring about reduction in thermal fatigue and wear, as well as improved surface hardness and extended tool life by as high as 30 to 40%. Our range of ABP treatment

includes a patented process developed mainly for die-casting application on both used and new dies. ABP Plus and ABP Dual Plus which combine different processes for high performance dies to extend tool life.

## NITRIDING

Nitriding is conducted by exposing the tools to some media rich in nitrogen under certain physical conditions to diffuse active nitrogen atoms into the metallic surface to form nitrides for a harder surface and a higher wear resistance. Steel appropriate to be nitrided is usually medium-carbon steel with nitride-forming elements such as chromium,

molybdenum, vanadium and aluminium. Our key nitriding technologies comprise gas-controlled nitriding and nitrocarburising. It involves state-of-the-art equipment and a user friendly software program, allowing full automation of all functions, process stages and safety procedures.



# OUR COMPLEMENTARY SERVICES OFFER

## COATING

We offer leading-edge PVD (Physical Vapour Deposition) technology through the renowned Alpha series PVD Arc Coating System, a system for reactive vacuum coating on substrates (tools or components) with metal-based and electrically conductive layers. Besides the arc coating process, the ASSAB Duplex Coating combines plasma nitriding and a subsequent

deposition of ASSAB PVD coating in a non-interrupted arc process to increase the surface hardness of the substrate. The wide range of PVD coating processes also includes the SPCS filtered arc technology for ultrafine coatings required in precision tools and components with high surface finish demand.







## LABORATORY AND CONSULTANCY SERVICE

Our corporate philosophy of treating customers as partners means that we are there for you. Whether it is in troubleshooting, training or provision of technical literature, we are only a call away. More than just selling and heat treating steel, we provide solutions to overcome any

process challenges. We improve customers' competitiveness by providing testing and analysis as well as consultancy on the usage of the right steel and the treatment required to meet specific tooling needs.

# ABOUT ASSAB

## MORE THAN JUST ANOTHER TOOL STEEL SUPPLIER

Choosing the right steel is of vital importance. ASSAB engineers and metallurgists are always ready to assist you in your choice of the optimum steel grade and the best heat treatment for each application. We support you for your next tooling challenge wherever you are in the supply chain – whether a toolmaker, tool user or end user.

From establishment in 1945 to market top-quality Swedish tool steel, we have since expanded our service range to include best-in-class metallurgical tooling services and technology. Today we enjoy an indisputable reputation as Asia's pioneering leader in tool steel and heat treatment solutions.

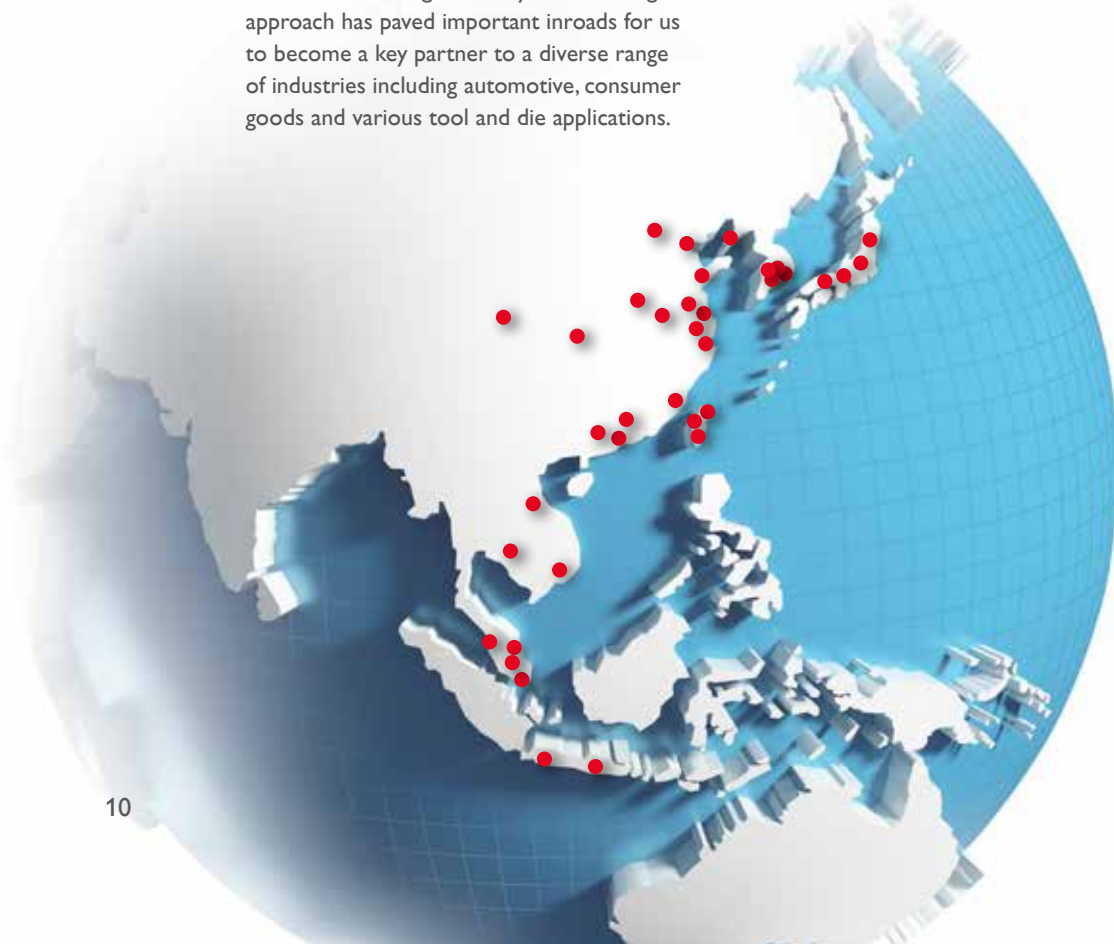
Headquartered in Singapore, we operate all over Asia Pacific. Using a holistic approach as a one-stop solution provider, we are more than just another tool steel supplier, we meet our customer's increasing demands for high performance tools with cost benefits for a better total tooling economy. This strategic approach has paved important inroads for us to become a key partner to a diverse range of industries including automotive, consumer goods and various tool and die applications.

We focus on cutting-edge innovation through research and development initiatives that are both customer-centric and environmentally aligned.

ASSAB and Uddeholm are present on every continent. This ensures you that high quality tool steel, heat treatment, other value added services as well as local support are available wherever you are. Together we secure our position as the world's leading supplier of tooling materials.

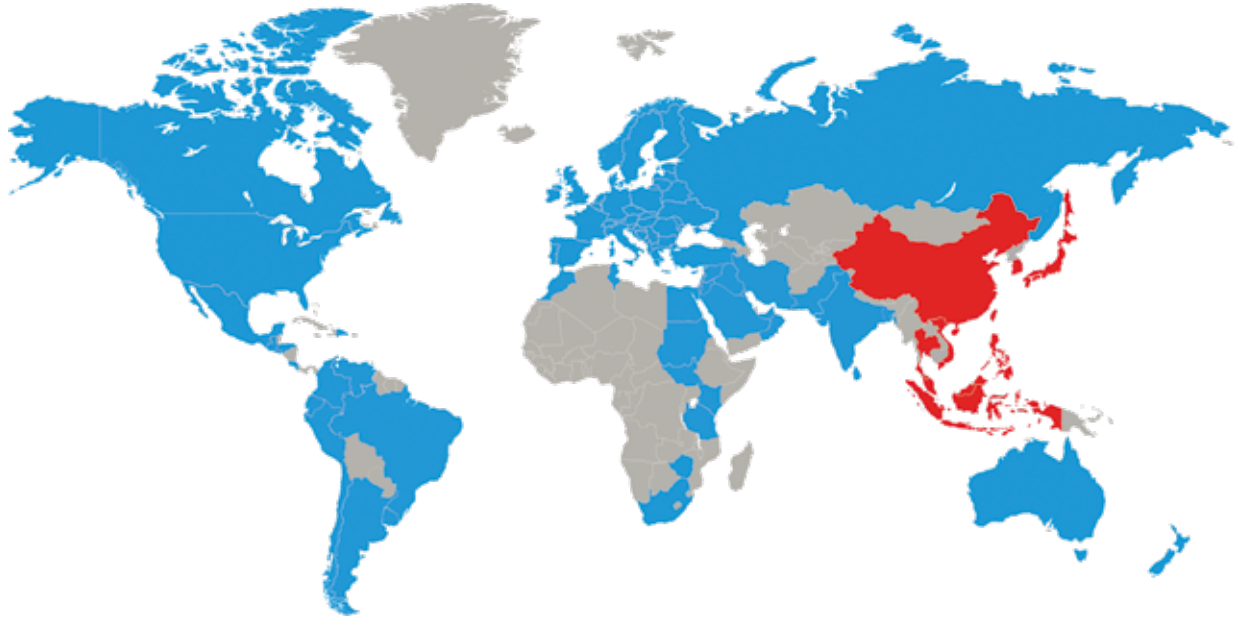
## REGIONAL NETWORK

We have the region covered through our growing network of processing facilities in strategic locations across Asia Pacific. Customers enjoy access to our comprehensive suite of heat treatment solutions that can be customised to meet market needs of varying specifications and budgets.





Scan me for more information



Choosing the right steel is of vital importance. ASSAB engineers and metallurgists are always ready to assist you in your choice of the optimum steel grade and the best treatment for each application. ASSAB not only supplies steel products with superior quality, we offer state-of-the-art machining, heat treatment and surface treatment services to enhance steel properties to meet your requirement in the shortest lead time. Using a holistic approach as a one-stop solution provider, we are more than just another tool steel supplier.

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For more information, please visit  
[www.assab.com](http://www.assab.com)

