

ARMOX[®]
PROTECTION PLATE

The steel you want
between you and risk



SSAB



On the safe side

It goes without saying. If you are the supplier of a steel plate that could be the only thing standing between a human being, and a bullet travelling at the speed of 925 meters/second - you better be on the safe side.

That is how we go about it, and that has been our approach since the very first day we entered the market for protection plates.

To stay on the safe side, we have to stretch the limits of what is possible. To go far beyond specifications and today's threat levels. We have to think differently, be innovative and take full advantage of SSAB's 50 years of experience, research and knowledge within niche steel production.

This approach has made it possible to develop harder and tougher steel than anyone else, and to offer you the markets most comprehensive product range. We are your competitive advantage for your future designs of protective equipment.

We decided to stay on the safe side. We think you should too.

50 years of research and a continuing ambition of pushing the boundaries

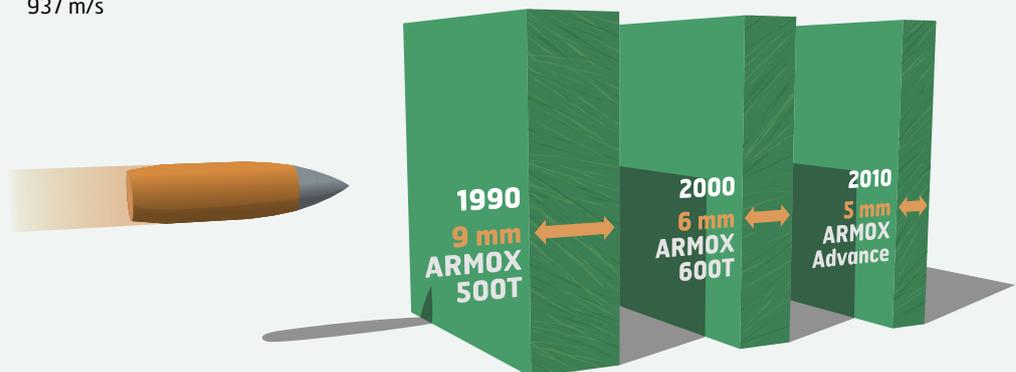
Armox was born and raised for one single purpose – to protect human life. We do that by providing the world's leading manufacturers of protection equipment with harder and tougher steel. The pedigree is unique; SSAB is a world leader in quenched and tempered steel, through 50 years of technological leadership.

There is no secret recipe for how to produce the worlds hardest protection plate, there are many. It all starts in the mines of northern Sweden, where we select the purest ore. From there we master every step of the production process; the coking, the raw steel making, the BOF process, the secondary metallurgy, the continuous casting, the slab reheating, the rolling, the quenching and the tempering.

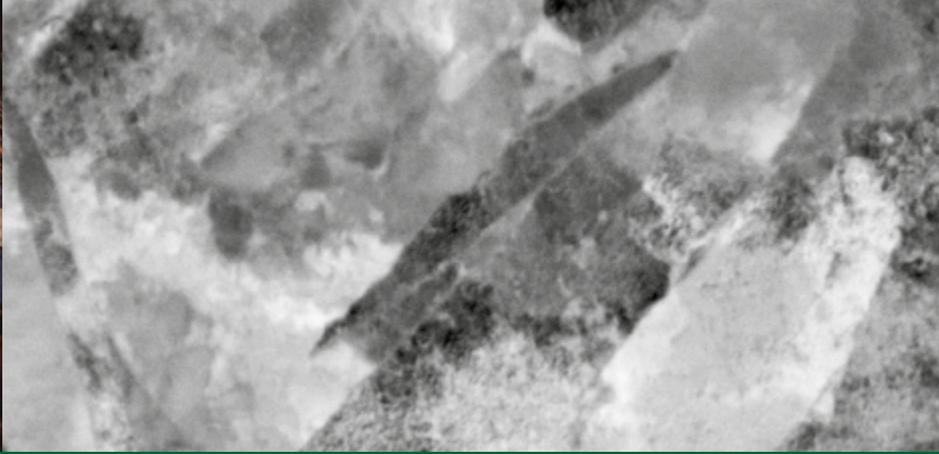
Our understanding of exactly how each step affects the properties of the steel, the desire to continuously find new ways to refine the process, and the ability to fully control the complete process is how Armox can offer you the superior range of protection steel.

Pure steel. Pure Evolution.

THREAT
Projectile:
5.56 M193/SS92
Velocity:
937 m/s

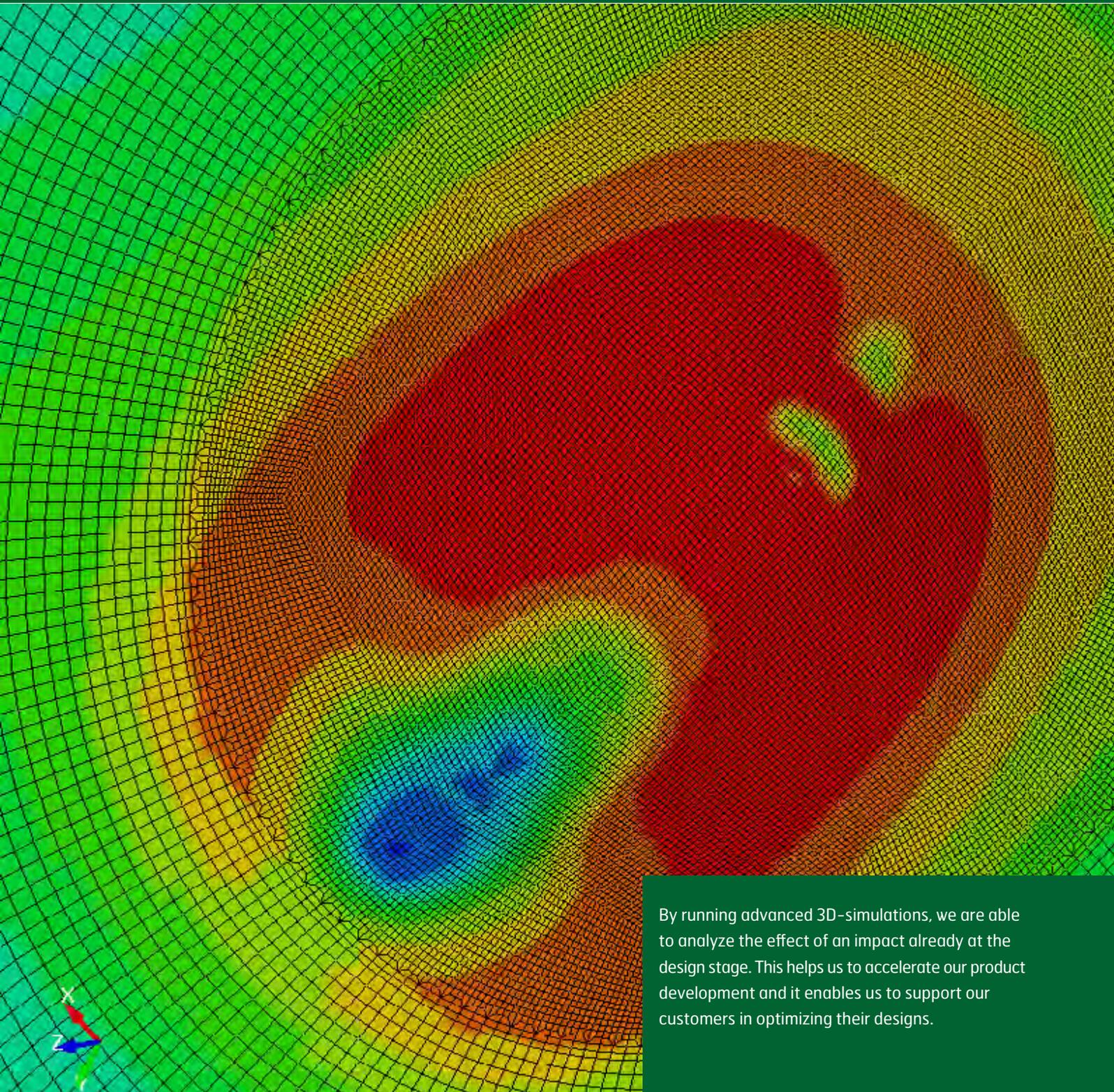


25 years of uncompromised product development, has made it possible to offer the market a protection plate that provides the same level of protection at half the plate thickness. This makes it possible to save 50 percent on weight, without compromising on safety. No one, can keep pace with our evolution.



OUR FULLY INTEGRATED MILL, includes a high-tech, and probably the worlds most powerful, four high rolling mill. A rolling force of more than 10 000 tonnes enables the production of plates with superior thickness precision.

ADVANCED METALLURGICAL PROCESSES ensure that we give the steel a composition that gives exactly the characteristics required to provide maximum protection. This is a 75000x magnified picture from our research laboratory. The grey scale in the picture represents martensite packages with different crystallographic orientations within the previous austenite grains.



By running advanced 3D-simulations, we are able to analyze the effect of an impact already at the design stage. This helps us to accelerate our product development and it enables us to support our customers in optimizing their designs.

Only by understanding tomorrows threat levels, can we help our customers protect human lives

When people with diverse expertise come together, evolution takes a major step forward and new knowledge arises. This happens when a metallurgist meets a vehicle designer and it happens when our ballistic experts are discussing future needs of armored clothing with a group of fabric manufacturers.

Over decades, we as a leading supplier of protection plates, have been involved in thousands of designs of protection equipment. Each time we enter a new project this interactive process creates new ideas and solutions come alive. This is how we improve ourselves, this is how we bring crucial knowledge into our projects.



PATROL VEHICLE

Used for homeland security missions. Policing operations. It has to look friendly and discrete, but still offer a certain level of protection, without compromising performance and fuel efficiency.



CASH IN TRANSIT VEHICLE (CIT)

The safe delivery of cash and valuables is constantly evolving as robbers and attackers become more sophisticated. These vehicles need to have the capability to protect both their cargo and their personnel with a minimum additional weight penalty.



8 X 8 ARMORED PERSONNEL CARRIER (APC)

It needs to be fully protected all around from threats such as; airborne missiles, IEDs and standard ballistic threats. Whilst remaining as light as possible and being covered with innovative survivability technology and solutions.



4 X 4 ARMORED PERSONNEL CARRIER (APC)

Vehicles of this type are suitable for armored patrol, surveillance and reconnaissance. The design has to include complete ballistic and mine protection technologies, whilst still maintaining good on and off-road capabilities.

PROTECTED BUILDINGS

Armox steel is used in various architectural applications. Including; government buildings, financial institutes, private homes and any location where a cash transaction takes place. The challenge is achieving the right protection level, without interfering with the building's functionality or its architectural values.



There is a reason why our product range doesn't only include the hardest steel in the world. You.

No matter if your task is to build an armored vehicle for military troop transport, a limousine for a corporate VIP or a panic room for a celebrity. Every application, every design has its own challenges and unique set of critical design requirements.

Armox is offering the markets most comprehensive product range. This way you should always find the optimal grade and dimensions for you application, whether it is hardness, toughness, total weight requirements or the machinability, which is your major challenge. Armox also offers customised manufacturing, for dimensions not covered by the standard range. Regardless of your choice, you will always benefit from Armox's higher toughness and superior thickness precision.





ARMOX 440T has the highest toughness in our range. Its superior toughness makes this steel a common choice for applications with high requirements on blast protection. The purity and composition of the steel also makes the steel easy to process, including excellent properties for welding and bending.



ARMOX ADVANCE is the hardest steel in the market - it is so hard it seriously challenges the hardness of ceramic plates. But it still offers all the advantages of steel, including the toughness required for withstanding multi-hits and the machinability to simplify your design and production process.

Armox product range	Thickness (mm)	Typical Hardness (HBW/HRC)	Typical Yield Strength (MPa)	Typical Tensile strength (MPa)	Typical Impact toughness (J)*
Armox 370T Class 1	3.0–19.9	405	1200	1300	35
	20.0–39.9	375	900	1150	35
	40.0–100.0	325	850	1050	35
Armox 370T Class 2	3.0–100.0	305	900	1000	100
Armox 440T	4–80	450	1200	1400	85
Armox 500T	3–80	510	1380	1690	45
Armox 600T	4–20	605	1500	2000	25
Armox Advance	4.0–7.9	60			10

*Average of three tests. Transverse to rolling direction. Single value min. 70% of specified average. Charpy-V at -40°C L. 10x10 mm test specimen, except for Armox Advance with a 5x10 mm specimen. For plate thicknesses under 12 mm sub-size Charpy-V specimen are used. The specified minimum value is then proportional to the specimen cross-section. For more information, see datasheets at www.armoxplate.com

When providing equipment for the protection of human lives, you better be on the safe side. We are.

Armox protection plates have been used to protect people in the world's most dangerous environments for more than 30 years. It has literally been tested in the field.

Our customers are suppliers of protection equipment for military and civil applications; equipment that can ultimately save human lives. Under such circumstances, there is no room for error. Our entire production process is designed to make sure our products are always well within your specifications, to ensure you are always on the safe side.

That's why Armox protection plates can be delivered with guaranteed ballistic properties. Each grade and thickness is tested according to the most extensive and stringent international standards. In addition we cooperate with leading independent laboratories for ballistic testing in order to offer protection plates, certified to your required standards.



TRUE STOPPING POWER

The test was performed in a multi-hit pattern. The distance between hit no 2 and 3 is 5mm, which illustrates the excellent multi-hit capability of the Armox plate.



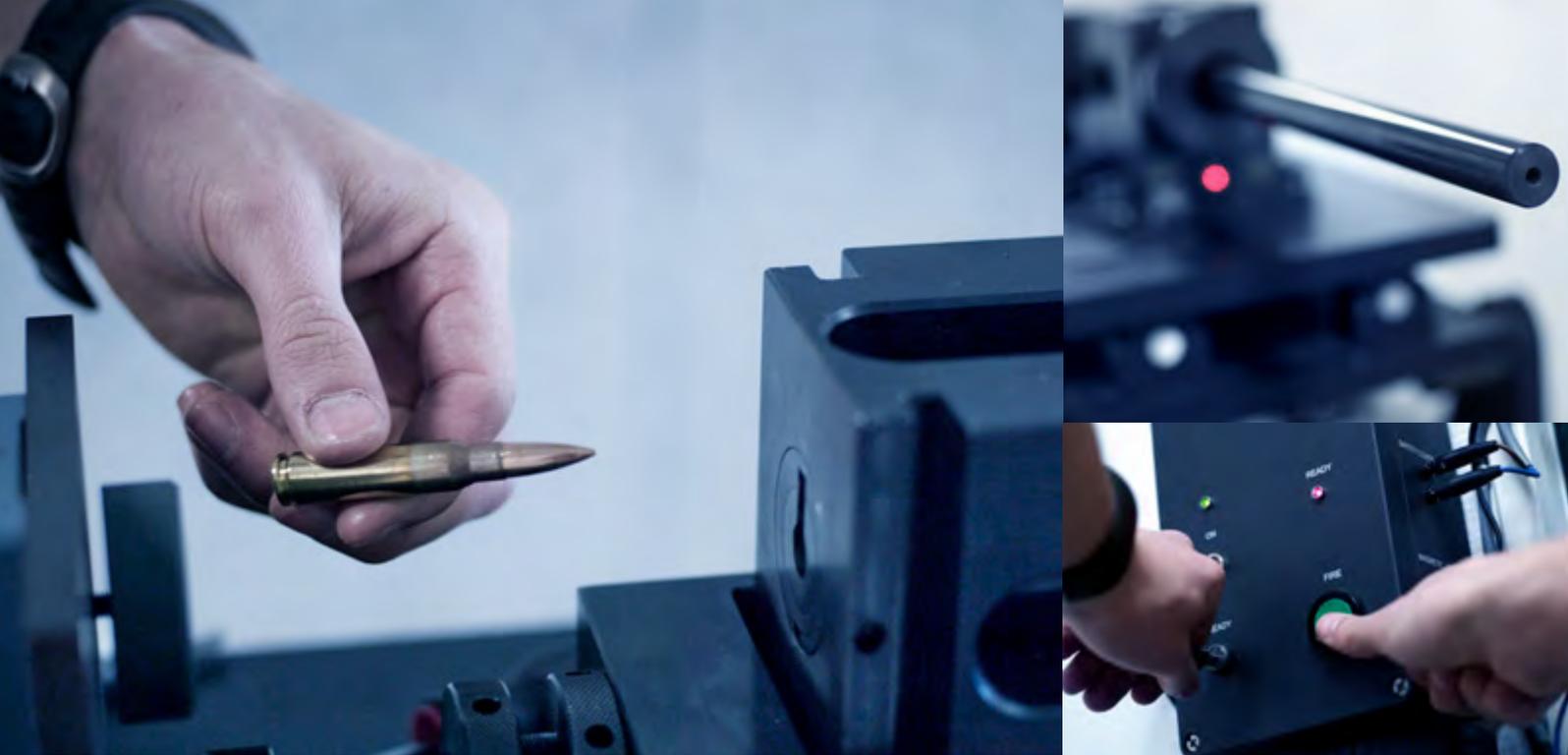


Plate thickness requirements vs. protection levels

EN 1522 (European Committee for Standardization)						
Protection Level	Threat	Muzzle velocity (m/s)	Range (m)	ArmoX 500 (mm)	ArmoX 600 (mm)	ArmoX Advance (mm)
FB4	.357 Mag FMJ/CB/SC	430 ± 10	5	3		
	.44 Mag FMJ/FN/SC	440 ± 10				
FB5	5.56x45 FMJ/PB (SS109)	950 ± 10	10	6.5	5	4.5
FB6	5.56x45 FMJ/PB (SS109)	950 ± 10	10	6.5	5	4.5
	7.62x51 FMJ/PB/SC (NATO Ball)	830 ± 10				
FB7	7.62x51 FMJ/PB/HCI (NATO AP)	820 ± 10	10	14.5	12	9

STANAG 4569						
Protection Level	Threat	Velocity (m/s)	Range (m)	ArmoX 500 (mm)	ArmoX 600 (mm)	ArmoX Advance (mm)
Level 1	5,56x45 SS109	900 ± 20	30	9	6	5
	5,56x45 M193	937 ± 20				
	7,62x51 M80	833 ± 20				
Level 2	7,62x39 API BZ	695 ± 20	30	12	8	7

"All statements as to the properties and utilization of materials and products mentioned in this data sheet are for the purpose of description only. Guarantees in respect of existence of certain properties or utilization of material mentioned are valid only if agreed upon writing."

Hard steel, easy processing - That used to be a contradiction.

It's one thing to develop the world's hardest steel and to ensure its ballistic properties, it's another to make the same steel easy to process in the workshop. We did both.

Being able to offer a protection plate that combines these characteristics has been a design criterion for the development of ArmoX.

SSAB is not only a leader within protection steel; we are also a global supplier of high strength steel and wear plates. By taking full advantage of the collective knowledge and expertise within our group we have been able to ensure ArmoX has the properties you need. Not only to produce and maintain your application efficiently, but also to enable new design solutions that could further enhance the protection of human lives.





PURITY

Our steels are cleaner than most other steels. The low carbon content makes them easier to weld and with the use of electrodes with low hydrogen content the risk of cold cracking is minimised.



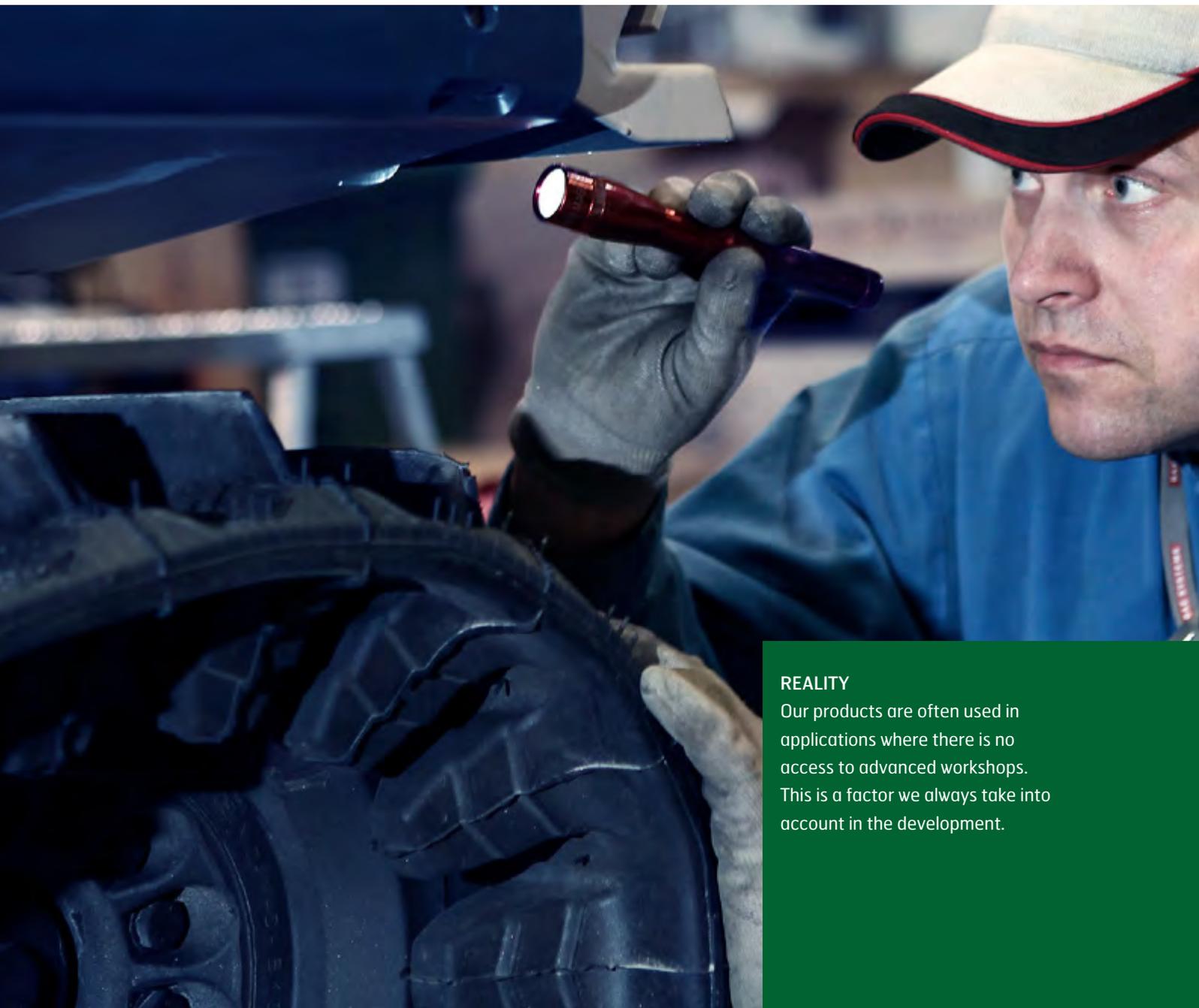
A BIT TOUGHER

ArmoX protection plates always offers a high toughness relative to its hardness. This gives our steel good bending properties. High thickness precision in combination with uniform properties ensures superior repeatability.



FITS RIGHT AWAY

As we control the entire production process, we can offer tighter tolerances than others. This saves time for our customers as our plates can often be fitted right away without levelling after being cut.



REALITY

Our products are often used in applications where there is no access to advanced workshops. This is a factor we always take into account in the development.

A controlled process - all the way from the mine to your production line

Steel from Sweden has become well known for its superior quality, consistency and reliability. And this is no coincidence. We have been around for over 50 years. Every year we produce millions of tonnes of high quality steel and every day we focus on making our products even better, to ensure we maintain our status as the technical leader for the next 50 years as well.

When you partner with us, you get the knowledge and resources of a world leading producer. You will benefit from our expertise throughout the design process all the way to the production and application. We will be at your side - from the evaluation and selection of grades and thickness, the optimization of your production process all the way to the tracking of your delivery to your production site.

The service and support, which comes as standard with our products, doesn't make our steel harder, but will make the journey to achieve your objectives much easier.





From our fully integrated mill in Oxelösund we cater the world's need for high quality protection steel



SSAB is a Nordic and US-based steel company. SSAB offers value added products and services developed in close cooperation with its customers to create a stronger, lighter and more sustainable world. SSAB has employees in over 50 countries. SSAB has production facilities in Sweden, Finland and the US. SSAB is listed on Nasdaq Stockholm and has a secondary listing on Nasdaq Helsinki.

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