

OVAKO

**CUSTOMIZE
YOUR STEEL –
SP-BAR**



The background of the entire page is a close-up, diagonal view of numerous blue-tinted steel bars. The bars are arranged in parallel lines, creating a strong sense of depth and texture. The lighting is dramatic, with bright highlights on the top surfaces of the bars and deep shadows in the gaps between them, emphasizing their cylindrical shape and metallic finish.

"SP-Bar is taking Ovako's hot-rolled round bar to a whole new level. Our capability for modifying the three properties with precision is unique. And we offer this solution with potentially significant cost savings for our customers."

Adam Hylan,
Business Development Manager Ovako Bar

DESIGN THE ROUND BAR YOU NEED

No more compromises! Whether your components are rail clips, stabilizers or high-impact bolts for sub-zero climates, you can order customized round bar that meet your specific requirements and, at the same time, lower your costs.

Let's say you want steel characteristics that will extend the fatigue life of your component. Or ensure greater impact strength. Or produce more components out of the tonnage you buy. Or, in some cases, replace drawn or peeled bars, to name a few examples. Ovako's Special Property Bar (SP-Bar) will deliver on these objectives. And more.

Tweak three properties to your specifications

A highly advanced and flexible technology, the SP-Bar is a concept based on the ability to modify three key properties – tolerances, mechanical properties and surface quality – to meet your requirements. Prior to an order, our engineers work closely with you to plan and calculate the rolling operation to achieve the properties that are important to you.

Every contract reviewed

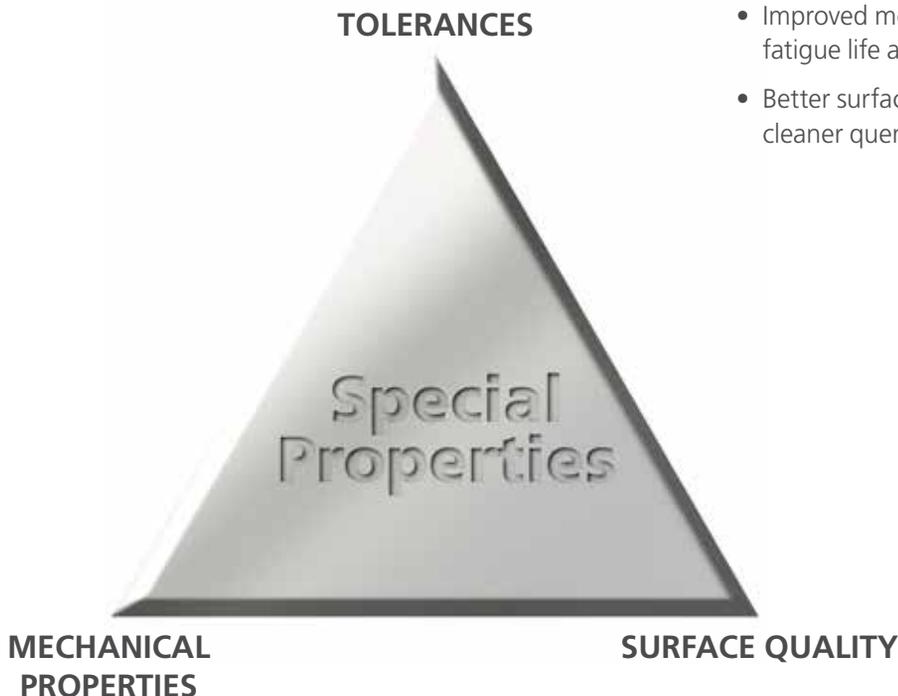
We do a thorough review of every contract and since we have a ISO/TS 16949 certification we are able to deliver according to existing requirements.

Sizes ranges

SP-Bar can be delivered in round sizes from 14 to 52 mm and in lengths up to 12 m.

Benefits:

- Tighter tolerances that deliver increased yields and repeatability as well as material savings.
- Improved mechanical properties that provide longer fatigue life and greater impact strength.
- Better surface quality that reduces scale and results in cleaner quenching tanks and improved environment



SP-BAR TOLERANCES

Ovako's hot-rolling techniques are capable of producing round bars with very tight tolerances, helping customers achieve significant material savings, as well increased yields and repeatability.

More cost-effective than peeled or cold-drawn bar

In many cases, the tight tolerances of SP-Bar are close enough to those generated by peeled or cold drawn techniques, both costly processes. In fact, some manufacturers of stabilizer bars for trucks are replacing components made from peeled bars with SP-Bar.

Furthermore, residual surface stress levels in SP-Bar are lower than in cold drawn bars as a result of reduced deformation in the straightening process. SP-bars can also be delivered non-straightened.

Get more from your tonne!

Tight SP-Bar tolerances allow customers to decrease the dimension of bars and get more manufactured pieces per tonne of purchased bar.

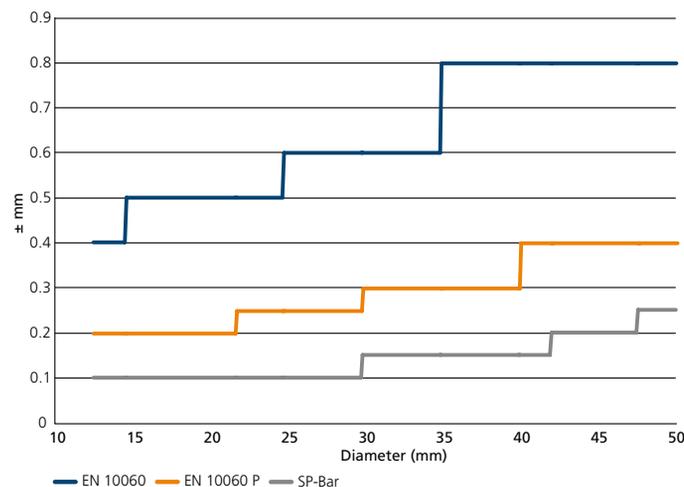
Increased yield

By using SP-Bars for cutting blanks in the forging operation the weight variation of the blanks is reduced, resulting in less burr and more efficient deburring after forging. If a peeled surface is required, the excellent roundness of SP-Bar can minimize the amount of material removed. The product can be offered in combination with M-Steel® from Ovako for improved machinability, making the peeling operation even more effective.

Repeatability

Tight dimensional tolerances provide consistent bar diameter and tight ovality control, allowing for predictable and repeatable processes.

Dimensional tolerances SP-Bar



Available tolerances (1/4 EN 10060)	
Ø 14–30	± 0.10
Ø 31–42	± 0.15
Ø 43–47.5	± 0.20
Ø 48–52	± 0.25

MECHANICAL PROPERTIES

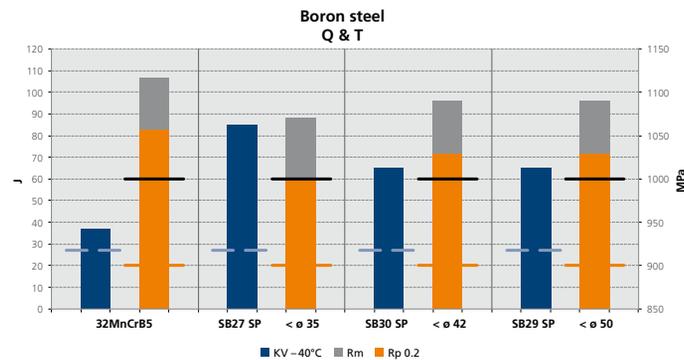
The fatigue life and impact strength of many steel grades (although not all) can be further enhanced with the SP-Bar process, which is being continuously developed at our mill.

Fatigue strength

Fatigue life is a very important property in applications with cyclic loading such as spring applications. By applying the SP-Bar process, fatigue strength can be improved for quenched and tempered bars as well as the as-rolled bar. This also gives our customers the opportunity to downsize dimension or to replace peeled bars.

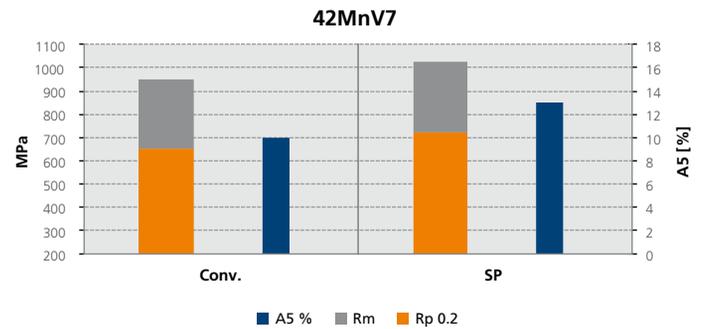
Impact strength

One of the challenges in low temperature applications, such as high-strength bolts for windmills, is securing high-impact strength levels. By using the SP-Bar process involving quenching and tempering, the steel can achieve superior impact strength levels combined with high tensile strength. See figure below.



Optimizing steel chemistry

The improved tensile strength and toughness of SP-Bar makes it possible to replace more expensive alloyed steel grades or reduce the amount of alloy content in the existing steel grade. Weldability also improves with alloy reduction. More-over, the enhanced properties of SP-Bars enables customers in the construction industry, for example, to use less steel, reducing overall weight.



Eliminate costly annealing

To meet the specified hardness requirements, certain steel grades require an additional annealing operation because of the high alloy content. Depending on the grade, however, SP-Bar enables customers to avoid this costly process.

SURFACE QUALITY

Thickness of the scale is generally reduced on SP-Bar. The amount of the reduction can be up to 50 % compared to conventional hot rolling. This is particularly important in subsequent heat treatment or cold forming processes, resulting in cleaner quenching tanks and work environment.

Testing guarantees quality

Ovako uses several ways to test the quality of the round bar. One of these is Nondestructing Testing (NDT), which carefully inspects the bars in state-of-the-art flux leakage crack detection equipment. The equipment works with high frequency alternating current that does not cause any residual magnetism, ensuring that customers get the quality of bar they have come to expect from Ovako.



"A significant reason our products perform so well is because Ovako supplies us with high quality steel with tight dimension tolerances and a very good surface finish."

Mike James

Production Director, Pandrol UK Limited

SECURING THE TRACK

Pandrol UK Limited is the world's leading producer of rail clips – the device that clamps the rail tracks to the sleepers (also known as rail ties in the US) and helps prevent trains from derailing. Ovako's Special Properties round bars (SP-Bar) have played a role in the development of these extremely tough spring clips.

The producer's reputation for high standards has resulted in companies such as France's SNCF, operator of the Train a Grande Vitesse (TGV) choosing Pandrol FASTCLIP clips for their high speed tracks. With a World record achievement of speeds reaching 357 mph, the engineering demands on the fastening system are enormous.

In addition to large dynamic loads, these clips must also be able to handle extreme climate conditions. In Mongolia where Pandrol has installations, track temperatures can range between minus 50°C to plus 40°C, temperatures that could make lesser materials fail.

"Our clips, once installed are expected to last at least the life of the rail," explains Mike James, Production Director Pandrol UK Limited and responsible for purchasing the

steel from which the clips are forged. "Our routine Quality Assurance (QA) processes test clips to 5 million cycles. That's why the standard of the steel we buy is critical to the performance of our clips."

According to James, the tight dimensional tolerances provide two benefits: the consistent bar diameter and tight ovality control allow for a predictable and repeatable clip-forming process; also, the company achieves material savings of around 1.5 percent compared to standard tolerance round bar.

Furthermore, the unique metallurgy of the SP-Bar has enabled Pandrol, through its quenching and tempering process, to create a particularly tough and resilient clip with high fatigue performance.

About Ovako

Ovako develops high-tech steel solutions for, and in cooperation with, its customers in the bearing, transport and manufacturing industries. Our steel makes our customers' end products more resilient and extends their useful life, ultimately resulting in smarter, more energy-efficient and more environmentally-friendly products.

Our production is based on recycled scrap and includes steel in the form of bar, tube, ring and pre-components. Ovako is represented in more than 30 countries, and has sales offices in Europe, North America and Asia. Ovako's sales in 2015 amounted to EUR 834 million, and the company had 2,905 employees at year-end. For more information, please visit us at www.ovako.com

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