Special Properties
Round Bars

OVAKO
afeel for steel
Special Properties

Special Properties on round bar, more known as SP bars are the result of our never ending efforts in our process development. SP Bars are not limited to any specific steel grade which opens great possibilities for customers to use our advanced technology. They can benefit from increased added value and substantial cost savings in manufacturing operations by optimizing the properties of the material.

Simply, SP is a hot rolled bar with enhanced properties into customer’s processing and their final product.

Size range
SP bars can be delivered in round sizes from 14 to 47.5 mm and in lengths up to 12 m. Crack detected SP bars are limited to a length of 9.5 m.

Each case is specific
No customer case is similar to any other case. Each case is thoroughly reviewed in order to optimize the material into customer’s processing and our technical department is always involved in the review. Every inquiry is followed by a customer contract review in accordance with the ISO/TS 16949 requirements.
Tolerances

SP bars can offer extremely tight tolerances and the strive towards even tighter tolerances is safeguarded by our continuous process development. In the information below you will find some ideas of the benefits you can get from the tight tolerances shown in the table.

<table>
<thead>
<tr>
<th>Available tolerances (¼ DIN 1013)</th>
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<tbody>
<tr>
<td>ø 14 – 20</td>
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<tr>
<td>ø 20 – 30</td>
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<tr>
<td>ø 30 – 42</td>
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<td>ø 42 – 47.5</td>
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Replace peeled or cold drawn bar
In many cases the tight SP tolerances are close enough to those generated in peeling or cold drawing process. This means in practice that these operations can be eliminated thus enabling the customer to save manufacturing costs. Residual surface stress levels in SP bars are lower than in cold drawn bars as a result of lower degree of deformation in the straightening process. SP bars can also be delivered non-straightened.

More out of tonne
The tight SP bar tolerances allows customers to decrease the nominal size and more manufactured pieces are obtained per tonne of purchased SP bar. This represents a vital cost reduction.

Increased yield
By using SP bars for cutting blanks in the forging operation the weight variation of the blanks is reduced which results in less burr and thus more efficient deburring after forging. The excellent roundness of SP bars can also be successfully utilized in the peeling operation. (There is not always a need for the peeling operation!) The amount of material removed from the surface becomes less when using SP bars in the peeling operation. We can also offer a combination of SP bars and our SBM™ steel for improved machinability, this will make peeling or any other machining operation much more efficient.

A combination of SP bars and our SBM™ steel for improved machinability.

Repeatability
Using SP bars with tight tolerances improves the repeatability in the customer process and, e.g. in the bending operation variation of spring back is reduced. You get more uniform properties on finished product when dimensional variations are reduced compared to conventional hot rolled bars.
Mechanical Properties

Steel is one of the world’s most used construction materials thanks to its excellent properties and cost effectiveness in many different applications. Like any other material steel has its limitations which we are pushing further with SP by continuously developing our process. However, the benefits on mechanical properties that can be reached depends on the steel grade and the alloying elements.

Presented below are a few examples of how the use of SP bars can enhance the mechanical properties and reduce customer manufacturing costs.

Fatigue Life
Fatigue Life is a very important property in applications with cyclic loading like spring applications. By applying SP bars fatigue strength can be improved in both quenched and tempered and the as rolled condition. This will result in longer fatigue life and gives our customers the opportunity to downsize dimension or to replace peeled bars.

Low temperature properties (Impact Strength)
In low temperature applications, such as high strength bolts for wind mills, it becomes very important to secure high impact strength levels to avoid brittleness of the steel. By using SP bars, superior impact strength levels can be reached combined with high tensile strength in the quench and tempered condition. See figure below.

Impact strength of boron steel Q&T for 10.9 bolt.
Optimizing Steel Chemistry
The improved tensile strength and toughness in SP bars make it possible to either replace more expensive alloyed steel grades or to reduce the alloy content in the existing steel grade which would also improve weldability.
As mentioned earlier, it is also possible to reduce weight in the construction by decreasing the size of SP bars. Or just increase the security level of your construction.

Avoid annealing
Certain steel grades require an extra annealing operation, because of the high alloy content, in order to meet the specified hardness requirements. This is a costly operation and can possibly be avoided by using SP bars.

Comparing conventional 42MnV7 and SP.
Accurate control of reheating of billets prior to hot rolling ensures low level of decarburizing of bars which is important for mechanical properties.

To ensure the surface quality the bars can be NDT inspected in a state-of-the-art flux leakage crack detection equipment. The equipment works with high frequency alternating current which doesn’t cause any residual magnetism.
Some SP Applications

**Automotive applications**

- Steering racks
- Stabilizer bars

**Railway clips**

**Bolts for Wind power mills**
Ovako is a leading European producer of special long steel products for the heavy vehicle, automotive and engineering industries. Our production covers low-alloy steels and carbon steels in the form of bars, tubes, rings and pre-components. The company has 14 production units and several sales companies in Europe and the US. Net sales are EUR 1,100 million and the company employs 3,000 people. Total steel production capacity is 1.3 million tonnes per year.