Steeltec

XTREME PERFORMANCE
TECHNOLOGY

OUTSIDE: Steel.
INSIDE: The New Extreme.
Inner strength is the key to achieving maximum resistance. Xtreme Performance Technology – the latest innovation to be launched by Steeltec – is driving the dynamic strength of steel to new heights and represents a breakthrough in the use of standard steels under extreme conditions.

While XTP-treated steel looks just like conventional steel from the outside, its true quality lies hidden inside. The ultra-fine-grained microstructure of the steel offers previously unattained levels of material resistance and strength. XTP Technology: Opening up a whole new world of possibilities for the design and engineering of steel components.
Xtreme Performance Technology is the sound of the future. Through its systematic development of the thermochemical processing phase, Steeltec is now able to treat almost any conventionally produced standard steel and significantly improve its properties. An ultra-fine grain can be imparted to the steel using a carefully controlled combination of heat and mechanical force, producing a steel with properties that could otherwise only be achieved by high alloy concentrations or by complex and costly additional processing stages. In short: heat + force = ultra-fine-grained steel.

**The Technology**

By carefully controlling the production of an ultra-fine microstructure within the material, conventional steels can be improved so that they exhibit both high strength and excellent toughness – two properties that normally run counter to one another. The result is an ultra-fine-grained steel that comes out on top in any trial of strength.

**The Properties**

Properties of steel after XTP Technology processing:
- Dynamic strength boosted by at least 10 per cent
- Major improvement in material toughness
- Significantly improved isotropic properties
- High strength
- Extremely resistant to crack propagation
The Areas of Application

XTP-treated steel opens up a whole new array of potential applications in the following industries:

- Spring manufacturing
- Hydraulics industry
- Connectors and fasteners
- Refrigeration systems
- Lifting equipment and lifting gear
- Cable car and aerial lift systems
- Wind power industry
- Railway industry
- Agriculture and forestry
- Oil and gas extraction and recovery

The Benefits

Slimmer, lighter, more efficient: XTP-treated steel gives users access to wholly new high-performance steel solutions for applications where materials have to cope with high levels of dynamic loading or where longer component lives are required. This offers not only greater design flexibility, but also greater freedom in the engineering and manufacturing processes, as existing components can now be made tougher and stronger or can be downsized without any loss in their ability to transmit forces. Even the most challenging applications in which components have to withstand strong vibrations, high internal pressures or extremely low temperatures can be mastered with XTP Technology. These technologically optimised steels also exhibit notch impact energy values considerably greater than 27 joules even at temperatures as low as −101°C – temperatures at which conventionally produced standard steels would simply fail. XTP Technology treatment also guarantees the highest levels of resistance to crack propagation. For maximum endurance and maximum safety.

### The Benefits Table

<table>
<thead>
<tr>
<th>Material</th>
<th>Delivery condition</th>
<th>$R_{0.2}$ [MPa]</th>
<th>$R_m$ [MPa]</th>
<th>$A_5$ [%]</th>
<th>$A_V, RT$ [J]</th>
<th>$T_{27}$ [°C]</th>
<th>$T_{RT}$ [°C]</th>
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<tbody>
<tr>
<td>1.0501</td>
<td>C35</td>
<td>&gt; 380</td>
<td>600–750</td>
<td>≥ 19</td>
<td>&lt; 80</td>
<td>−30</td>
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<tr>
<td>1.0501</td>
<td>C35 XTP</td>
<td>500</td>
<td>660</td>
<td>23</td>
<td>≥ 120</td>
<td>−50</td>
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<tr>
<td>1.1303</td>
<td>38MnVS6</td>
<td>≥ 520</td>
<td>800–950</td>
<td>≥ 12</td>
<td>&lt; 30</td>
<td>20</td>
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<tr>
<td>1.1303</td>
<td>38MnVS6 XTP</td>
<td>640</td>
<td>840</td>
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<td>≥ 100</td>
<td>−60</td>
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<tr>
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<td>950</td>
<td>1100</td>
<td>18</td>
<td>≥ 90</td>
<td>−40</td>
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<tr>
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<td>1200</td>
<td>1210</td>
<td>11</td>
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<td>−40</td>
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<tr>
<td>1.1551</td>
<td>7MnB8</td>
<td>≥ 400</td>
<td>690–750</td>
<td>≥ 15</td>
<td>&lt; 30</td>
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<tr>
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<td>430</td>
<td>700</td>
<td>22</td>
<td>≥ 150</td>
<td>−101</td>
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<tr>
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<td>850</td>
<td>1000</td>
<td>13</td>
<td>≥ 100</td>
<td>−50</td>
<td></td>
</tr>
<tr>
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<td>7MnB8 XTP</td>
<td>950</td>
<td>1100</td>
<td>13</td>
<td>≥ 50</td>
<td>−20</td>
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</tr>
</tbody>
</table>

Typical physical and mechanical properties of XTP-treated steels. Round steel bar: 18–40 mm, tolerance h11

$R_{0.2}$ = yield strength (at 0.2% offset), $R_m$ = tensile strength, $A_5$ = elongation after fracture, $A_V$ = notch impact energy (ISO-V, specimens), $T$ = temperature, $T_{27}$ = transition temperature at 27 J, $RT$ = room temperature
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