

Buildings & Infrastructure



outokumpu

high performance stainless steel



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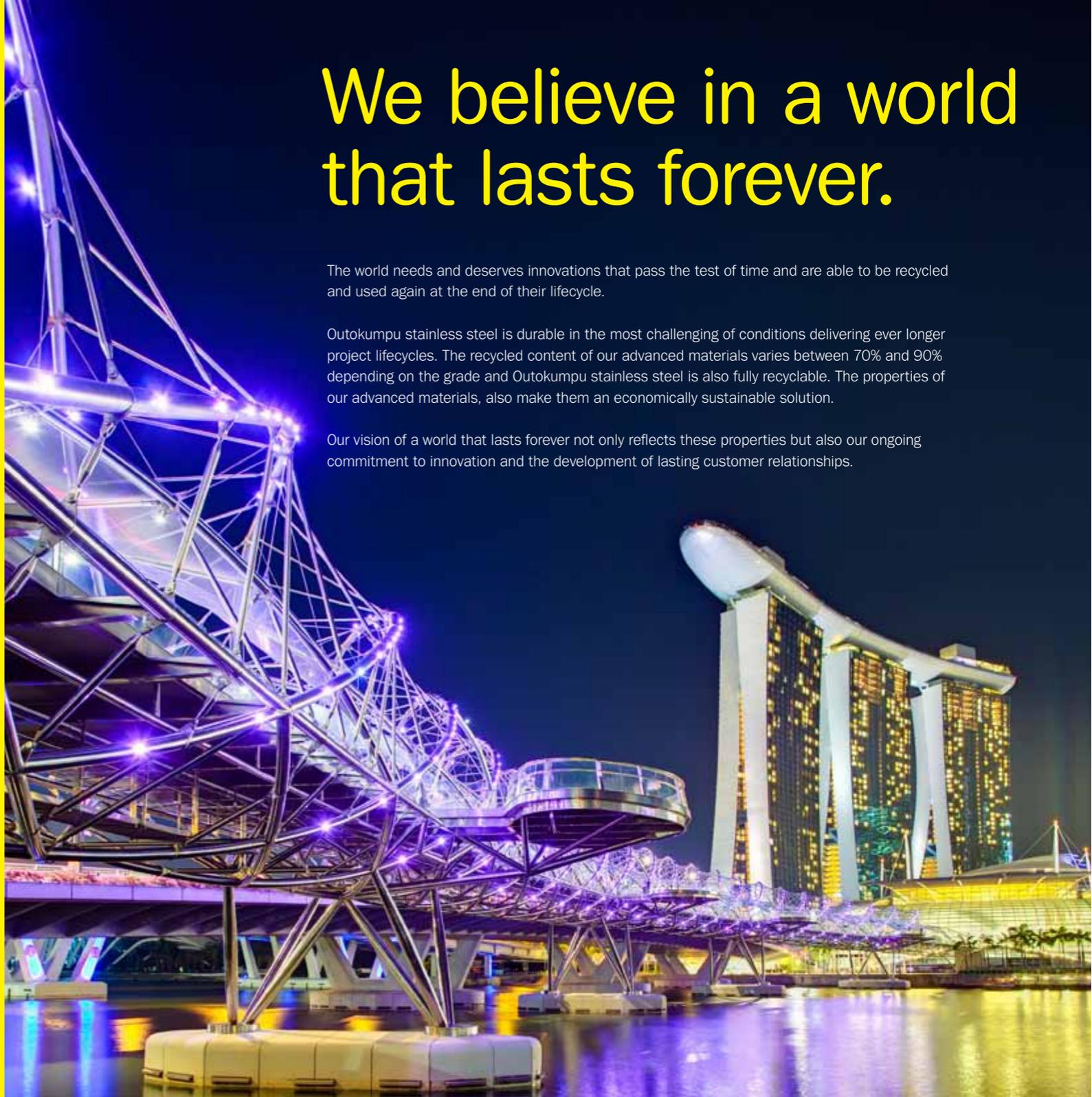
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We believe in a world that lasts forever.

The world needs and deserves innovations that pass the test of time and are able to be recycled and used again at the end of their lifecycle.

Outokumpu stainless steel is durable in the most challenging of conditions delivering ever longer project lifecycles. The recycled content of our advanced materials varies between 70% and 90% depending on the grade and Outokumpu stainless steel is also fully recyclable. The properties of our advanced materials, also make them an economically sustainable solution.

Our vision of a world that lasts forever not only reflects these properties but also our ongoing commitment to innovation and the development of lasting customer relationships.



The way we build today is changing

With increasing focus on long project lifecycle and sustainable solutions the choice of construction material is a vital factor in meeting the combination of challenges faced in each project. These challenges are varied; extreme climate conditions, aesthetic considerations, the demand for particular mechanical properties, safety, low maintenance requirements or price stability over a long term project to name but a few. Stainless steel is the ideal material for many construction projects due to its high mechanical strength, resistance to corrosion, good fatigue resistance, low thermal expansion, overall appearance and cost efficiency.

Meeting the challenge

Modern building and structure designs require aesthetic appearance and extended life. As a result stainless steel, once the preserve of prestige projects, is becoming an everyday material due to its strength, corrosion resistance, appearance and sustainability. We have delivered stainless steel to some of the most famous bridges, buildings and public art projects around the world. This includes modern classics such as the Burj Khalifa in Dubai, the Marina Bay Bridge in Singapore, and the Freedom Tower in New York as well as icons such as the Chrysler building also in New York and the Cloud Gate in Chicago.

Our broad range of austenitic stainless steels offer solutions for all types of building and construction applications where strength and corrosion resistance are critical. Our ferritic stainless steels and wide portfolio of surface finishes are ideal for interior applications where aesthetic appeal is important. Our high-strength duplex stainless steels have become increasingly popular in recent years due to their excellent combination of strength and corrosion resistance. Steel bridges are now being built using Outokumpu Duplex beams and structural profiles, as are many other construction elements. For concrete bridges, duplex stainless steel rebar ensures that bridge maintenance is avoided with a minimum increase in investment cost.

Building sustainable operations

We target continual improvement in our performance and minimising the environmental impact of our operations and products. We always aim to minimise environmental impact, which means we focus on energy and material efficiency, use of non-emission energy sources, reducing emissions into water and air and reducing waste.

The recycled input of our material is more than 85%, well above the industry average. The carbon footprint of products today is more than 40% lower than in the 1990s. Energy efficiency has been improved and best available technology utilized. We have also significantly reduced the amount of waste landfilled.

We are currently ranked best sole stainless steel manufacturing company by the Dow Jones Sustainability Index. Our long standing program for occupational health and a safe workplace, also for our suppliers and contractors, are other examples of our commitment to sustainability and a world that lasts forever.

The right choice of grades

Applications

Our offering areas	Application areas	Outokumpu grade/ASTM
Buildings	Components and steel structures	<p>Ferritic: 4003/-, 4016/430, 4509/-, 4521/444, 4622/-</p> <p>Austenitic: 4301/304, 4307/304L, 4401/316, 4404/316L, 4311/304LN</p> <p>Duplex: LDX 2101[®]/-, 2205/-, 2304/EDX 2304TM/-, LDX 2404[®]/-, 2507/-, 4501/-</p>
	Exterior and interior surfaces	<p>Facades</p> <p>Balconies</p> <p>Roofs</p> <p>Ballustrades</p> <p>Elevators and escalators</p> <p>Heating, cooling and ventilation</p> <p>Interior claddings</p> <p>Ferritic: 4003/-, 4016/430, 4509/-, 4512/409, 4521/444,</p> <p>Austenitic: 4301/304, 4306/304L, 4307/304L, 4401/316, 4404/316L, 4541/321</p> <p>Duplex: LDX2404[®]/-, LDX2101/-, 2205/-</p>
Infrastructure	Pre-fabricated component parts	<p>Duplex: LDX 2101[®]/-, 2304/-</p> <p>EDX 2304[®]/-, 2205/-, 2507/-, 4501/-</p> <p>Cr-Ni austenitic/-, Cr-Ni-Mo austenitic/-</p>
	Stainless for concrete structures	<p>Bridges</p> <p>Reinforcing concrete</p> <p>Austenitic: 4301/304, 4311/304LN, 4436/316, 4571/316Ti,</p> <p>Duplex: LDX 2101[®]/-, LDX 2404[®]/-, 2304/-, 2205/-</p>

For decades Outokumpu stainless steel products have been used in building construction, infrastructure improvements, and sculptural projects around the world.

Stainless steel is a favorite of architects designing the world's tallest buildings, the longest bridges, and the most popular public arts projects. Steel bridges are now increasingly being built using Outokumpu duplex beams and structural profiles, as are many other construction elements. For concrete bridges, duplex stainless steel rebar ensures that bridge maintenance is avoided with a minimum increase in investment cost.



Stainless steel provides a wide range of benefits for buildings and infrastructure projects including:

- Aesthetic appeal and inherent long-life
- Resistance to high heat, corrosion, pitting, and stress corrosion cracking
- High-strength duplex grades for cost-savings on initial material and over the lifecycle of the project
- Stainless steel rebar for extended lifespan and reduced maintenance for concrete construction where corrosion is a concern

Outokumpu online – useful tools and links

Select the right materials at steelfinder.outokumpu.com

- Mechanical properties
- Chemical composition
- Physical properties
- Corrosion rates/values
- Fabrication indexes/values

Contact our sales at outokumpu.com/contact-us

- Dimensions for flat and long products
- Thickness and width ranges in mm and inches
- Available surface finishes and decoration patterns for flat products
- Calculation tools to optimize material selection

Download brochures, certificates, white papers and much more at outokumpu.com/download-center
 Subscribe to our newsletters at outokumpu.com/newsletter

Products are available in Hot and cold rolled coil, sheet and plate, Bar, Rod coil, Semifinished (bloom, billet, ingot, slab), Pipe.

Finishes

In addition to the standard finishes of hot-rolled pickled (1D), cold-rolled pickled (2B) and cold-rolled bright-annealed (2R), other surface finishes are also available.

Particularly in interior use but also in facade construction, pattern-rolled stainless steel finishes (2M) create design accents. Our stainless steels are available in a wide range of pattern finishes. Textures produced by polishing (2G) offer attractive design possibilities. Different grit belts produce directionally textured, low reflecting finishes through to only lightly brushed surfaces (2J) characterized by a silk-matt shimmer.

Stainless steel indwells a natural shininess that can be enhanced or reduced depending on the surface treatment. By selecting the appropriate pattern structure or roughness, light reflectance can be influenced, leading to either a shiny or matt overall appearance. Shine is a visual phenomenon that is at once perplexing and fascinating. The eye is unable to precisely locate the source of the shine or gauge the exact distance to it. Shine creates liveliness and attracts attention. In architecture, this light reflecting effect is a key determinant of visual impact.

Architects use surface patterns to modulate the effect of shine and enhance the appearance of a building. Besides the high-sheen finish, matt finishes are increasingly being used today and we offer an attractive technical solution for this.



Outokumpu offering of standard finishes typically available directly from the mills

Finish	Product descriptions	Provider
Linen	Pattern of closely alternating dots and dashes resembling a textile surface, remains intact even under forming.	Nirosta
Square	Clearly structured pattern creating a technical impression. Raised and recessed sections have different reflection characteristics.	Nirosta
Diamonds	Strictly geometric pattern given added tension by its diagonal orientation.	Nirosta
Microlinen	Scaled-down version of the typical linen pattern, making for a finer, denser, higher-quality appearance.	Nirosta
Leather Grain	Irregular structure making it insensitive to scratches and similar surface damage.	Nirosta
Austenite	Modeled on the microstructure of an austenitic stainless steel, plays with the light to create a dazzling effect.	Nirosta
Haze	Finish capable of withstanding heavy forming operations. It offers advantages in terms of scratch resistance and easy-clean properties.	Nirosta
Laser	Laser consists of digitalized micro-patterns which are irregularly arranged without a pattern repetition. This results in a surface with a genuine random structure. Under all viewing angles and light conditions a nearly homogeneous surface is observed.	Nirosta
Microchecker	Triggers industrial associations, ideal when a high-quality technical impression needs to be conveyed.	Nirosta
Waterfall	Creates an impression of many small water droplets running down a smooth surface. Insensitive to fingerprints.	Nirosta
Triangle	A calm, stylish pattern consisting of small equilateral triangles.	Nirosta
GritLine	This finish has similar appearance compared to polished 240 grit, but with improved properties through rolling. Open topography, that provides easier cleaning compared to polished finish.	Nirosta
Microlon	The very fine grinding texture makes the surface appear in an elegant dark gray. Microlon gives interior and exterior claddings a classy appearance.	Nirosta
Ground grit size 180	Grit size 180 is often chosen to represent the classic polished look.	Nirosta
Ground and brushed	The possible combinations of different grinding and brushing types are wide. Please contact the sales for more guidance and support.	Nirosta
Supermatt	The shot blasted supermatt surface is Outokumpu's dullest available surface finish with an extremely homogeneous high class appearance. The use of industrial production lines guarantees a reasonable cost competitiveness.	Nirosta
2R ²	High smoothness and reflectivity is achieved on the 2R ² finish almost matching the gloss and roughness figures of the mirror polished (No. 8) surface finish. Due to the inline production 2R ² is a cost efficient alternative to No. 8 finish.	Nirosta
2R	Smooth surface with high reflectivity. Mainly used for white goods, sinks, cutlery, chimney pipes and decorative claddings.	Nirosta
2B	Smooth surface with low lustre. 2B is the most widely used cold rolled finish in many applications. It can be further processed to polished and brushed variations.	Tornio Works
2BB	High reflective finish, smoother and brighter than 2B, R _a usually below 0,10 µm. Available in 1.4016/430 grade, the finish is suitable for interior applications where a bright surface combined with good mechanical properties are a key issue.	Tornio Works
4N	Wet polished finish R _a 0,18...0,30 µm that is smooth with a satin-like appearance, which provides easy cleaning. Typical uses include exterior cladding and household appliances.	Tornio Works
DB	Dry brushed finish R _a 0,13...0,20 µm is easy to clean, which has made them popular for household appliances and applications seeking a decorative effect.	Tornio Works

Buildings



BMW Welt

With the launch of BMW Welt, the German car manufacturer has elevated buying a car from mere transaction to ritualistic experience. This landmark building, situated on a highly visible site between Munich's Olympic Park and the BMW headquarters, is designed to embrace visitors entirely into the world of BMW. Buyers can not only meet their new cars as they rotate on turntables, but also immerse themselves in visions of future mobility. BMW expects to deliver 45,000 cars and to receive 800,000 visitors each year.

The architectural design speaks volumes about BMW's values. The dominating feature is a "double cone" glass-and-steel structure that supports a cloud-like roof. Here perforated stainless steel panels act as

both aesthetic and functional elements, providing the desired impressions as well as sun protection. Stainless steel is also the dominating façade material on the upper sections of the building, and it is used in indoor cladding. Outokumpu stainless steel was selected based on a long-term good relations with the contractor Josef Gartner GmbH of Germany and our long experience with architecture.

We supplied approximately 500 tons of stainless steel coil and sheet. The material for the external sections was austenitic EN 1.4404 (ASTM 316L), with the milder grade EN 1.4301 (ASTM 304) chosen for indoor cladding. All material was delivered with a 2B surface finish shotblasted prior to fabrication.

The Chrysler Building

Stainless steel was used for the spire of the 319-meter tall Chrysler Building in New York back in 1930. The roof has never once had to be repaired. It has been cleaned only twice, in 1961 and 1995, and is still in an excellent condition.

Chrysler Building, New York
Architect: William van Alen



Infrastructure



Stonecutters bridge

Stonecutters is one of the biggest road bridges in the world and one of only two cable-stayed bridges with a span of more than one kilometre. Dominating Hong Kong's skyline, the bridge echoes Hong Kong's image as one of the most cosmopolitan and vibrant cities in Asia. The towers are in reinforced concrete up to level 175mPD and, for the top 118m, they are in a composite section consisting of an inner concrete core and stainless steel on the outside, connected by shear studs. The heavy composite structure necessary stiffness and damping for the stay cables, as well as a striking aesthetic effect.

The owner requested a 120-year design life for the bridge. Finding that carbon steel did not provide sufficient durability the constructor, Arup, concluded that the appropriate material was high-strength duplex stainless steel. Duplex steels are today preferred for a broad range of structural applications owing to their high strength – close to double that of austenitic grades. The hot, humid and maritime environment of Hong Kong also required a material with high corrosion resistance, provided by the duplex grade to render the tower tops maintenance-free, a major consideration for the bridge operators because of the difficulty of accessing these sections.

We supplied of polished plates with 1K surface and followed up with technical support during construction. We also supplied duplex stainless steel tubes and plates for the anchoring boxes of the bridge's cables.



Helix bridge

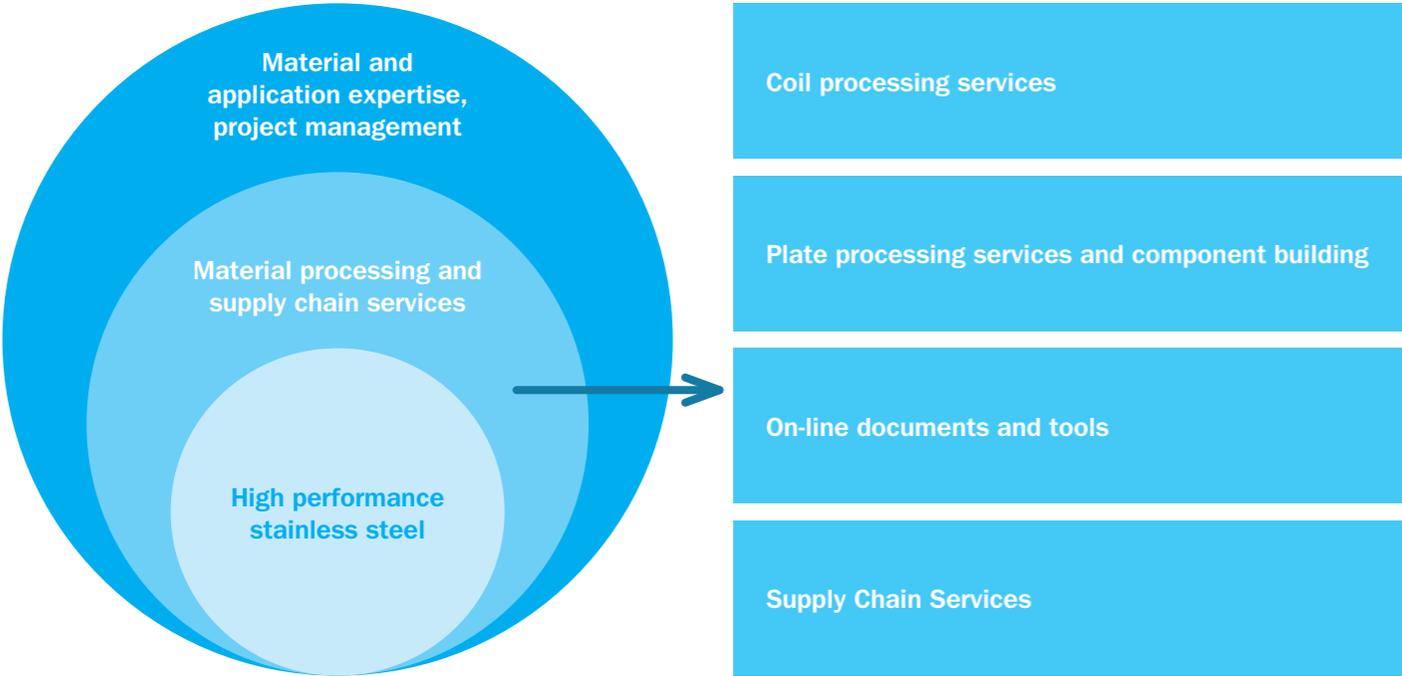
A major urban development is underway in Singapore's Marina Bay area. An integrated resort is going up on one side of the Bay comprising a business and financial center, high-end apartments and waterfront gardens. The opposite side of the Bay will see a giant observation wheel named Singapore Flyer. In addition, a landmark pedestrian bridge, part of a larger bridge development project, spans the bay and links key destinations. It provides the first pedestrian access around Marina Bay.

The bridge is composed of two spiraling tubular stainless steel members, resembling the structure of DNA. This unique stainless double-helix structure takes bridge architecture and engineering to entirely new directions. According to the designers, the DNA-like structure symbolizes "life and continuity, renewal and growth" and as such underscores Singapore's international image and goals for Marina

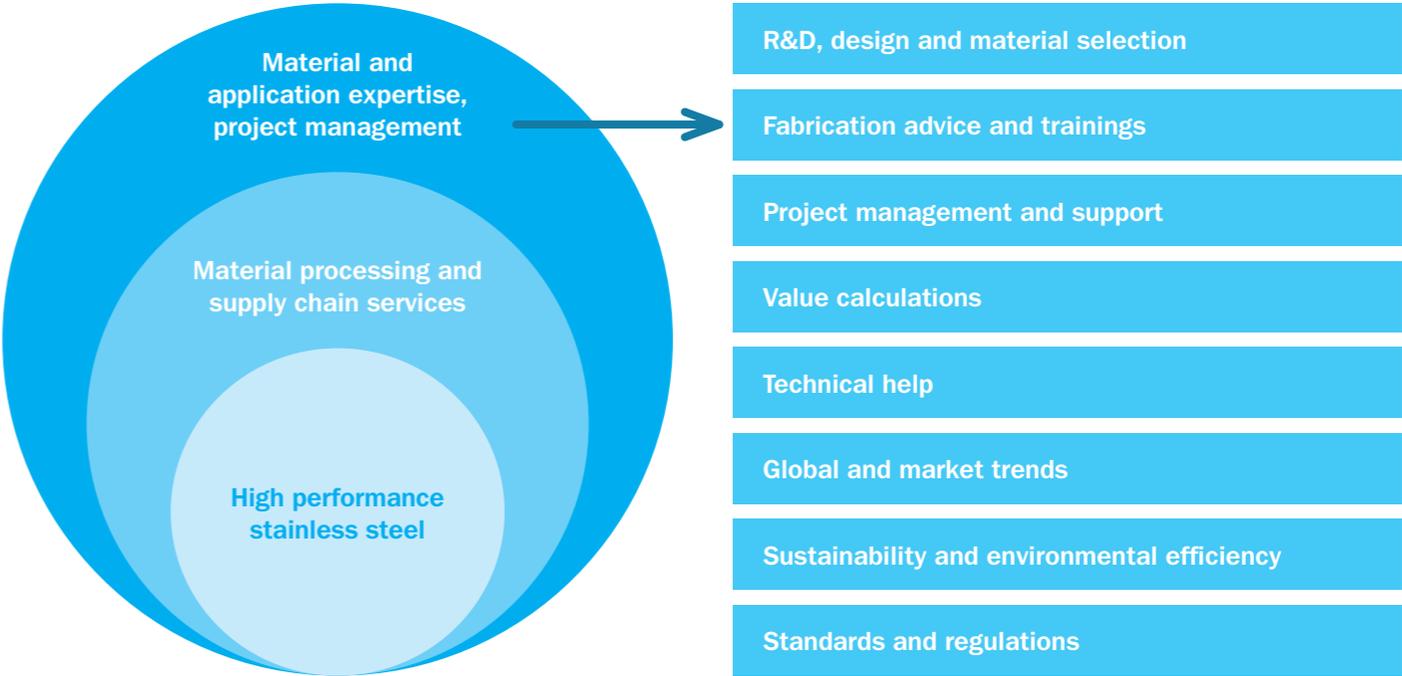
Bay. The bridge will also allow for spectacular views of the city skyline, both from the deck and five viewing platforms, with the stainless steel surfaces reflecting a series of illuminating lights programmed to enhance the design.

The bridge engineers selected high-strength duplex as the appropriate stainless grade for the double-helix and support structures. In the hot and humid, maritime climate of Singapore, this highly corrosion resistant grade ensures low maintenance costs and continued good appearance during a service life of at least 100 years. The high strength of the grade also enables the development of a cost-efficient design. The contract follows a series of demanding bridge projects worldwide for which Outokumpu has supplied duplex stainless products in several different grades.

Material processing and supply chain services



Material and application expertise, project management



Working towards forever.

We work with our customers and partners to create long lasting solutions for the tools of modern life and the world's most critical problems: clean energy, clean water and efficient infrastructure. Because we believe in a world that lasts forever.

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