INTERNATIONAL MOLYBDENUM ASSOCIATION
THE VOICE OF THE MOLYBDENUM INDUSTRY

Floating towards the future

Like a net frozen in mid-air, a striking footbridge in southern Germany is making a statement about minimalism. This gossamer structure is only possible thanks to the unique characteristics of 2205 duplex stainless steel.

At first glance, it resembles a giant piece of metallic silk. But this airy bridge offers more than just good looks; it represents new possibilities for sustainability and efficiency in structural design. The footbridge connects two production areas of the TRUMPF campus in Ditzingen near Stuttgart, Germany. International success and growth meant the only way to expand was to the other side of a busy country road. With the campus divided in two, getting from one part to the other was cumbersome. Besides crossing the road, checking in and out of security gates increased the amount of time taken. The new bridge not only provides employees and visitors with a way to move around their campus, but also serves as a showcase for what is now possible in laser-cutting technology – one of the main products of the company.

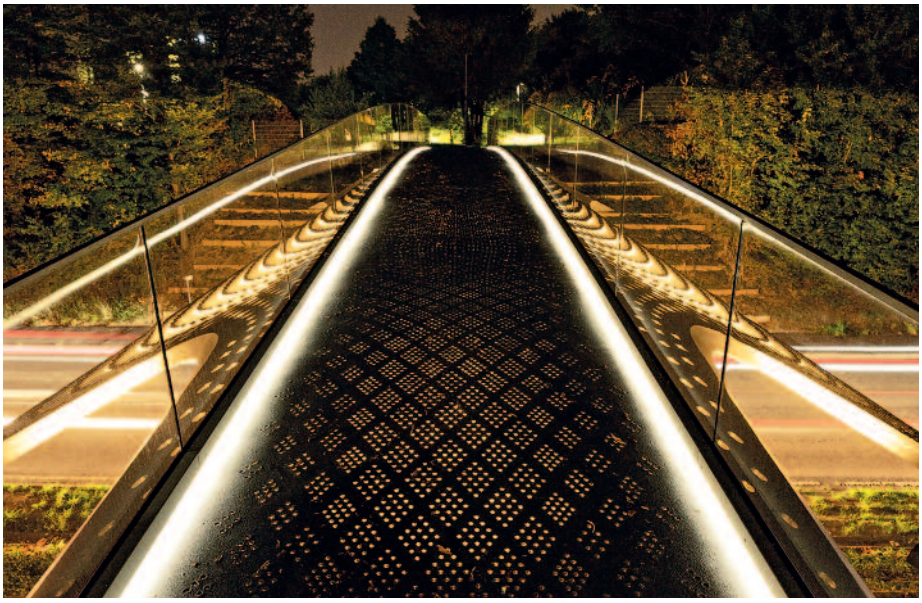
An elegant reduction

The 28-meter long and 10-meter wide footbridge was designed by schlaich bergermann partner. It consists of double curved stainless steel sheets just 20 millimeters thick. To reinforce the lightweight structure, all edges are folded downwards and twist towards the four base points to form triangular bearing points. No further bracing was ❯

Due to the optimized design, the bridge is so light, it appears to float over the road. © sbp/Andreas Schnubel

required in the shell to support the 21-tonne bridge. To create the ethereal feel of the structure, holes corresponding to the flow of forces were cut into the shell with laser machines. Their size and placement were calculated to maximize airiness while maintaining structural integrity.

Pedestrians walk directly on the stainless steel shell, which is treated with a slip-resistant coating. The holes in this area are smaller but more numerous and filled with glass plugs. These bundle the daylight and increase the transparent appearance. During the night, the effect inverts; light from LED spotlights under the bridge shines through the glass fillings in the walking area and the lateral areas of the structure. Additionally, the lightness of the bridge is accented by anti-reflective, all-glass railings. The culmination of these effects is a bridge that appears not only to float, but also to softly glow as it hovers over the country road.



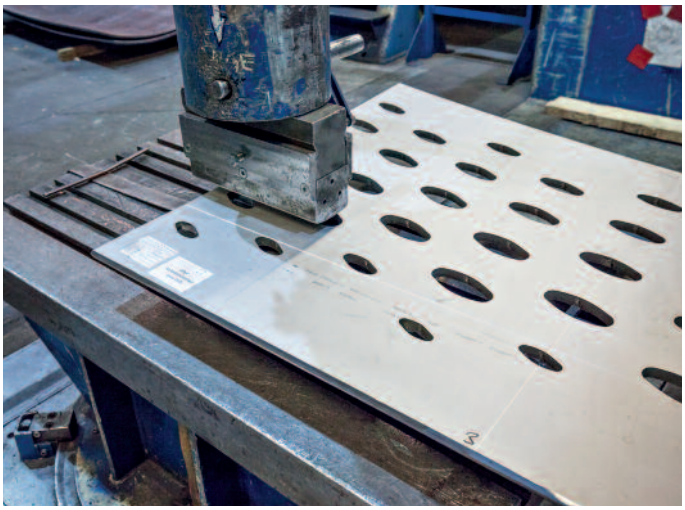
At night, LED lights illuminate the bridge on both sides of the walkway and from underneath. © sbp/Andreas Schnubel

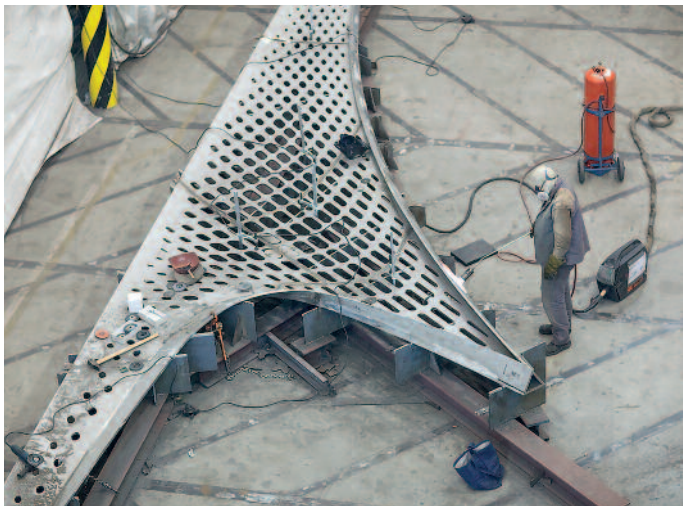
2205 Duplex: less is more

To realize the unique design of the bridge, 2205 duplex stainless steel was an ideal choice. With its 3% molybdenum content, it resists the corrosive environment created by deicing salts used both on, and under, the bridge. While a similar design may have been possible in carbon steel, it would not have been practical given the many perforations. Sealing all these surfaces with a protective coating would have been intricate work and therefore, expensive. Additionally, this process would have had to be repeated regularly as the coatings deteriorated, resulting in enormous maintenance costs. Finally, the bare stainless steel surface also affords the bridge a crisp and modern look.

Innovation meets tradition

The duplex stainless steel sheets were cut to shape and holed by modern laser technology. Nevertheless, forming the high-strength duplex stainless steel into double-curved shapes was not easy. Turning the 20-millimeter-thick flat sheets into the three-dimensional structures prescribed by the data model, required operator experience as well as a heavy press at a traditional shipbuilding firm. ›





The lasered stainless steel sheets are formed three dimensionally on a heavy press (left). Afterwards these sheets are welded together into four quarters. The ‘folded’ edges that reinforce the lightweight shell construction are actually attached by welding. © Wilfried Dechau

The bridge being lowered into its final position by crane; it is only self-supporting once placed in this exact position. © schlaich bergermann partner

There they were also welded into seven larger pieces of the bridge. These parts were then transported to a field factory adjacent to the installation site and welded together. Lastly, a heavy-duty crane lifted the entire bridge into its final position. Due to the bridge's strength and light weight, the crane was able to lift it quickly and with minimal disruption to traffic.

With its striking design and innovative use of material, the bridge sets new standards. The interplay between high strength, work hardening rate, and elongation means that duplex grades are particularly well suited to lightweight and cost-efficient applications with complex shapes. Due to the excellent weldability, structural components can be prefabricated in large sections and installed on site very quickly. The possibilities are endless. This beautiful, almost weightless bridge shows that sustainable, efficient architecture can also be high art. (Martina Helzel)