What's *Cool* in STEEL?

THE OBSERVATION TOWER ON AUSTRIA'S RIVER MUR FEATURES THE INTERPLAY OF FORM, MOTION AND STRUCTURE.

A Tower in the Treetops

THE NEW OBSERVATION TOWER on the River Mur (Southern Styria, Austria) opened to the public just in time for the beginning of spring 2010. The design for the sculptural structure set amidst the landscape of the European habitat system "Green Belt" was developed by the Munich-based architects and landscape architects, terrain:loenhart&mayr, who are renowned for the new and trend-setting Olympic Ski Jump in Garmisch-Partenkirchen. Looking out on the banks of the River Mur, the observation tower offers access to the ecology of the surrounding floodplain forest and lets visitors experience the river catchment, which changes according to the intensity of the water's flow.

The access and construction principle of the Mur Tower is based on the idea of a double helix that is perceived as a continuous path rising up through the trees. The climb to the top is a scenic experience. The circular path, ascending to the top like a screw, passes through the different levels of the forest—the ecological stories of the floodplain forest—and enables visitors to experience the eco system and the microclimate of the forest. Eventually, after 168 steps, at a height of 89 ft, the observation platform is reached. This was deliberately kept small and offers wonderful panoramic views of the surrounding countryside. A second flight of stairs leads down from the platform so that ascending and descending visitors are actually moving through the defined space on different flights of stairs.

Hubertus Hamm

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▲ The Mur Tower provides a place from which to observe the ecological restoration of the Mur River, which forms part of the border known as the Iron Curtain that divided Europe for more than 40 years. Today these deserted areas taken over by nature have become the Central European Greenbelt.

◀ The Murturm Nature Observation Tower's double-helix design provides a striking contrast to the surrounding woods and a place for hikers to observe the Mur River.

▼ Looking up from the base of the Mur Tower reveals another aspect of its symmetry, which is one of its fundamental features.

The tower design began with preliminary models, which were then statically dimensioned in digital form, and reviewed again as physical models. The process was repeated several times to achieve the desired interplay of form, motion and structure.

terrain/loenhart&mayr

Marc Lins

There is a surprising link to the historical double-spiral staircase in the nearby Graz Castle. The architects of the Mur Tower were inspired by that staircase built around 1500 and well known for the unique spatial atmosphere it creates. In a homage to this historical site, the Austrian poet, Erich Fried, wrote that "the double-spiral staircase connects space and time like a screw." The connection between space and the experience of climbing up and down is the basic idea behind the spiral-shaped paths of the Mur Tower.

In collaboration with the structural planners, a polygonalised spatial structure was developed, which took into account all aspects relevant to the structure and the technical production. Significantly, an integrated approach was adopted for the design process—after some preliminary model studies were prepared, the model designs were statically dimensioned in digital domains to then once again be checked from an architectural point of view in physical models. This process was repeated several times until the desired interplay of form, motion and structure was established.

Structural Concept

Structural planning for the Mur Tower was provided by the Frankfurt, Germany-based Office for Structural Design. The structural framework of the Mur Tower is a hybrid structure with the load-bearing system consisting of a combination of fixed spatial node connections, cables and struts. The main structure is made up of supporting and load-bearing tube-shaped members, which provide the stability, whereas the cables limit oscillation and horizontal sway at the top of the tower. The most important aim of the structural design was to support the clarity of the architectural concept of the double-spiral staircase with the up and down contra-flows and the clearly defined geometrical crossing points,

Marc Lins

◀ The Mur Tower's double-spiral staircase, with separate flights of up and down steps, pays homage to the nearby Graz Castle, which dates back to the 15th century.

while avoiding the need for any further nodal connections. For this reason, all load-bearing elements meet in the intersection points of the spiral-shaped ascent and descent. The complexity of the nodal connections demanded detailed 3D planning.

The developed hybrid framework works as a contiguous spatial bar structure. Whereas the vertical cabling controls the oscillation, the horizontal cables, that wind their way up to the top of the tower, minimise the sway at the highest point. This intelligent cable arrangement removed the need for additional vibration dampers. Furthermore, the prestressing of the stay cables had a positive effect on the endurance strength of the fixed joints. The seemingly informal geometry of the bearing elements, as perceived from a distance, is due to the spatially clear symmetrical arrangement of elements in the design of the structural framework. The regular grid pattern, with all joints evenly spaced, is a fundamental feature of the tower.

Digital Production

Whereas in the past it was necessary to avoid the design of complex geometries in the arrangement of nodal connections, technical developments in 3D planning and CNC manufacturing now enable interpretation of new levels of complexity. The principle of an assembly set was applied for the main details, which was then used to configure all of the other joints. Despite variations in the dimensions and material thickness of the joints, the principle of recurring joint configuration is the basis for efficient production and high-quality workmanship.

The tower has a diameter at the bottom of 28.3 ft and includes 87 tons of structural steel. The stair cladding is aluminium.

Text and photos provided by terrain:loenhart&mayr, Munich.