DILLINGER HÜTTE GTS

STEELS FOR CONSTRUCTIONAL STEELWORK

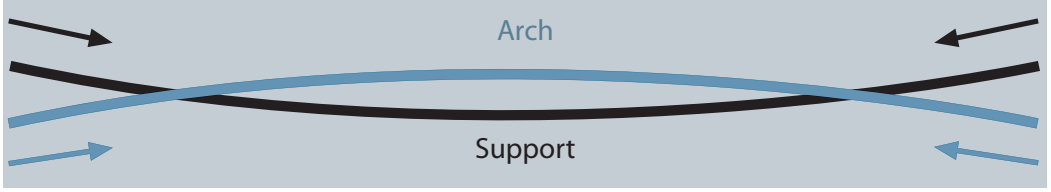
THE SIMONE DE BEAUVOIR FOOTBRIDGE

STEEL IN THE SERVICE OF ARCHITECTURE

At the purely mundane level, it is simply the 37th bridge over the Seine in Paris. But this viewpoint fails to do justice to the new *Simone de Beauvoir* pedestrian bridge. Simultaneously striking, bold and elegant, this exceptional structure links the *Bibliothèque Nationale* with the *Parc de Bercy*, and harmonizes perfectly with the city's classic townscape. The mid-section of 194 m is complemented by two side elements, the Seine thus being traversed in a single span. The originality of the design can be found in the combination in each case of two bows and two inverse suspended arches that function respectively as tension and compression elements. The central section, referred to as a "lens", due to its geometry, was entirely prefabricated in the workshop. The omission of additional piers, despite the fact that the Seine is sufficiently wide at this point, is the factor that gives the structure its exceptional lightness.

Special steel for special architecture

To achieve this structure, with its great span and minimal space requirements, a perfect balance between graceful agility and strength, the bridge engineers placed their faith in quality steel. A large portion of the heavy plate for the bridge was supplied by Dillinger Hütte GTS, including plates of up to 150 mm in thickness; about 1,000 t of grades S355K2G3, S355N and S355NL. The mid-section, the "lens" alone, consists of 550 t of heavy plate. The arches are composed of welded box girders of a combined height of 500 to 700 mm, with chord thicknesses of between 40 and 60 mm. The web thicknesses are 20 to 35 mm. The inverse arches in the mid-section are made up of 100 mm strips of plate. Plate thicknesses of up to 150 mm were, in fact, used for the outer elements of the bridge. This plate material was supplied with minimum toughness specifications of 27 J at 50 °C, to guard against the possibility of brittle fracture. Plate widths of up to 4,000 mm were employed even at these plate thicknesses, in order to avoid the need for complex welding work.



THICK PLATES WITH SPECIAL PROPERTIES

Due to the exceptional loading characteristics of this bridge, more than half the heavy plates supplied had additional Z35-properties, i.e. special deformation properties in the thickness direction (so-called "Z" properties). Arch and counter-arch are linked to one another by obelisk-shaped struts, with the result that loads are applied to the girder plates and plate strips in the thickness direction. This property profile can be achieved only using special steels and special rolling processes, particularly in the case of the thicker 100 and 150 mm plates.

A special voyage

One particular advantage of structural engineering in steel is the high level of prefabrication possible in the workshop, as is demonstrated in an extraordinary manner by the mid-section, or "lens". This element was entirely welded throughout its length of 106 m and width of 12 m at the Lauterbourg (Alsace) workshops and then transported as a single component to the site on barges. Its "odyssey" led via the Rhine, the North Sea and the Channel, concluding with its passage up the Seine to reach Paris.
The element was installed in a single night, in order to minimize obstruction to traffic on the river. The *Simone de Beauvoir* pedestrian bridge is therefore anything but a mundane structure, as is amply illustrated by its winning the 2007 European Steel Design Award.

The Simone de Beauvoir pedestrian bridge: Facts and Figures:

Length: 304 m, **Width:** 12 m, **Span:** 194 m
Total metal-structure weight: 1,600 t, **Weight of the "lens":** 550 t
Arches: welded girders consisting of rolled 500 to 700 mm high sections, width 1 m
Support structure: heavy plate, thickness 100 to 150 mm
Steel grades: S355K2G3, S355N, S355NL, **Notch impact strength:** up to 27 J at –50 °C

Simone de Beauvoir Footbridge

Client:	Ville de Paris, Direction de la Voierie et des Déplacements
Architect:	Feichtinger Architectes
Engineers:	RFR
Technical supervision:	SETRA, SNCF
Prime steel fabricator:	Eiffel Constructions Métalliques
Prime heavy plate supplier:	Dillinger Hütte GTS

DILLINGER HÜTTE GTS

AG der Dillinger Hüttenwerke
Marketing
D-66748 Dillingen/Saar
Postfach 1580
Telephone: + (49) 6831 / 47 - 3454
Fax: + (49) 6831 / 47 - 3089

GTS Industries
Marketing
F-59379 Dunkerque Cedex
BP 6317
Telephone: + (33) 3 28 29 31 56
Fax: + (33) 3 28 29 69 28

e-mail: info@dillinger.biz
http://www.dillinger.de