



Case study

STIHL Treetop Walkway, Gloucestershire

Client: Westonbirt Arboretum,
Forestry Commission

Architect: Glenn Howells Architects

Principal contractor: Speller Metcalfe

Structural engineer: BuroHappold
Engineering

Steel fabricator: SH Structures Ltd

Tata Steel products:
Celsius® 355 Structural Hollow Section

Steel bender:
The Angle Ring Company Ltd

Year: 2016

The STIHL Treetop Walkway was constructed as part of The Westonbirt Project, a five-year development project at the National Arboretum at Westonbirt, Gloucestershire. Opened in the spring of 2016, the elevated walkway takes visitors through the treetop canopy and offers a bird's eye view of the Westonbirt landscape and tree collection.

Supported on timber columns, the walkway framework is constructed from steel hollow section. The sinuous structure rises to around 13 metres and incorporates features including a circular viewing platform. A significant amount of section bending was required to achieve the walkway's curving form. Tata Steel's Celsius® 355 Structural Hollow Section was utilised in the build. In addition to offering weight savings and proven performance, hot-finished Celsius® 355 delivers high levels of formability.



COMPLEX CURVING STRUCTURE DEMANDS HIGH-PERFORMING STEEL



The challenge

The National Arboretum at Westonbirt, near Tetbury in Gloucestershire, was founded in the 19th Century and is now under the care of the Forestry Commission. The 600-acre arboretum contains around 15,000 trees – featuring 2,500 different species from around the world. A major five-year development programme included a new car park and Welcome Building along with restoration of a listed downland landscape, which was completed in 2014.

Creation of the STIHL Treetop Walkway formed part of the final phase of the programme and was conceived to enhance year-round visitor interest for the arboretum and connect people more closely with trees. The design contract was awarded to Glenn Howells Architects, working closely with BuroHappold Engineering. The architects designed a 300 metre-long walkway that winds its way through the trees and incorporates several features.

Aesthetics were also an important consideration in enabling the structure to harmonise with its woodland environment.

“This was a very complex and curving structure in an exposed environment. Building through the middle of a wood is unusual and there were several challenges. We needed a robust and durable material that would lend itself to the walkway’s curving form. We also had to make sure that trees weren’t damaged when putting the walkway structure in place.”

Jonathan Roydon, Technical Director - BuroHappold



The solution

Various materials were considered for construction of the walkway. Steel structural hollow section was selected for the main structure because it's a robust, durable and compact material. Importantly, it could be bent to create the sinuous form. The balustrade also uses steel in lots of verticals to create an interesting aesthetic.

Timber was chosen for the support columns which were installed on strategically-placed concrete footings. To minimise the visual impact of the support structure, the timber legs were configured in a cross pattern rather than a more traditional vertical arrangement. Tension cables lock these crossed legs to the footings to provide overall stability. Scottish larch was selected for the walkway deck with a Siberian larch handrail.

The walkway doubles in width at 'pause locations'. It incorporates features – also constructed from structural hollow section – including a raised 'crow's nest' viewing platform that wraps completely around a tall pine tree.

SH Structures Ltd were sub-contracted to supply and install the entire structure including the supporting columns and tension cables. Tata Steel's Celsius® 355 Structural Hollow Section was used extensively to create the main walkway and viewing platforms. Circular and rectangular section were used.

Tim Burton, Sales and Marketing Manager at SH Structures, said: "We know from experience that Celsius® 355 offers reliable formability. This was important for the Westonbirt Project because of the significant amount of section bending required.

"We contracted the bending to specialists, The Angle Ring Company. They did an excellent job in bending the section to the various radii required for the framework supporting the deck."



Mark Phillips, Associate Director (Technical) at The Angle Ring Company said:

"The walkway and viewing areas posed several challenges for bending, with many hollow sections needing to be curved to elliptical shapes rather than single radii. As such, we needed to employ a combination of cold rolling and mandrel bending as well as induction bending – where the section is heated to enable the tighter bends to be produced with minimal deformation. Celsius® 355 material performs well with all our bending processes and the quality of Tata Steel products always impresses."

SH Structures fabricated the walkway in sections at its North Yorkshire workshop prior to final assembly on site.

Jonathan Roynon said the finished walkway had met all expectations. He said: "The whole project has been a very collaborative effort between the client, ourselves, the architects and the contractors. The client is very pleased with the end result which is both attractive and functional. It's been an interesting and satisfying project that's met its objective of connecting visitors with the trees."



Tata Steel products:

Celsius® 355 is a hot-finished hollow section suitable for all construction and mechanical applications – performing reliably in even the most arduous conditions. With a minimum strength of 355 MPa, it allows the highest fabrication factors and enables material cost savings and lighter structures. Available in a wide range of circular, square, rectangular and elliptical hollow sections, Celsius® 355 offers dimensional

consistency, high levels of formability and excellent weldability.

Celsius® 355 products are traceable, CE-marked and fully compliant with the Construction Products Directive. Celsius® 355 is the first structural hollow section to be certified to BES 6001, allowing British projects to maximise credits under the 'Responsible Sourcing of Materials' sections of BREEAM.

Multiple benefits

Jim Parley, Tata Steel's Customer Technical Services Applications Manager, said: "The curving Treetop Walkway demonstrates just how well Celsius® 355 lends itself to section bending. In addition to delivering strength and durability, our ongoing improvements to Celsius® 355 surface finish mean customers can also rely on it to contribute aesthetically to project design. Compared with open section, structural hollow section does not trap water – an added advantage on exposed sites such as Westonbirt."

For technical advice on the application of Celsius® 355 for your project, please contact our

Customer Technical Services Team:

T: +44 (0) 1536 404561

E: technicalmarketing@tatasteel.com

W: www.tatasteelconstruction.com

www.tatasteelconstruction.com

Tata Steel

Shotton Works, Deeside
Flintshire CH5 2NH

T: +44 (0) 1244 892199

F: +44 (0) 1244 892121

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