

**Tubular Design Guide 20:
Background and design basis**

by

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and

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3 BACKGROUND TO SSHS IMPLEMENTATION

3.1 Advantages of SSHS for construction

Structural steel hollow sections (SSHS) have a long history of project implementation and an equally long history of development as a high performance building product. This pedigree is reflected in the fact that compared to other steel products, the worldwide consumption of welded steel tubular products is increasing in a market share sense if not an overall sense.

There are numerous reasons for the increased focus on and use of SSHS, and many speak towards the advantages of SSHS for production, supply and building and infrastructure construction. These include:

1. A world steel industry moving from the traditional production of hot-rolled sections and plate towards coil and strip production with attendant advantages of easier delivery from steel mill to manufacturing plant and the capacity to supply pre-coated (galvanized or primer-painted) product in some cases.
2. Improved manufacturing technology which facilitates enhancement of the overall performance of the product.
3. Structural steel design Standards which permit design of cold-formed SSHS sections along with hot-rolled sections are now available in most countries around the world (Refs. 1, 9, 12, 13, 63). These Standards have been continually improved, enabling the design of cold-formed SSHS members and connections to take advantage of the increased performance produced by the manufacturing process and inherent in the products.
4. The inherent structural efficiency of the hollow section shape, which places material at the maximum distance from the centroid of the section. Increased compression load capacity, torsional strength and stiffness and lateral stability per unit weight are direct advantages of the hollow section shape and lead to structures that, on a per unit area basis, are amongst the lightest that can be designed.
5. A per unit mass cost which, whilst usually higher than for hot-rolled open sections, has reduced relative to hot-rolled sections.
6. SSHS combines resistance to wind, water or wave loading with an architecturally stimulating and aesthetic shape, characteristics which combine to naturally lend themselves to exposure in landmark structures with open light designs. The smaller surface area than comparable structures with open sections and the absence of sharp corners and reduced ledges result in better corrosion protection in these applications.

Critical to the design of structures comprising SSHS framing is the efficient and sympathetic design and detailing of connections, often with no or minimal cleats or stiffening plates. Since the connection strength is influenced by the geometric properties of the members, the designer must understand the nuances of hollow section connection design and the consequent ever present conflict between member size and shape and the desirable elimination of ancillary stiffening/strengthening plates and the like. A strong appreciation of these issues is needed at conceptual design stage in order to ensure optimal design.

