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THE BASIS OF ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

CHAPTER 1

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- 16 The Evolution of Architecturally Exposed Structural Steel
- 17 From Structural Rationalism to High Tech
- 18 Initial Developments in High Tech Detailing
- 20 Primary Factors of Influence that Define AESS
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WHAT IS AESS?

Architecturally Exposed Structural Steel (AESS) is steel that must meet two requirements: it must be designed to be structurally sufficient to support the primary needs of the structure of the building, canopies or ancillary structures, while at the same time being exposed to view and forming a significant part of the architectural language of the building. Any structural steel that is not concealed can therefore be considered architecturally exposed. The design, detailing and finish requirements of AESS will typically exceed that of standard structural steel, which is normally concealed by other materials or finishes. This naturally increases the time and cost to design, detail, fabricate, erect and finish AESS systems.

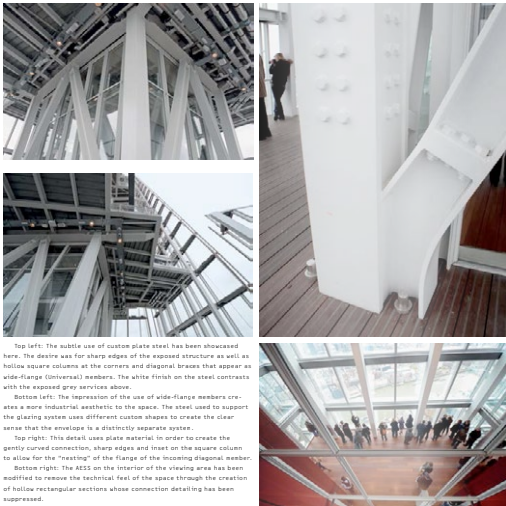
Perth Arena in Perth, Australia, designed by ARM Architecture and CCA, uses finely welded round HSS tubes to create a dynamic entrance structure for this arena completed in 2012. The complex angles that challenge the fabrication of this structure push this construction to an AESS 4 category.

The categorization of structural steel as architecturally exposed necessitates a new approach to its design and detailing, in particular as not all AESS need be designed to be equally expensive. Retail stores, arenas, museums and airports will each have very different expectations of the role of the steel in the aesthetics of the building. Even within building typologies, different approaches to steel design are valid.

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THE SHARD OBSERVATION LEVEL | LONDON, ENGLAND Renzo Piano Building Workshop and WSP, 2013

The observation level of The Shard makes subtle use of custom plate steel to create its relatively technical-looking exposed steel structure. Hot-rolled members would not have provided the crisp edges, so the sections are fabricated from welded plate; the corner elements are square and the diagonals mimic a wide-flange (Universal) shape. In many of the end connections of the bracing members the flanges have been rolled to create a subtle custom look. Fabrication and erection by Severfield Reeve Structures.



Top left: The subtle use of custom plate steel has been showcased here. The desire was for sharp edges of the exposed structure as well as hollow square columns at the corners and diagonal bracing that appear as wide-flange (Universal) members. The white finish on the steel contrasts with the exposed grey services above.

Bottom left: The impression of the use of wide-flange members creates a more industrial aesthetic to the space. The steel used to support the glazing system uses different custom shapes to create the clearance that the envelope is a distinctly separate system.

Top right: This detail uses plate material in order to create the gently curved connection, sharp edges and inset on the square column to allow for the "nesting" of the flange of the incoming diagonal member.

Bottom right: The AESS on the interior of the viewing area has been modified to reduce the technical feel of the space through the creation of hollow rectangular sections whose connection detailing has been suppressed.

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THE NEW YORK TIMES BUILDING | NEW YORK CITY, NY, USA Renzo Piano Building Workshop, FXFOWLE Architects and Thornton Tomasetti, 2007

The design for the New York Times Building had as its aesthetic intention to reflect the permeability and transparency of the relationship between the newspaper and the city. To this end the exterior AESS structure supports a layer of the double facade that consists of a lighter steel frame, which in turn supports horizontal ceramic rods that act as a sunshade and a heat sink. The bracing of the steel frame takes a key role in the building's aesthetic expression at the recessed corners that mark the discontinuity of the screen elements.



Top left: The double facade uses an expressed AESS bracing system on the exterior. AESS is additionally used to support the exterior screen skin of the double facade.

Bottom left: AESS is used to create a textured, multi-layered facade system reminiscent of Piano's earlier high-tech design, while being more easily contextualized to the highly urban New York site. The grey color of the steel is well suited to be durable.

Top right: Although at first glance the members look like standard sections, their sharp corners and attachment systems reveal that they were custom-fabricated from plate steel. Although not all welds have been ground and blended, the nature of the structural design as well as its integration of a tension bracing system would place this in an AESS 3 category.

Bottom right: Custom coatings have been used to create the support system for the double facade. These incorporate a bolted system of connections to make on-site assembly more efficient.

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