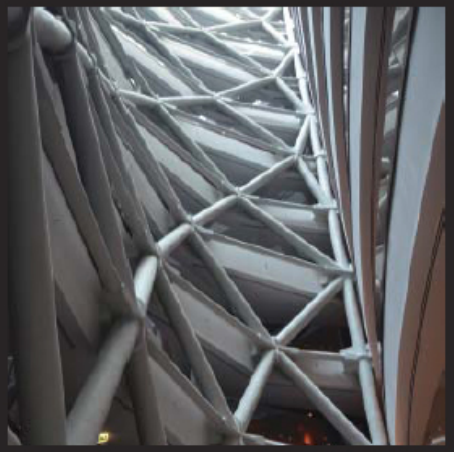



The New CISC Architecturally Exposed Structural Steel Documents

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Presenter:

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What is AESS?

- Architecturally Exposed Structural Steel is steel that has been purposefully left exposed
- It must fulfill structural functions
- It is normally part of the Architectural aesthetic of the space
- It usually requires detailing, finish and handling that requires more attention and care than regular structural steel
- It adds to the cost of the contract

High Tech Architecture

Hollow sections were only “invented” in the 1970s and their adoption truly changed steel design and detailing.

Foster, Sainsbury Centre, 1977

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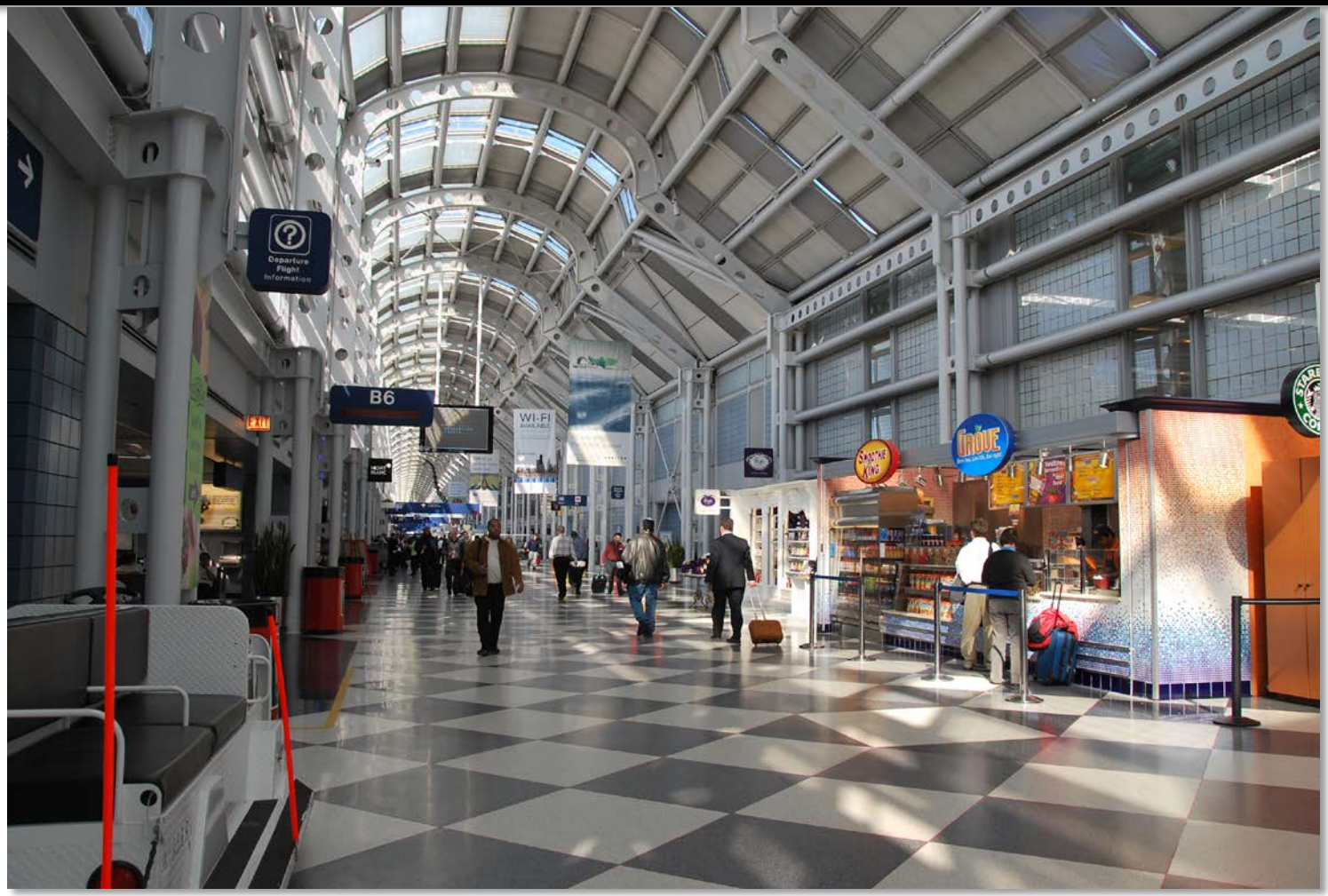
Contemporary AESS



Chicago O'Hare United Airlines Terminal by Murphy/Jahn was the first AESS Airport – finished in 1987

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How good is “Good Enough”?

- AESS was being used on very high profile projects
- AESS was also being specified for mid to lower end projects
- Not all projects had/have the budget to pay for the sort of detailing of “A Calatrava”
- There was no agreed language or specification that could assist in the communication of expectations between the Architect, Engineer and Fabricator

Brookfield Place, Toronto, Santiago Calatrava

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Problems Specifying AESS

- Miscellaneous Metals spec does not address the **structural** requirements of AESS
- AESS can be priced out of sight on projects if excessive requirements are added “out of ignorance”

<u>The Bottom Line is that:</u>

- *All AESS does NOT need to be equally crafted…*
- Not to say that it should not be properly crafted, but not all situations or projects either need or can afford the same level of detailing


“God is in the details”
What are they doing?


They are grinding the surfaces …


... for a structure that will be visible close-up, but for passengers that are just standing by, waiting for an airport taxi.


Delta

Photo: Sylvie Boulanger


Why?
Because it doesn’t matter, given the thickness of the coating …

Photo: Sylvie Boulanger

Not all AESS *need* be created equal.


Sculpture


Conference Center


University Building


Arena

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Exquisite/expensive detailing

Needs to be close enough to be seen, and even touched, to be warranted

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Distance should play a factor

Can anyone *really* see this?

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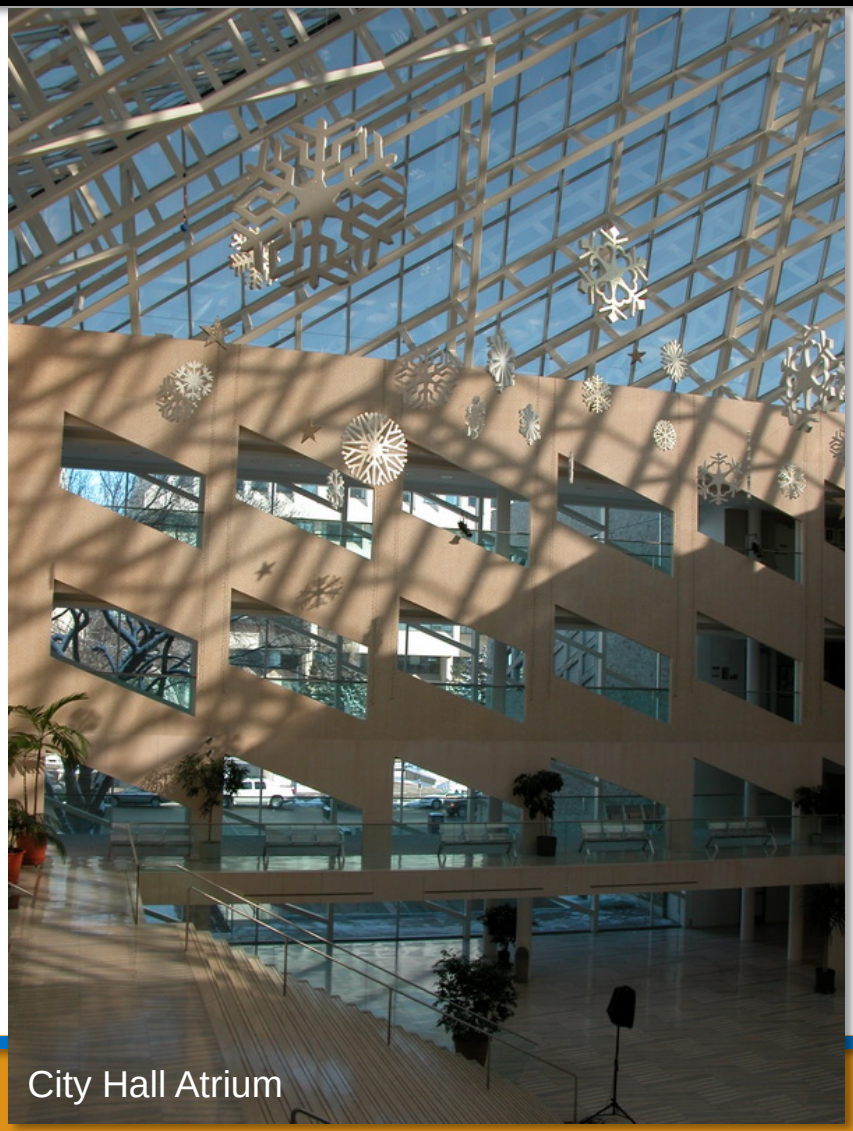
Distance should play a factor


City Hall Atrium


MUST this be filled?


MUST this be realigned?

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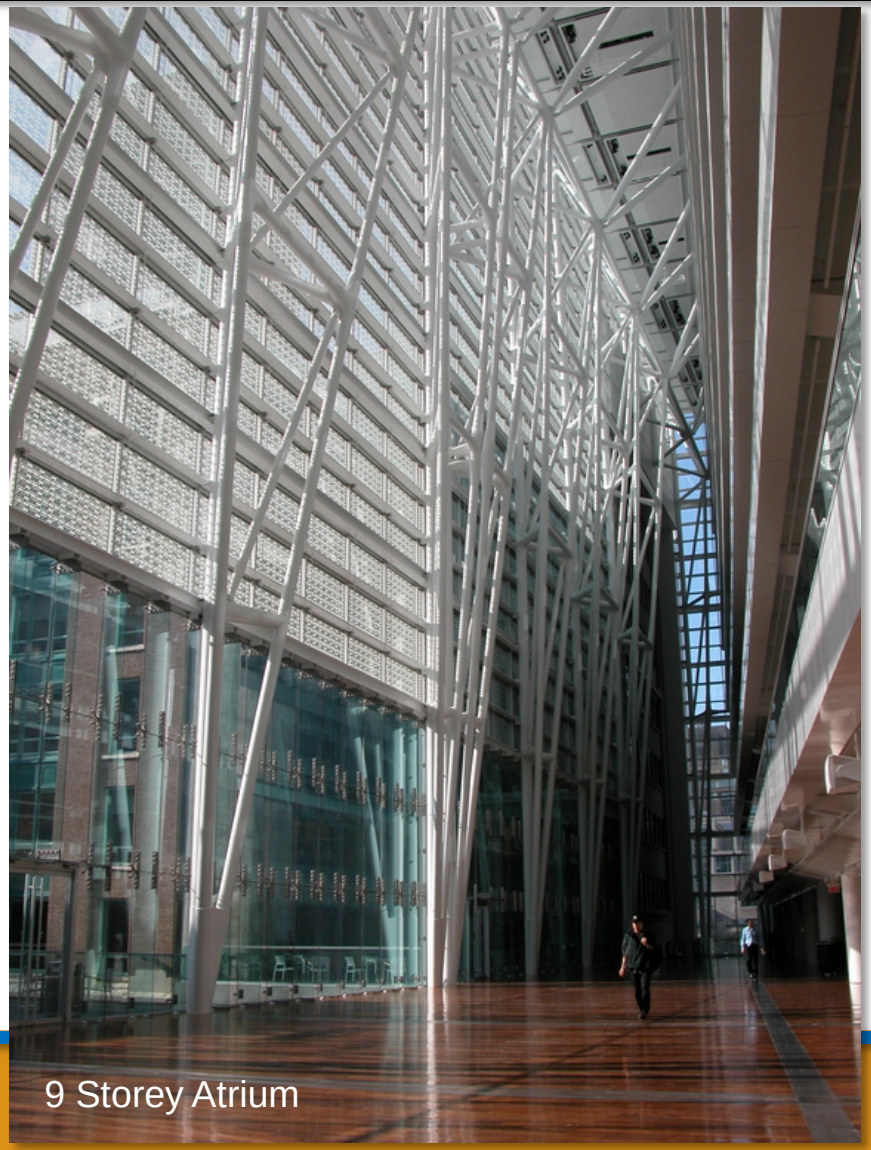
Distance should play a factor (360º)



9 Storey Atrium

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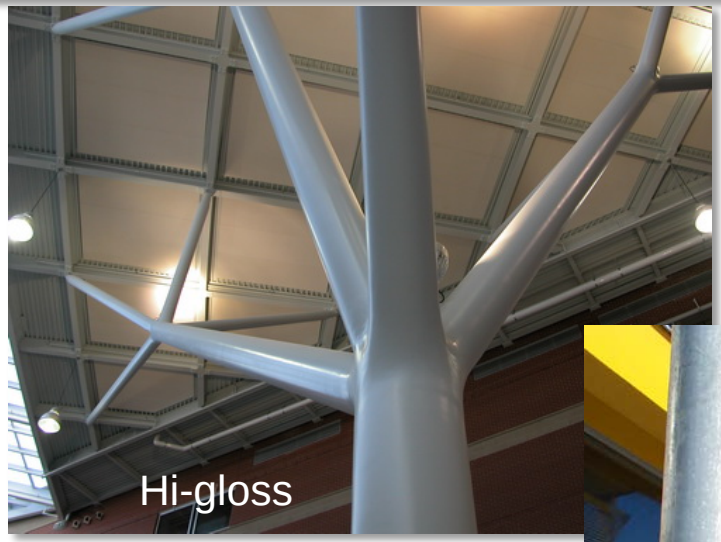
Coating, protection systems should be a factor



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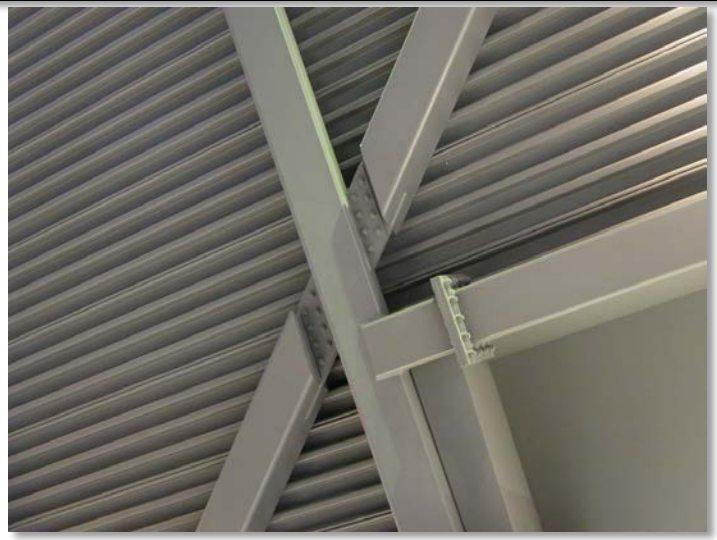
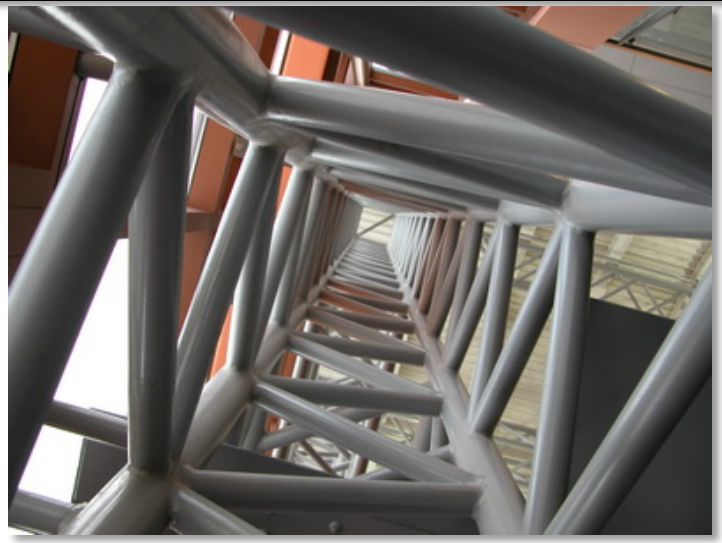
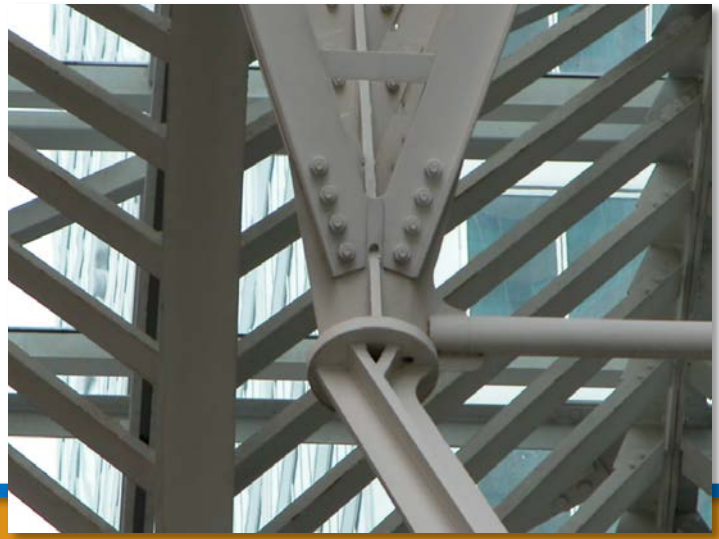
Connection types are important differentiators

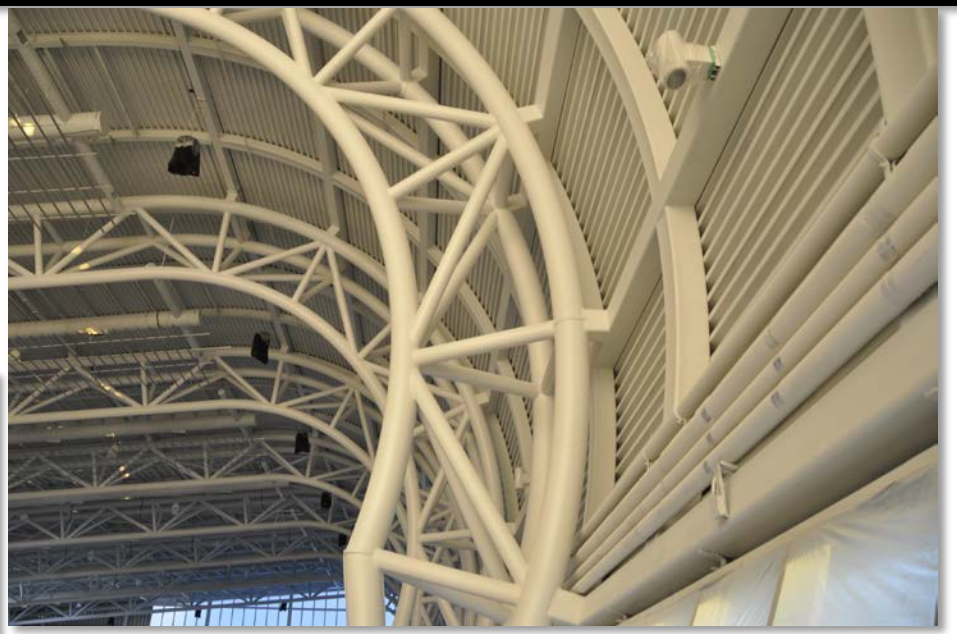






Bolts vs Welds

The choice is there….



And the AESS is very different…

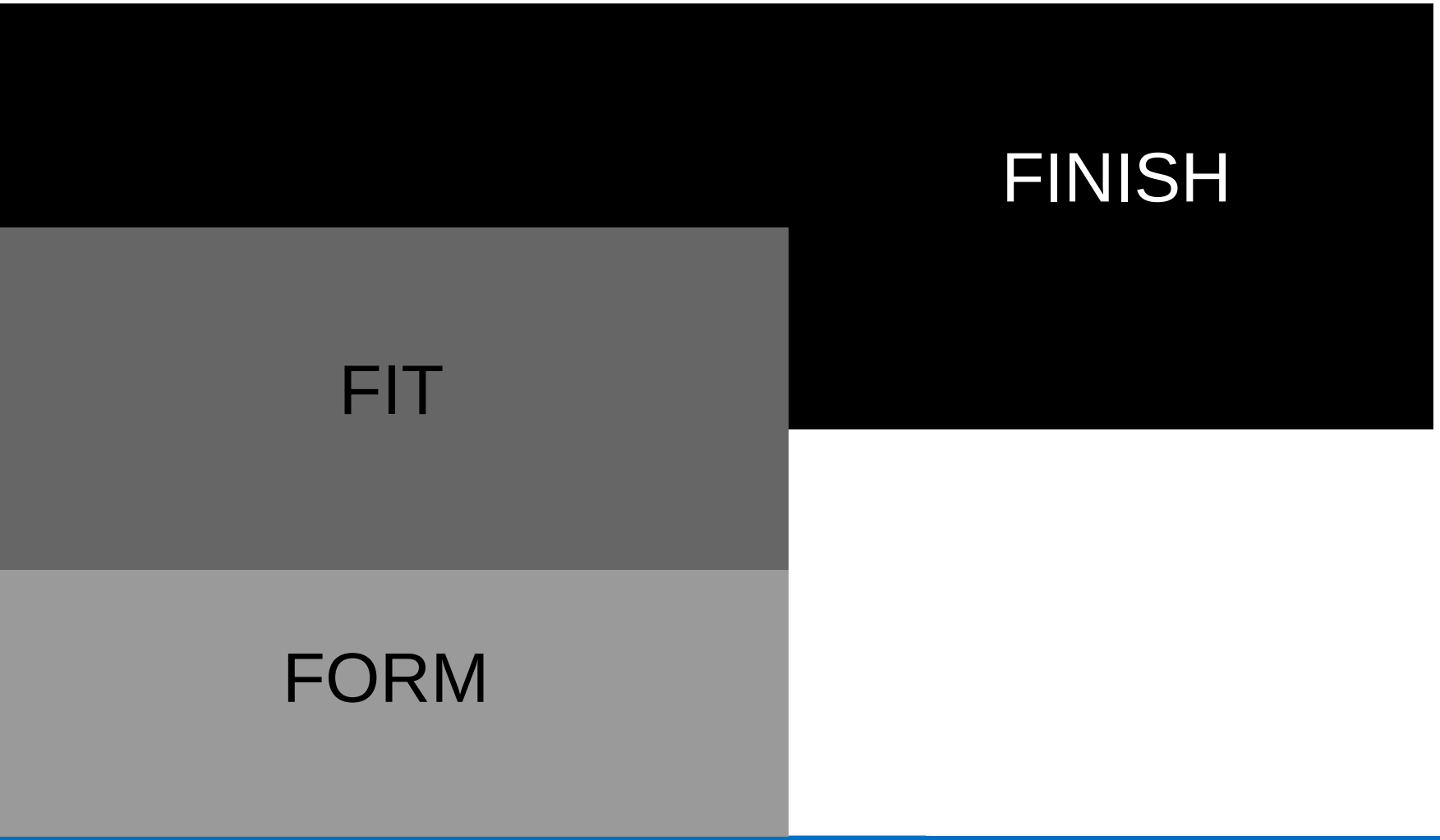
AESS: Primary Factors of influence

- Distance. Visibility.
- Connections mostly bolted or welded
- Tolerances required at fabrication and erection
- Access to detail to perform required finish

- Degree of expression
- Size and shape of structural elements

- Interior or exterior setting
- Paint finish, corrosion resistance, fire protection

AESS: Primary Factors of influence



New AESS Documents

- ✓ Subdivision of **Spec**ification for Structural Steel
- ✓ Fabricator's document
- ✓ Visual **Guide** for specifying AESS
- ✓ Category **Matrix**

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AESS: Factors of influence

SPEC
+
CODE

GUIDE

GUIDE

MATRIX

Approximating Cost Premiums

- Discussions/roundtables made it apparent that Architects and Engineers wanted cost premiums provided
- Cost premiums could begin to differentiate the AESS Categories
- A “range” of extra cost has been included
- *The range is very wide and should only be used as a starting point for contractual discussions between the Architect, Engineer, Fabricator and Client*

Table 1 - AESS Category Matrix

Id	Characteristics	AESS C *Custom Elements*	AESS 4 *Showcase Elements*	AESS 3 *Feature Elements* Viewed at a Distance ≤ 6 m	AESS 2 *Feature Elements* Viewed at a Distance > 6 m	AESS 1 *Basic Elements*	SSS *Standard Structural Steel* CSA S16
1.1	Surface preparation to SSPC-SP 6		√	√	√	√	
1.2	Sharp edges ground smooth		√	√	√	√	
1.3	Continuous weld appearance						
1.4	Standard structural bolts						
1.5	Weld spatters removed						
2.1	Visual Samples		optional	optional	optional		
2.2	One-half standard fabrication tolerances		√	√	√		
2.3	Fabrication marks not apparent		√	√	√		
2.4	Welds uniform and smooth		√	√	√		
3.1	Mill marks removed		√	√			
3.2	Butt and plug welds ground smooth and filled		√	√			
3.3	HSS weld seam oriented for reduced visibility		√	√			
3.4	Cross sectional abutting surface aligned		√	√			
3.5	Joint gap tolerances minimized		√	√			
3.6	All welded connections		optional	optional			
4.1	HSS seam not apparent		√				
4.2	Welds contoured and blended		√				
4.3	Surfaces filled and sanded		√				
4.4	Weld show-through minimized		√				
C.1							
C.2							
C.3							
C.4							
C.5							
	Sample Use:	Elements with special requirements	Showcase or dominant elements	Airports, shopping centres, hospitals, lobbies	Retail and architectural buildings viewed at a distance	Roof trusses for arenas, retail warehouses, canopies	
	Estimated Cost Premium:	Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

Categories go from lowest at the right to highest at the left.

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	Estimated Cost Premium:	Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

Viewing distance is noted as the differentiating factor between the high and low end AESS Categories.

Grinding permitted $$

No Grinding!!

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	Estimated Cost Premium:	Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

Characteristics are listed from the most common/least expensive at the top to the more specialized at the bottom.

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Estimated cost premiums over Standard Structural Steel are noted at the bottom.

Sample Use:	Elements with special requirements	Showcase or dominant elements	Airports, shopping centres, hospitals, lobbies	Retail and architectural buildings viewed at a distance	Roof trusses for arenas, retail warehouses, canopies	
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Table 1 - AESS Category Matrix

AESS 1

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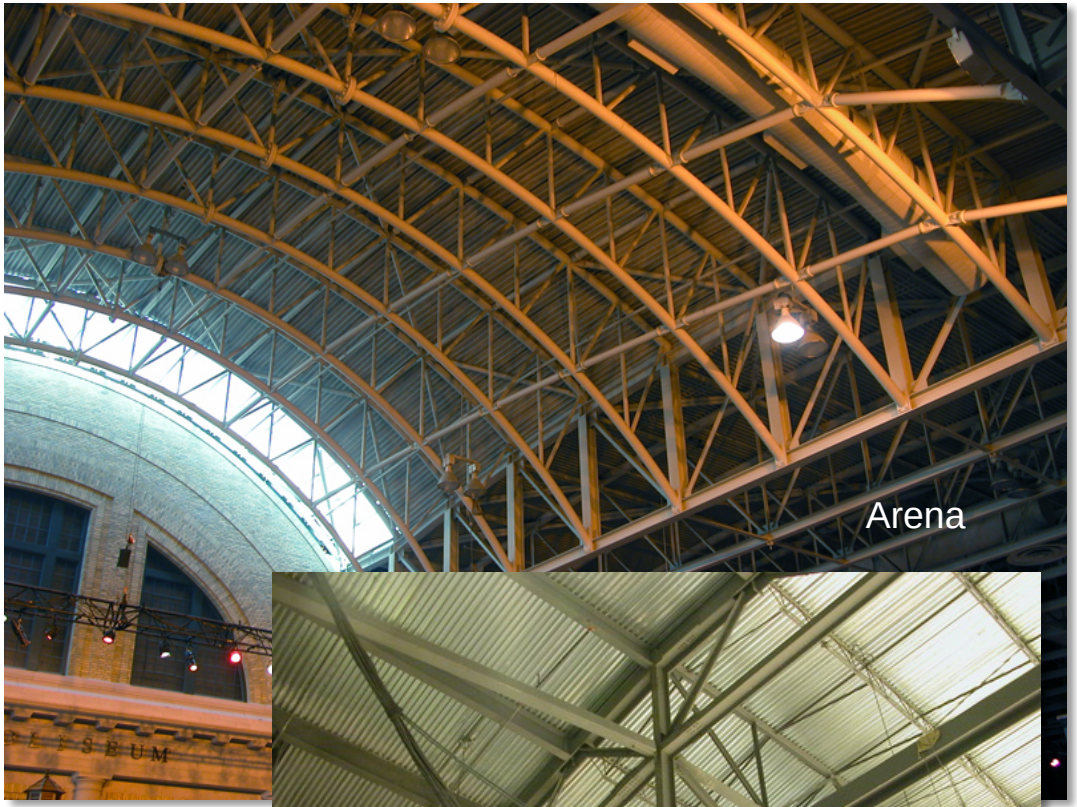
Estimated Cost Premium:		Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

Roof trusses for arenas, retail warehouses, canopies

Cost premium: Low (20-60%)

AESS 1 – Basic Elements



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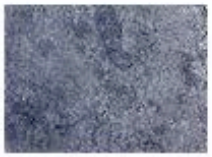
1.1 Surface preparation to SSPC-SP 6

SP 3 : Power Tool Cleaning

SP 6 : Commercial Blast Cleaning

SP 15

S.S.P.C. Steel Surface Preparation Standards (click a picture for more details)


Bare Metal


SP-5


SP-6


SP-7


SP-10

SP-6
Commercial Blast Cleaning

Complete removal of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter, except for spots and discolorations.

Spots and discolorations shall be limited to no more than 33% of each area of nine square inches.

Usual methods for cleaning: compressed air nuzzle blasting or equipment with centrifugal wheels.

Equivalence: NACE 3# • Swedish Standard # SA-2

SSPC-SP 6 for complete removal of visible oil, mill scale, rust, paint.

photo: Dry-Tec website - www.drytec.ca

1.1 Surface preparation to SSPC-SP 6

Shot blast cleaning with
the use of abrasives

Photos: Sylvie Boulanger

1.2 Sharp edges ground smooth

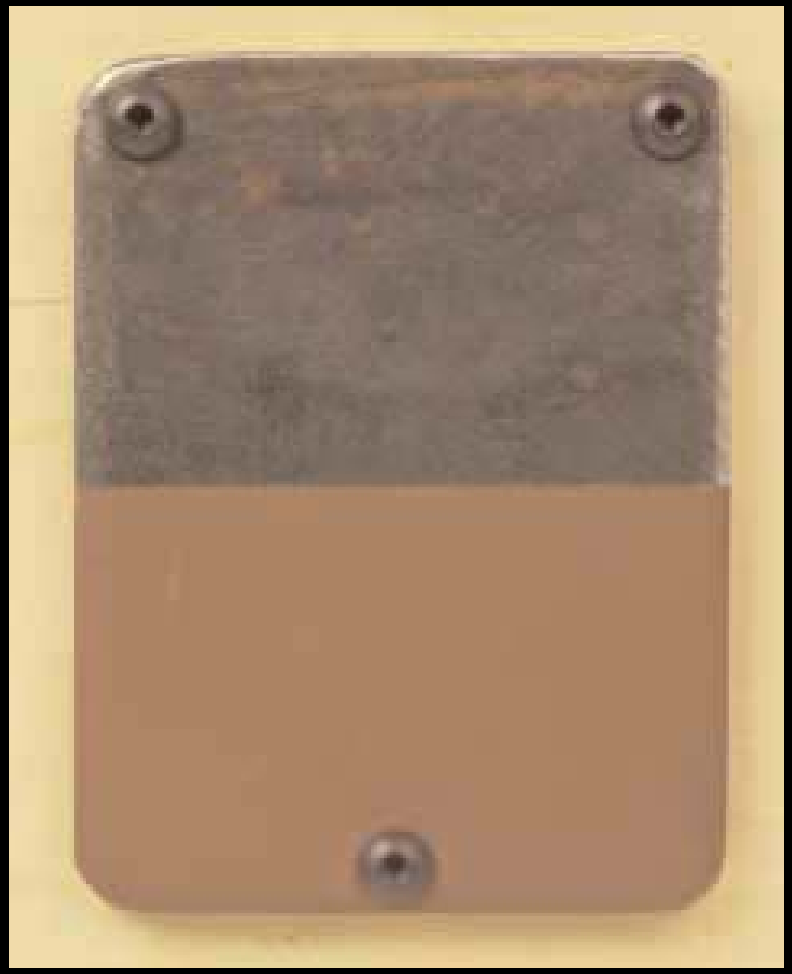


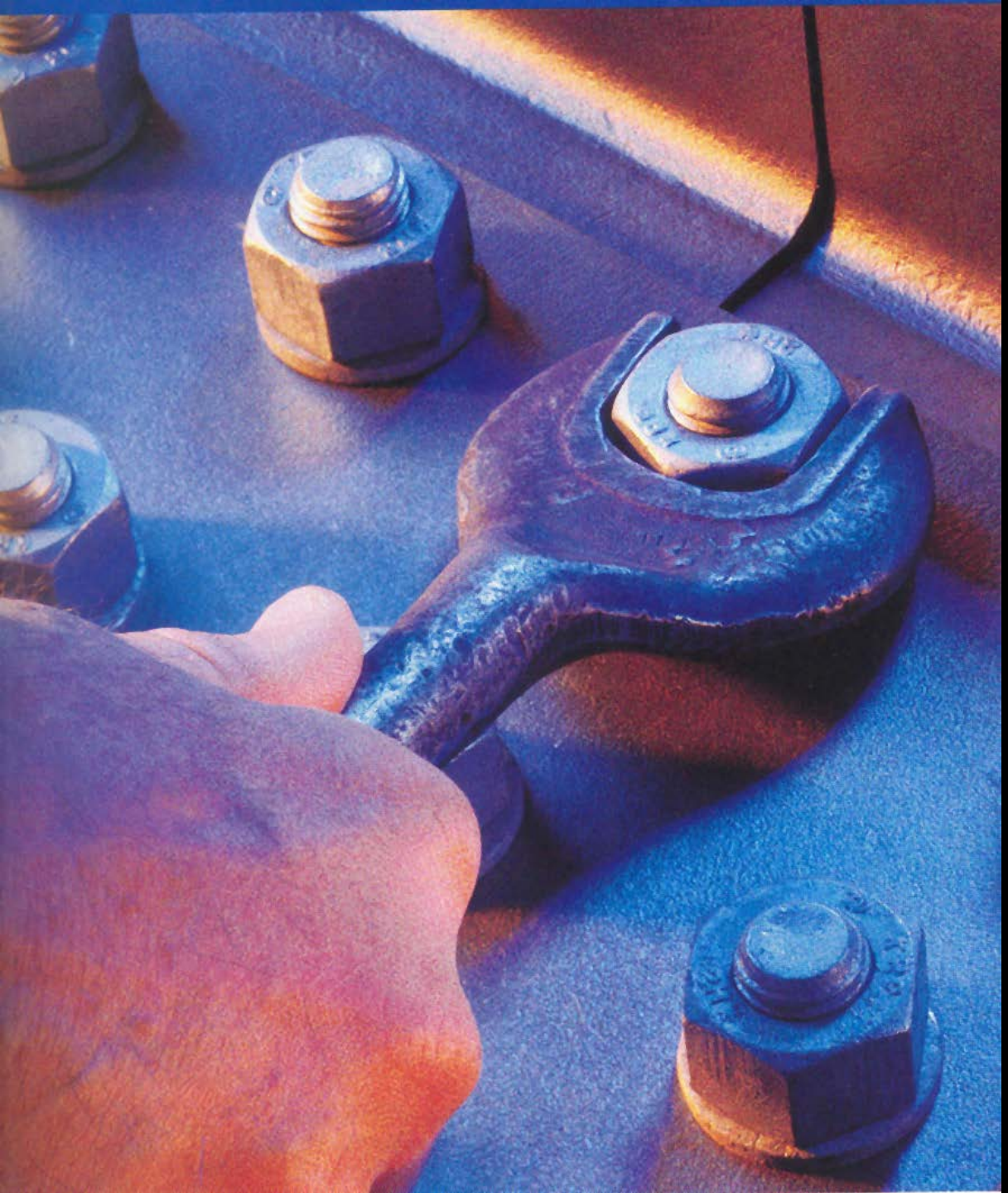
photo: AISC AESS Guide

1.3 Continuous weld *appearance*

Photos: Sylvie Boulanger

1.3 Continuous weld *appearance*

Consider carefully your reasons for welding.



1.4 Standard structural bolts

Hex bolts by default

The side on which the bolt heads should appear can be specified …. not the rotation!

1.4 Standard structural bolts

or TC (tension control) bolts

It is a VERY simple request, but makes a HUGE aesthetic difference!

1.4 Standard structural bolts

Photos: Sylvie Boulanger

Photo: Sylvie Boulanger

1.5 Remove weld spatter

Weld spatter prevents a quality/smooth finish as the imperfections will translate through the coatings.

Table 1 - AESS Category Matrix

AESS 2

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1.5	Weld spatters removed		√	√	√	√	
2.1	Visual Samples		optional	optional	optional		
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Estimated Cost Premium:		Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

Retail and architectural bldgs viewed at a distance
Cost premium: Low to Moderate (40-100%)

AESS 2 – Feature Elements (>6m)

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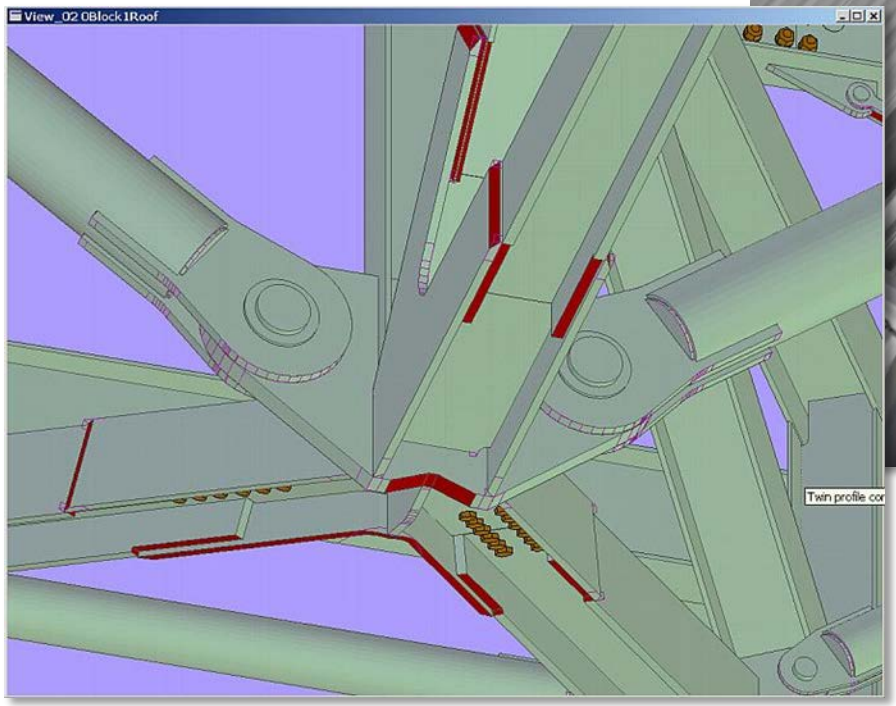
2.1 Visual Samples (optional)

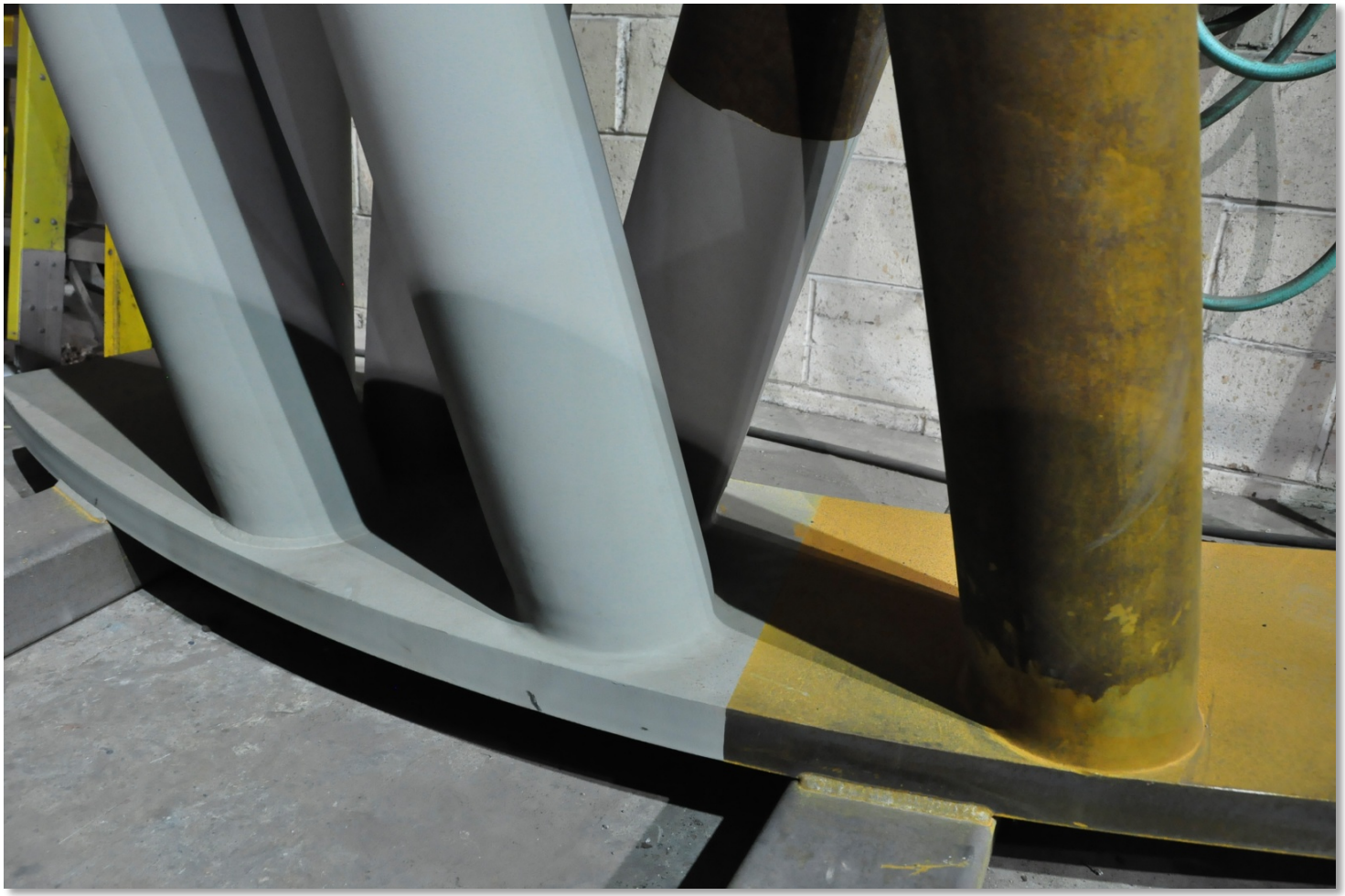
1. 3-D rendering;
2. Physical sample of surface preparation and welds;
3. First off inspection; First element fabricated for use in finished structure
4. Mockups; Scaled or full-scale. Mockups are to demonstrate aesthetic effects as well as qualities of materials and execution:
    a. May have finished surface
    b. Architect’s approval of mockups required;
    c. Retained until project is completed;
    d. Approved full-scale mockups may be part of work.

Option 1: 3-D rendering

This standard 3D image, taken from the Fabricators' detailing software, combined with built examples of previous work was enough to agree on the requirements.



Option 2: Physical Samples



Sample of base connections for World Financial Centre baskets showing the appearance of the welds with and without remediation.

Option 2: Physical Samples

The client needs to understand that THIS is what the welds look like in order to make the structural connection FIRST.

Is there room to do the WORK?

Option 3: First off inspection

Element is included in the final structure. Subsequent elements may have minor modifications.

Photo: Walters Inc.

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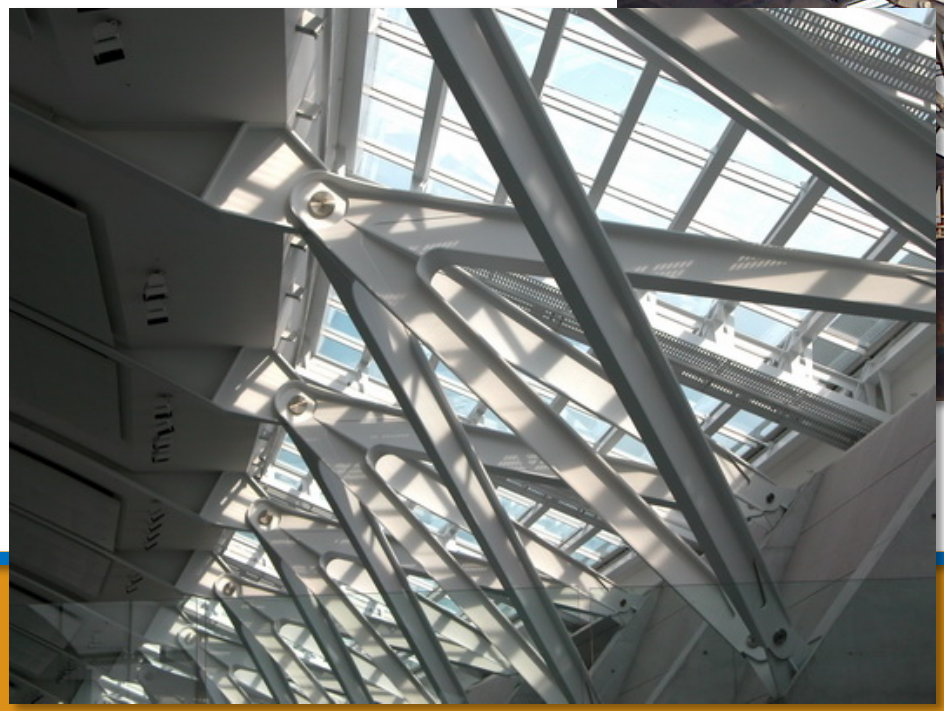
Option 3: Approved first off inspection assembly

One of the “wishbones” is the full scale first off inspected assembly. Can you tell which one?



Option 4: Mock-up

When a mock-up is required….
Remember that the shop conditions are different than the final conditions, with respect to:

- Distance
- Position
- Lighting

Photo: Sylvie Boulanger

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2.2 One-half standard fabrication tolerances

Photo: Sylvie Boulanger

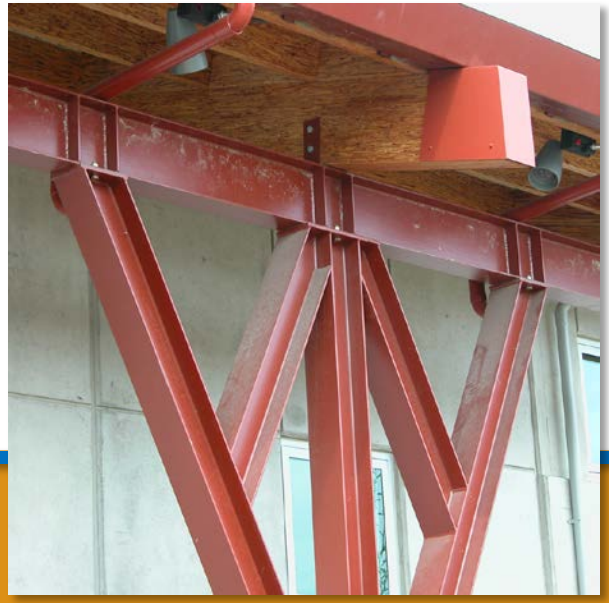
2.3 Fabrication marks *not apparent*

photo: AISC AESS Guide

2.4 Welds uniform and smooth

Photo: Sylvie Boulanger

2.4 Welds uniform and smooth



3 very different welded conditions,
yet all are appropriate to the project

Table 1 - AESS Category Matrix

AESS 3

Id	Characteristics	AESS C *Custom Elements*	AESS 4 *Showcase Elements*	AESS 3 *Feature Elements*	AESS 2 *Feature Elements*	AESS 1 *Basic Elements*	SSS *Standard Structural Steel*
				Viewed at a Distance ≤ 6 m	*Viewed at a Distance > 6 m*		CSA S16
1.1	Surface preparation to SSPC-SP 6		√	√	√	√	
1.2	Sharp edges ground smooth		√	√	√	√	
1.3	Continuous weld appearance		√	√	√	√	
1.4	Standard structural bolts		√	√	√	√	
1.5	Weld spatters removed		√	√	√	√	
2.1	Visual Samples		optional	optional	optional		
2.2	One-half standard fabrication tolerances		√	√	√		
2.3	Fabrication marks not apparent		√	√	√		
2.4	Welds uniform and smooth		√	√	√		
3.1	Mill marks removed		√	√			
3.2	Butt and plug welds ground smooth and filled		√	√			
3.3	HSS weld seam oriented for reduced visibility		√	√			
3.4	Cross sectional abutting surface aligned		√	√			
3.5	Joint gap tolerances minimized		√	√			
3.6	All welded connections		optional	optional			
4.1	HSS seam not apparent		√				
4.2	Welds contoured and blended		√				
4.3	Surfaces filled and sanded		√				
4.4	Weld show-through minimized		√				
C.1							
C.2							
C.3							
C.4							
C.5							
	Sample Use:	Elements with special requirements	Showcase or dominant element	Airports, shopping centres, hospitals, lobbies	Retail and architectural buildings viewed at a distance	Roof trusses for arenas, retail warehouses, canopies	
	Estimated Cost Premium:	Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

Airports, shopping centres, hospitals, lobbies
Cost premium: Moderate (60-150%)

AESS 3 – Feature Elements (≤6m)

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3.1 Mill marks removed

Grinding first appears in AESS 3!

photo: AISC AESS Guide

Example of mill mark show through.

3.2 Butt and plug welds ground smooth and filled

Right side shows groove weld ground smooth.

photo: AISC AESS Guide

3.3 HSS weld seam oriented for reduced visibility

3.4 Cross sectional abutting surface aligned
3.5 Joint gap tolerances minimized

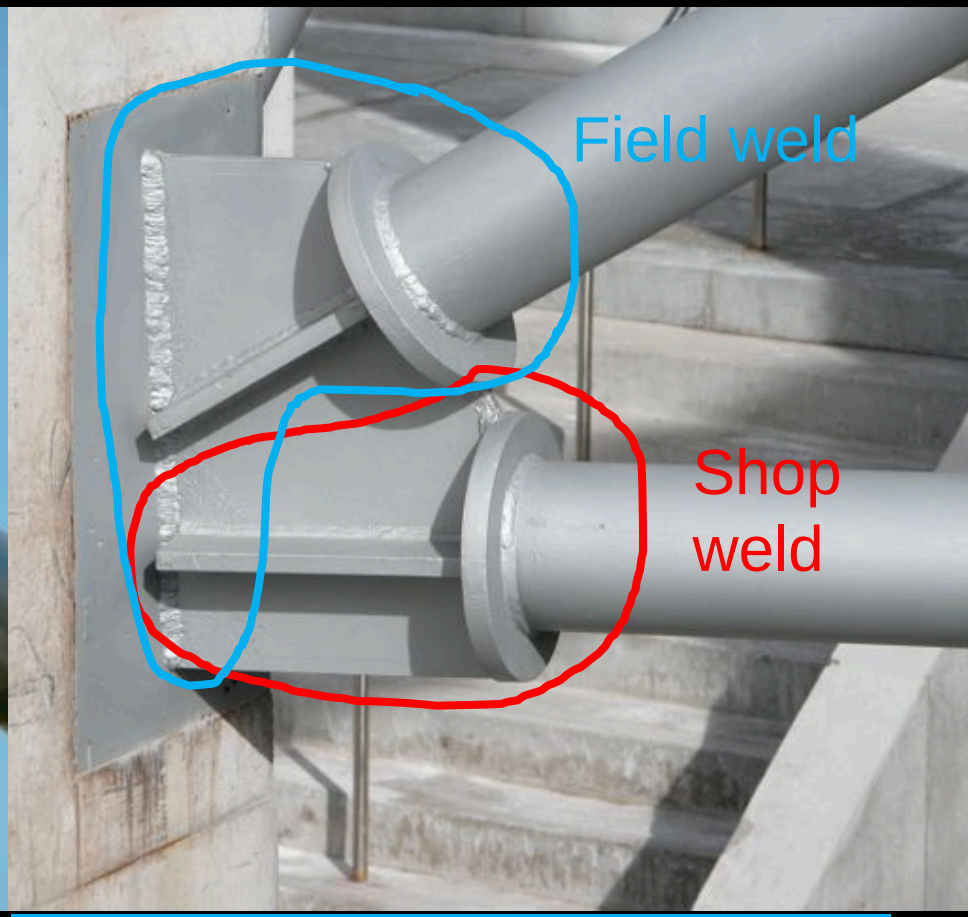
photo: AISC AESS Guide

3.5 Joint gap tolerances minimized

Required to accommodate complexity and alignment

Photo: Sylvie Boulanger

3.6 All welded connections (optional)



Requires skilled field welder.

Welded connections

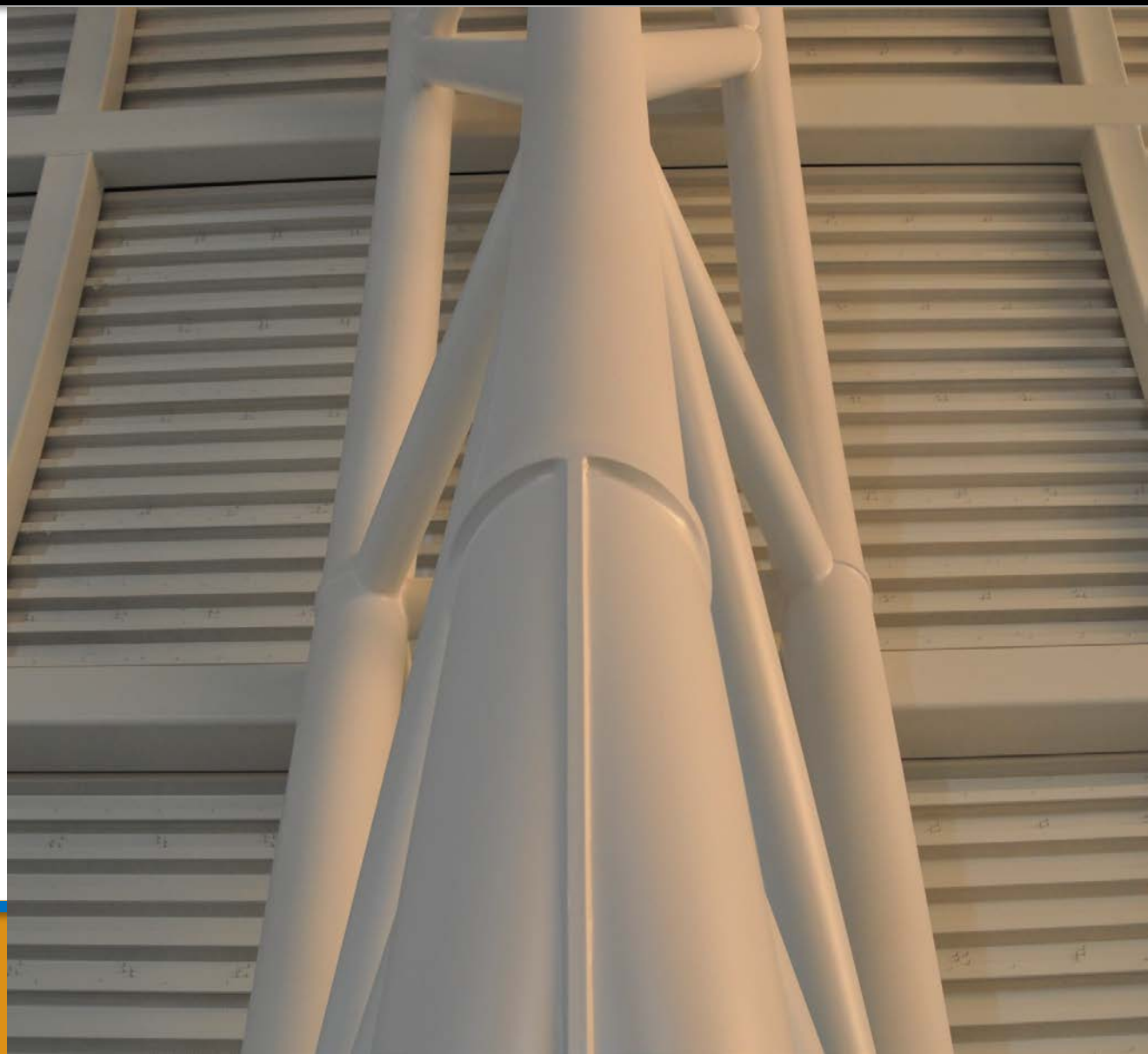
The Abilities Centre in Whitby, Ontario, uses curved steel to create the top and bottom chords of these large, long span trusses over the rink area of the sports facility.

Welded connections

The connection between the curved “vertical” truss and the long horizontal members have been done as to be invisible. The AESS4 level of this project requires impeccable workmanship.

Welding choices

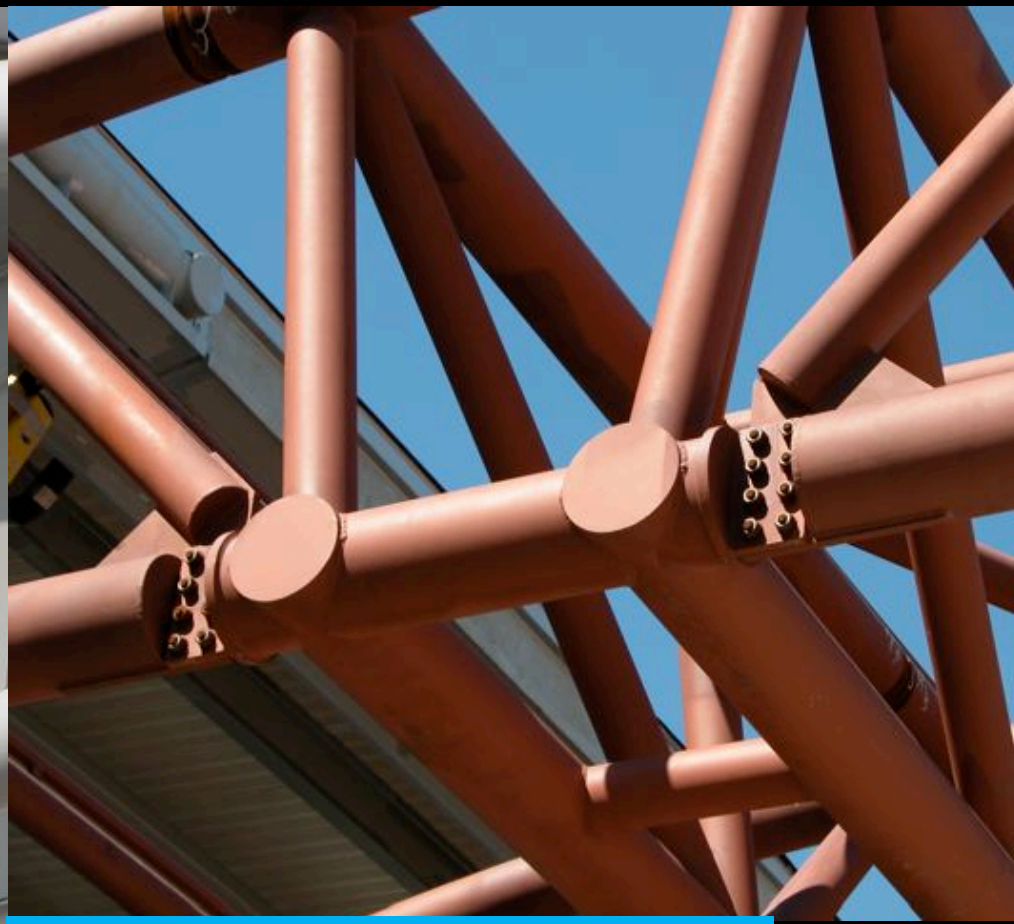
It is not always necessary to hide connections. Here plates are used between the joining elements of the truss to accentuate the detail. This is easier to accomplish than a fully blended weld, and truly adds elegance to the detail.



3.6 All welded connections (optional)

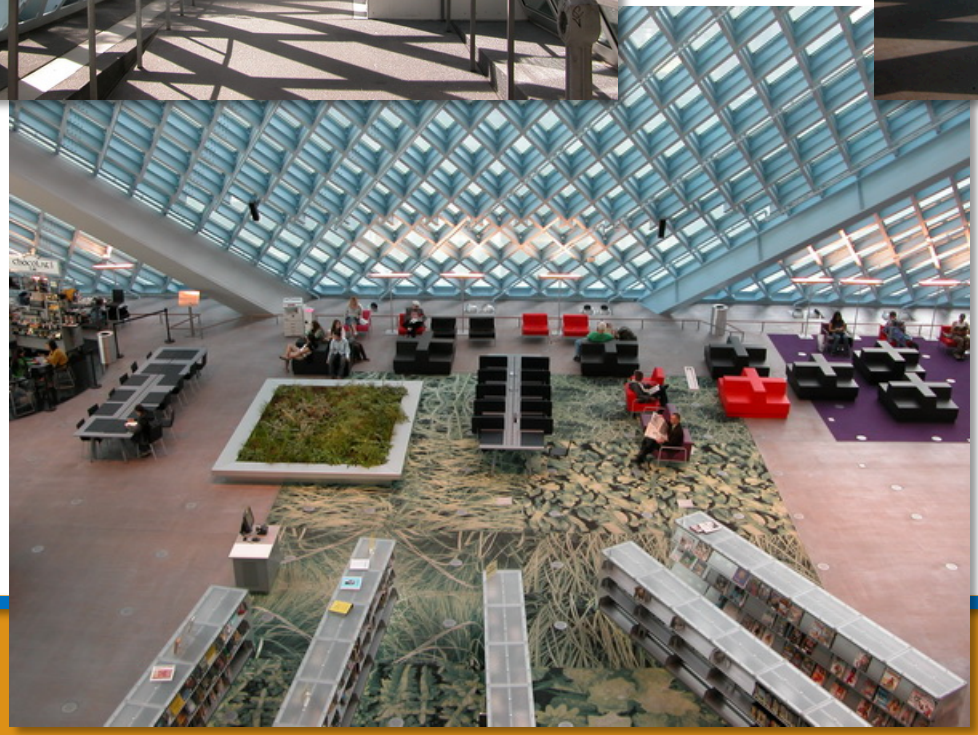
Requires access and remediation to remove the markings from the temporary bolted connections.

3.6 All welded connections (optional)



Discreet bolts can be proposed as unobtrusive.

Unobtrusive connections



Even where design governs, there are alternates to field welding

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Hidden connections or splices

Where site welding might be problematic, make parties aware that bolted connections may be effectively “hidden”

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Hidden connections or splices

This hidden connection must also be weatherproof

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A bolted connection can be used for a splice. A simple sleeve is fitted over the connection to provide continuity of appearance.

Photo: Sylvie Boulanger

Table 1 - AESS Category Matrix

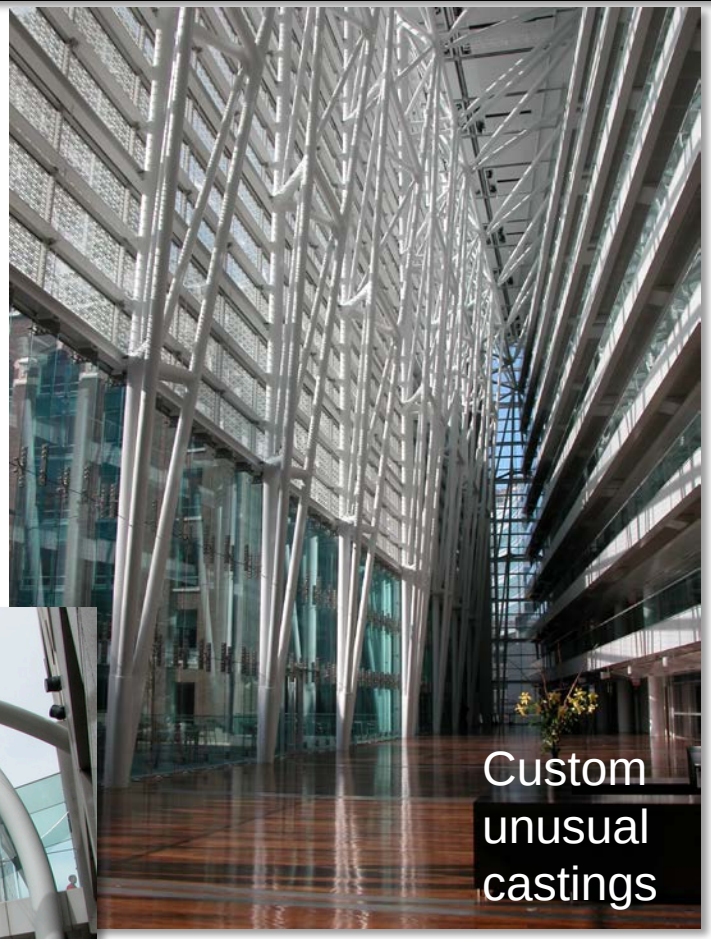
AESS 4

Id	Characteristics	AESS C *Custom Elements*	**AESS 4** *Showcase Elements*	AESS 3 *Feature Elements* Viewed at a Distance ≤ 6 m	AESS 2 *Feature Elements* Viewed at a Distance > 6 m	AESS 1 *Basic Elements*	SSS *Standard Structural Steel* CSA S16
1.1	Surface preparation to SSPC-SP 6		√	√	√	√	
1.2	Sharp edges ground smooth		√	√	√	√	
1.3	Continuous weld appearance		√	√	√	√	
1.4	Standard structural bolts		√	√	√	√	
1.5	Weld spatters removed		√	√	√	√	
2.1	Visual Samples		optional	optional	optional		
2.2	One-half standard fabrication tolerances		√	√	√		
2.3	Fabrication marks not apparent		√	√	√		
2.4	Welds uniform and smooth		√	√	√		
3.1	Mill marks removed		√	√			
3.2	Butt and plug welds ground smooth and filled		√	√			
3.3	HSS weld seam oriented for reduced visibility		√	√			
3.4	Cross sectional abutting surface aligned		√	√			
3.5	Joint gap tolerances minimized		√	√			
3.6	All welded connections		optional	optional			
4.1	HSS seam not apparent		√				
4.2	Welds contoured and blended		√				
4.3	Surfaces filled and sanded		√				
4.4	Weld show-through minimized		√				
C.1							
C.2							
C.3							
C.4							
C.5							
Sample Use:		Elements with special requirements	Showcase or dominant elements	Airports, shopping centres, hospitals, lobbies	Retail and architectural buildings viewed at a distance	Roof trusses for arenas, retail warehouses, canopies	
Estimated Cost Premium:		Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

Showcase or dominant elements, sculptures
Cost premium: High (150-250%)

AESS 4 - Showcase or dominant elements

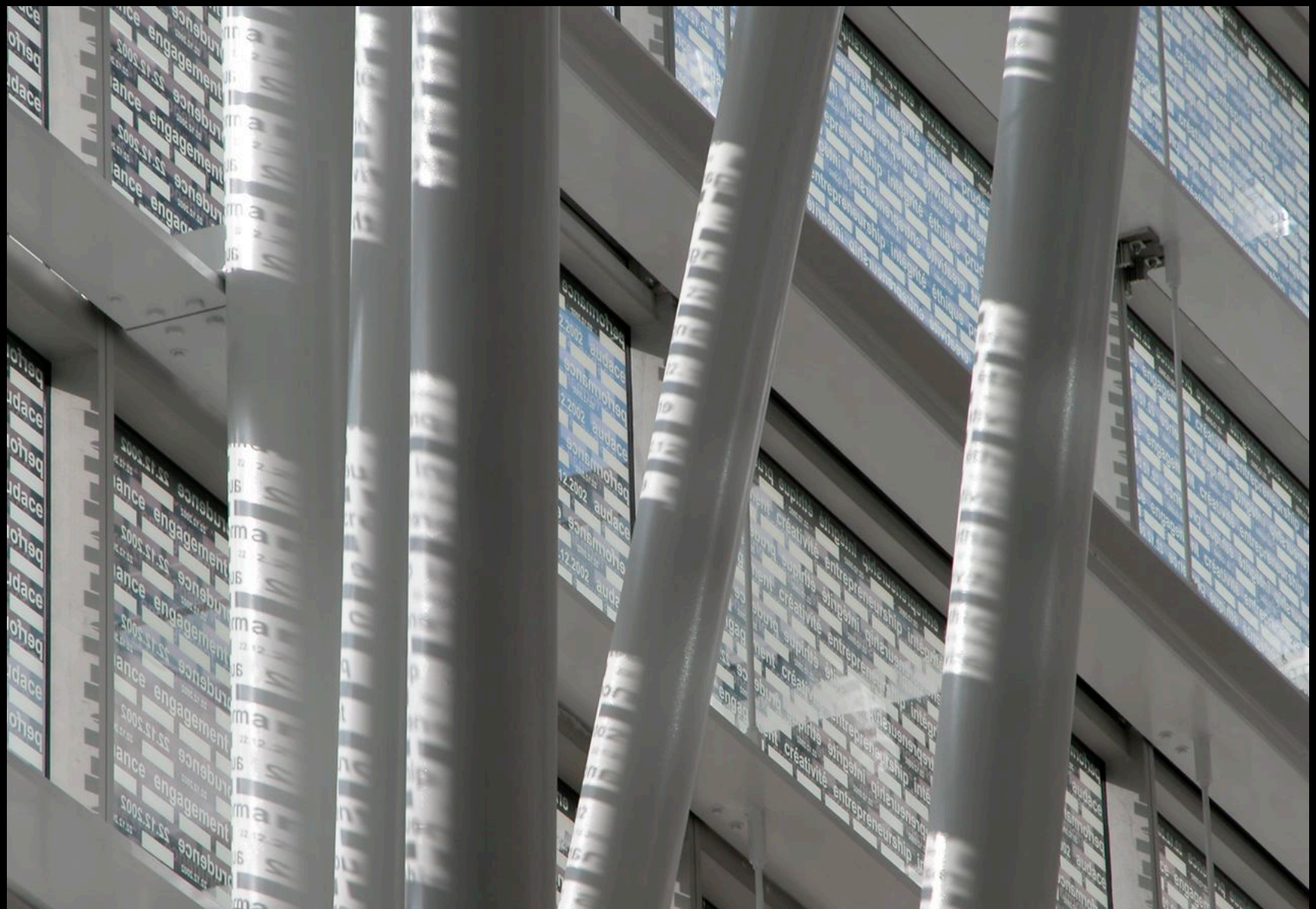
Custom platework + sharp edges



Custom unusual castings

Large curved members

4.1 HSS seam not apparent



4.1 HSS seam not apparent

Exposed columns should make orientation of seams consistent and ensure splices such as the one at right are better done.

4.2 Welds contoured and blended

photo: AISC AESS Guide

Very expensive

4.2 Welds contoured and blended

4.3 Surfaces filled and sanded

Photos: Sylvie Boulanger

4.4 Weld show-through minimized

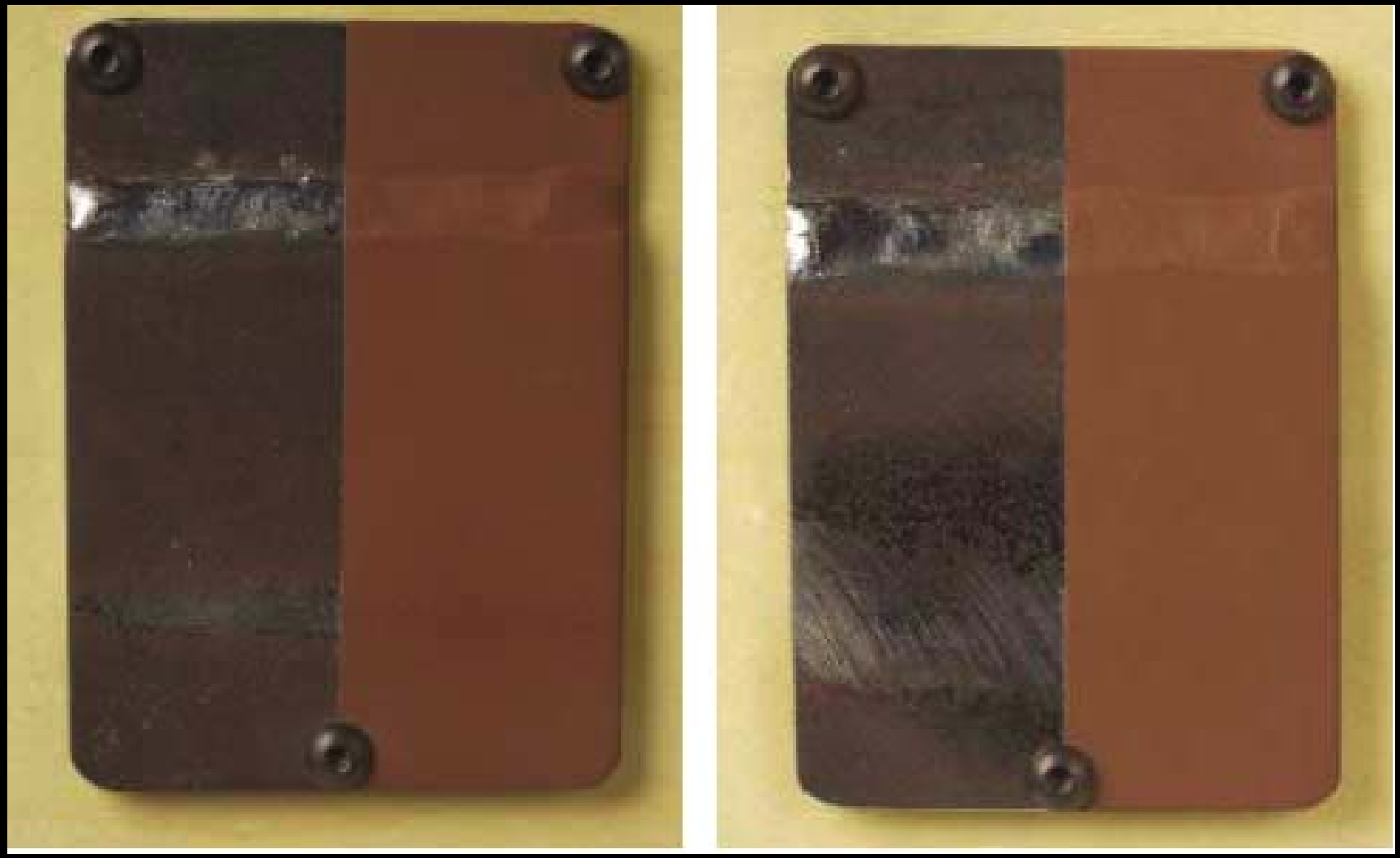


photo: AISC AESS Guide

Table 1 - AESS Category Matrix

AESS C

Id	Characteristics	AESS C *Custom Elements*	AESS 4 *Showcase Elements*	AESS 3 *Feature Elements* Viewed at a Distance ≤ 6 m	AESS 2 *Feature Elements* Viewed at a Distance > 6 m	AESS 1 *Basic Elements*	SSS *Standard Structural Steel* CSA S16
1.1	Surface preparation to SSPC-SP 6		√	√	√	√	
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2.1	Visual Samples		optional	optional	optional		
2.2	One-half standard fabrication tolerances		√	√	√		
2.3	Fabrication marks not apparent		√	√	√		
2.4	Welds uniform and smooth		√	√	√		
3.1	Mill marks removed		√	√			
3.2	Butt and plug welds ground smooth and filled		√	√			
3.3	HSS weld seam oriented for reduced visibility		√	√			
3.4	Cross sectional abutting surface aligned		√	√			
3.5	Joint gap tolerances minimized		√	√			
3.6	All welded connections		optional	optional			
4.1	HSS seam not apparent		√				
4.2	Welds contoured and blended		√				
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	Sample Use:	Elements with special requirements	Showcase or dominant elements	Airports, shopping centres, hospitals, lobbies	Retail and architectural buildings viewed at a distance	Roof trusses for arenas, retail warehouses, canopies	
	Estimated Cost Premium:	Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

AESS1-4 are NEVER modified!

This section is for those who have unusual requirements or are confident enough to create their own set of requirements

Re-used / Sustainable Steel

- An increasing number of projects are making use of re-used steel to be sustainable
- Some of these projects choose to leave the steel exposed to “celebrate” its re-use

- A Custom spec will be required for such projects as the demounting, transportation, re-erection of the steel will be unique and vary by project

Adaptive Re-use

- Project used an old steam locomotive shed
- Repurposed for offices and a grocery store
- Most of the steel was left in its original condition to show off the reuse

- Other was “cleaned up and repainted, leaving the original rivets exposed.

Highlight Re-used Elements

Steel beams saved from demolition were reused to support the roof.

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Rivets

Photos: Sylvie Boulanger





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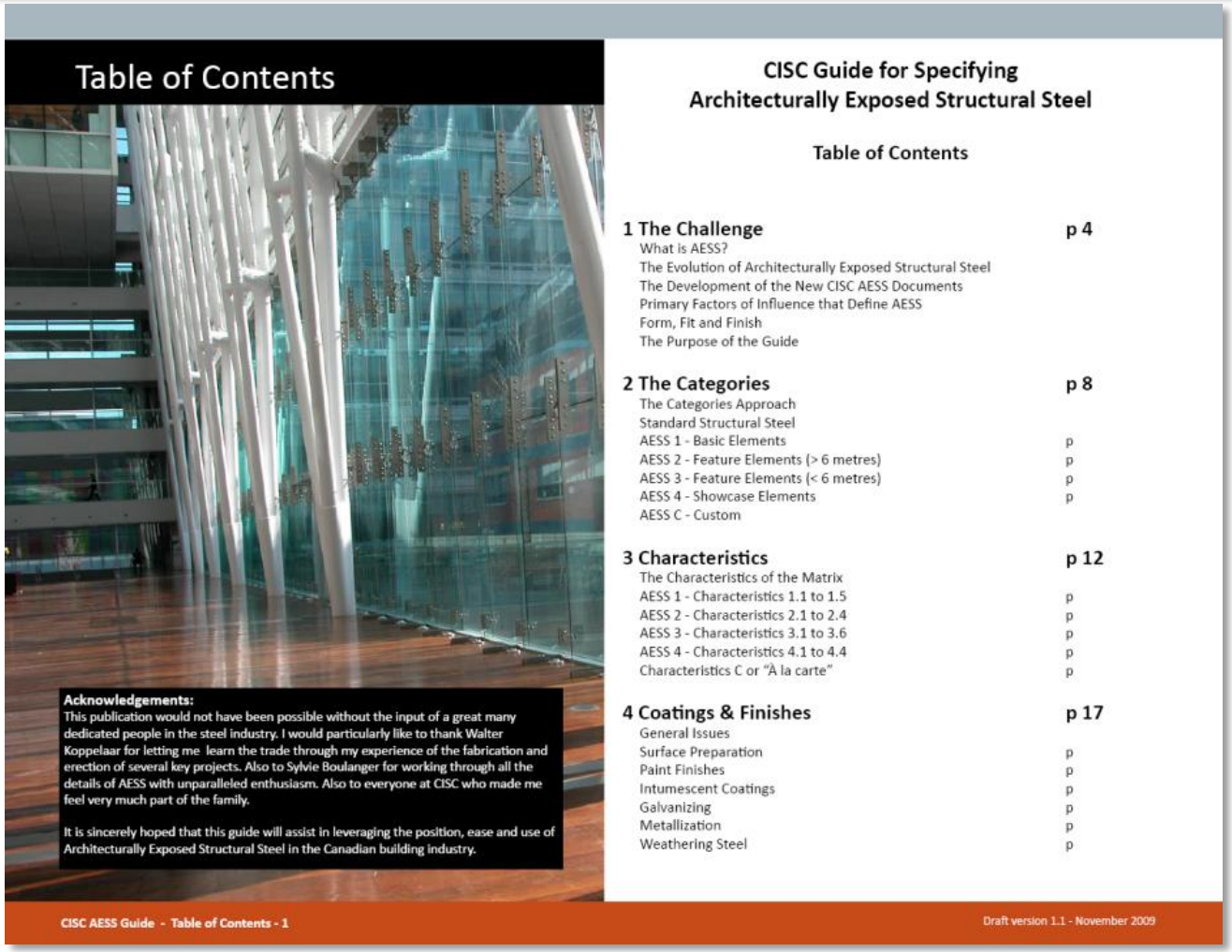
Guide for Specifying Architecturally Exposed Structural Steel





Added Topics in the AESS Guide



The AESS Guide for the Architects includes all of the technical issues addressed in the Spec and Code

Additional Topics

Disclaimer:
It is not the intention of the CISC AESS Committee that the projects and details included in this Guide should be replicated or necessarily represent "best practices". They are included only to hopefully allow for a better understanding of the visual intentions of the practices and procedures outlined in the Guide and related specficiation documents - understanding that "a picture might be worth a thousand words".

1 The Challenge

What is AESS?

Architecturally Exposed Structural Steel, AESS, is steel that must be designed to be both structurally sufficient to support the primary needs of the structure of the building, canopies or ancillary structures, while at the same time be exposed to view, and therefore is a significant part of the architectural language of the building. The design, detailing and finish requirements of AESS will typically exceed that of regular structural steel that is normally concealed by other finishes.

The Evolution of Architecturally Exposed Structural Steel:

The basic understanding of steel construction lies in its roots as an "assembled", largely prefabricated methodology. Steel construction is "elemental" in nature, and its artistry reliant on not only the appropriate choice of members (shapes versus tubes), but also heavily on the method of attachment. AESS steel design requires detailing that can approach "industrial design standards" when creating joints between members. The structural requirements of shear and moment resistance must be accommodated, along with tighter dimensional tolerances, along with "other" considerations such as balance, form, symmetry and economy. If the creation of connections requires an excessive degree of unique fabrication details, the designer can price the project out of existence. The method of preparation and finishing of the connections can also radically increase costs. Specialized welds and unnecessary ground and filed finishes increase fabrication and erection expenses.

Much of the architectural "enjoyment" as well as "challenge" in designing with AESS is in the creation of the key details and connections that give the structure its distinctive character. After the primary choice of member type and "system" (shape vs. tube), the challenge lies in determining the method of connection – welding vs. bolting, and ultimately the "Design" of the joint itself. Whereas designers tend not to be involved in connection issues for concealed structural systems, exposed systems become the architectural trademark of the building, hence requiring much involvement. Compositional issues usually necessitate the addition of "extra" steel at the joints to create a "beautiful" connection. Unfortunately not all designers are adequately informed either to choosing appropriate methods of attachment or to the cost implications of their choices.

The surge in the use of AESS has created a paradigm shift in the sequential communication that usually takes place in a more conventional building where the steel structure is hidden. The ar-

…with more information and image references on:

- Maintenance & design
- Coatings & finishes
- Connections
- Member types
- Curves & Cuts
- Erection issues
- Steel with glass
- Steel with timber

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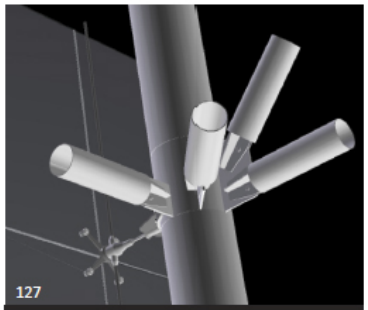
Connection Design

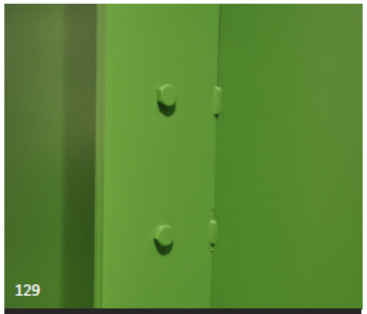


127

3-D modelled detail as can be used to verify connection details through a digital mock-up.

128

Tubular members can be connected using very inventive means. This combination of plates allows for constructability, minimal on site welding and enhanced interest in appearance.

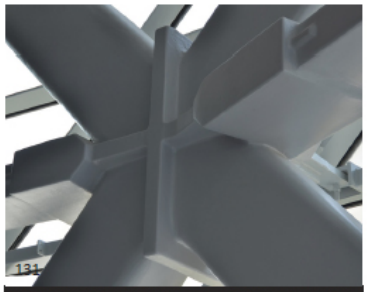


129

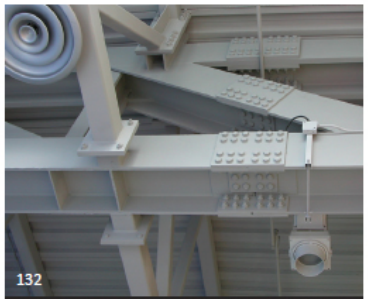
This connection has taken care to align the required intermittent welds with the bolts. This avoided unnecessary welding or filling.

130

This building uses extensive diagrids formed with I sections. These are very simply attached using bolted splice plates on both sides of the flange.



This heavy connection in a diagrid uses welding in combination with plates and RHS members to aesthetically handle the large load paths in this node.



132

Varying approaches to bolting are used to achieve the splicing of the I sections and the joining of the SHS members to the truss.

SELECTING A CONNECTION TYPE

- A huge impact on detailing!
- Impacts fabrication costs
- Impacts erection and constructability
- Impacts timing of the project
- Impacts transportation
- How big are the pieces
- How much can be assembled in the shop?
- BOLTS VS. WELDS
- SHAPES VS. TUBES

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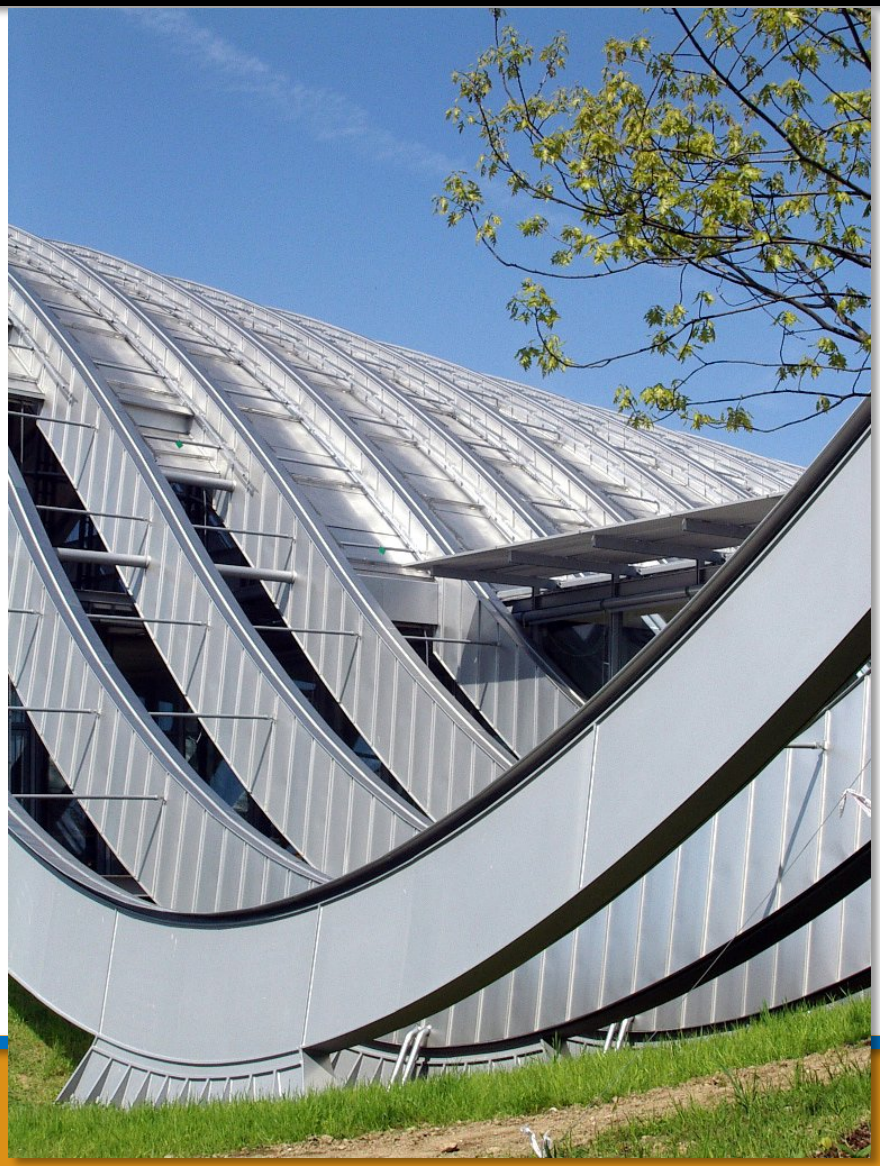
Coatings & Finishes



- The protection type and finish MUST be known at the beginning of design.
- The level of gloss will either mask or reveal minute imperfections.

Coatings and finishes are covered in their respective specs, not in the AESS spec.

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EXTERIOR VS INTERIOR FINISHES

- Water, snow and weathering are obvious issues here. Steel must be detailed so that moisture does not get trapped inside, causing the structure to rust out.
- Some details create ledges that will trap snow and meltwater.
- Some arrangements will also collect dirt and provide roosts for pigeons.

Primers & Painting

SHOP VS SITE PAINTING

- Quality is better with shop painting
- Shop painting is less costly
- Shop painted steel requires better care and handling during transportation, site staging and erection
- Anticipate that some touch up work will be required

PRIMERS

- A BIG caution note here!
- Each type of final finish requires a DIFFERENT primer
- Incompatible primers must be removed
- Especially important with intumescent fire protection.
- Some steel does not need a primer – cost and environmental savings!

Intumescent coatings

- Acrylic

  Commercial/architectural applications, mostly interior, field applied

  - water based
    - longer to dry, more fragile, but “greener”, for interior
  - solvent based
    - faster, most common use, robust, mostly interior setting but also exterior

- Epoxy

  Industrial applications, ext. or int., shop applied

    - very fast to dry, very resistant (also anti-corrosion)

Intumescent coatings have become a widely used way of expanding the application of exposed steel, but have major ramifications when specifying the level of fit and form on a project!

Solvent based intumescent being site applied.

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Intumescent Issues

Photo: Sylvie Boulanger

- The finish is not the same as paint – it has an orange peel like texture
- Intumescent coatings will NOT provide a precise colour match to adjacent paint
- Must be top coated against damage
- Should be detailed to allow for routine repair and refinishing

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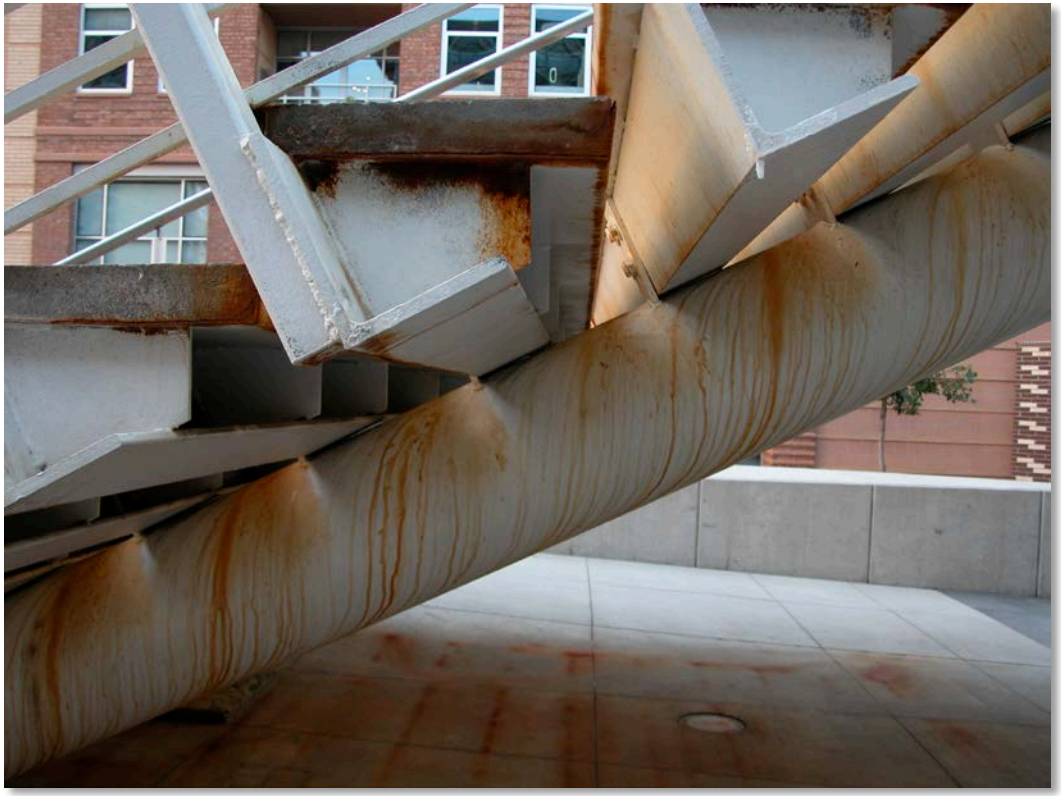
When you need corrosion protection …



- Galvanizing
- Hot Metal Spray (metalizing)
- Paint systems
- Intumescent coatings (epoxy)
- Weathering steel
- Stainless steel

Corrosion + Fire Protection

Support legs covered with a shop applied epoxy intumescent coating.

Requires additional care during erection to protect (and repair) the surfaces.

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THE ENGINEER AND FABRICATOR SAY ABOUT GALVANIZED STEEL:
It was NEVER meant to be a “FINISH”!
It is a corrosion protection system!

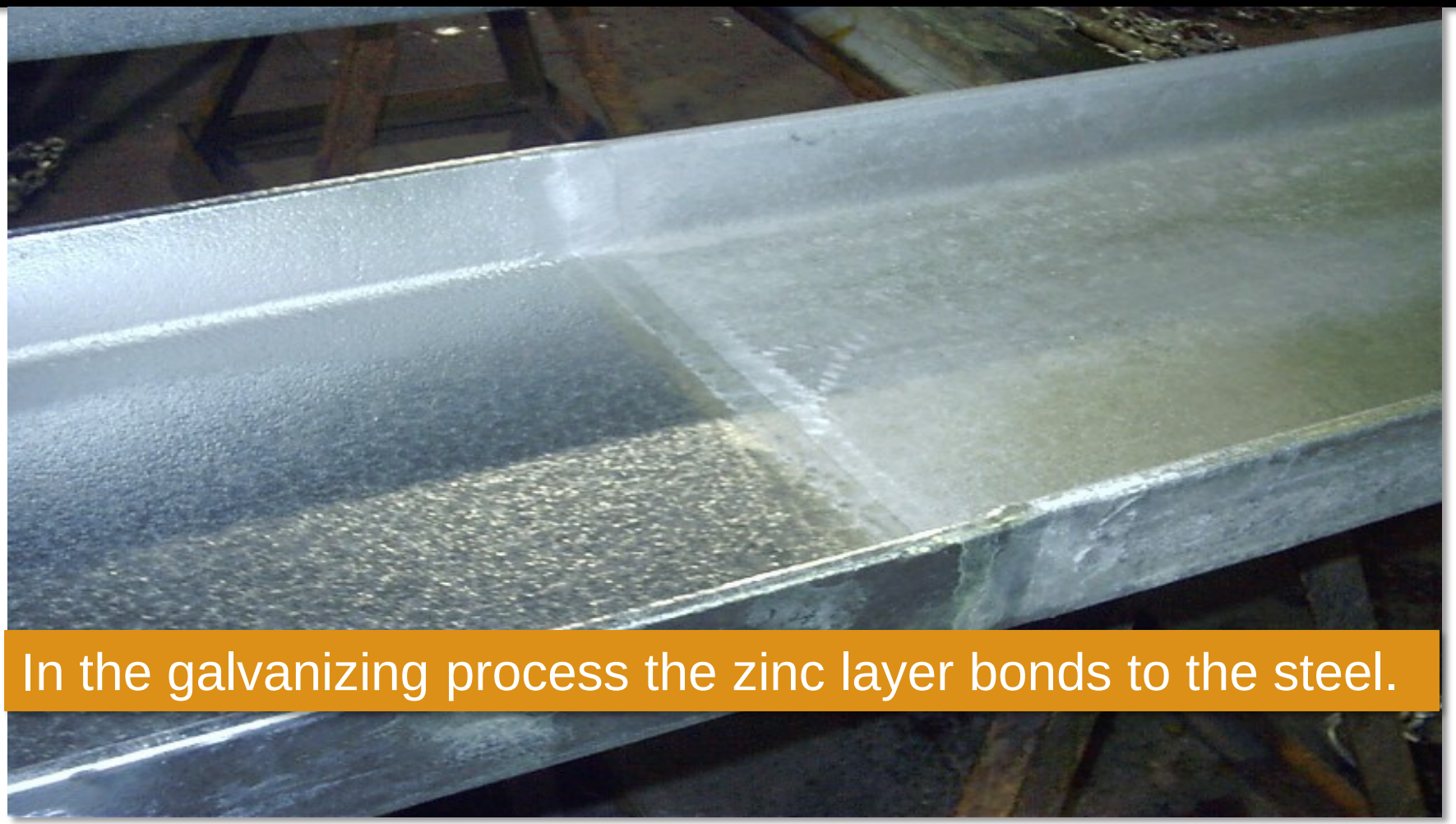
THE ARCHITECT SAYS:
But it looks so cool! I want it as a FINISH – can you make it look consistent please??

What impacts the final look of galvanized steel?

- Impurities, presence of certain chemicals, especially silicon
- Steel origin from several different heats
- Thickness of material: too thin, too different

- Access to all surfaces being dipped
- Size of pieces of steel

Differences between heats of steel!



In the galvanizing process the zinc layer bonds to the steel.

Photo: Sylvie Boulanger

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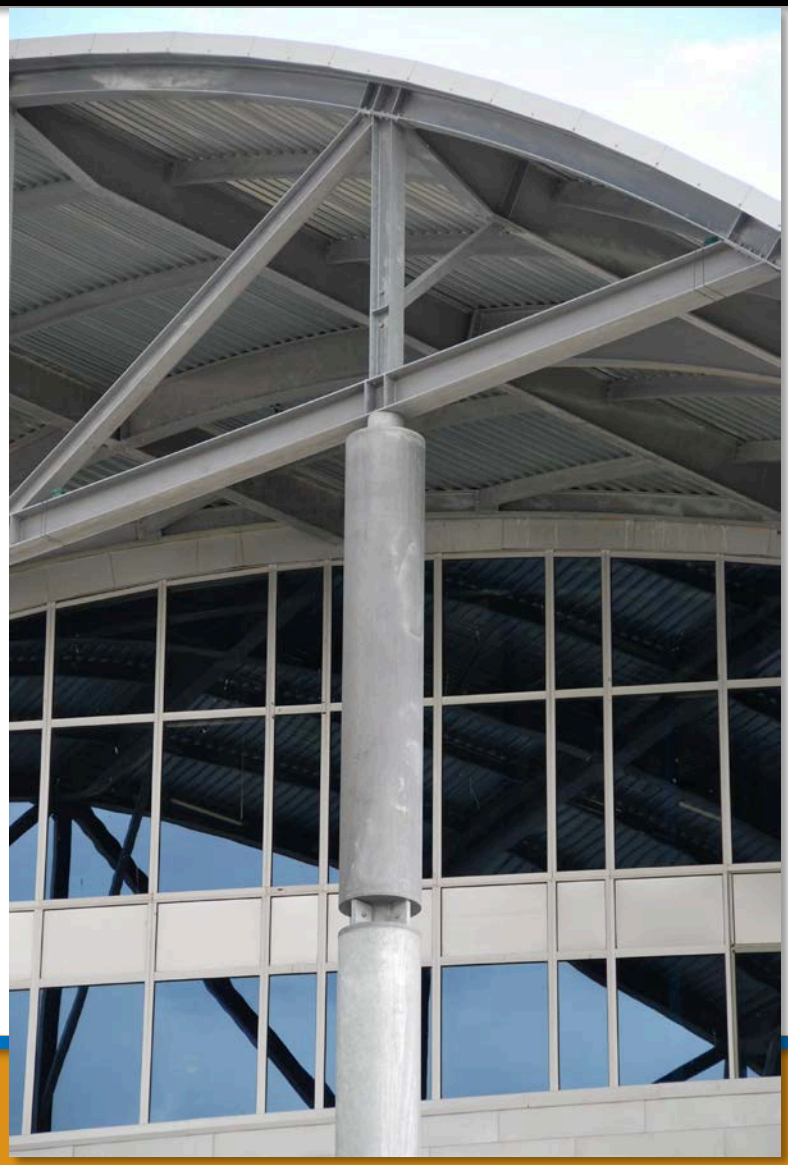
Galvanizing Applications



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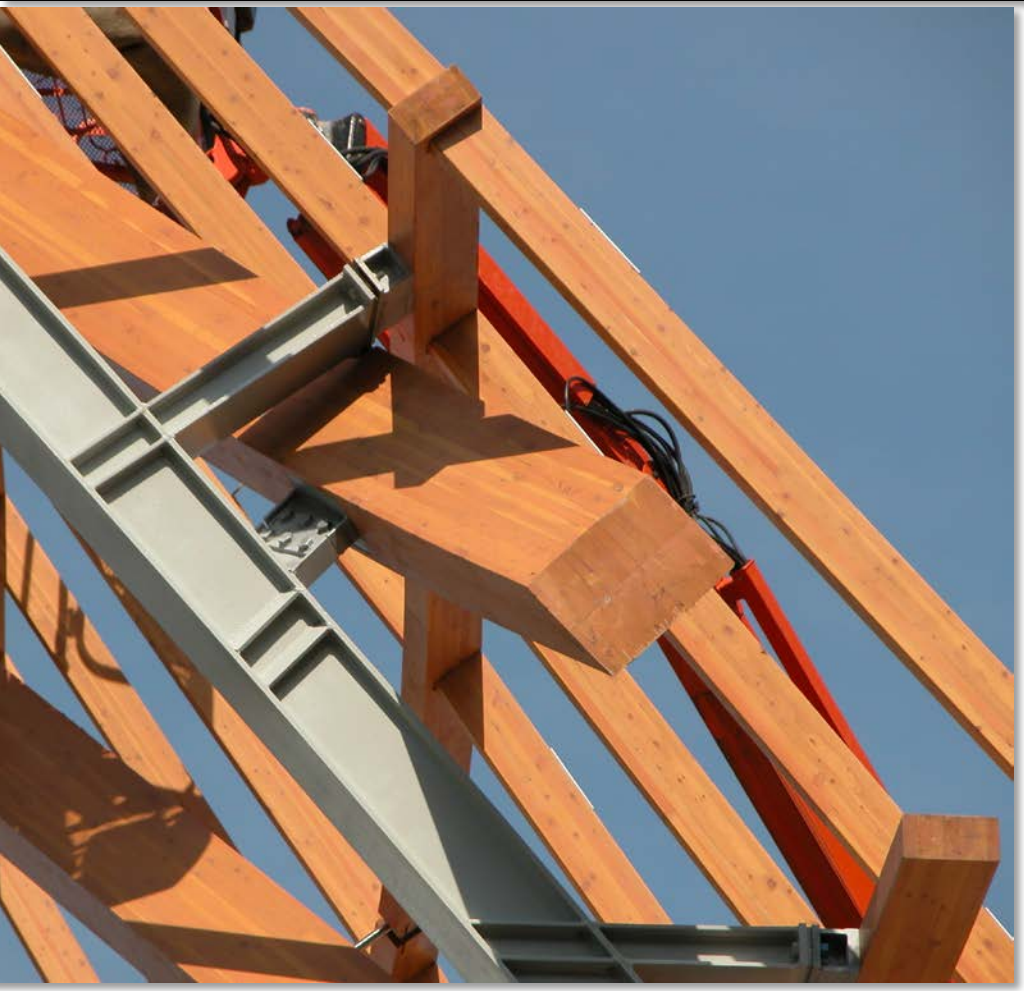
Access for cleaning (and re-painting)

Also included! Sections on:



Erection & Challenges

- Best Practices
- Transportation Issues
- Care in Handling
- Erection Issues
- Staging and Site Area Requirements
- Steel and Wood
- Steel and Glass
- Curved Steel

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The core idea! FORM, FIT & FINISH

Two “TREES” – both AESS – each quite different from the other – so why would the AESS Specification be even remotely the same????

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Cost impact items

- Custom “shapes”
- Use of welded plate in lieu of W, C and L sections
- Connection details
- Transportation restrictions
- Staging area restrictions
- Bending the steel
- Custom castings
- General level of complexity of the elements or structure
- Eccentric elements

Design process implications

- Architects and engineers have to talk to decide on AESS Categories.
- AESS Categories need to appear on all contract documents as per Spec.
- We typically expect that there will be 2 Categories specified per structure
  - ex. AESS 2 upper portion of atrium, AESS 3 for the lower portion; 1 and 2; 2 and 3; 3 and 4…
- Fabricators to bid on Engineering documents and the Categories specified.

Fabrication and Erection Implications

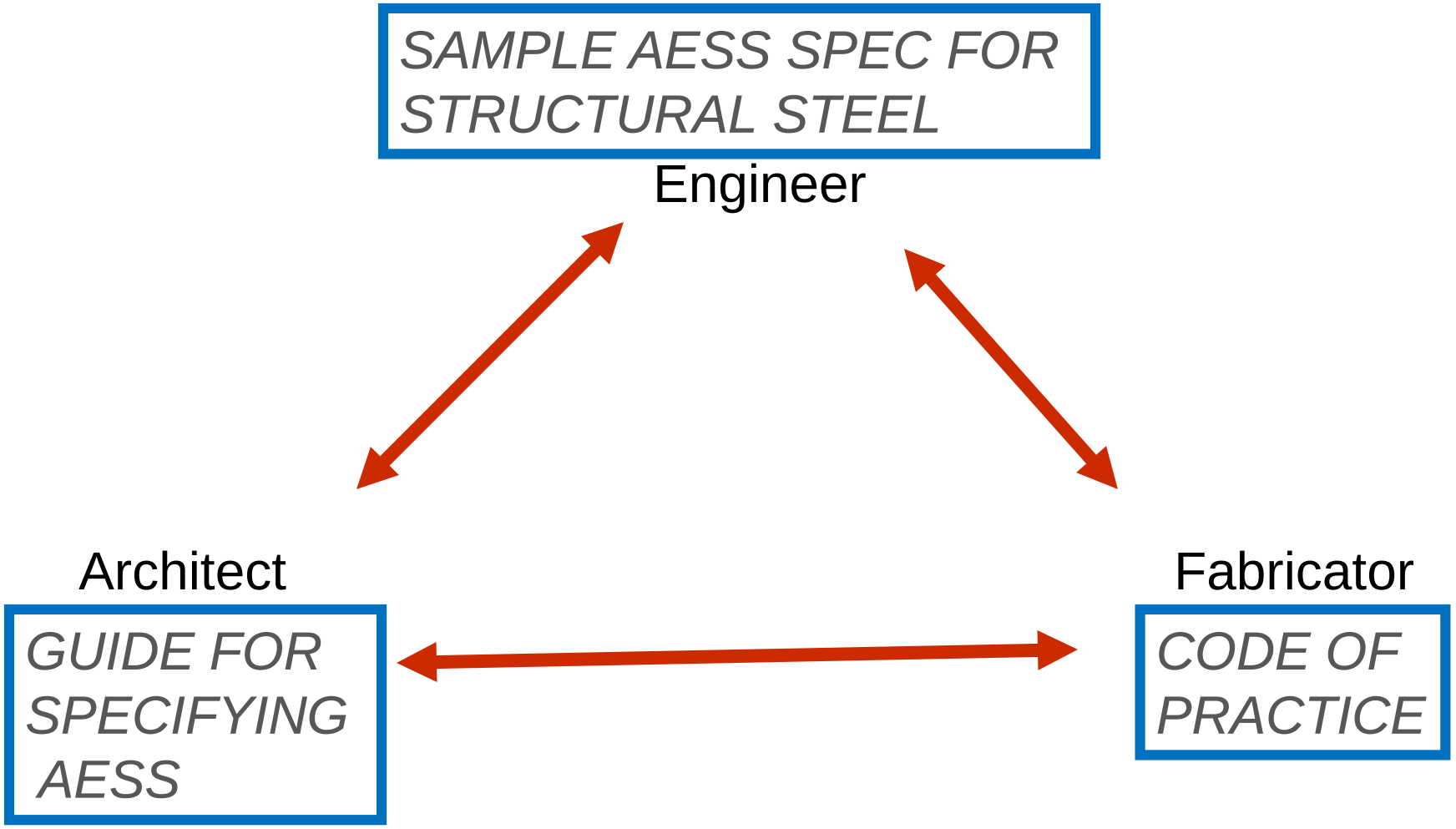
- Architects need to fully appreciate and include AESS considerations in their designs and *negotiate with the Fabricator for more appropriate details*
- Categories specified infer sequencing, cost and constructability issues.
- Higher level of care as provided for in the Code for Fabricators.
- AESS Categories to appear on all Shop and Erection drawings.

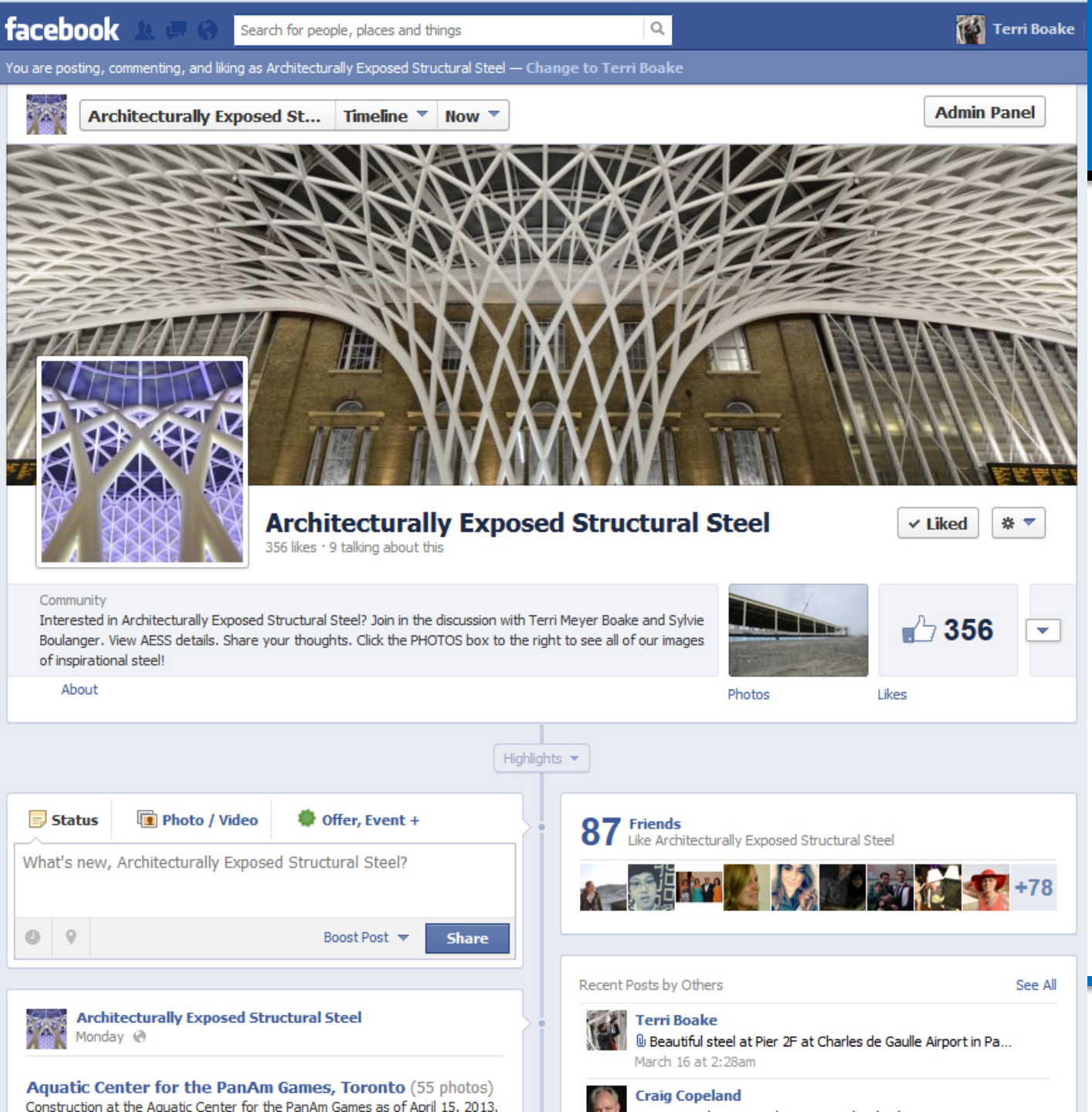
Positive outcomes

- AESS system standardizes basic design and fabrication issues
- Eliminates many ‘routine’ issues through the Category System
- Very important NOT to change AESS Categories
- If you want something different, pick CUSTOM
- Allows team to concentrate efforts on more particular issues for the project

New AESS Documents

- Available for purchase and download:
  - CISC Guide for Specifying Architecturally Exposed Structural Steel
- Available for download at http://www.cisc-icca.ca/solutions-centre/aess
  - Sample Specification
  - Code of Practice for Fabricators
  - Matrix


SAMPLE AESS SPEC FOR STRUCTURAL STEEL
Engineer
Architect
GUIDE FOR SPECIFYING AESS
Fabricator
CODE OF PRACTICE



Check out our AESS Facebook Page!

facebook.com/aess4u

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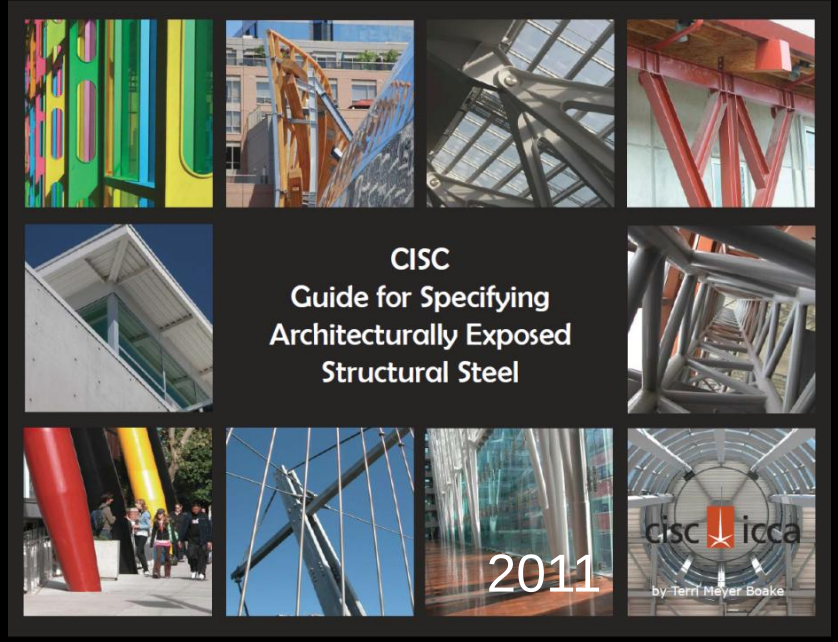

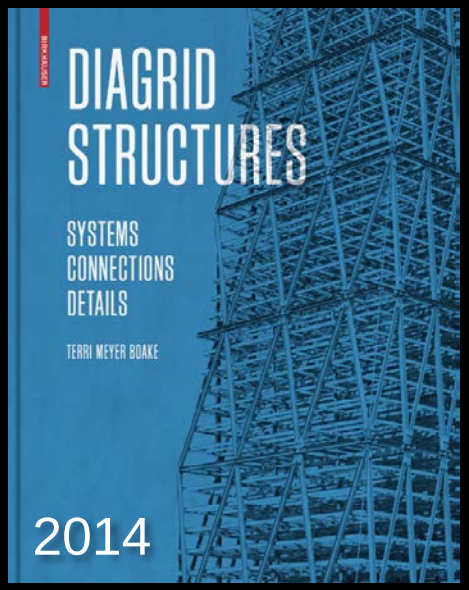

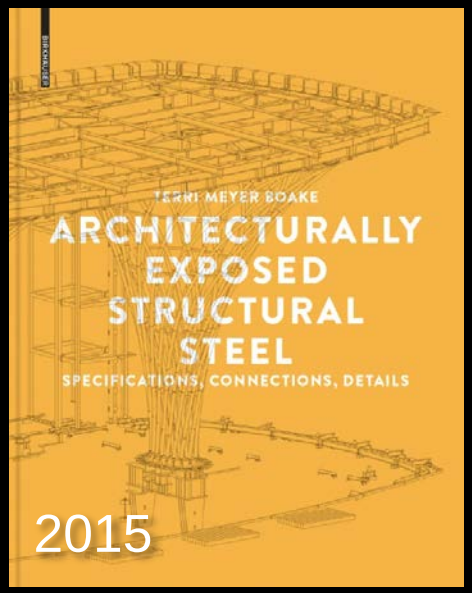

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