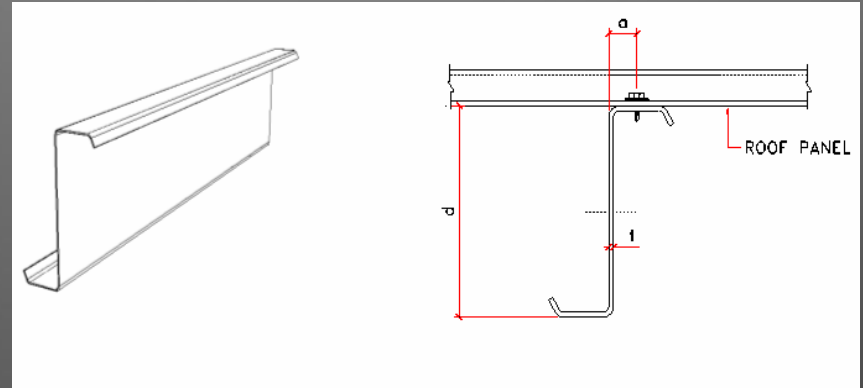
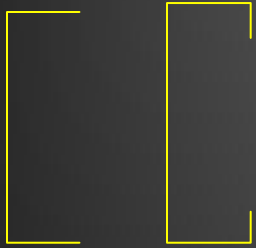


# COLD FORMED SECTION

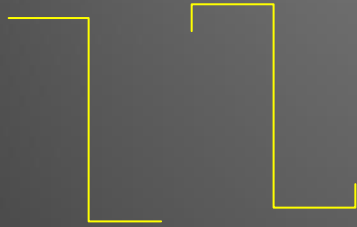
► Definition

Cold Forming is a process where light gauge steel members are manufactured by rolling or shaping the steel after it is cold. This process makes the steel stronger.

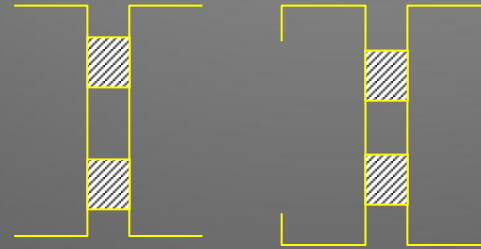




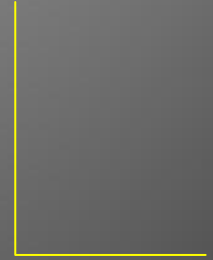
Channels



Zees



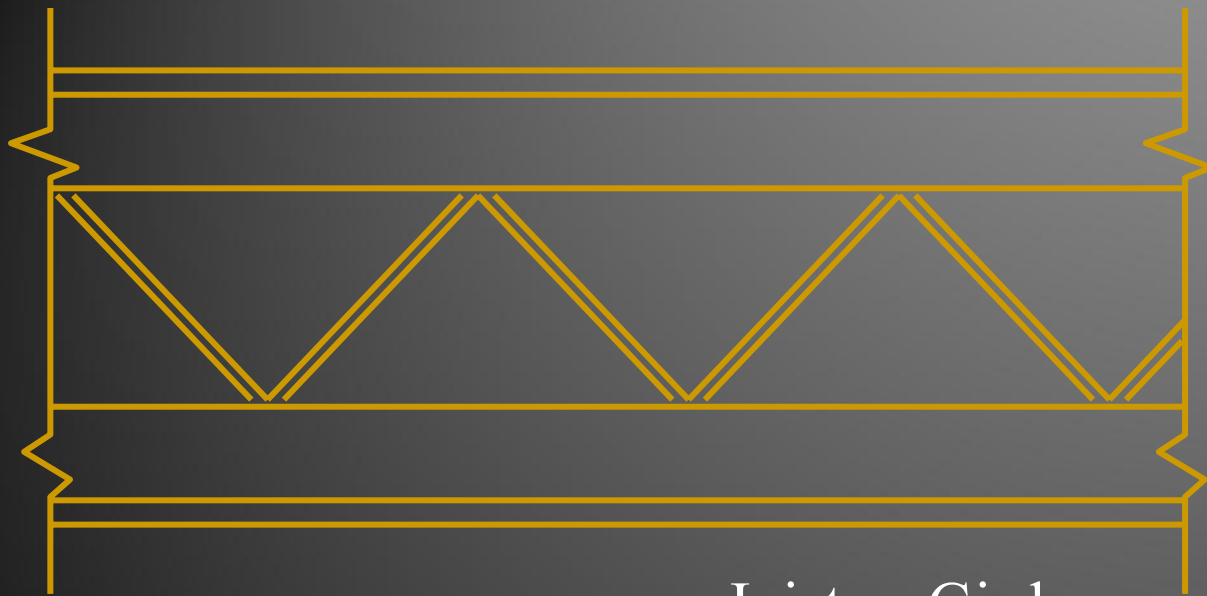
I-Shaped Double  
Channels



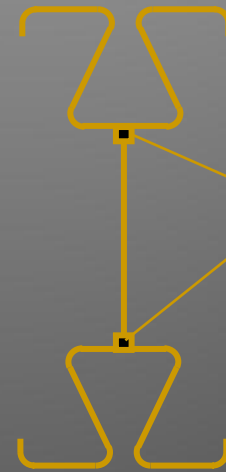
Angle



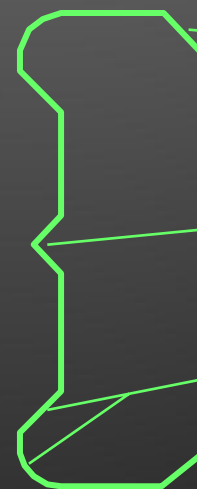
Hat Sections



Joist or Girder



Spot welds



Lip

Wrinkle

Bends

Channel Section

- ▶ Cold forming is a process during which light gauge steel members are manufactured from steel sheets by rolling or shaping into the desired cross-sections at room temperature.
- ▶ Bends, wrinkles and lips are produced in the cross-sections improving the post-buckling strength and behaviour.

- ▶ The thickness of steel sheet used for cold forming ranges
  - from 0.35 mm to 6 mm. The thickness generally ranges from 1.2 mm to 6 mm for framing members,
  - from 1.2 to 2.5 mm for floor and wall panels and long span roof decks and
  - from 0.35 to 1.2 mm for wall claddings and standard roof decks.

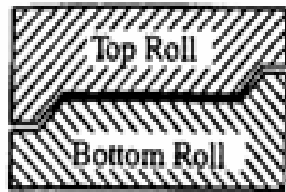
# Production

- Press Brake
- Cold Roll-forming

# Press Brake



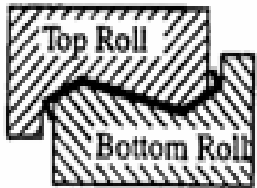




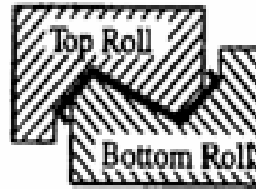
Stage 1



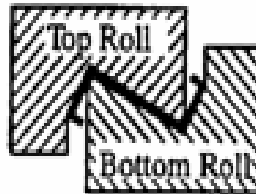
Stage 2



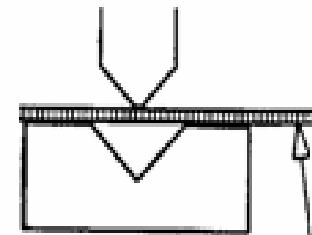
Stage 3



Stage 4

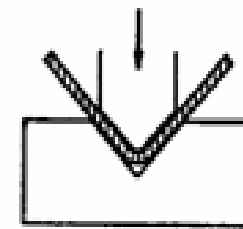


Stage 5



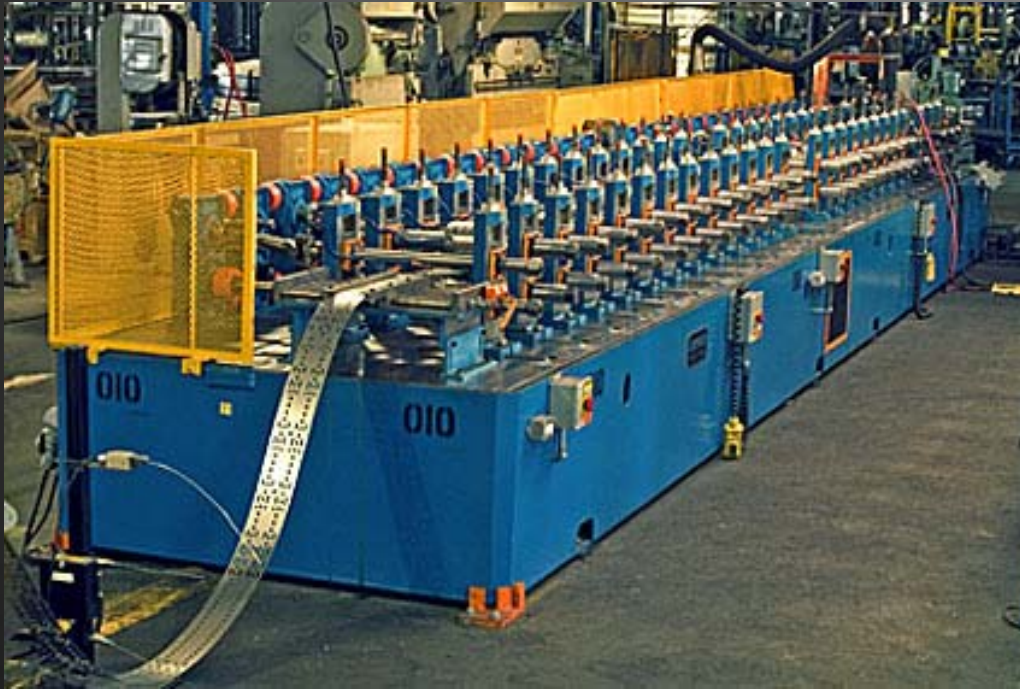
Stage 1

Thin plate



Stage 2

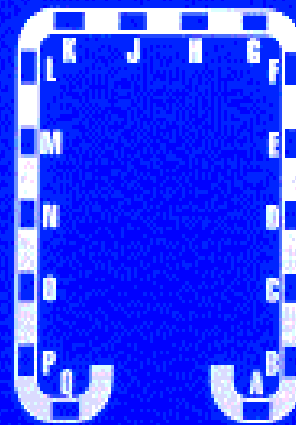
# Cold Roll-forming



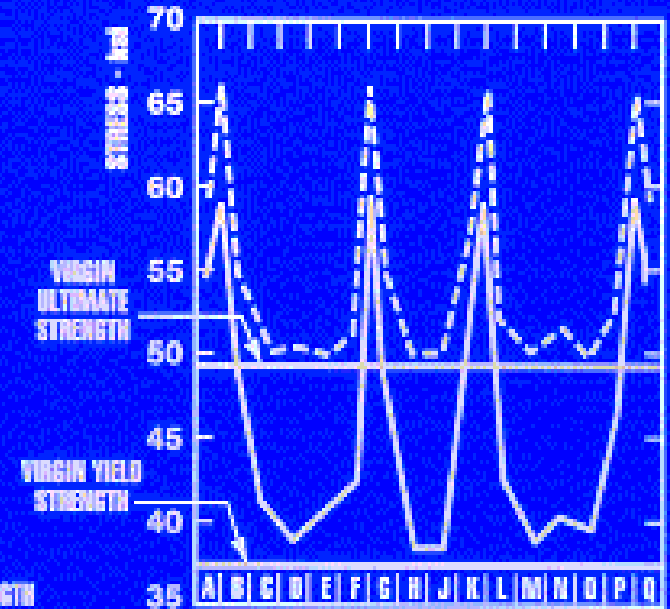
The yield strength and the Ultimate strength is increased due to the Cold Working particularly in the bends of the section.

It permits the designer to treat the formed steel as a stronger material than the original unformed steel.

## Effect of Cold Work

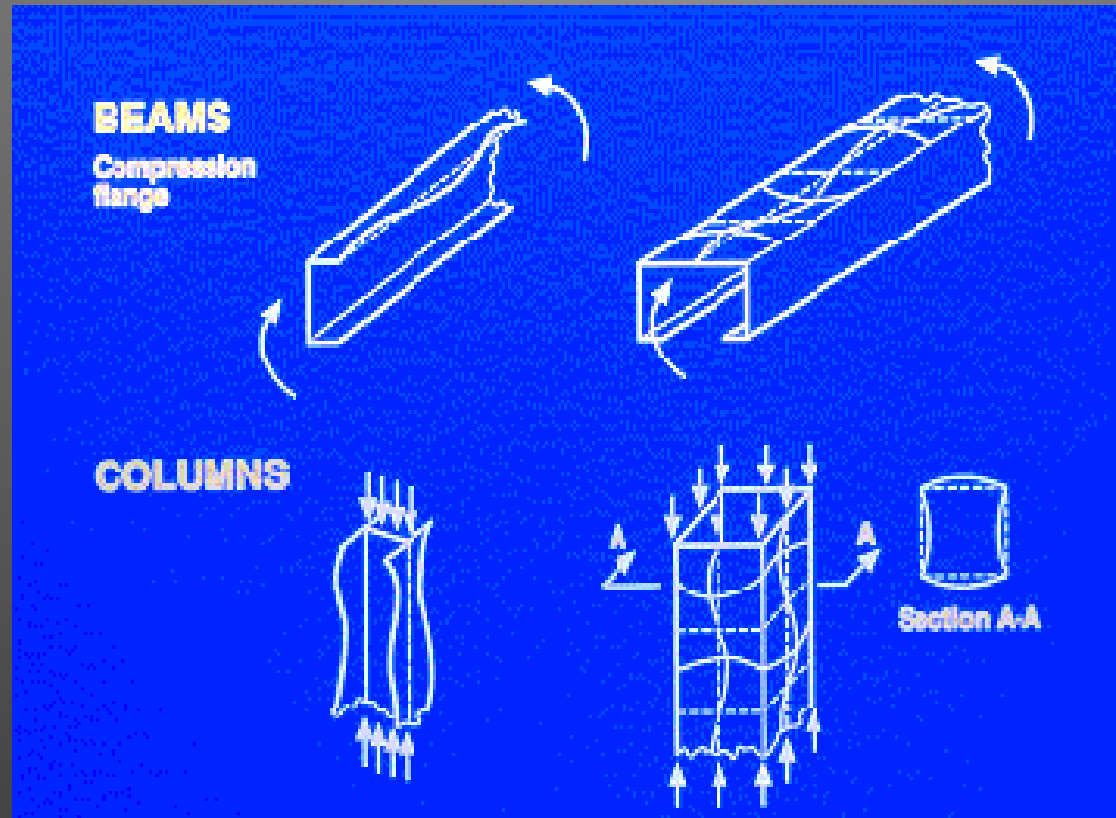


— YIELD STRENGTH  
 - - - ULTIMATE STRENGTH



The individual flat, or plate, elements of the section often have width to thickness ratios that will permit buckling at stresses well below the yield point.

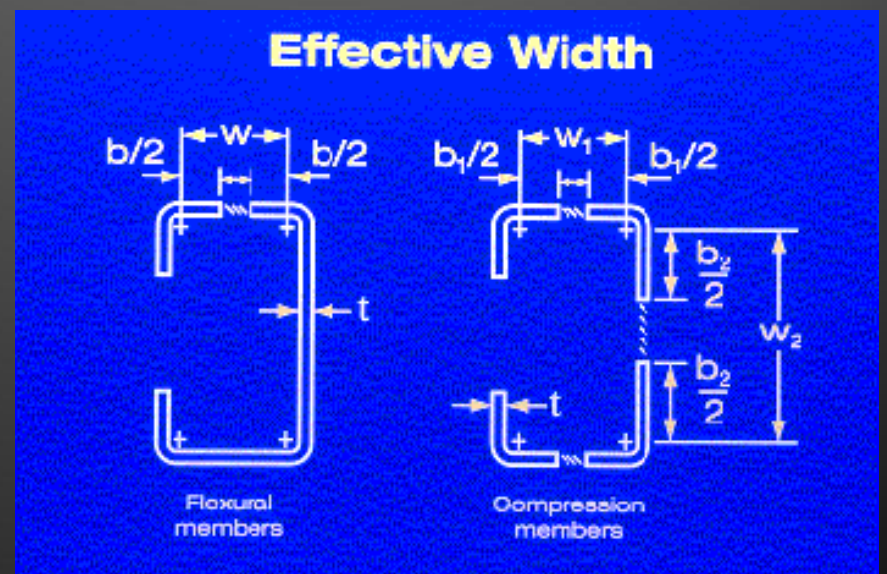
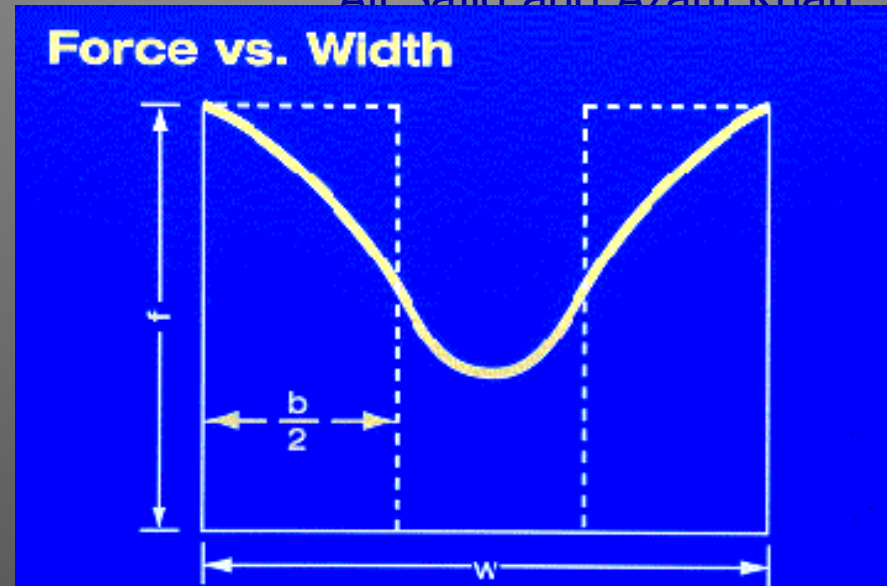
In this case, the member develops out-of-plane deformations but they will continue to carry increasing load. This is known as their post-buckling strength.



The concept of effective width is the key to the design of cold-formed steel.

- The total compressive force is the area under this stress distribution curve, times the thickness.

- Replace the actual variable stress distribution with a fictitious uniform stress distribution, of the same intensity.



# Failure of Cold Formed Section













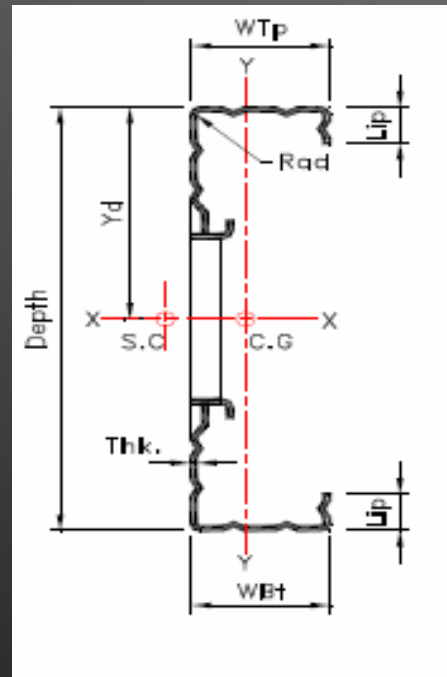
# Significance of Cold Formed Sections

- ▶ Light weight construction, lesser dead loads, higher section modulus at less weight
- ▶ High strength and stiffness
- ▶ Ease of fabrication and mass production
- ▶ Ease of handling, storage and transportation
- ▶ Any desired shape for structural stability with a great ease

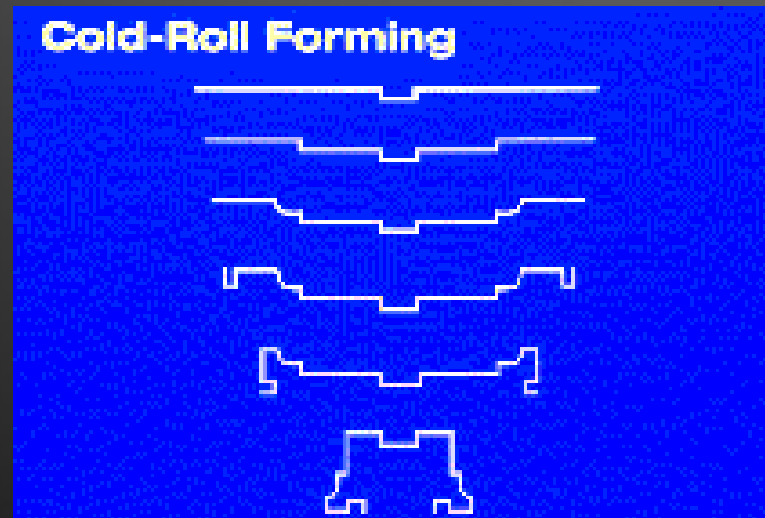
- ▶ Fast and easy erection / installation
- ▶ Elimination of delays due to weather
- ▶ Easy and accurate detailing using nails, spot weld and bolts
- ▶ Non-shrinking and non-creeping structures
- ▶ Termite and rot proof
- ▶ Aluminium coated galvanized steel coils provide maximum resistance to corrosion

- ▶ No formwork needed
- ▶ Recyclable construction
- ▶ Immediate availability
- ▶ Adaptability to later changes
- ▶ Easy placement of housing conduits within cells
- ▶ Minimization of deflections

- Lesser Dead Loads
- Provides a higher section Modulus at lesser weight.

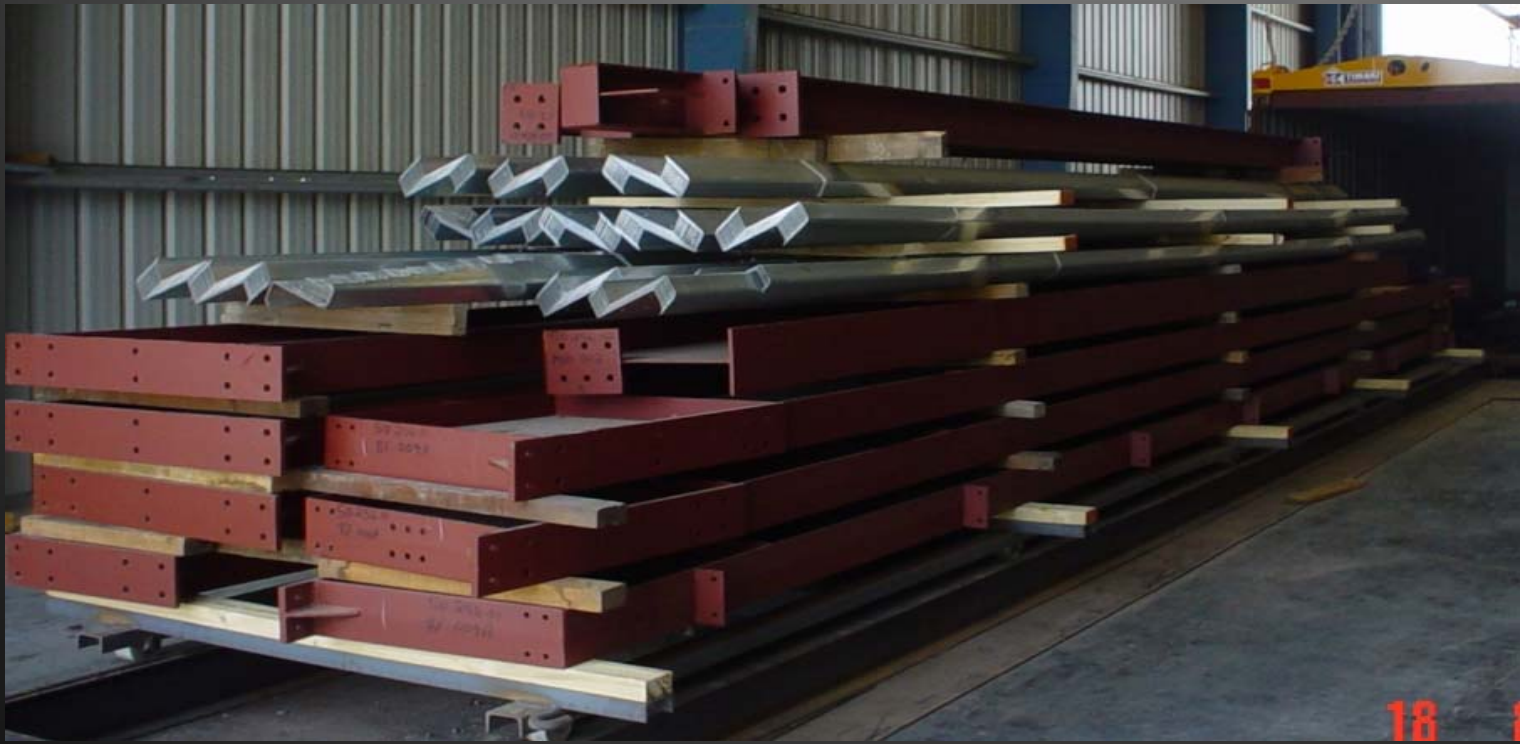


- These are formed from Aluminum coated Galvanized steel coil which shows maximum resistance to corrosion.
- Very Economical
- Can attain any desired shape for structural Stability with a great ease.

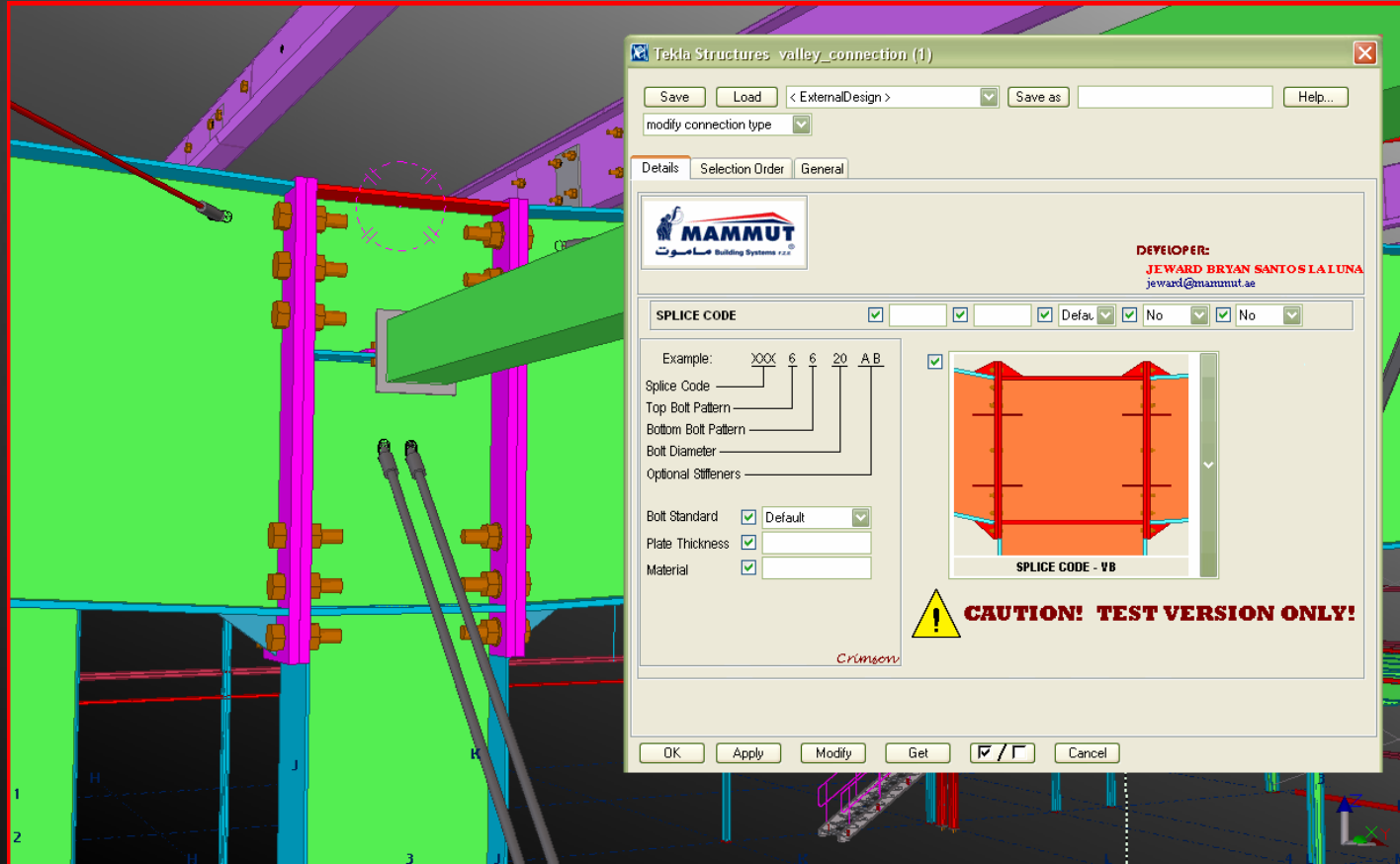


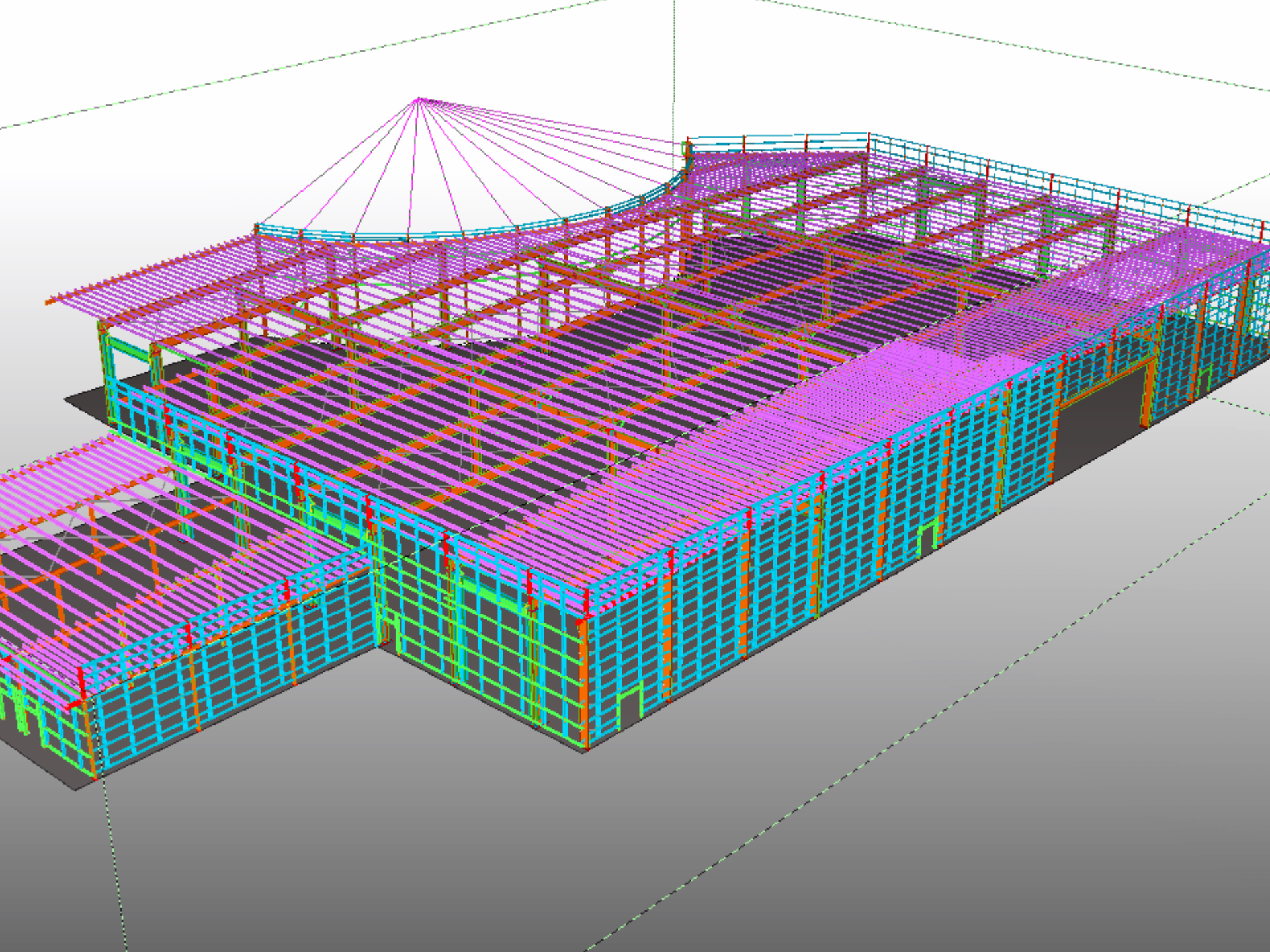


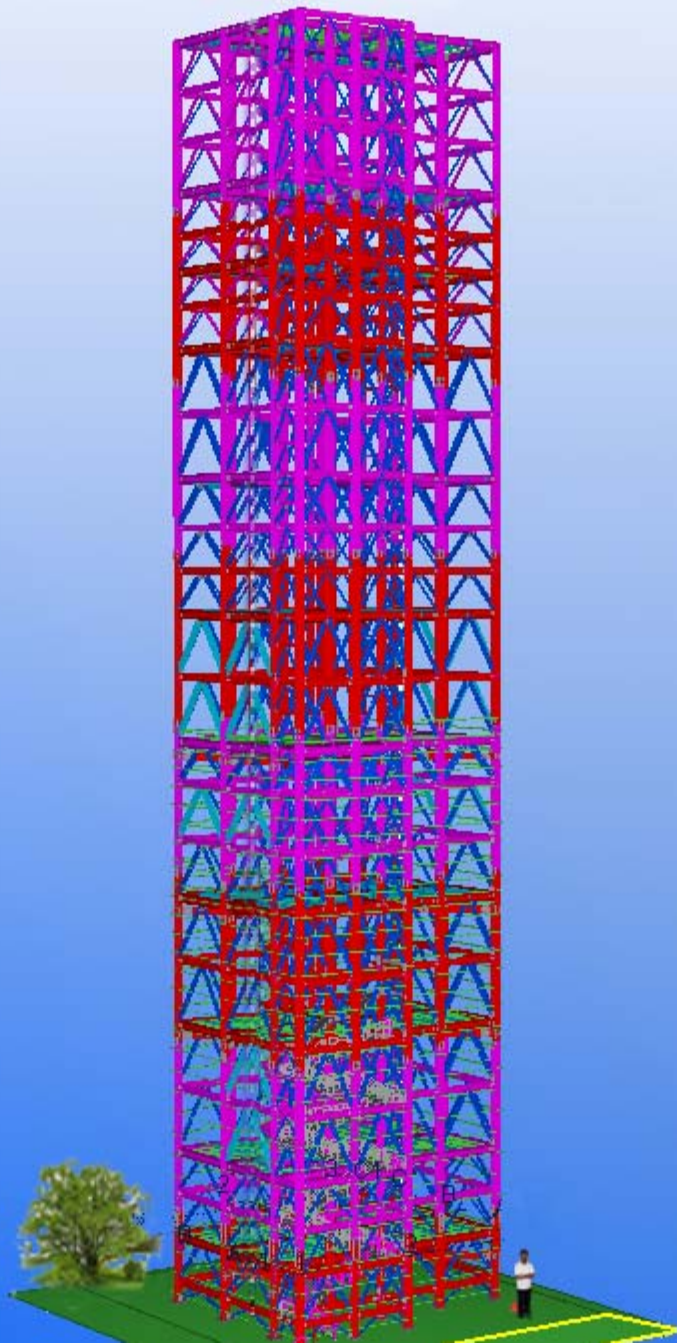
- Very Easy and Economical
- Mass production
- Transportation
- Installation

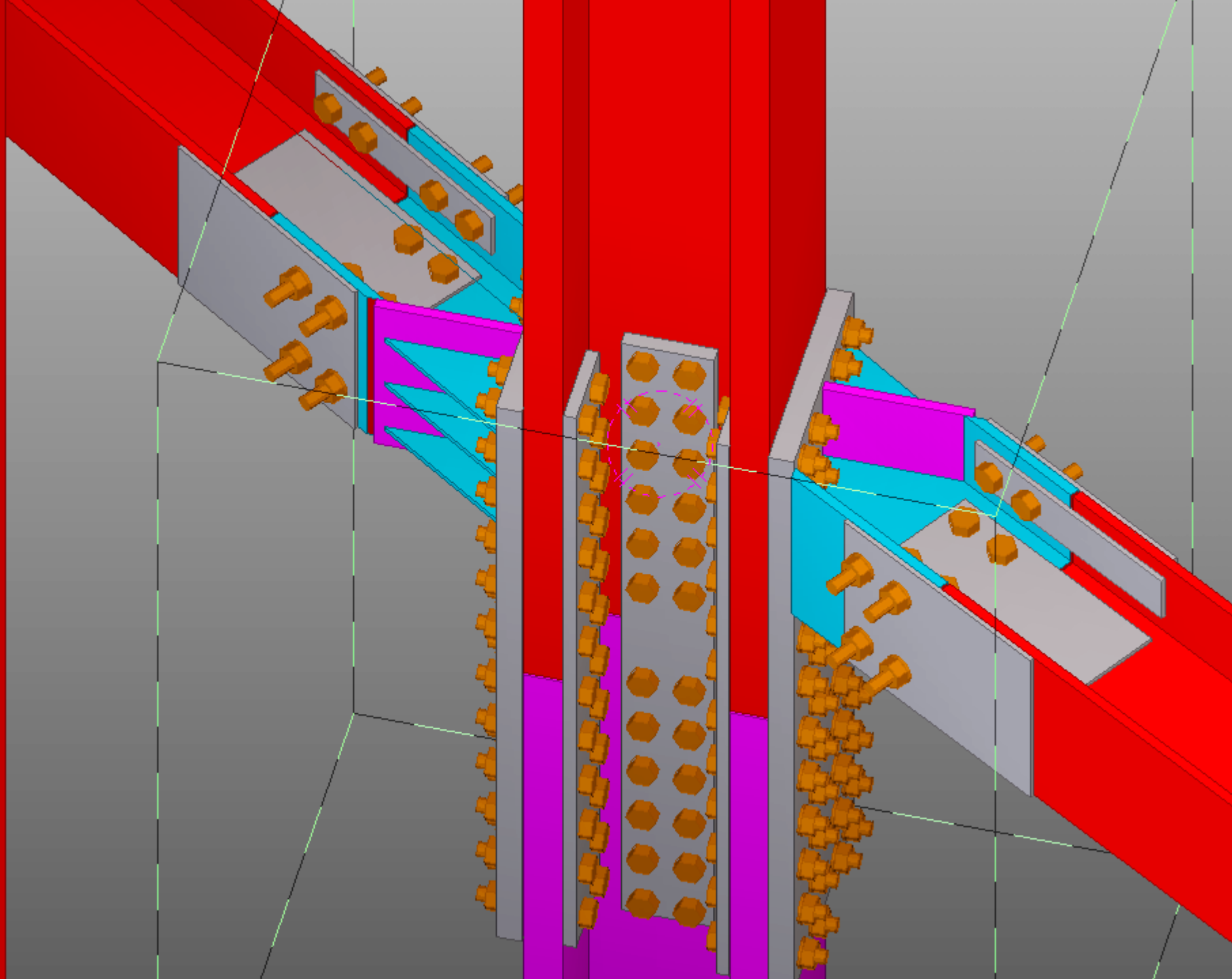


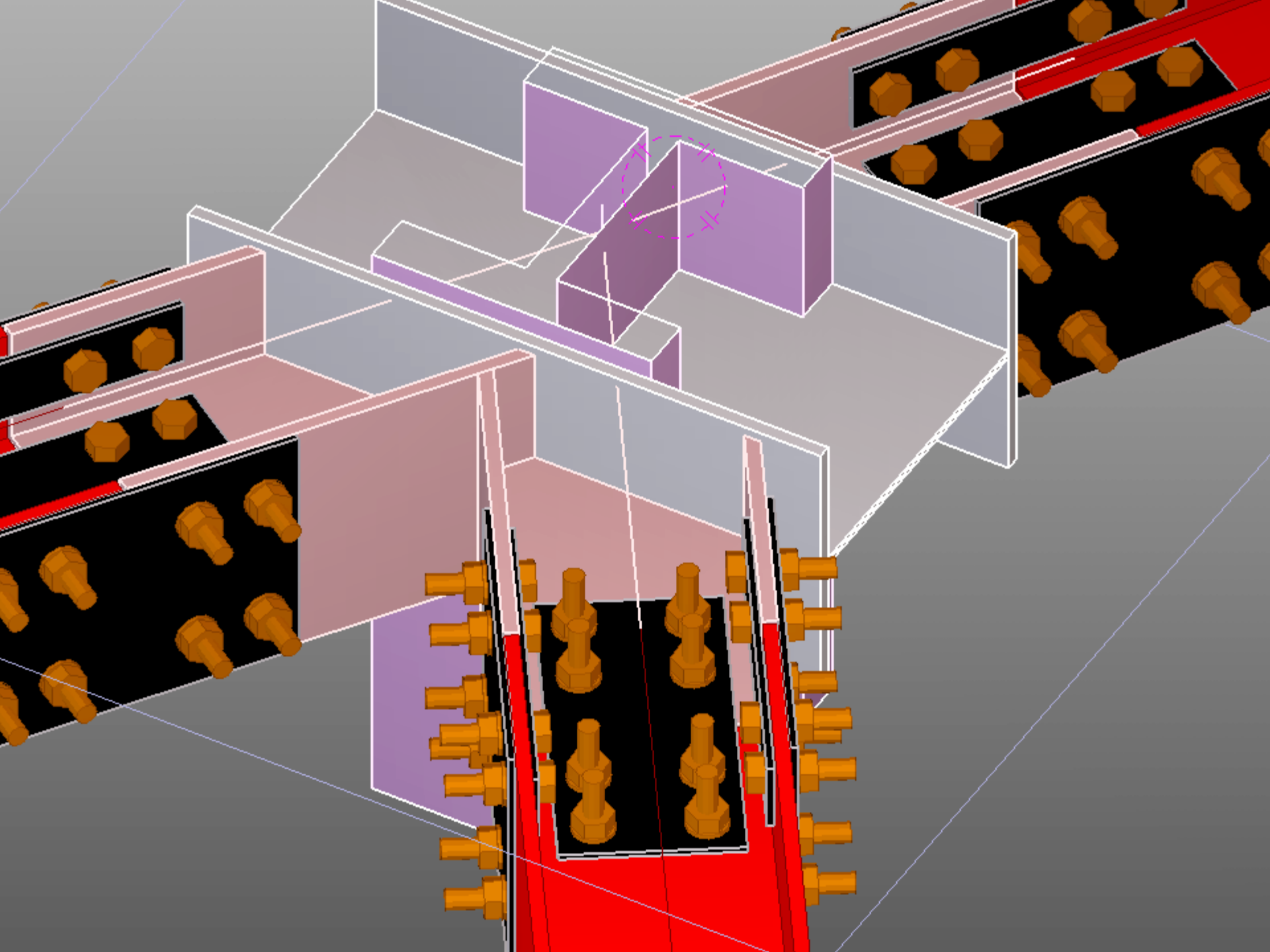
- Connections & Detailing is a very time consuming task for hot rolled & Built Up sections as compare to cold formed sections.

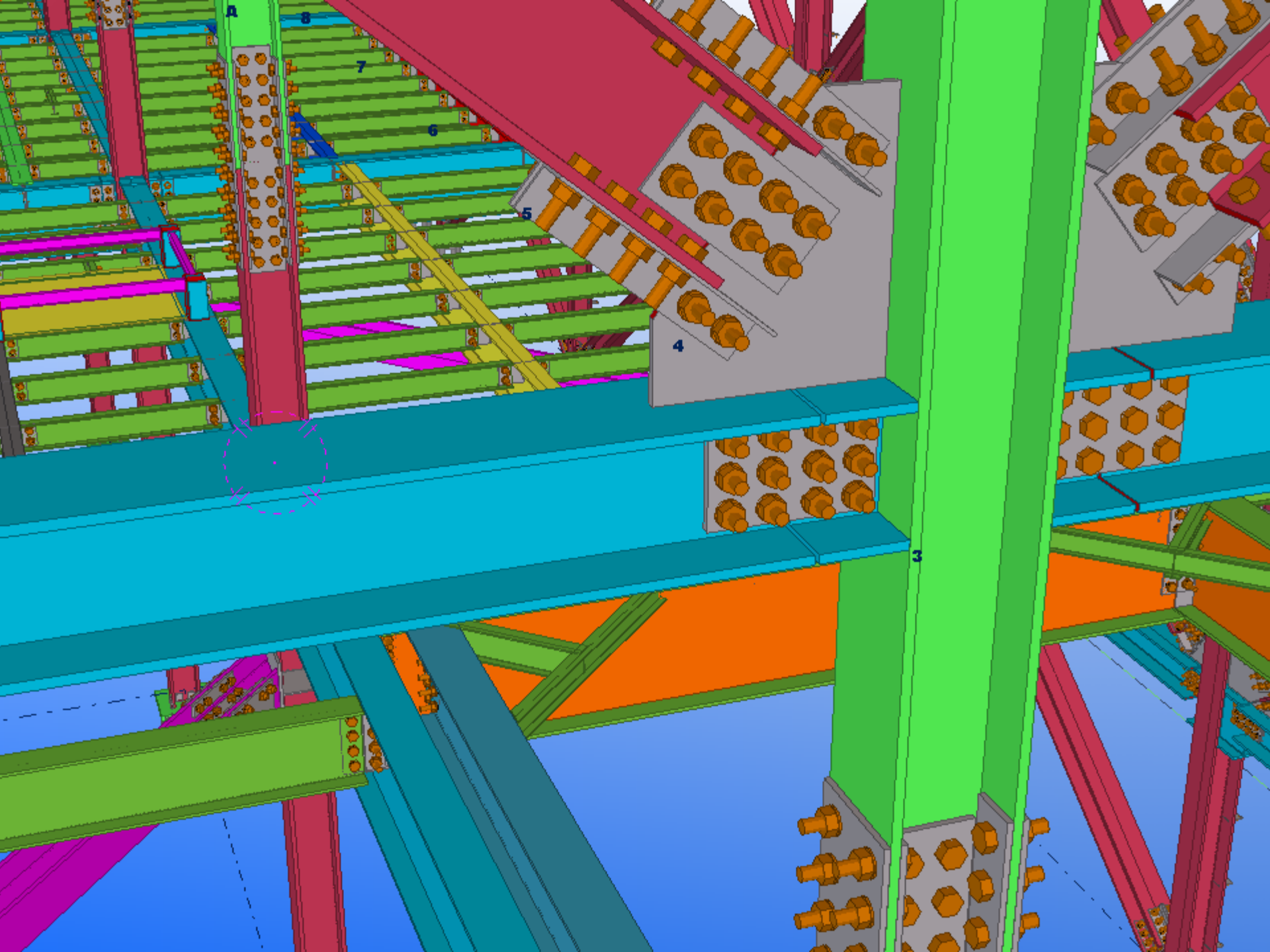


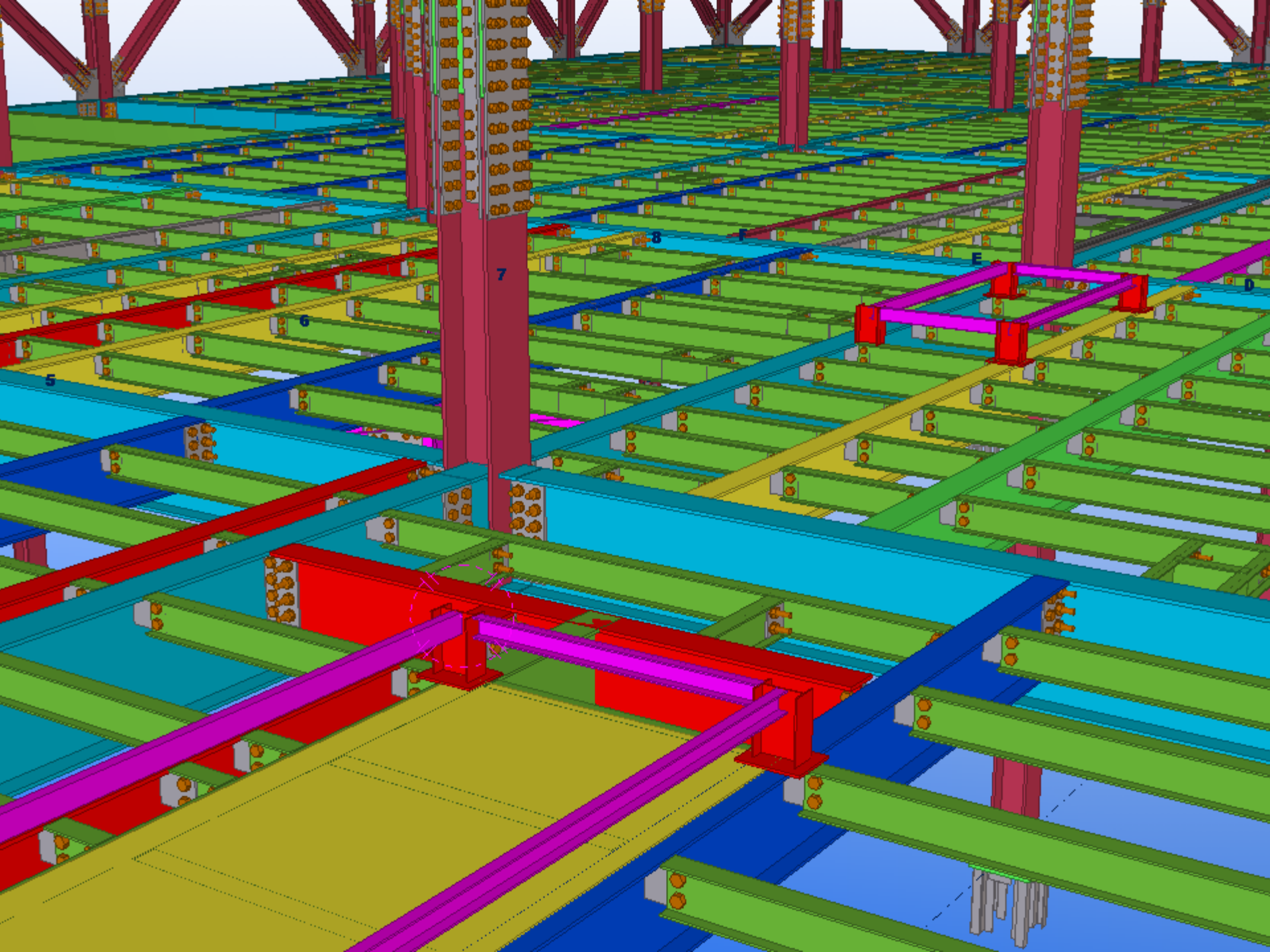












7

8

F

D

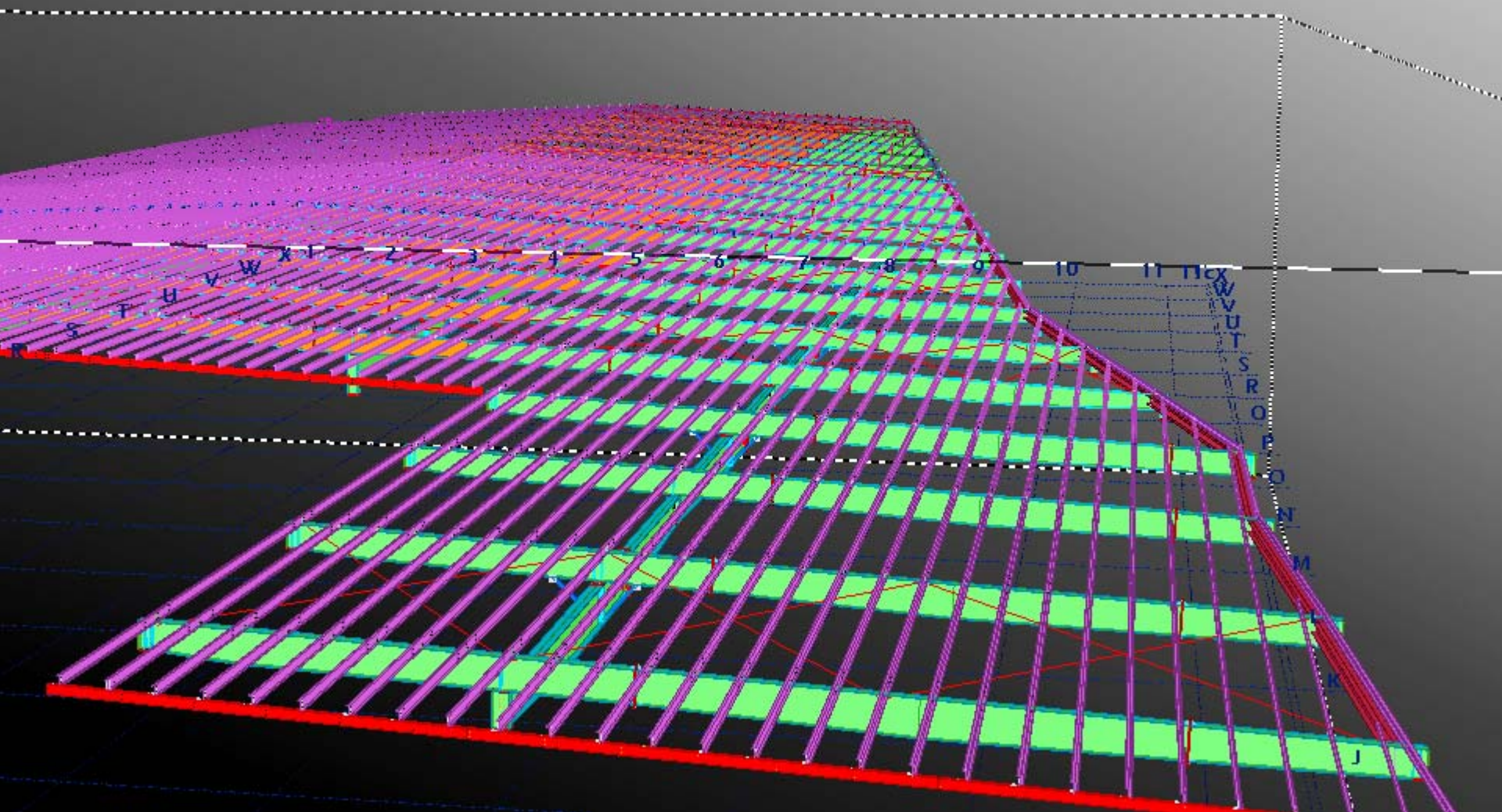
6

5





# Roof system

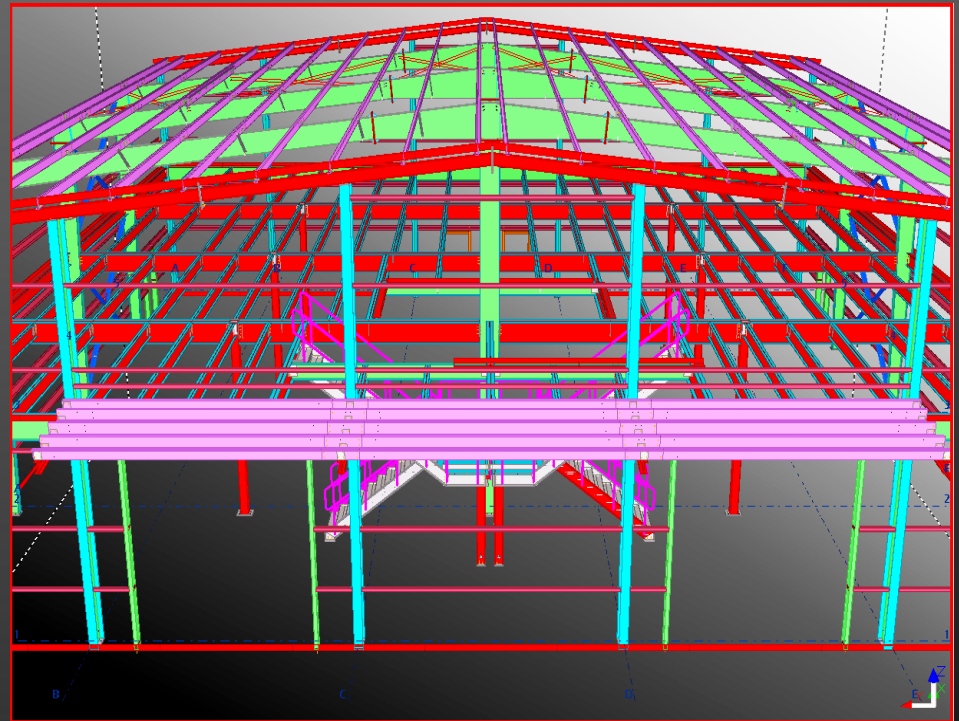
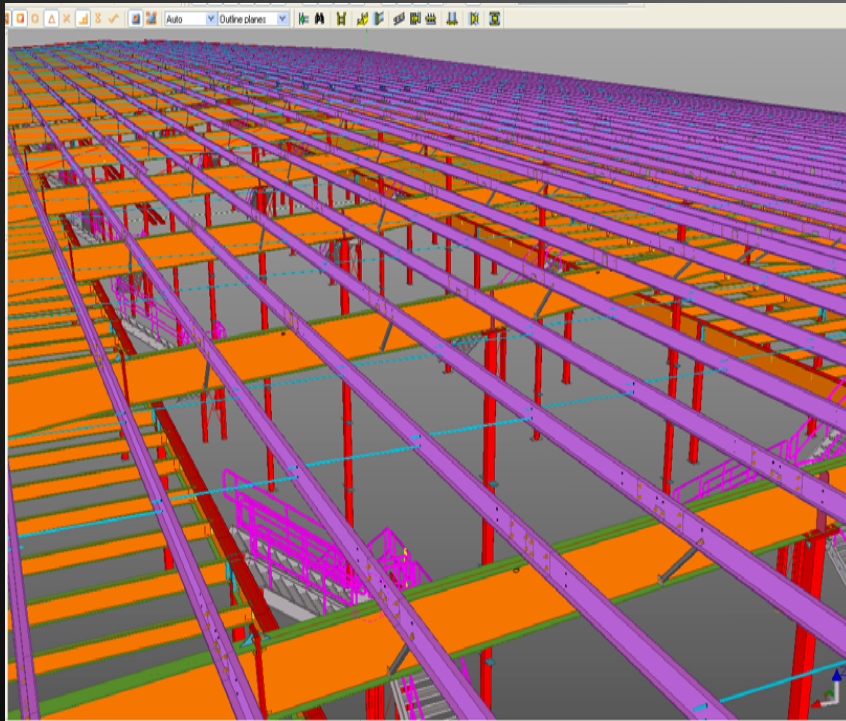


# Usage of Cold Formed Sections

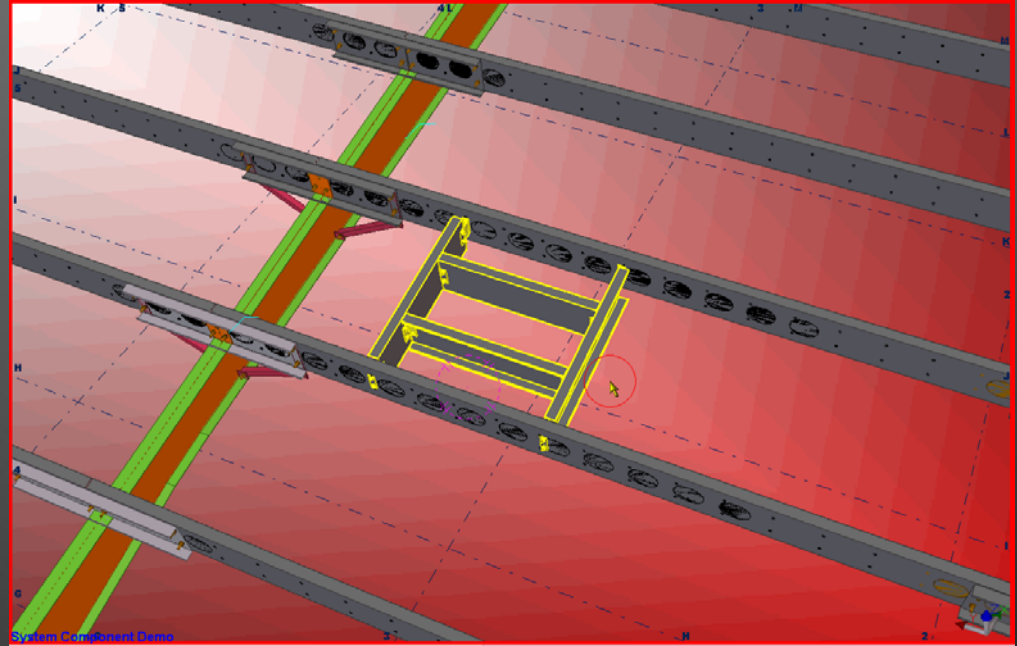
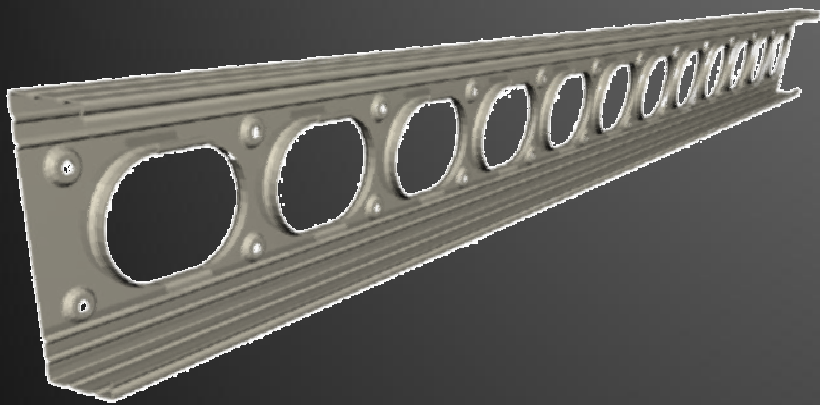
- ▶ Body of buses and railway coaches
- ▶ Roof coverings
- ▶ For members having low to moderate spans and loads, such as joists, purlins and roof trusses; can be used for spans up to 12 m with the help of open web members (members having openings)

- ▶ For floor, roof decks and wall panels
- ▶ Construction using smaller modular units of panels up to  $3 \times 4$  m
- ▶ Used extensively in pre-engineered construction for secondary framing elements
- ▶ Used in insulated panels and false ceiling
- ▶ Material storage and handling racks

- Used Excessively in Pre-Engineered Buildings. For Secondary Framing elements.



- Used for Purlin and Girts with very high Bay Spacing up to 12m with the help of Open Web Members.



- Material handling and storage Racks. New rack systems are as high as 100 feet (30m).



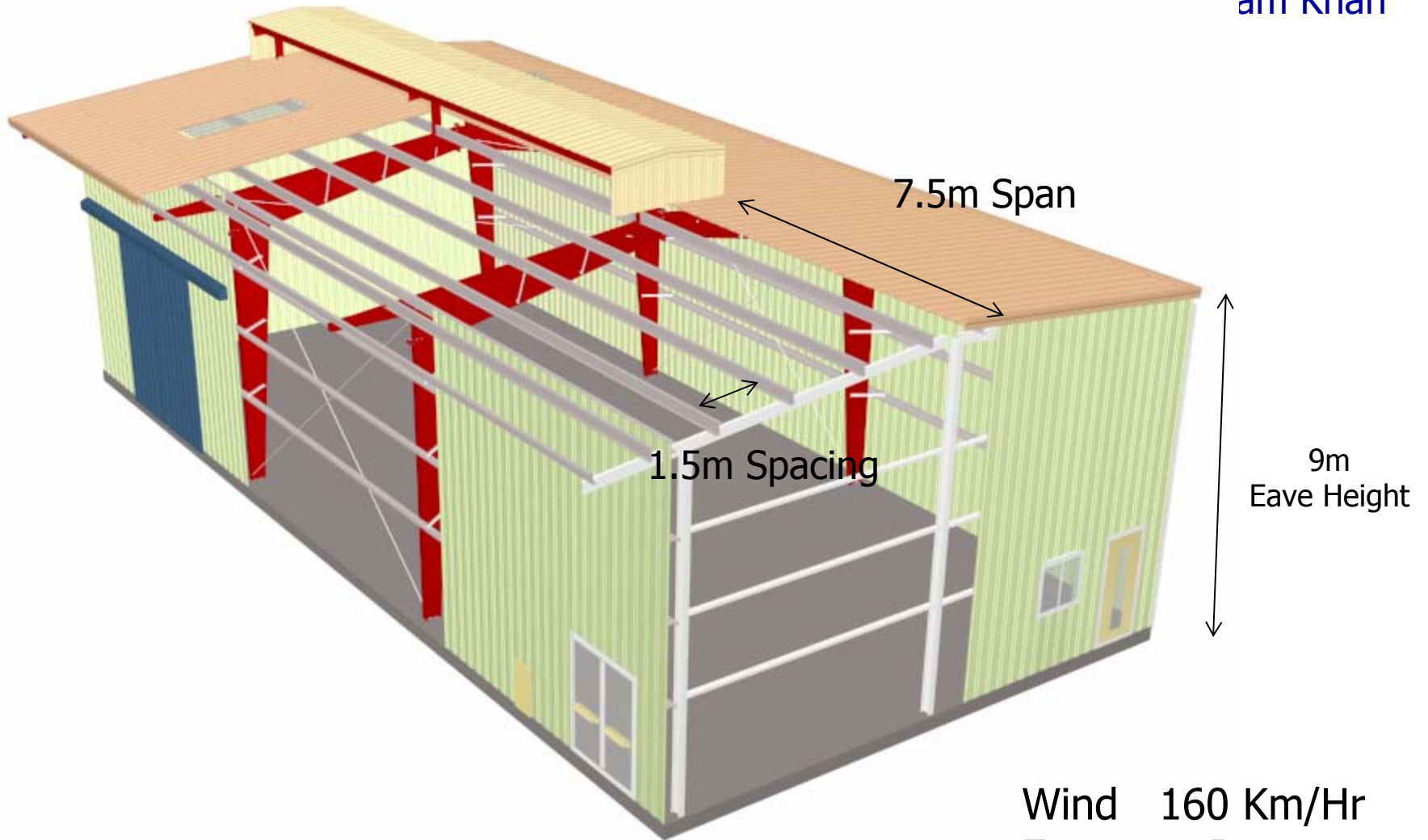
- Cold Formed Steel has replaced 50% of the conventional steel Construction.



# Design Codes

- ▶ American Iron and Steel Institute (AISI)
- ▶ Metal Building Systems Manual (MBMA), especially for the loadings
- ▶ AISI Design Manual for Direct Strength Method of Cold Formed Steel Construction
- ▶ Australia/New Zealand Standard AS/NZS 4600, which is based mainly on the 1996 AISI Specification with some extensions for high-strength steels
- ▶ British Standard BS 5950–Part 5
- ▶ Canadian Standard CAN/CSA S136
- ▶ Eurocode 3 part 1.3

am Khan



Wind 160 Km/Hr  
Exposure B  
Enclosed Structure  
Roof Slope 1:10

# Thank You

Prepared By Mr. Ali Sajid

and Mr. Azam Khan