# Lesson 23

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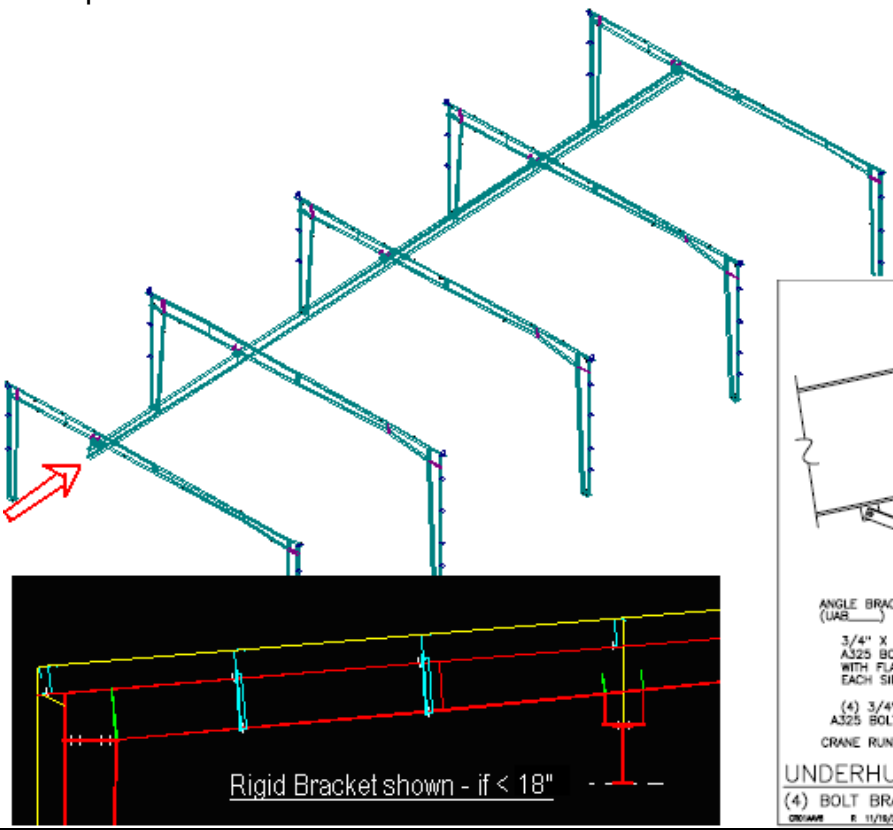
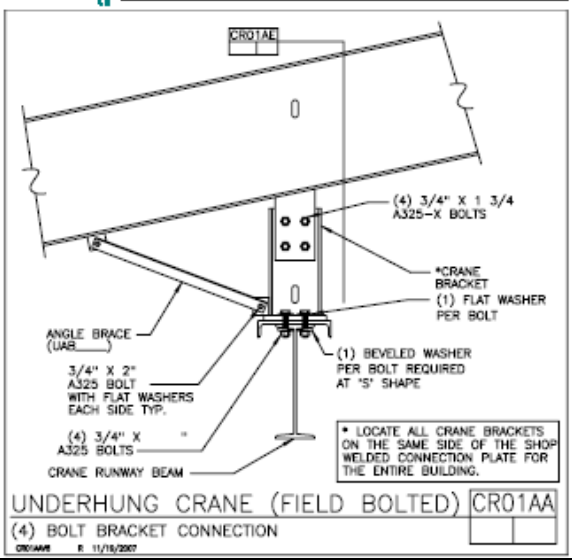
## 1. General Comments

- Crane data for monorail cranes are not included with VP Command. However, by using crane data for Underhung cranes in conjunction with the following Monorail input steps, the system will generate the following:
  - Applicable crane loads to the rafters.
  - Appropriate support brackets (Rigid if ≤ 18", Flexible if > 18")
  - Lateral bracing angles and connections required for Flexible Brackets
  - Design for the HR crane runway beams.
- VP Command will *NOT* automatically provide:
  - Pricing for the HR runway beams.
  - Required longitudinal bracing rods/angles from runway beams to roof bracing as required (SED CR01AE).
- VP Command currently does not allow runway beam combination of S-Shapes with Cap Channels.



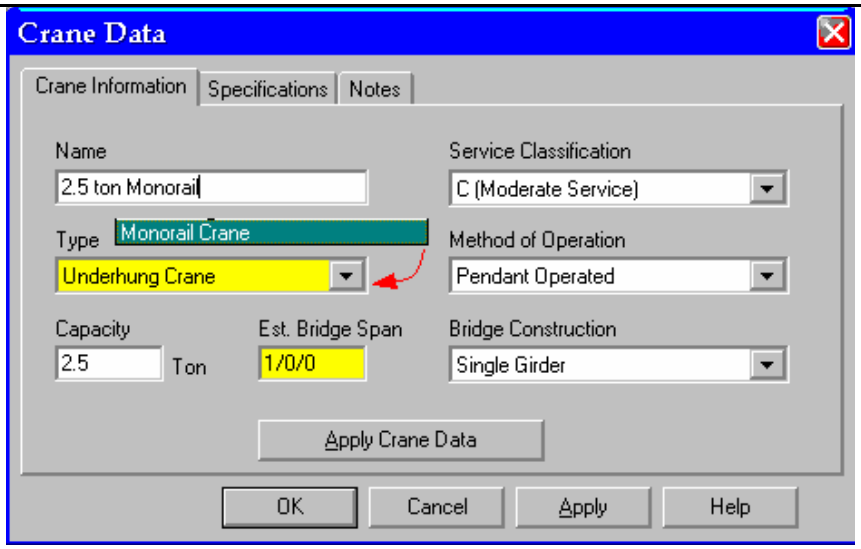
Rigid Bracket shown - if < 18"

Flexible (Bolted Bracket) shown - if > 18"



2. Input Steps:

- Create a single slope building 50'-0" wide x 100'-0" x 18' EH (1:12 RP)
- Insert Rigid Frames at 25/0/0 spacing (1/0/0 from endwalls)
- Follow the steps to generate a monorail crane runway system in VP Command

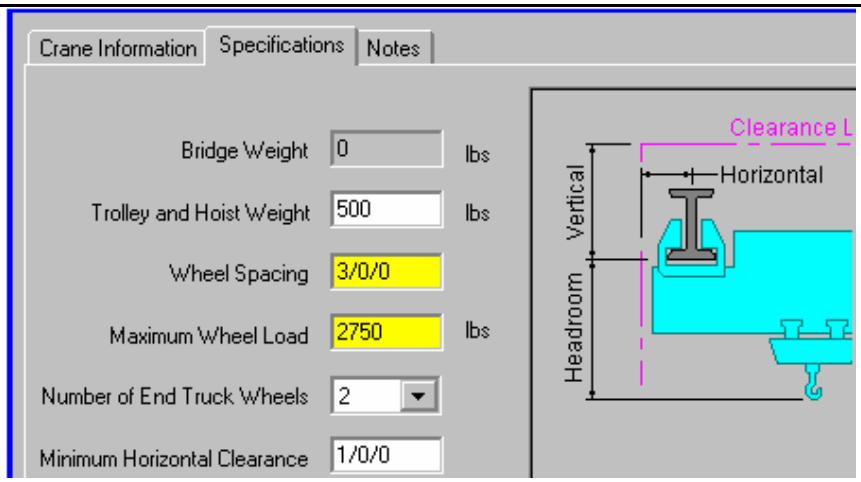



a) Go to Cranes/ Schedule/ and "*Insert a Crane Definition*". Select Underhung Crane; enter the required capacity (2.5 Tons) and a fictitious bridge span of 1/0/0.

b) Click on "*Apply Crane Data*".

c) Now change the crane type from Underhung to Monorail Crane.

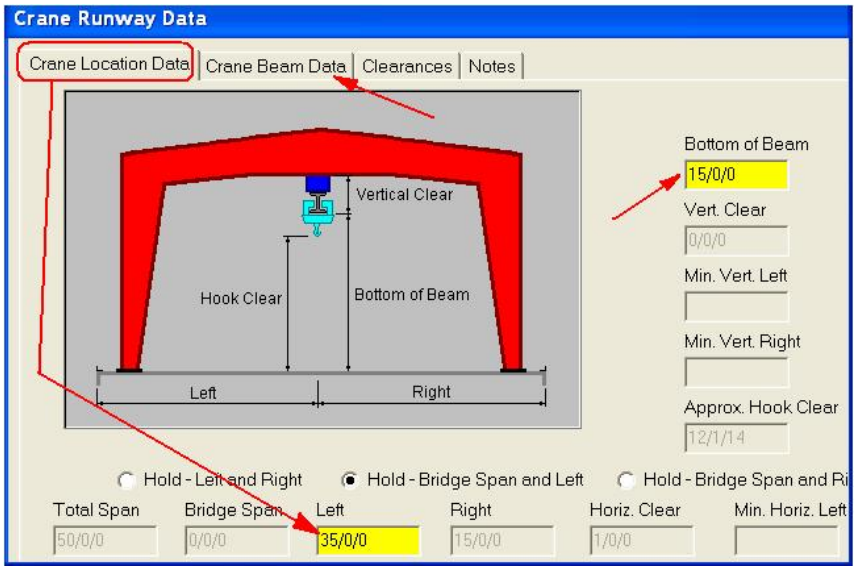
d) Revise the Name to "2.5 ton Monorail"




e) On the specifications screen, change the max wheel load to:
½ (Trolley Weight + Crane Capacity) lbs
= ½ (500 + 5000) = 2750 lbs

f) Input appropriate Wheel Spacing and Trolley/Hoist Weight, then OK off the crane schedule screen.


g) Insert the monorail crane aisle in the shape off Wall 4.
h) Use "Flexible Suspension – Hangers" for the bracket type. The system will select a rigid bracket if ≤ 18" long and a Flexible bracket otherwise.
i) Now click on the *Properties* button.

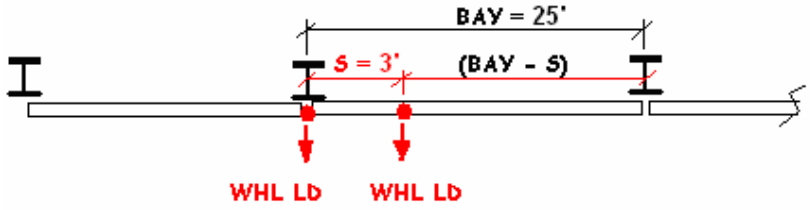



j) Adjust the left crane rail location from wall 4 to 35/0/0 and Bottom of Beam to 15/0/0
k) Now click on the "*Crane Beam Data*" button to design or select the runway beam.

Note: Combination S-Shape with Cap Channel is not currently included in the system database.

*WARNING*: See below for bracket location tips.

3. Design Issues (Consult your VP Estimating Department):
- Review all generated bracket details and welding.
- Review flange bracing SEDs and develop details for lateral and longitudinal load paths.
- System will generate rod breaks at secondary members closest to runway beam if bracing is generated after crane is input.
- VPC defaults to yield strength for Hot Roll runway beams of 36 ksi.




Frame Side Loading Information

Loading | Influence Areas | Load Cases | Load Dependencies

| Loca... | Type | Sh... | U.. | Start | Magnitu... | End | Magnit... | Coef... | Dir. | Ori.. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/0/0 ... | E> | Line | plf | 0/0/0 | 3.4293 | 50/2/1 | 3.4293 | 1.0000 | RIGHT | ENV |
| 1/0/0 ... | <E | Line | plf | 0/0/0 | 3.4293 | 50/2/1 | 3.4293 | 1.0000 | LEFT | ENV |
| 1/0/0 ... | EG- | Line | plf | 0/0/0 | 2.7434 | 50/2/1 | 2.7434 | 1.0000 | UP | ENV |
| 1/0/0 ... | EG+ | Line | plf | 0/0/0 | 2.7434 | 50/2/1 | 2.7434 | 1.0000 | DOWN | ENV |
| 1/0/0 ... | AD | Point | k | 35/1/7 | 0.7501 | NA | NA | 1.0000 | DOWN | SYS |
| 1/0/0 ... | AL | Point | k | 35/1/7 | 5.1563 | NA | NA | 1.0000 | DOWN | SYS |

## Design Issues (cont)

An example verifying the system generation of rafter loading is shown.

<u>Rafter Point Load:</u>

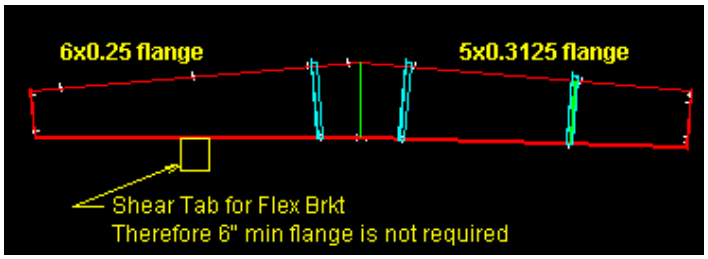
Wheel Load * [ 1 + (Bay – S)/Bay ]

= 2.75k [ 1 + (25.0-3.0)/25.0 ]

= 5.17k

AL = 5.1563 k [OK]

## 4. Support Rafters




- The system automatically uses 6” minimum flange on any rafter section above an Under-Hung Crane bracket (Welded or Flexible bolted). Note: As shown above a two (2) section rafter may result, where unequal flange widths occur across a shop splice.
- An Edit Check item is generated as shown when this occurs.

  Primary Framing
  Flange on RBX002 [Member Id:3] has different flange widths within the same part (6.0 != 5.0) which can not be made in the shop.
- Welded Rigid Brackets - Have IA Design optimize the frame using 6” minimum flange on the entire member (both sections).
- Flexible Brackets – Have IA Design make both sections the same width, and optimize the frame without regard for a 6” minimum flange. The minimum flange width does not apply to Bolted Brackets that use shear tabs.

5. WARNINGS:

- Combination S-Shape with Cap Channel is not available.
- Brackets must be offset a minimum of 1/8” from ridges of gable buildings to avoid duplication of crane loads and minimum of 6” for proper detailing of the brackets. Brackets may be manually re-located at the ridge by Services if required.