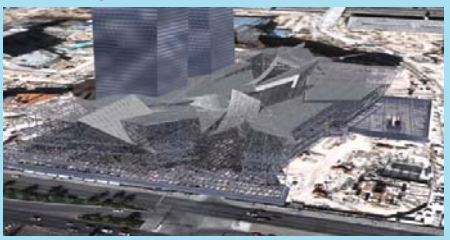


## Crystals Mall, City Center



### Las Vegas



Virtual Construction  
Steel Detailing  
Model Coordination  
Connection Design

[www.bdsvircon.com](http://www.bdsvircon.com)

Auckland → Bangkok → Brisbane → Chennai → Nottingham → Oxford → Phoenix → Vancouver





## Crystals Mall, Las Vegas


- The 14,000ton structure consisted of a below grade garage, two levels of beam and column framing covered by a unique roof structure
- The unique roof structure consisted of 19 separate but interlocking structures
- During the project, 3D models were passed between architect, engineer and BDS for coordination between the steelwork and other trades.




## Crystals Mall, Las Vegas



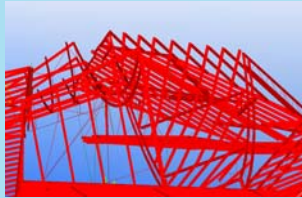
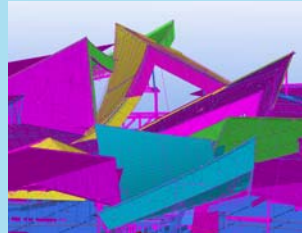
- Complex interior and exterior shape
- Fit within a narrow envelope
- Closely follow the roof shape.
- 100's of pipe columns sloping in two directions
- Over 100 curved and inclined truss segments




## Model Creation

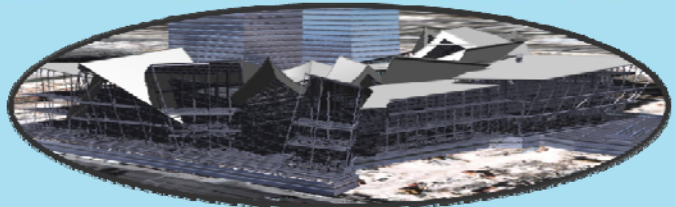


- Engineer provided SDNF files for each of the roof elements from their Catia model
- BDS imported the SDNF models into Tekla to produce one roof model
- BDS reviewed the intersection of the Roof elements with the engineer to resolve framing issues
- The underside of deck face was imported into Tekla as a 3D DWG file to ensure the correct roof shape


## Planning





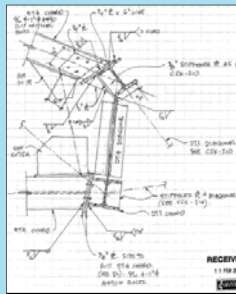
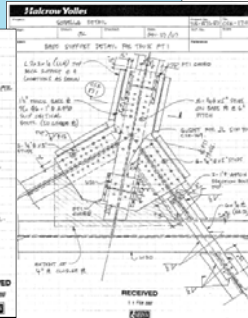
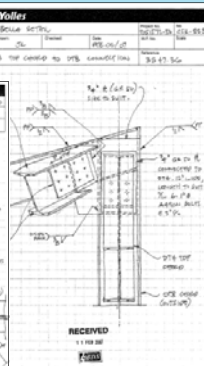
- Advanced material quantities
- Sequence break-up's
- Fabrication scheduling
- Truss splice locations
- Erection planning (inc. temporary props)

## Connection design



Connections were developed using the Tekla model


- See true member sizes and intersections
- Better understand member geometry
- Test concepts to see if connection works

**BDS**  
VIRCON  
SIMULATING THE FUTURE

## Connection design

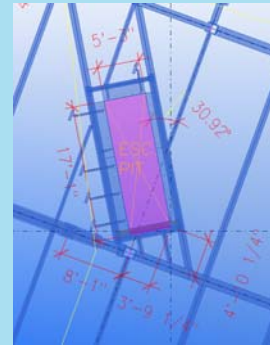
The roof structures were intertwined with each other to follow the individual roof shapes. Connections for the intersecting members had double bevel cuts, irregular bolt patterns and skewed connection plates.



**BDS**  
VIRCON  
SIMULATING THE FUTURE

## Slab edges and Openings

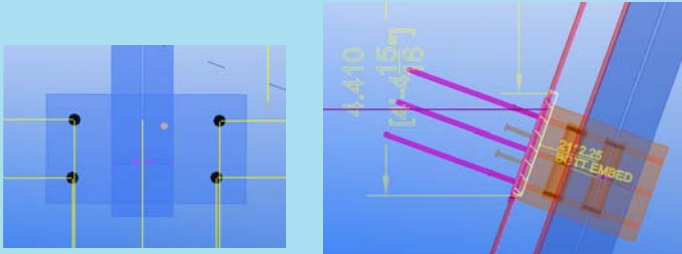
- 2D drawing issues were not fast enough
- Cad files were provided before drawings were formally released
- Cad files provided a quick visual reference for revision handling
- Over 11 revisions to the slab edges during the project



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VIRCON  
SIMULATING THE FUTURE

## Anchor Bolts & Embeds


- As-built embed locations imported back into the Model
- As-built anchor bolt locations imported back into the model
- Allows rectification before shipping to site



**BDS**  
VIRCON  
SIMULATING THE FUTURE

## Catwalks

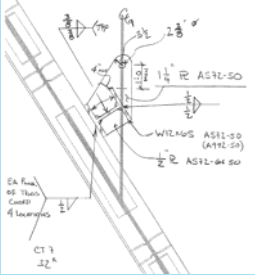
- 3D DWG and IFC files were handed back to the architect to update their model
- This
- A ba




### Lifting Lugs

BDS provided for all truss assemblies

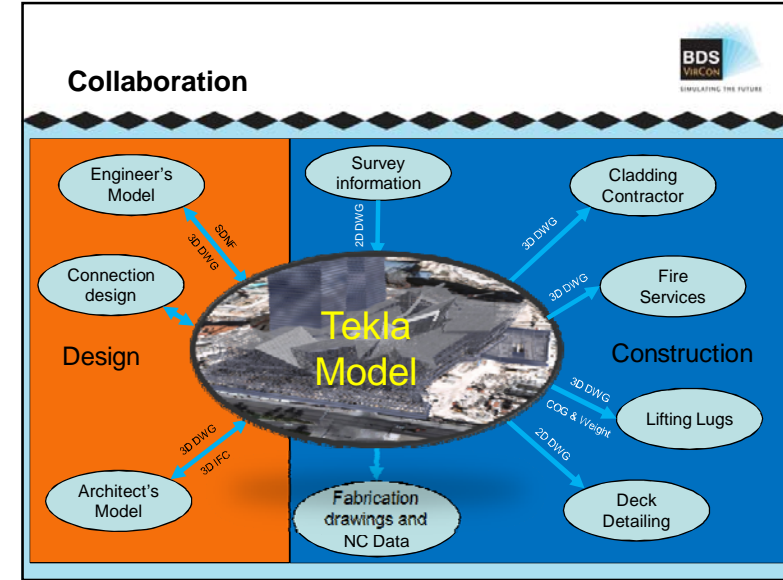
- Weights
- Centre of Gravity locations
- 3D DWG for reference



Enabling the engineer to sketch the lug design



Lugs were detailed enabling each truss to be lifted into position for a perfect fit



### Crystals Mall, Las Vegas

