Date: November 2020 to November 2022
Client: Bito Lagertechnik

David Beneke Consulting
Finite Element Analysis for Engineering

BITO ADAPTO RACKING – EARLY BAG STORAGE

Project Description:

Bito Lagertechnik in Germany, developed a light gauge steel racking system called "Adapto" system which can be used for projects in which tote storage is required. One such adaptation of this system is where the rack is used to temporarily store baggage for airports. David Beneke Consulting was commissioned to undertake 3rd Party structural engineering proof checking services of the Early Bag Storage (EBS) racking at Xian Airport (China), Hong Kong Airport (Hong Kong) and Western Sydney Airport (Australia)

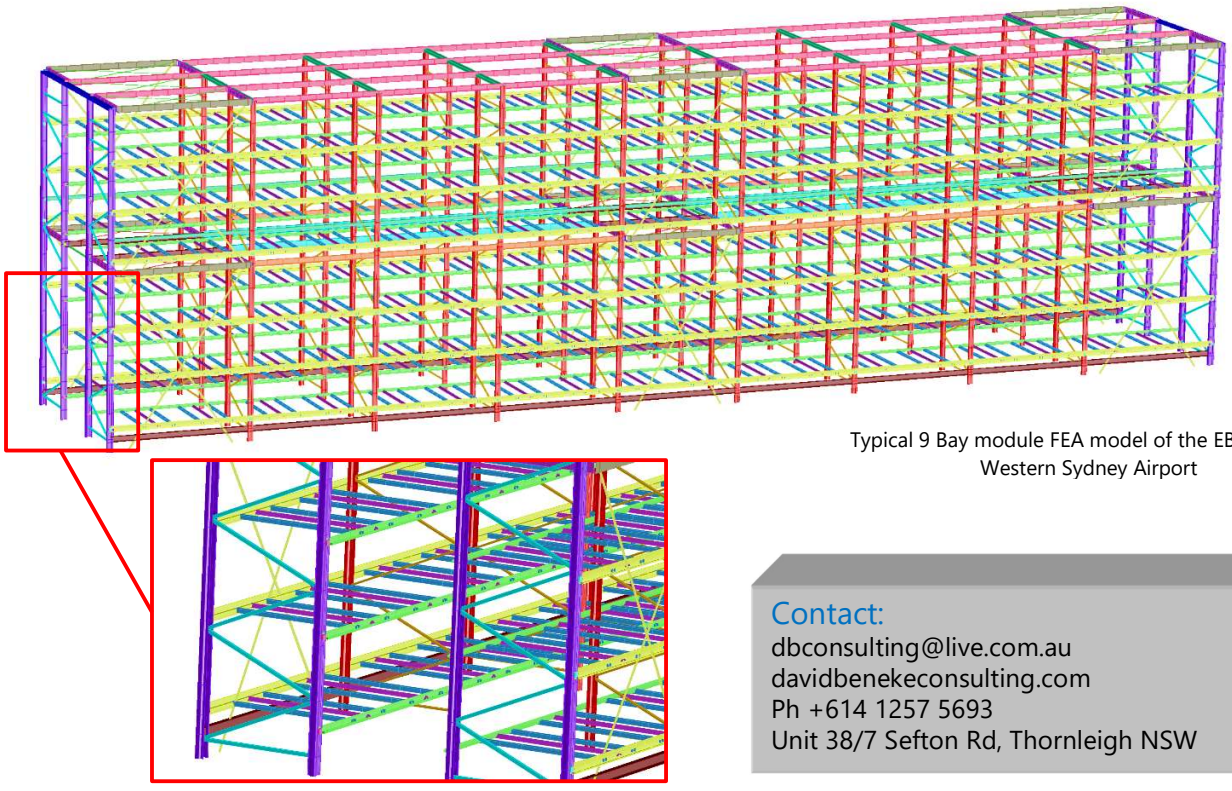
Each project presented significant technical challenges which included the following:

For the Hong Kong project, the rack was supported by a slab that deflected up and down on a daily basis due to tidal movement. This was because the slab was located below the water table.

For the Xian project, the rack was exposed to significantly high seismic loads and the geometry of the rack was complicated as it had to accommodate large concrete beams within its envelope.

For the Western Sydney project, significant care was required for the footplates of the rack as the rack was supported by a suspended slab with significant top reinforcement to cope with the required quasi-rigid floor design.

Our analysis of such racking consists of geometric non-linear incorporating material non-linear for tension only bracing elements. Upright capacities were initially evaluated using the effective section approach (Hong Kong and Xian) with the Direct Strength Method being developed and used for the Western Sydney project.



Typical 9 Bay module FEA model of the EBS Rack for Western Sydney Airport

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