

SRM-1200 CRANE – LIFTING CARRIAGE CASTING

Linear Static and Non-Linear Contact Analysis

Date: October 2010

Client: Dematic

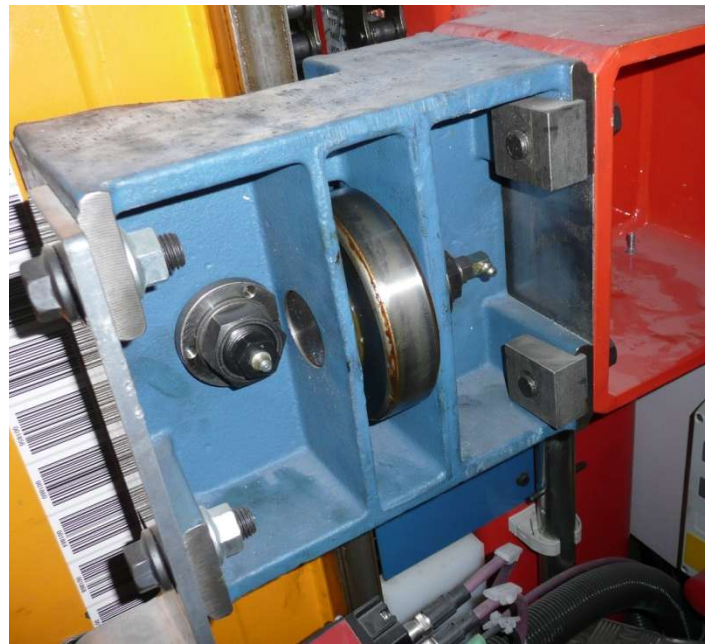
Project Description:

As a part of developing a Chinese manufactured equivalent of the SRM-1200 high bay pallet racking crane, Dematic commissioned David Beneke Consulting to investigate the ultimate and fatigue capacity of 4 castings which form part of the roller connection between the lifting carriage and mast of the crane.

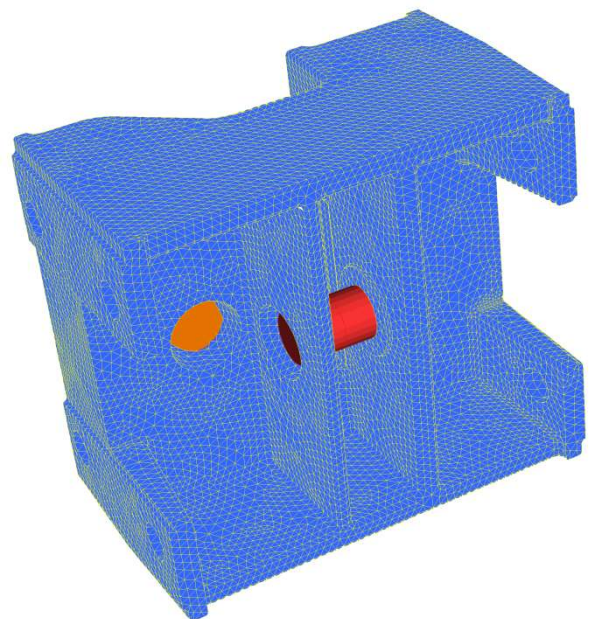
The geometry of the casting was imported into Strand7 finite element analysis (FEA) software and meshed with 3 dimensional tet10 solid elements. The shafts for the two roller wheels contained within the casting were modelled as 1 dimensional line elements with rigid links connecting them onto the tet10 mesh. Boundary restraint conditions synonymous with rigid restraint was applied where connection bolts were evident. Again rigid links were used to connect the bolt centre-lines to the tet10 mesh. Unit loads were applied to the centrelines of the roller wheels and then combined in accordance with ultimate and fatigue limit state criteria.

The linear static analysis confirmed that the zone of interest was where the casting was connected onto the lifting carriage via bolts and large plate washers. It was found that the stiffness of this support in the FEA model was proportional to the induced stresses. Accordingly the support arrangement was changed to include the contact zones between the casting and the lifting carriage as well as that between the casting and the large plate washers.

The results of the analysis were then incorporated into a spreadsheet which allows one to design the SRM-1200.



Lifting carriage casting (blue) in service with lifting carriage right (red)



FEA model of lifting carriage casting.

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