

# WINNER

## Category 3: Industrial Buildings and Plants



*“This project combines several requirements. First, we have the analysis of different influences, such as seismic, dynamic loads and wind vibrations. Second, the American standards for the check of the structure were applied. Furthermore, the combination of 1D and 2D members was a big advantage to proof the complete construction and to optimise the weight of the steel structure.”*

Quote of the Jury



# Shoaiba II Power Plant - Shoaiba, Saudi Arabia

Owner Saudi Electricity Company  
Architect CMI Energy  
General Contractor Daelim Industrial Co.  
Engineering Office I.d.d. Engineering  
Construction Period 11/2011 - 01/2014

The power plant is a raw-oil plant. The electricity is made by burning raw oil. The cylinder is 60 m high and its diameter is 4.6 m. The ground surface at the bottom of the transition piece is 26 x 13 m<sup>2</sup>. In total, the analysed structure is constructed 10 times on site. The building contains heavy equipment such as boilers and a lot of piping. The internal furnace structure is modelled in a separate SCIA Engineer project. The building meets seismic requirements (0.30 g) and the eigenfrequency of the main structure is designed to comply with the wind vibration mode of the American standards.

SCIA Engineer is used with steel check according to the American standards. Seismic analysis, general vibration for wind vortex, plate elements and stability check are used to verify that the model meets all the above given criteria. The structure of the cylinder and its transition piece is modelled with 2D-plates and stiffening beams. The general stability check is also used for some parts.

The difficulty is the buckling effect of the plated transition piece which is self-supporting and takes the weight of the cylinder on top of it. Another challenge is to have all the connection details matching together. The client reached a 30% reduction in the weight of steel thanks to a good optimization of the upper shell plate thickness.

## I.d.d. Engineering

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I.d.d. Engineering bvba is an engineering office near Brussels specialising in steel and concrete structures and foundations. The study presented contains a detailed engineering of connections and general stability. I.d.d. Engineering is specialising in industrial plants and civil structures such as bridges. The company was established in 2010 and has designed many structures all over the world, such as in Africa, Asia, Australia and the Middle East.

