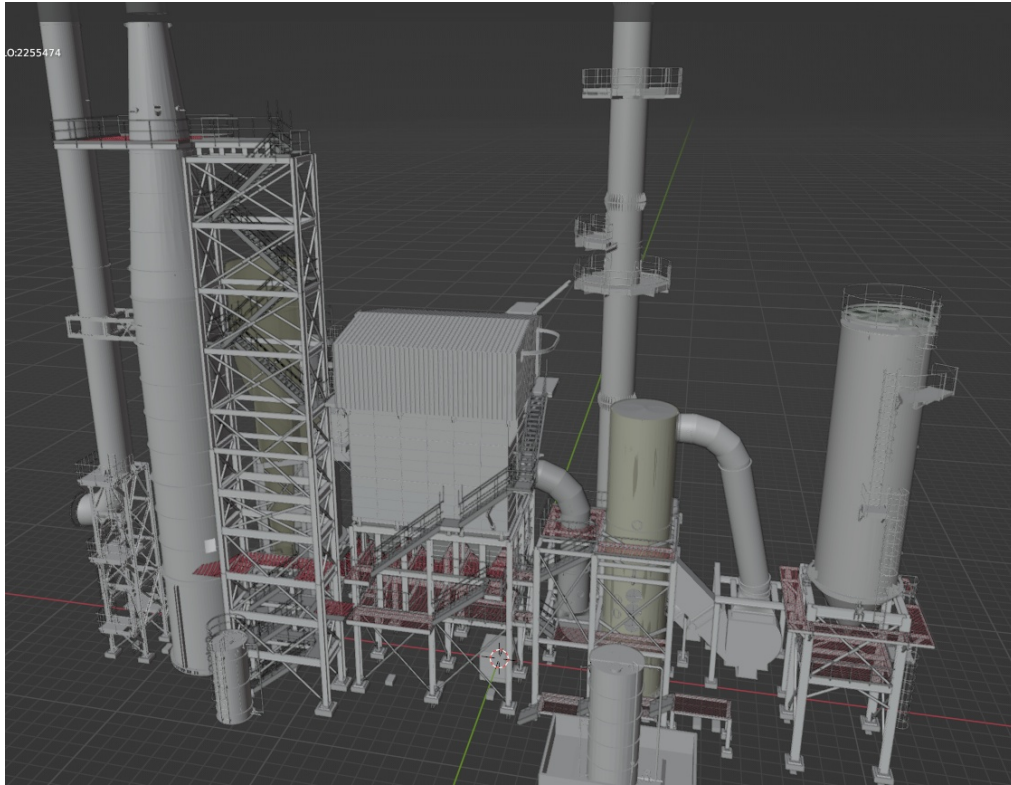# WASTE TO ENERGY VALORIZATION PLANT (JUBAIL KSA)

The Veolia Value Park (VVP) plant is located in Jubail Industrial City, Kingdom of Saudi Arabia, and consists of an Integrated Waste To Energy (IWTE) Central Utilities and Valorization Plant that will precondition liquid and solid hazardous industrial waste (Class I and Class II), burning it and recovering energy in the form of steam for use within several industrial applications.

The works carried out consisted of the design and analysis of the steel support structures, equipment and other auxiliary facilities for access, maintenace, storage and convey of products.
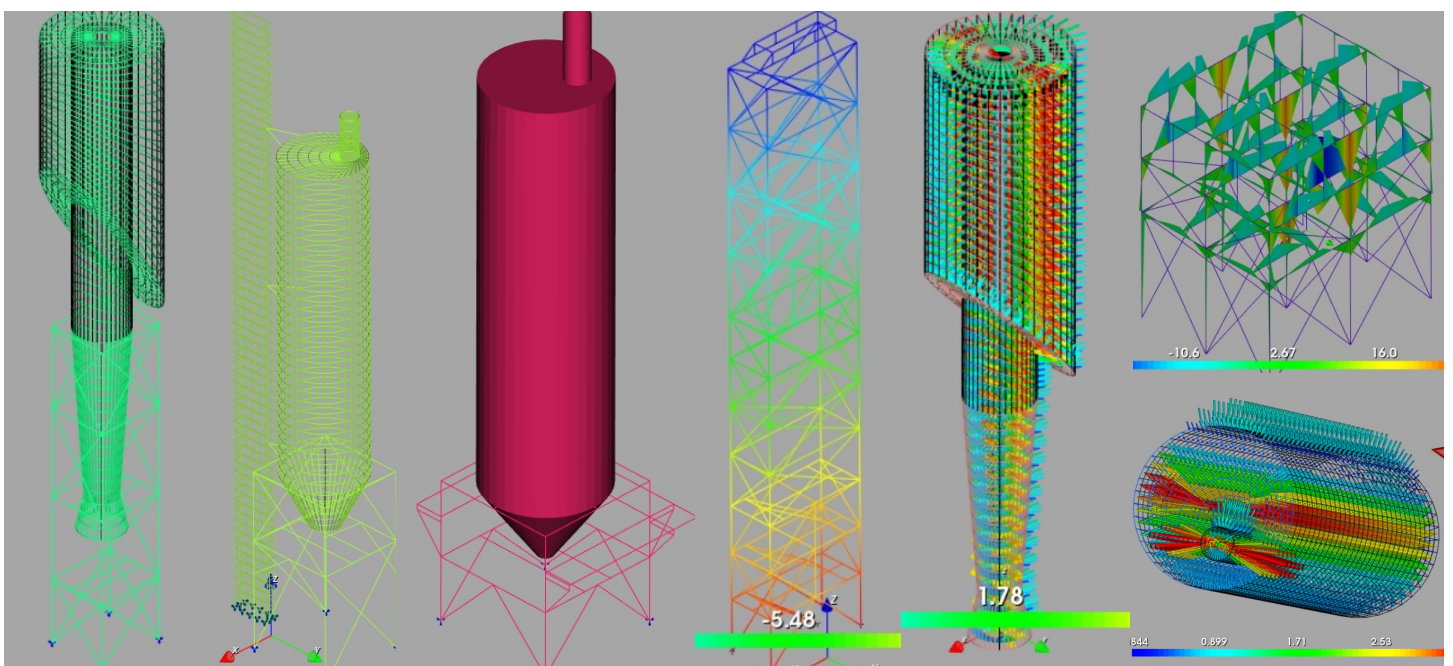
The steel structures were calculated with the XC finite element software, using the direct analysis method, based on a geometrically non-linear elastic analysis as defined in sections C.1 and C.2 of AISC 360-05. The main action is wind, with a basic speed of 155 km/h.The model of each connection is derived from the structural finite element model of the steel frame; the actions for each load case are internally computed and applied on the appropriate member. As a result of the analysis, the displacements and stresses in each sub-component are known in all their sections for checking.

The analysis of the connection by means of finite elements does not rely on any basic assumption regarding the behaviour of the connector subcomponents. All the components were modelled in exact spatial positions, taking into account the parameters that define the stiffness of each of them (length, diameter and number of bolts, length of welds, throat section, . . .). That way, the model does not neglect any part of the response, all the forces flow correctly between components.
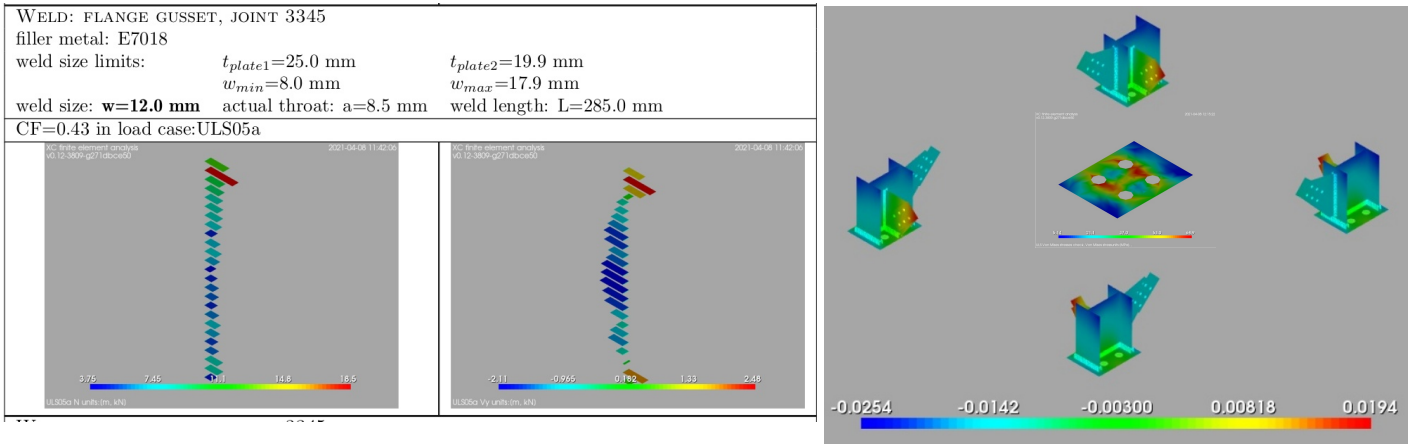
Welds are modelled with a number of equally-spaced linear elements, glued to the mid-urface of the welded plates by rigid offsets. For each weld element the internal forces axial, parallel and perpendicular shears are obtained. AISC provides close check formulae for the welds using the integration of these forces, which can be immediately computed for each loading combination and for each weld, so the checks are immediate.

Bolts are modelled with a single element, defined by two nodes placed in the bolt-shaft center, at the two extremities of the bolt. The holes in the plates joined by the bolt are explicitly modelled in the shell FE layouts. A ring of 8 nodes at 45 degrees are placed at distance half of the bolt-hole diameter. The interface between the bolt shaft and the plate bolted is simulated by means of a set of eight elements at each extremity of the bolt, that connect the bolt center to the nodes of the ring.