

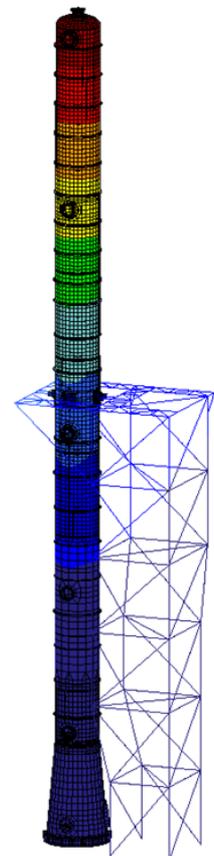
## **LIFE EXTENSION**

FCL regularly carry out structural integrity assessment of existing plant with the aim of demonstrating fitness-for-purpose for continued operation beyond the original plant design life. In one such project, undertaken for the operator of a large chemical plant located in the north of England, work was carried out to underwrite continued operation of a large process column after the discovery of levels of internal corrosion in the lower regions of the shell which were significantly in excess of the original design value.

After initial calculations indicated that it would not be possible to demonstrate the adequacy of the column as a free-standing item, the decision was made to construct a structural steelwork tower alongside the column to provide additional lateral support, thereby reducing the level of bending stresses induced in the lower sections of the shell under the influence of wind loading.



Assessment of the adequacy of the combined structure was based on the results of finite element stress analyses, carried out using Pro/MECHANICA (now CREO/Simulate) software, which addressed the influence of internal and external design pressures, weight and wind loads acting on the structure. The analyses were complicated by the presence of significant gaps between the column and steelwork at the support points, which necessitated detailed consideration both of the initial deflections expected during installation and of the interaction between the two items using contact analysis methods. The results obtained were assessed in accordance with the requirements of ASME Section VIII Division 1 and ASME Section VIII Division 2 Part 5, and confirmed the adequacy of the modified design at current measured thicknesses.



Subsequent scaling of the predicted stresses then provided an indication of the thickness margins available which, allied with information on expected future corrosion rates, permitted FCL to demonstrate that retiral of the column could be safely delayed for a period of at least four years. This prevented the need for costly unscheduled shutdown of the plant and enabled our client to programme a planned replacement at an appropriate future date.