

FEA & PD5500 Code Assessment to Accelerate Dough-Mixing Machine Development

Baker Perkins Ltd, as part of its continuous development program, had a requirement to design and manufacture a modified version of its dough mixing machine. As part of this process, Wilde Analysis was asked to provide a Finite Element Analysis (FEA), followed by Code assessment to meet the requirements of PD5500:2012.

Company

Baker Perkins is a leading equipment manufacturer, supplying products and process support to many of the world's top food manufacturers.

Its origins date back to the 19th century, when two separate companies existed, one owned by Jacob Perkins, a prolific inventor, and the other by a Canadian called Joseph Baker. Originally fierce rivals, a collaborative project during World War One helped lead to the companies merging in 1920.

Baker Perkins is an independent company operating from two sites in the UK and USA. Its strength lies in its process expertise, engineering excellence and the ability to fully support customers worldwide.

Challenge

The existing dough-mixing machine design had six quick-acting clamps mounted at the top of the vessel body to locate the lid. The new design had been modified to have four clamps, and the lid now had a double skin to increase stiffness.

The existing design had been in service without any major problems for many years and had become the market leader in its field.

Wilde Analysis was asked to provide a finite element analysis of the new design, followed by Code assessment in accordance with the requirements of PD5500:2012.

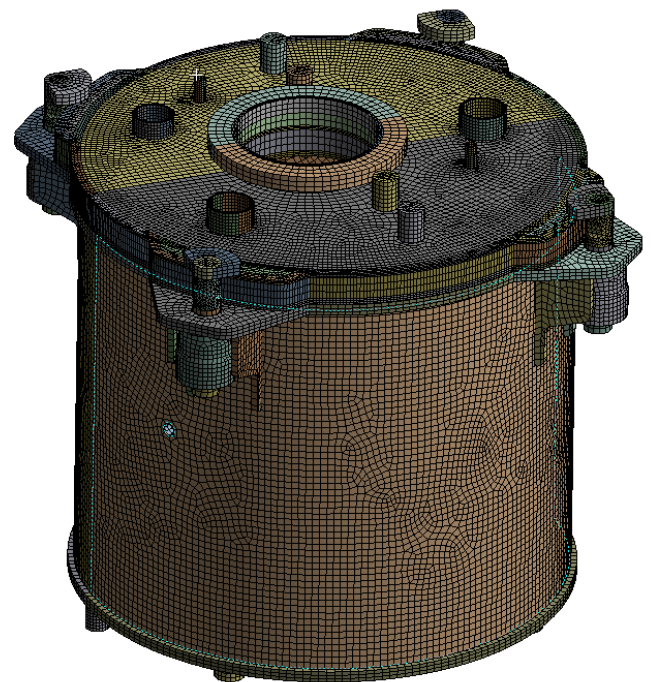


Fig 1: Mesh for FEA (Courtesy: Baker Perkins)

Solution

As part of the model set up, two load cases were considered for the stress analysis relating to the water jacket and mixing bowl to envelope the extremes of operating conditions. A linear buckling analysis was also performed for the first load case which was considered to be the most susceptible to structural instability.

Contacts were created to represent all welds in the mixer assembly, and appropriate boundary conditions were applied at the vessel mounting points. High order solid and shell elements were used to create the mesh for the finite element analysis.

Business Benefits

The finite element analysis and subsequent Code assessment showed that the equipment complied with the requirements of the pressure vessel code PD5500:2012 when subject to two extreme operating case conditions.

Baker Perkins is an existing ANSYS FEA user but on this occasion asked Wilde Analysis to support them with additional resource. By using the same software, Wilde were able to help Baker to meet a tight deadline while working closely as a team.

This has given Baker Perkins an increased level of confidence in the product generally, whilst specifically proving the new simplified lid clamping system.

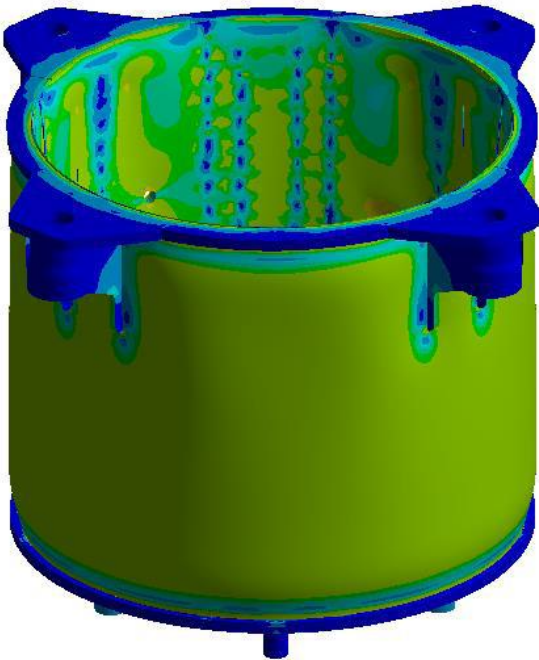


Fig 2: Stress Intensity, Mixing Bowl (Courtesy: Baker Perkins)

“It was a case of us needing to get the job done **quickly**. If you have a good supplier, they become an extension of your business, in whom you can **have confidence** and rely upon when needed. This is where Wilde proves so useful to us; their engineers are really helpful, **highly knowledgeable** and very competent.