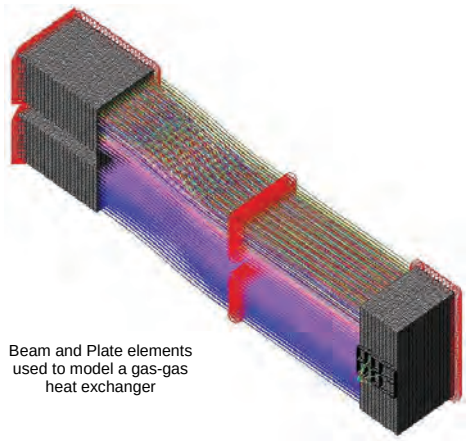
FINITE ELEMENT MODELLING

Many engineering situations are simply not amenable to even an approximate analysis by conventional hand calculations, and therefore **Damor Engineering Ltd** can provide a comprehensive Finite Element Modelling and Analysis service, for both stress analysis and heat transfer. Stress and heat transfer models can be combined to include the effects of thermal stresses on components and systems.

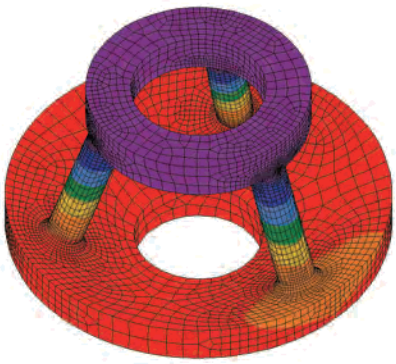


Beam and Plate elements used to model a gas-gas heat exchanger

Damor Engineering Ltd utilises the latest ALGOR® software, a widely-used Finite Element Analysis (FEA) program from the United States. Our Principal Engineer has used ALGOR® software since 1991, and has also been trained in the implementation of some of the more specialist modelling and analysis techniques. Further details of the software and a list of major international users can be found on ALGOR's website at *www.algor.com*.

For stress analysis modelling, the following types of basic loads can be incorporated, either individually or in any combination :-

- Applied forces
- Applied moments
- Applied pressures
- Body forces (e.g. gravity effects)
- Centrifugal forces



Bottom bearing steady of a process mixing vessel

Model element types include plates, shells, beams, trusses and solid bricks. Combinations of element types can be modelled to produce an accurate representation of almost any mechanical or structural system. Latest versions of the software include sophisticated meshing tools to reduce the time required for modelling.

A comprehensive database reference of mechanical and heat transfer properties is available, or alternatively material properties can be entered manually. Materials with non-linear or hyperelastic properties, e.g. rubbers and plastics, can also be analysed.

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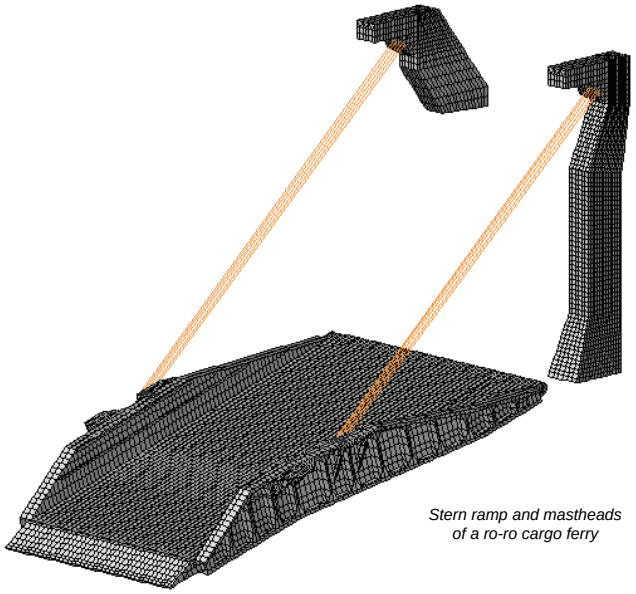
Models with planes of symmetry along their primary axes can often be simplified to either half or quarter models, to reduce the size of the modelling and hence reduce the analysis run time required.

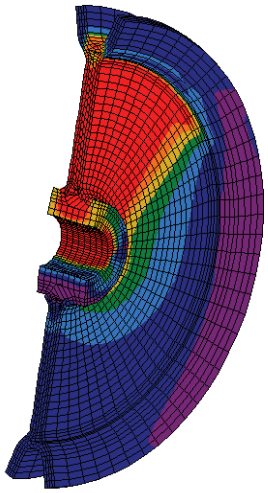
On behalf of many of our clients, **Damor Engineering Ltd** have undertaken analyses of a wide range of systems and components, including :-

- process and pressure vessels
- pipelines and pipe fittings
- heat exchangers
- structural fabrications
- complex castings

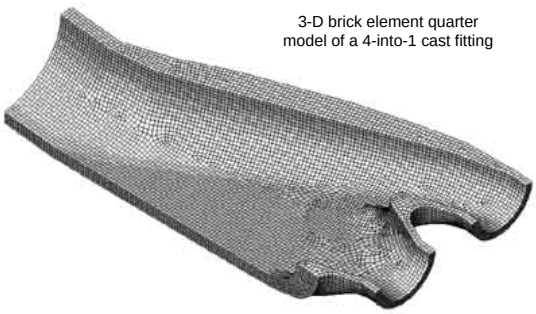


Stern ramp and mastheads of a ro-ro cargo ferry

Another very useful add-on to the FEA software is the *Mechanical Event Simulation* capability, whereby problems such as impacts and buckling can be assessed. With this program, the problem is defined from the basic physics of the situation, and there is no need to make assumptions about loads arising from motion, impact, instabilities or contact between bodies.



Mechanical Event Simulation (MES) can therefore be useful to simulate crash-tests and other situations where plastic deformation occurs. The model is analysed at each of a series of small time steps, and realistic animations can be produced to show the changing nature of the event. Natural frequencies of complex bodies can be obtained using this method, to ensure that potential problems with resonance can be avoided.



3-D brick element quarter model of a 4-into-1 cast fitting

To complement our finite element modelling and analysis services, we at **Damor Engineering Ltd** also offer a complete equipment and product design service, from the conceptual and front-end design works through to analysis and the production of arrangement and manufacturing drawings.

Details of many more of our previous FEA projects can be seen on our website, at www.damor.co.uk. To find out more about **Damor Engineering Ltd**, please contact us by phone or e-mail.