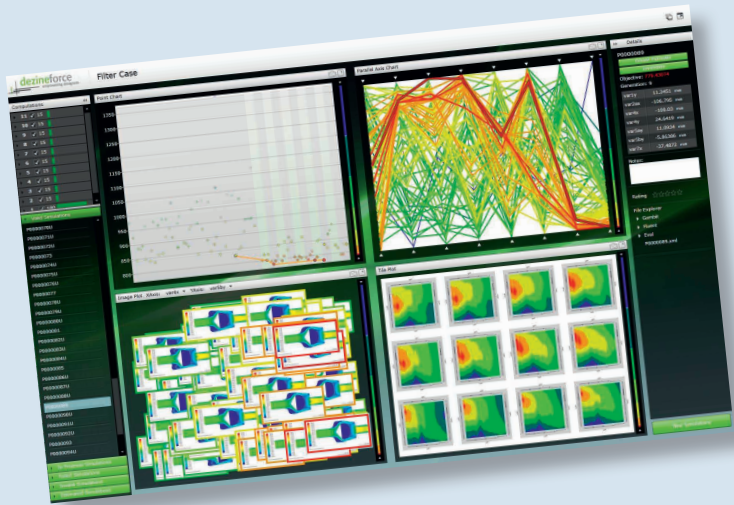


TECHNOLOGY FEATURE | AEROSTRUCTURES



Intelligent structures

A new approach to design optimisation is enabling composites pioneer Tods Aerospace to make the best use of the latest advances in material technology.

Composite materials provide far greater freedom in the design of aerospace structures than metallics and are set to play an increasing role. However, they are relatively new and there is still a collective lack of experience in the application of these materials to many engineering problems.

Early approaches involved replacing existing materials with an essentially uniform or isotropic composite, which produced positive results in areas like weight reduction and corrosion resistance, but overlooked many useful properties, such as the way the structured layers and alignment of fibres respond to loading in specific directions.

With increased choice for the designer, there is an opportunity to create significant improvements over existing single material structures. However, with added complexity comes new challenges, particularly for the engineers charged with deciding how the materials are used.

In 2002, Tods Aerospace pioneered the use of thermoplastic materials in structural sandwich panel floor sections for aircraft interiors. These solutions include composite structural beams moulded into the core of the flooring sections.

“To get the most out of these materials they must be used as composites, not simply as substitutes for metal,” says Simon Clark, Tods’ chief structural engineer. “The problem is that traditional engineering analysis often fails to consider the wider range of options and composite materials characteristics.”

The nature of the problem is a combination of discrete parameters, which include the choice of materials, the way they are structured and continuous parameters arising from geometric factors like length and thickness. To find new solutions and gain insights into the available design options for its sandwich panel floor sections, Tods has embraced a new approach to design optimisation from dezineforce, the first fully integrated, SaaS-based (software as a service) engineering design optimisation service.

More and more companies are tapping into web-based applications and SaaS portals, assigning computing tasks to remote locations, collectively known as a ‘cloud’. SaaS gives organisations the opportunity to use the latest software without the hidden costs of traditional software use, particularly hardware, consulting, IT support and maintenance.

On demand access

dezineforce provides ‘on demand’ access over the internet to a wide range of tools for the analysis of design behaviour and systematic search facilities for improved designs, all delivered on a high performance computing platform. Workflow technologies provide a preconfigured but flexible set of standard design process steps that integrate optimisation tools and applications. The workflows provide guidance through the design process and enable designers to select, configure, execute and monitor engineering design computations.

“dezineforce has been specifically designed to produce optimum solutions to problems involving many variables,” says Clark. “It takes account of the multiple variables associated with composite materials as well as the geometric properties associated with the engineering problem. This allows the trade-off between alternative materials to be considered at the same time as optimising the dimensions of elements like internal beams and the thickness of the outer skins.”

Using such optimisation techniques, Tods can not only improve its understanding of the performance of composites, it can generate optimum designs that will make the best use of innovative new materials as they become available. This on demand approach allows design houses and manufacturers to raise their design capability to an entirely new level, achieving breakthroughs in composite design and driving true innovation in the aerospace sector. |

www.dezineforce.co.uk