

# CAE on the Offensive

A leading Australian aerospace and defense company, Tenix Defence Pty Limited, reports on computer-aided engineering software trends.

*By Peter Wilson, Engineering Manager, Electronic Systems Division, Tenix Defence, Sydney, Australia*

*With comments from Fabian Ravalico, Engineering Manager, Land Division, Tenix Defence*

*Kerry Thurstans, Engineering Manager, Aerospace Division, Tenix Defence*

*Saeed Roshan-Zamir, Structural Engineering Manager, Tenix Marine Division, Tenix Defence*

From a naval shipbuilding business in 1997, Tenix Defence Pty Limited has grown to service most areas of the defense industry; it also has established businesses working in aviation, parking and traffic infringement management, commercializing innovative technology and providing engineering services for utilities including water, sewerage, gas and electricity. Based in Sydney, Australia, Tenix operates in all mainland Australian states and territories, New Zealand, the South Pacific and Southeast Asia. It is also an active partner in high-technology ventures with United States and European firms. *ANSYS Advantage* magazine interviewed Peter Wilson, Engineering Manager of Tenix Defence, Electronic Systems Division, and his colleagues about computer-aided engineering (CAE) software trends at Tenix.

*Note: Tenix was sold in late January 2008 to BAE Systems, which is Europe's largest defense company. The acquisition makes BAE the biggest supplier of equipment to Australia's armed forces.*

**Q: Who is Tenix and what is its role in the defense industry?**

**A:** Tenix is one of the largest independent defense contractors and integrators in both Australia and Southeast Asia. There are four major defense businesses: Aerospace, Land, Marine and Electronic Systems. We have other

interests in engineering systems, such as traffic cameras and domestic utilities including waste water treatment and electricity generation.

The company emerged from the industrial construction company Transfield, which was formed in the 1950s. We see our core competence as the ability to be the smartest defense integrators in our segment, and we seek to understand our customers' individual niche needs. We then work with original equipment manufacturers to deliver best-in-class flexible, customized designs fit for purpose.

Tenix works extensively for the Australian government and other Southeast Asian and Australasian countries providing defense engineering solutions. We currently are building and delivering seven vessels for the Royal New Zealand Navy tailored to their unique systems integration needs. In addition, we work with major defense contractors, such as Lockheed Martin, L3 and Northrop-Grumman, to customize their off-the-shelf defense equipment.

**Q: What sort of technical systems integration do you typically perform, and how do computer simulation and CAE feature in your processes?**

**A:** This varies significantly among our defense divisions, and it is best answered on a case-by-case basis, as follows.



**Electronic Systems Division:** Peter Wilson, Engineering Manager

The Tenix Electronics Systems Division (ESD) conducts many research and development-type projects. As such, we have a high focus on new design rather than the evolution of existing products and systems. CAE plays an important role in this line of work, as it allows our engineers to communicate and deliver designs that, due to their developmental nature, can change rapidly in scope. Our key technology areas, including electronic warfare, high-power lasers and electro-optics, see simulation of fluid flow and thermal interactions as a high priority, with structural analysis and modal response being the next most used simulation capabilities.

The tools from ANSYS have already demonstrated benefits: increased confidence in design solutions leading to less conservative designs and reduced solution iterations in the high-technology defense sector in which ESD conducts its business. All of ESD's mechanical and aeronautical engineers now have been trained to use the ANSYS tools. We are part of a powerful community of users among the various divisions of Tenix that is able to share its experience, ideas and workload.

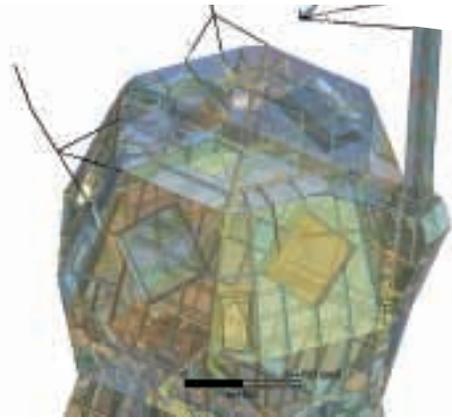
**Land Division:** Fabian Ravalico, Engineering Manager

Land Division's core business is based on the development, modification, upgrading and through-life support of military and commercial armored vehicles. Product development traditionally involves physical prototyping followed by testing and introduction of improvements in an iterative manner until the design is mature, verified and validated. The use of modeling and simulation of design concepts via CAE tools leads to accelerated product development lead times; it also reduces the amount of iteration required to reach a mature design. It allows all concepts and design solutions to be considered and assessed for validity in a relatively compressed timescale, enabling progression to a hardware solution (prototype) with high confidence of success. Modeling and simulation are very often more cost-effective than prototyping.

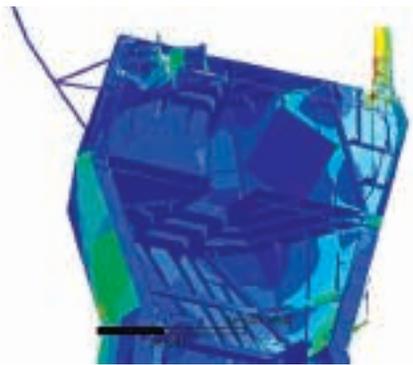
Using Tenix's new suite of tools from ANSYS, Land Division's most commonly explored analysis domains are linear analysis, nonlinear analysis, dynamic analysis, crash analysis and blast analysis. Our new challenge is to provide the necessary staff training to capitalize fully on the new tools available.

**Marine Division:** Saeed Roshan-Zamir, Structural Engineering Manager

We use software from ANSYS extensively to design and assess a large variety of marine structures. This principally involves the solution of load cases, such as shock and airblast, fatigue, vibration and operational loadings at sea. The most notable example is the structural design and analysis of new masts on the ANZAC-class frigates for the Anti-Ship Missile Defence (ASMD) project, which involves the integration of a precision targeting, tracking and illumination



Geometry model for the new mast for ANZAC-class frigates

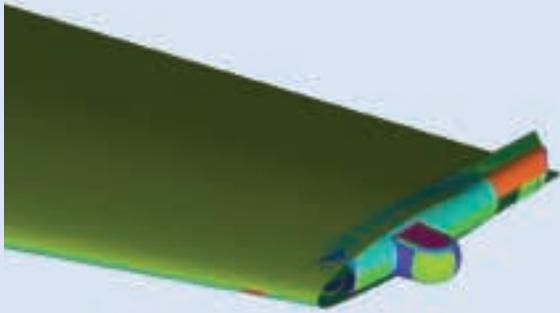


Stress analysis of the new mast structure for ANZAC-class frigates

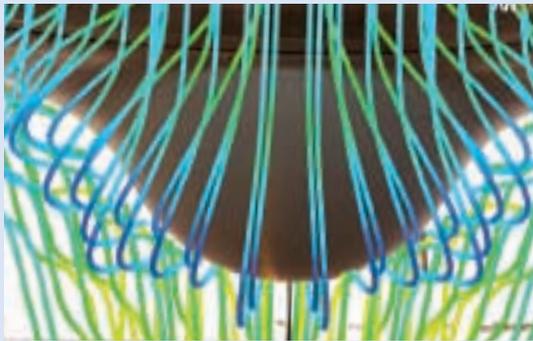
phased array radar system. Often, we utilize transient simulations to model and capture the response of the structure subject to shock pulse accelerations and blast pressures; in addition, we commonly require nonlinear boundary conditions and modal results to capture the natural frequencies of the structure. We employ CAE for our tasks because we require detailed and accurate results in order to effectively optimize our designs. A high percentage of our staff needs to be capable of using the programs effectively — so it's important for us that the programs can be learned quickly and successfully. We have found software from ANSYS to be highly capable of meeting our needs.

**Aerospace Division:** Kerry Thurstans, Engineering Manager

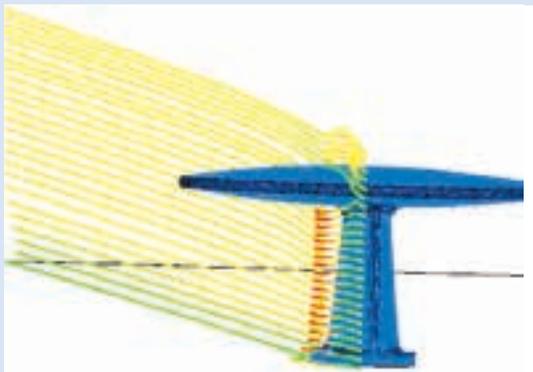
Tenix's Aerospace Division undertakes work in the Australian defense aerospace environment as the lead (or prime) company for the systems integration of avionics, communications, electro-optics, electronic warfare (EW) self protection, and other advanced commercial and military systems. During the design and testing phases of many of our projects, we make extensive use of computer-aided engineering to complement classical analysis and physical testing.



Electronic surveillance measure (ESM) antenna mounted onto an aircraft wingtip



Flow streamlines around a radome (a structural, weatherproof enclosure used to protect an aircraft antenna)



Laminar flow analysis over a typical aircraft SATCOM antenna



Stress analysis of a container lock mechanism

Using a company-wide common toolset, as we have implemented with ANSYS, provides a common training environment, encourages intra-company collaboration and facilitates knowledge transfer.

**Q: How do you see your CAE usage evolving in the future?**

**A:** The company's recent decision to choose simulation packages from ANSYS as enterprise-wide CAE tools means that we can improve our productivity and design flexibility like never before for all of our divisions. We selected ANSYS because of the proven performance of the toolset across our broad range of CAE requirements along with the collaborative approach adopted by ANSYS and their Australian agent. We also like the way that we can access a wide range of CAE tools in the one common ANSYS environment, all during the same work session.

One of the benefits of using software from ANSYS in all Tenix divisions is that it allows us to increase and improve our in-house CAE capabilities. We want our existing engineers to use CAE widely. In addition, we intend to hire more engineers to use these exciting new design tools, and the concept of a one-stop design house will certainly be attractive to them.

Going forward, Tenix is looking to increase its capability in analyzing fluid and structure simultaneously using fluid structure interaction simulations. We certainly have the need to extrapolate existing simulation models with confidence and develop a well-validated set of CAE capabilities.

**Q: What does Tenix see as the biggest defense sector CAE challenges for the foreseeable future?**

**A:** Personally, I want Tenix to have a strong integration of the engineering capabilities within all four defense divisions with a close coupling of our technical know-how and expertise. I see CAE as the latest part of that revolution. Already, we have integrated our systems engineering requirements management tools, and product lifecycle management (PLM) is next on our list.

By getting enterprise-wide usage of these same tools, I believe it will lead Tenix to significant productivity gains and efficiency savings as we develop a virtual community of internal users. Over the years, the separate divisions at Tenix have been geographically dispersed across Australia, and they have developed their own expertise. We need to cross-fertilize this CAE knowledge with our deployment of a common integrated software toolset from ANSYS. ■