

Femap • NX • Teamcenter

## Aquila Engineering

Faster FEA improves productivity and saves tens of thousands of dollars

### Industry

Aerospace and defense

### Business challenges

Aircraft modifications must meet regulatory requirements

Modifications must be cost-effective

### Keys to success

Compatibility of FEA solution with legacy models

Ability to import NX CAD geometry into FEA software

### Results

Less time needed for finite element modeling and results processing

NX Nastran completes analysis many times faster than previous solver

Higher engineer productivity saves tens of thousands of dollars

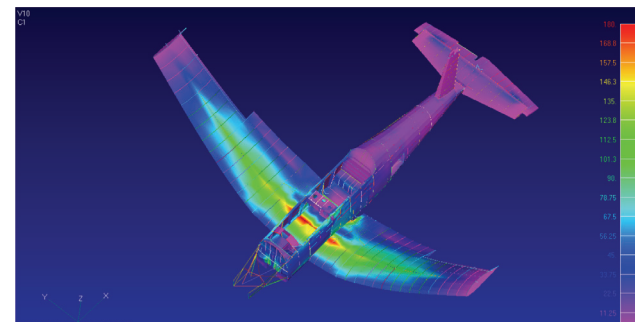
Less prototyping and physical testing

**Femap with NX Nastran reduces modeling/results processing time; software's accuracy decreases need for physical testing**

### Accurate engineering for aircraft

Aquila Engineering provides a wide range of services, including systems, avionics and structures engineering; technical writing; training; logistics support; computer-aided design (CAD) and project management. Many of its employees have more than 20 years of experience in the aircraft industry. One of the company's customers is Pilatus Aircraft of Switzerland. Aquila Engineering operates under contract to the Swiss company as the Pilatus Australian design office. In this role, Aquila Engineering provides engineering and logistics support to various clients throughout Australia and overseas.

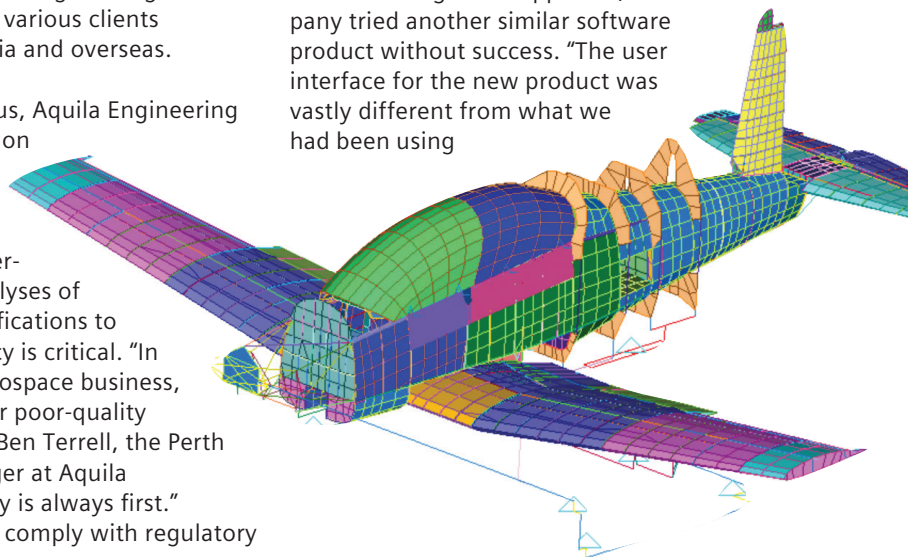
In its work for Pilatus, Aquila Engineering develops modification orders, which require the use of finite element analysis (FEA) to perform structural analyses of the proposed modifications to the planes. Accuracy is critical. "In the aircraft and aerospace business, there is no room for poor-quality engineering," says Ben Terrell, the Perth engineering manager at Aquila Engineering. "Safety is always first." Modifications must comply with regulatory



requirements, and the cost-effectiveness of these changes is important to the customer.

### Better FEA needed

In the past, Aquila Engineering used MSC/Nastran for Windows. After learning that the finite element modeling software would no longer be supported, the company tried another similar software product without success. "The user interface for the new product was vastly different from what we had been using



**"Femap with NX Nastran directly improves the quality of our work, and this is seen in the reduction of prototyping and testing required."**

Ben Terrell  
Perth Engineering Manager  
Aquila Engineering

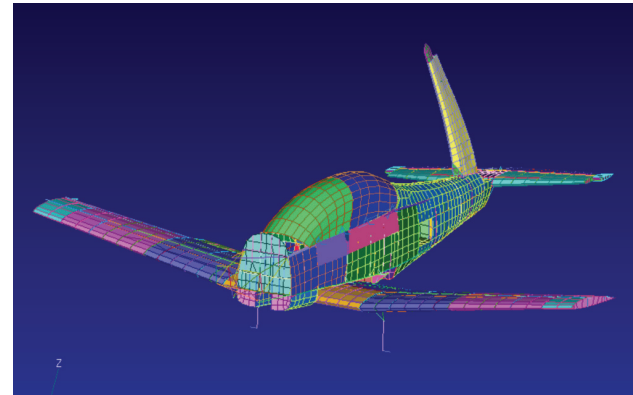
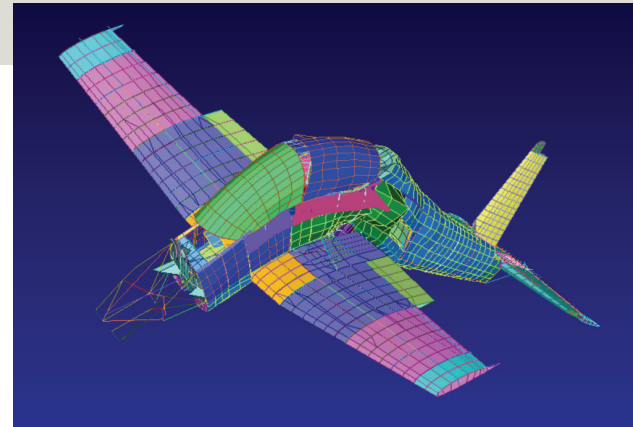
and we didn't receive sufficient training," says Terrell. "Even worse was the fact that we could not use our legacy models. Also, support for the product was email-based and there was no one person we could consistently deal with."

With FEA playing such a critical role in its work, Aquila Engineering decided to see what else was available. In looking for a new FEA solution, compatibility with the legacy models was critical. Other requirements included affordability, an intuitive interface so that the software could be quickly learned by engineers who had used other FEA programs and product support from someone who knew the product well and was available by phone. Training was another important consideration. The company wanted to be able to get product-specific training when it needed it to maximize the impact of the instruction.

Aquila Engineering chose Siemens PLM Software's Femap™ with NX™ Nastran® software along with Siemens' computer-aided engineering (CAE) partner, EnDuraSim. The selection met all of Aquila Engineering's technical requirements, as well as brought the company a new level of compatibility between FEA and CAD. The company was already using NX for drafting. By choosing Femap with NX Nastran, Aquila Engineering gained the ability to import geometry from NX that it could then use to create its finite element models. (Aquila Engineering also uses Teamcenter® software from Siemens for data management.)

#### **Outstanding training**

"The 'mentor' training offered by EnDuraSim is a great service," says Terrell. "Engineers are receptive to training that is project-specific and when there is an end goal. Also, the training is tailored to how we use the product. That is to say, there is no time wasted on aspects of the product that we will never use." Another important benefit of this training was that no productivity was lost; the training was focused on the actual project Aquila Engineering was

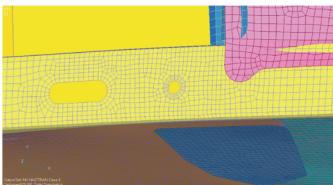
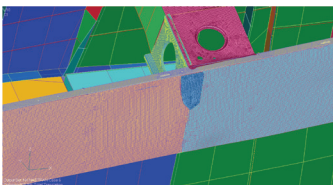
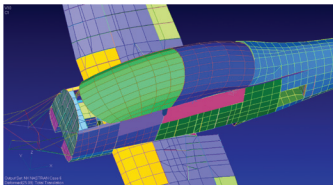


working on at the time the training took place. EnDuraSim also provides the engineering firm with ongoing "phone support that sets them apart," according to a number of engineers at the company who have personally leveraged the service.

#### **Faster and highly accurate**

The project that was underway when the mentor training was delivered was a splice repair design for the upper longeron on a particular aircraft. From the analysis, the company wanted to ascertain the loads within all the members and obtain rivet loads from the free-body diagrams for each part. Because the longeron is a single load path structural member, fatigue and crack growth investigations are essential. Proprietary software was used in conjunction with Femap with NX Nastran for this investigation.

The finite element model for the longeron was a refinement of the company's existing coarse model, rather than a separate submodel. Its accuracy was verified by



## Solutions/Services

Femap with NX Nastran  
[www.siemens.com/plm/femap](http://www.siemens.com/plm/femap)  
Teamcenter  
[www.siemens.com/teamcenter](http://www.siemens.com/teamcenter)

## Customer's primary business

Aquila Engineering is an engineering design firm that provides services to a range of Australian and international military and civil aviation organizations.  
[www.aquilaeng.com.au](http://www.aquilaeng.com.au)

## Customer location

Sale, Victoria (headquarters)  
Australia

## Partner

EnDuraSim

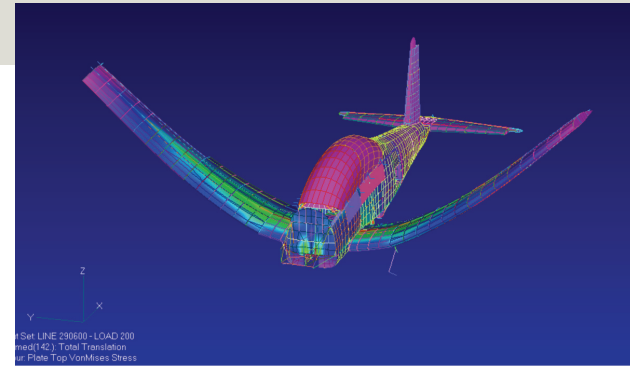
comparing the FEA results with physical test data. "Using Femap with NX Nastran, we were able to validate the model using measured strain data from a full-scale load test conducted years earlier," notes Terrell.

In general, finite element modeling methods have improved with the new software. "This is due to the vast but specific pre-analysis tools available for model definition, as well as post-analysis tools for results review, including the ability to sift through huge amounts of engineering results data with minimal effort and computer resources," explains Terrell. "These changes have significantly improved productivity. With Siemens' technology, our engineers now focus on engineering and not the software."

There has been a 50 percent gain in speed in terms of modeling and results processing since the new FEA software was adopted. Also, NX Nastran is a faster solver than the company was using previously. Analyses are accelerated manyfold due to the multi-processor capability, which NX Nastran can use during solutions.

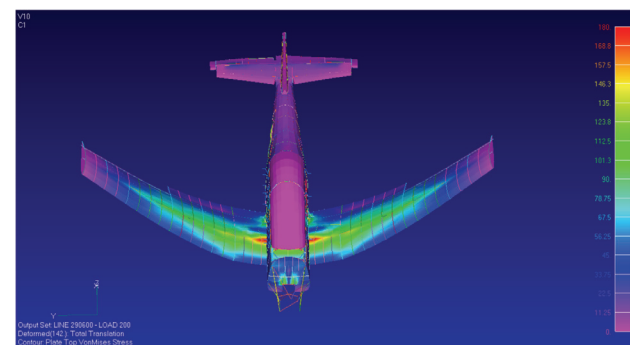
## Cost savings through higher productivity

Terrell estimates that his company has saved "tens of thousands of dollars due to



the improvements in modeling and analysis speed, as well as improvements in the accuracy of models." Ultimately, the company's engineers believe that the analysis tools have directly and measurably improved the quality of their work. One senior engineer notes, "We have more confidence in how we go about tackling challenges for our customers, and this comes across in our regular interactions with them."

Another financial benefit of this FEA solution is reduced testing costs, even while meeting the demanding regulatory requirements involved with aircraft. "Femap with NX Nastran directly improves the quality of our work, and this is seen in the reduction of prototyping and testing required," says Terrell. "This software aids us in meeting very strict aircraft regulations."



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[www.siemens.com/plm](http://www.siemens.com/plm)

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