Overview

The Boeing Company has long been at the forefront of CAE. Since the late 1970s Boeing has been developing its own specialist systems and computational codes both for internal and commercial use. Boeing has been using CADfix from ITI to help streamline the data exchange process and enable the accurate transfer of data between their custom in-house CAE solutions and a range of CAD systems.

Enabling CAD Interoperability

At the time already recognized worldwide for its aerospace innovation, Boeing launched the Aero-Grid and Paneling System (AGPS) in 1979 to enable its engineers to create, manipulate and interrogate precision geometry for aerospace design applications. Soon, AGPS became widespread among Boeing's aero-engineers.

In the early 1990s Boeing began using CATIA V4 for 3D CAD model generation. It soon became apparent that a reliable data link was needed between this industry standard software and AGPS. "In 1995 we released the first version of what we call 'the bridge'," explains Roger Pomeroy, Associate Technical Fellow, Aerodynamics/Geometry at Boeing.

Enabling CAD Interoperability

"The bridge", Boeing's custom data translation tool, was the ideal way to create a reliable link between AGPS and other applications across internal design disciplines. However, by the end of the 1990s the CAD/CAE landscape had become much more diverse throughout the supply chain and the company's data translation issues became considerably more complex.

Acquisition of several companies meant that Boeing's engineers were receiving data from a much broader range of CAD systems, there were widespread and significant geometry repair issues and there was an increasing number of computational tools needing effective translation support. With the implementation of CATIA V5, 'the bridge' was fast becoming obsolete to all but the remaining users of CATIA V4.

The Boeing team learned from their first version of 'the bridge' that the translation business is expensive, difficult and time-consuming. "The original version took over a year to develop, and an even more sophisticated bridge would surely have taken even longer," said Pomeroy. Boeing sought a partner that already had the expertise and solutions in place to deliver a translation tool that could be integrated within AGPS and provide seamless translations between a host of other CAD and CAE systems.

Evaluation of Solution Partners

"In particular we were interested in how they coped with some of our complex geometries," says Pomeroy. "Because we are trying to provide usable data for analysis codes, a lot of the time the geometry that we need for CAE is not necessarily the same geometry that is used for manufacturing. In addition we needed a system that could be easily integrated into our environment, was adaptable for our needs, and was user-friendly, with minimal training requirements for our extensive user base."

After evaluating commercially available translation and repair tool, in 1999 Boeing chose CADfix, the leading data interoperability tool from ITI.

CADfix

CADfix removes barriers preventing the reuse of solid models. By providing an extensive set of geometry manipulation tools for importing, repairing and exporting data, CADfix maximizes the reuse of CAD data in downstream applications.

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> *- Roger Pomeroy, Boeing*
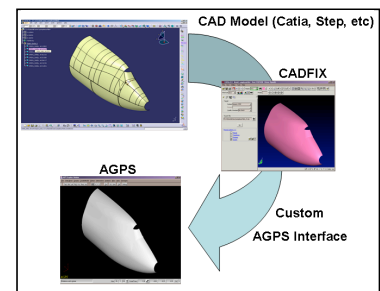
CAD to CAE process for AGPS

ITI
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CADfix, "...the best tool for the job."

CADfix is a sophisticated yet intuitive translation solution for the seamless exchange of data between different engineering systems and applications. It allows the user to import CAD data and then repair and manipulate it ready for downstream use, with the main aim of eliminating expensive CAD model repair and rework. "We chose CADfix because, given all our criteria and future objectives, it really looked like the best tool for the job," says Pomeroy.

More Than Just Software - Then and Now

Boeing chose CADfix also for the expertise and experience of the engineers at ITI.
"We always had the idea that we wanted to be able to customize whichever solution we chose, to make it a more integrated part of our systems," explains Pomeroy. "So it was important we chose a company that we felt comfortable working with, and that clearly had the expertise to create exactly what we wanted."

In 2001, Boeing and ITI set about creating a custom application. A few iterations into the process, the concept had shifted so that CADfix would provide STEP translation capability as a separate process for use within AGPS, creating an almost invisible and seamless translation environment. "For the most part, users know they are using CADfix because we have told them," says Pomeroy. "But in terms of what it looks like, most of them don't see CADfix at all... it's just there in the background facilitating the data exchange process."

Boeing/ITI Partnership Endures

In recent years, Boeing's engineers have become more familiar with some of CADfix's more advanced features and are identifying ways to integrate these into the company's own solutions. "Rather than using CADfix purely for its translation functionality, we'd like to take advantage of all the other features – like being able to do meshing, or extract other information," says Pomeroy.

This has lead Boeing and ITI are working to develop a direct programming interface, using CADfix as a kind of CAE library within AGPS from which users can extract the functionality they require. "We hope to have this integrated into the next release of AGPS," says Pomeroy. "It's a very exciting time."

Boeing's commitment to CADfix

Pomeroy has ideas of his own about the future relationship between the two technologies. "I think we should look at the emerging capabilities that CADfix is developing," he says, "particularly its ability to undertake the geometrical reasoning of a CAD model, analyze its make up and derive underlying structural information such as internal proximity, wall thicknesses and aspect ratios; and work with geometry and meshing tools which perform much better and with more intelligence than they currently do."

In whatever way Boeing's AGPS users shape the future of the system, the company's commitment to CADfix is clear. "The way we've positioned it with our users is: if there is a functionality that it is easier to get directly through CADfix, then that's what we'll do," says Pomeroy. "We know we can work with ITI... to help us create the best possible solution for our engineers, and it's now up to them to decide which direction they want the technology to take into the future."

Create Momentum

www.iti-global.com
info@iti-global.com
1-800-783-9199

World Headquarters:
5303 DuPont Circle
Milford, OH 45150 USA

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International TechneGroup