CADfix®

Flying change

Boeing, the world's leading aerospace company and the largest manufacturer of commercial jetliners and military aircraft combined, has been at the forefront of CAE for as long as there have been computers, and since the late 1970s has been developing its own specialist systems and computational codes both for internal and commercial use. Such specialist systems can create data interoperability issues when it comes to interacting with other applications, and for the last eight years Boeing has been using CADfix from ITI TranscenData, to help streamline the data exchange process and enable the accurate transfer of data between a range of CAD systems and specialist in-house CAE solutions.

In 1979, Boeing, already recognised worldwide for its aerospace innovation, launched AGPS (the Aero-Grid and Paneling System), to enable its engineers to create, manipulate and interrogate precision geometry for aerospace design applications. Now available for commercial use, AGPS was originally designed as a kind of programming language that could be modified by end-users for whatever specific aerospace design task they were trying to achieve. The flexibility and sophistication of AGPS meant its use was soon widespread among Boeing's aero-engineers.

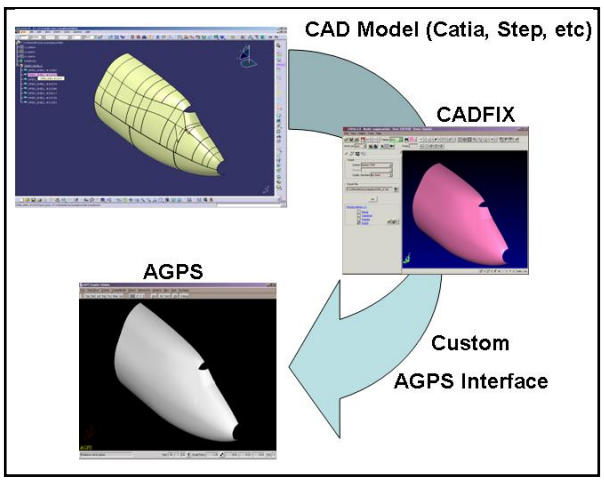
Boeing began using CATIA V4 for 3D CAD model generation in the early 1990s and it soon became apparent that a reliable data link was needed between this industry standard software and AGPS. "In 1995 we released the first version of what we call 'the bridge'," explains Roger Pomeroy, Associate Technical Fellow, Aerodynamics/Geometry at Boeing. "It is a custom-built application, developed in-house to allow users to exchange data reliably between AGPS and CATIA. It soon became our primary data exchange tool, and for those of us still using CATIA V4, is it still the tool that we use today."

Acquisition and expansion

Boeing's bespoke data translation tool was the ideal way to create a reliable link between AGPS and other applications across internal design disciplines, but 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 considerably more complex.

Following the acquisition of several companies, Boeing's engineers were receiving data from a much broader range of CAD systems. A post-acquisition research group focusing on Boeing Corporations' use of computational tools revealed widespread and significant geometry repair issues and identified an increasing number of computational tools needing effective translation support. In addition, the implementation of CATIA V5 meant that 'the bridge' was fast becoming obsolete to all but the remaining users of CATIA V4.

"Initially, we thought about completely re-writing 'the bridge'," says Pomeroy. "But our experience with the first version had taught us some valuable lessons: not only is the translation business expensive and difficult, but it is also very time-consuming – the original version took over a year to develop, and an even more sophisticated bridge would surely have taken even longer." Boeing began to look for a company 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

Boeing began to evaluate several commercially available data translation and repair tools, judging each on its complexity, ease of use, functionality and capability. "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 is not necessarily the same sort that you would actually build. In addition we needed a system that could be easily integrated into our environment, was adaptable for our needs, and with an ease of use and minimal training requirements for our extensive user base."

In 1999 Boeing chose CADfix, the leading data interoperability tool from ITI TranscenData. 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.

Customised solution

Aside from its capabilities as a sophisticated translation tool, one of the other reasons Boeing chose CADfix was for the expertise and experience of the engineers at ITI TranscenData. "We always had the idea that we wanted to be able to customise 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 TranscenData set about creating a customised application. Initially, the idea was to create a single, separate tool written by TranscenData. But 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 certainly 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 doesn't come up on screen, it's just there in the background facilitating the data exchange process."

Evolution

Boeing's original vision was to find an elegant solution to its growing data translation issues, and over the past six years CADfix has certainly delivered effective and reliable data exchange and repair for an increasing number of applications. But the story doesn't end there, and in recent years, as Boeing's engineers have become more familiar with some of CADfix's more advanced features, the company has begun to think about ways to integrate these into its 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 TranscenData to begin looking at developing 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. "At the moment we are in the process of asking users which functions in the fully interactive form of CADfix they would most like to be able to access through AGPS. So we're now in the situation where the future of the solution is in the hands of the users. It's a very exciting time."

New direction

The exact functionality of the next version of AGPS with CADfix may yet to be decided, but 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, analyzing it's make-up and deriving 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."

However 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 TranscenData 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."

CADinterop

For further information contact:

CAD Interop Europe & Corporate
info@cadinterop.com

www.cadinterop.com