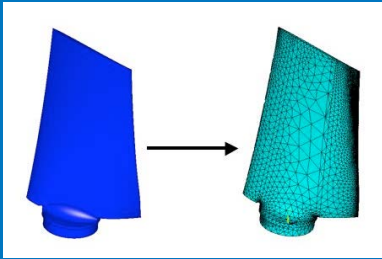


CASE STUDY: Chromalloy Overcomes CAD Data Challenges with CADfix for Streamlined FEA and Improved Accuracy

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.

The pace of change and product lifecycle only serves to reinforce the importance of solutions like CADfix



CAD to CAE Process for Blade Geometry

“CADfix accepts data from a whole range of different CAD packages. It means I don’t have to be an expert in lots of CAD systems. CADfix shows me where the problem data is and how to fix it”

*- Randy Smith,
Chromalloy Georgia*

Overview

Randy Smith, Senior Development Engineer at Chromalloy Georgia, has been using CADfix to repair CAD data ready for downstream FEA for the past ten years. In 1996, CADfix was the only solution available with the capability to do the job properly, and, according to Randy, it still is today.

Chromalloy Georgia, a division of Chromalloy Gas Turbine Corporation, is a world leader in the repair and manufacture of aircraft engine parts. The company employs sophisticated reverse engineering techniques to design and manufacture parts to the exact specification of original OEM components.

“Initially, we scan the component and then use ISD Quick Surfacar to create a model that our CAD systems can read,” explains Smith. “Once the designers are happy with the model, it then needs to be analysed to ensure the frequencies match those of the original part, and that the finished product will comply with FAA regulations.”

Challenges

Finite element analysis (FEA) is used by the company to test and identify concerns in the reverse engineering of each part. Two years ago, Chromalloy decided to bring its FEA capability in-house, in the form of Randy Smith. “I used to work for Ansys, and since then I’ve been using their software within different companies to carry out FEA on aviation components,” he says. “When I joined Chromalloy, I was able to select not just the FEA system I wanted to use, but any additional software I thought necessary for the job.”

One of the major problems in preparing data for downstream applications is the quality of the CAD model. Sometimes he carries out FEA for other divisions and the CAD data is not always suitable for the downstream CAE application. To ensure the smooth translation of data from CAD to FEA, Smith chose CADfix, the leading engineering data interoperability tool.

Chromalloy’s product development group uses two CAD systems – Pro/E and UG. “When I was looking at the various software options, I did explore the possibility of using UG’s data repair and FEA tools, but they lacked the flexibility I needed to work with other systems,” says Smith. “I was keen to use Ansys because it’s a system I trust, and CADfix accepts data from a whole range of different CAD packages. It means I don’t have to be an expert in lots of CAD systems. CADfix shows me where the problem data is and how to fix it, ready for seamless translation into Ansys.”

Smith began using CADfix while working at Ansys, running complex analyses for companies like Rolls Royce and GE. “Even back then, CADfix was a great tool for working with models that were not developed in a very good way.”

CAD and FEA technology has improved over the past decade, but, as Smith explains, the problem of inconsistent CAD data hasn’t: “If anything, it’s getting worse. The number and complexity of both upstream and downstream applications has grown tremendously, so you need a solution that can cope with receiving data in a wide range of formats and can prepare it for translation into any number of downstream systems.”

CASE STUDY: Chromalloy Overcomes CAD Data Challenges with CADfix for Streamlined FEA and Improved Accuracy

Solution

The progress of CAD technology isn't the only issue: "In the US, the big OEMs are having to cut costs wherever possible, which means the increasing use of unskilled designers, who lack the experience to create reliable models for downstreaming." This means that for engineers, it is becoming more important to have a reliable CAD translation and repair tool. "Recently, I've been using CADfix on a low pressure turbine blade with an interior cooled system," explains Smith. "The aerofoil part was fine, but the outer cover, called the shroud, and the root were not particularly well designed. I was able to open up the model in CADfix, which immediately pinpointed the problematic areas and guided me through the repair process."

CADfix enables Smith to sidestep the problem of inconsistent or poor CAD modelling, so although the use of less skilled designers is far from ideal, it doesn't ultimately affect the quality or accuracy of his analysis results. "I do back checks by re-importing models from CADfix into UG, so the designers can confirm it's a good model and see what CADfix has changed. We never have any problems with accuracy."

Result

As a long-term user of CADfix, Smith has witnessed the solution evolve over time to meet the changing needs of users. The most obvious development has been the introduction of instant fix functionality, enabling users to perform, often complex, interoperability tasks in just one click of the mouse. "Over time, I have found that I'm definitely doing much less manual geometry processing – without losing the integrity of the results," says Smith. "So it's quicker and easier to use and I still trust it to be accurate."

CADfix's developers at ITI TranscenData have also worked to make the solution more intuitive for novice or less skilled operators. As the sole user of CADfix at Chromalloy, Smith has never had to test this out before, but with FAA paperwork taking up an increasing amount of his workload, he has decided it is time to bring someone new on board to help. "I'll need to train them to use both Ansys and CADfix," he explains. "But since CADfix guides you through the repair process in a logical way, it's actually quite hard to make mistakes."

Over the past decade, Randy Smith has witnessed huge changes, both within the aerospace industry and the technologies that serve it. The volatile aerospace economy fuels the need for improved productivity, shorter development times, reduced costs and better products, and technology is playing its part to help make this all happen.

For engineers like Smith, the pace of change and product lifecycle only serves to reinforce the importance of solutions like CADfix, which evolve to meet the needs of each new generation of CAD or downstream technology, delivering accurate and reliable results every time.