CASE STUDY: CADfix Lightens the Load for Glacier Vandervell's Bearing Analysis

"We use CADfix as a tool to get data into a form we can use as quickly as possible. The real benefit to us is time saved."

- David Merritt, Senior Engineer at Glacier Vandervell

Overview

A bearing is a steel shell coated in a specialized material, typically about 2mm thick and 15mm wide. It transmits a load through two elements of an engine moving relative to each other. The structure is fairly simple, but the interactions between the bearing and the rest of the engine can be complicated. Much of the research at Glacier Vandervell goes into developing bearing materials that give better performance in terms of wear and resistance to seizure and fatigue.

If there is a problem with a bearing system in an engine or if a customer wants to look at different bearing designs or engine structures, the Advanced Bearing Technology team performs analyses to highlight the problems and how they can be solved. This could involve changing the shape of the bearing, adding different features to it, changing the bearing material or actually changing the structure of the engine.

"We analyze the bearings in the engine using a piece of software that we've developed, called Sabre-EHL. This performs an elasto-hydrodynamic analysis of the engine bearing, which couples the pressures generated in the oil film with the flexibility of the engine structure," says Merritt. "The process of setting up the analysis involves receiving CAD models from our customers, usually the connecting rod or engine block plus the crankshaft. The first task is to translate these into the software we use for the pre-processing."

Challenges

The engineering team uses MSC.Patran for mesh generation and analysis set-up. The model is then analyzed in Abaqus to obtain a stiffness matrix for the bearing surface and also the deformed bearing profile due to the interference-fit of the bearing relative to the housing during the bolt-up procedure. The data is fed into Sabre-EHL, which performs the calculations.

Usually, the OEM specifies the application and dimensions and Glacier Vandervell recommends the type of bearing that would best suit the job, based on inspection after certain test procedures. "We take all the dimensions of the structure, the stiffness and the loads that are applied and use this information to perform a lubrication analysis taking into account the oil film," says Merritt.

At a basic level the bearing only survives because there is a very thin oil film separating it from the crankshaft. The crank is riding on a film of oil that may be no more than 0.1 of a micron thick in some places. The success of that oil film determines how well the bearing performs.

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.

ITI
a wipro company

ITI is the global leader providing reliable interoperability, validation, and migration solutions for product data and related systems. Our customers recognize the value in having a trusted solution partner that provides more than just software. ITI solves complex product data interoperability problems so that the world's leading manufacturers can focus on making great products. You need to keep your engineering initiatives moving forward.

CASE STUDY: CADfix Lightens the Load for Glacier Vandervell's Bearing Analysis

Solution

Because the engineers at Glacier Vandervell are dealing with CAD models from customers, the ability to translate data reliably and accurately is a major issue. In the past, the process of getting a customer's model into a form that could be meshed was time consuming.

"We have Pro/Engineer here so we're able to take Pro/E files from customers. We use MSC.Patran for pre-processing and are able to import Pro/E files via a direct link. This is fairly successful but not 100 percent reliable. In the past for all other CAD software we had to rely on an IGES file. It was the amount of time that that process was taking that led us to think that it would be good to look at CADfix," says Merritt.

CADfix is a suite of translation and repair tools for engineering product data that facilitates true interoperability between a comprehensive selection of CAD, CAM and CAE systems. The software removes significant barriers that can hamper the reuse of solid models.

Result

The benefits Glacier Vandervell has experienced through adopting CADfix are typical and illustrate the importance of addressing the challenge of engineering data interoperability. "We use CADfix as a tool to get data into a form we can use as quickly as possible. The real benefit to us is time saved," says Merritt. ITI's own research suggests that up to 80 percent of a typical engineering design project is wasted on reworking data.

More manufacturers are turning to CADfix because they employ qualified engineers to engineer things, not to spend time remodeling CAD files from scratch. Merritt concludes: "We are saving between a half and four man days per project, depending on the complexity of the model. In percentage terms, the amount of model re-working has been reduced by around 90 percent and the total model setup time reduced by around 50 percent."

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

5303 DuPont Circle
Milford, OH 45150, USA