# DuPont Solves Data Interoperability Puzzle

## 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.

At the cutting edge of polymer research, companies like DuPont are finding more ways to make plastics prevalent in our lives. As plastics parts are generally lighter and less expensive to manufacture than many "traditional" materials, it is no surprise that manufacturers choose polymer-based substances as soon as strength and durability are proven.

DuPont Engineering Polymers supplies a vast range of modern manufacturing materials. Perhaps more importantly, the company is called upon to assess manufacturing feasibility and end-product characteristics for customers. Many of DuPont's customers are first and second tier automotive suppliers. In this environment, defects in finished components can mean losing a lucrative contract. "Companies like Ford are pushing design responsibility further and further down the supply chain," says Paul Abraham, Engineering Manager at DuPont. "Often they will provide broad specifications and it will be up to the suppliers to come up with the detailed design. This places more burden on us, as we are called upon to make sure the chosen designs are going to work."

## Analysis Tools

DuPont uses an established set of tools to assess designs. ANSYS is used for general structural analysis and Moldflow for specialized plastic molding simulation. For these tools to be effective, though, fully defined 3D representations of the proposed designs are required. Until recently, this slowed down the process.

"Three years ago our main communication medium was still the engineering drawing," explains Abraham. "We would manually translate drawings into 3D models in our own CAD system – or sometimes directly in ANSYS – and move on to meshing and solving from there. Not perhaps an ideal system – but one that worked well."

The past couple of years, however, the use of desktop solid modeling has increased, along with the complexity of computer-aided designs. Now designers are unwilling – or unable – to translate their efforts into engineering drawings, and the modem is becoming DuPont's primary tool for communicating design intent.

## Data Limitations

But placing such emphasis on 3D models reveals limitations in data communication. Even with a modest number of modeling kernels, there is still a wide range of proprietary formats across the solid modeling market, each with quirks and peculiarities. Even "standard" file formats, such as IGES, are causing problems. IGES (and other specifications) is handled so differently at import and export by each CAD/CAM/CAE tool that relying on IGES alone is a recipe for disaster.

DuPont has used IGES for some time, but typically this has required significant rework of 3D data to isolate and correct errors and inconsistencies following the IGES import.

## Bridging the Gap

Fortunately, DuPont has found a way to reuse CAD data without costly and time-consuming remodeling. "When we saw CADfix we knew immediately that it was exactly what we had been missing," said Abraham. CADfix has powerful tools for assessing geometric and topological

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imperfections in solid models and for making corrections to cure them. Much of the time this can be performed automatically, but users tend to step through the corrections interactively. An initial analysis highlights graphically which surfaces are incorrectly connected and need further attention, and merges any duplicated points, edges, surfaces and faces. The user can then step through the detected imperfections and chose a method for curing them, typically closing a loop or fusing edges that lie within a specified tolerance. The end result is a fully formed, closed solid model that can be taken to a downstream application – in DuPont's case a finite element analysis (FEA) package.

## Flexibility and Productivity

"With CADfix we have managed to eliminate any in-house solid modeling altogether," explained Abraham. "We can now confidently take IGES files from any CAD system and process them in CADfix before going straight to analysis. As a result we are working with a truer representation of the proposed design and we can therefore perform more accurate analysis."

The real benefit, though, is in time savings. Abraham estimates that, on average, the previous way of working – often involving complete part remodels – involved up to three times more work for each component. "I would estimate that in about 95 percent of cases we can make a good solid model in a short time with CADfix," he says. "This greatly increases our analysis capacity and therefore boosts the service we can offer our customers. Analysis is effectively completed far quicker, we can perform more design iterations and the end-products are better engineered as a result."
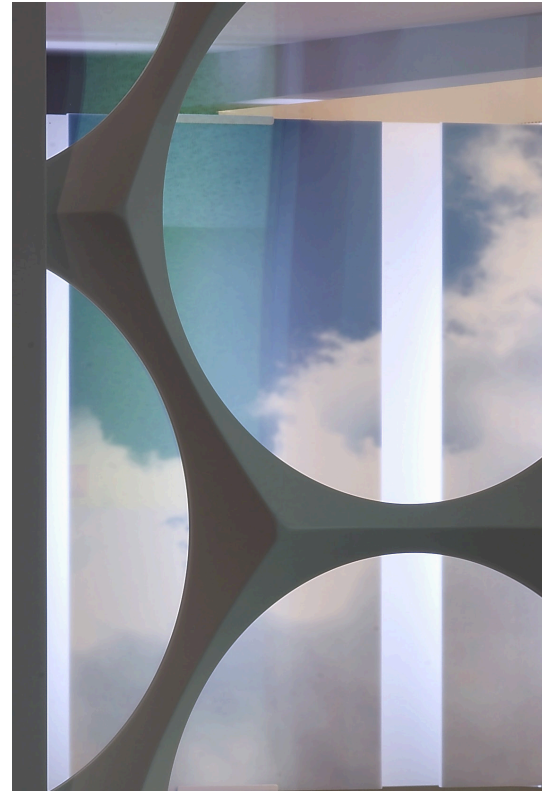
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