

From Forensic Analysis to Predicting Design Function

Why structural and thermal simulation is now an analysis tool for every design engineer

Pro/ENGINEER® Structural and Thermal Simulation provides simple, quick, accurate analysis capability that's integral with the Pro/ENGINEER design environment. Now it's easy and accessible for every design engineer to simulate the function of their product design and ensure it works the way it was intended.

In the Beginning...

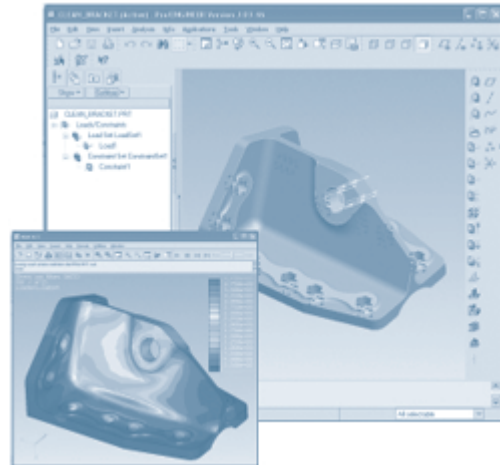
To understand why traditional analysis applications are unsuitable for today's product design engineers, we need to look at their origin.

Analysis applications, originally developed for automotive and aerospace engineers, were designed to determine the root cause of product failure. Once a design failed, analysis would be performed to better understand the mechanism by which this occurred. These applications were clunky, slow, and hard to use. Moreover, they required the user to be a finite element analysis (FEA) expert with an understanding of FEA theory.

Analysis Not in the Designer's Domain

Traditionally, the majority of design engineers avoided analysis or functional simulation, not only for the reasons cited above, but also because these traditional applications weren't integrated into mainstream design tools. They required too much time and effort to use, and since the primary responsibility of design engineers is product design, instead of delving into analysis tools, these engineers would count on physical prototyping, educated guesses, a handbook, and their experience to validate their design.

This seemed sufficient – but was it? In previous generations, many, if not most engineers designed without considering the negative impact to their product or the possibility of dire consequences. But in today's environment, where the pressure to produce differentiated products that are low cost, high quality, and that serve market and customer needs is intense, there is a new mandate to 'design it right the first time', design it fast, and without failure.



"I was amazed at how fast I was able to produce accurate stress results...."

- **Derrick Rogers**, Lead Technical Engineer, Miss Budweiser Racing Team; Loads and Dynamics Engineer, Boeing Commercial Aircraft

Simulation for Every Engineer

Today, every design engineer needs to ensure their product design is the best it can be and that it's nearly perfect when it gets to production. And they need to find any means possible to ensure that level of quality. Today, with Pro/ENGINEER Structural and Thermal Simulation, analysis and functional simulation is within easy reach of every engineer, on any level. The ease and intuitiveness of this solution means the majority of design engineers need only be good engineers—and not experts at analysis—to capitalize on the capabilities of design simulation.

Uniquely Qualified

Pro/ENGINEER Structural and Thermal Simulation offers a number of uniquely powerful capabilities designed to make analysis easy for any design engineer. Because it automatically drives toward, or converges, a solution without requiring user intervention, the design engineer doesn't need to be an expert in results interpretation, or even understand FEA theory, to converge on the most accurate solution – the first time.

Because of its native application structure, scaling up to the Advanced Structural and Thermal Simulation capability is as easy as flipping a switch.

'Native application' in the Pro/ENGINEER Family

Automatic solution convergence that delivers accurate results the first time is a large part of what makes Pro/ENGINEER Structural and Thermal Simulation the best solution for every design engineer. Yet, there's another essential piece. Analysis applications must be more than simply 'integrated' with MCAD tools. Unlike other traditional analysis packages that claim "integration" to the design environment, Pro/ENGINEER Simulation is built to work within the design environment as a native application of the product family.

How important is the difference between "integrated" and "natively developed?" According to ITI, Inc., a leader in the development of consulting and applications development for data transfer, import and export, up to 70% of analysis time is wasted transferring data between different CAD and analysis packages. As a native application, Pro/ENGINEER Structural and Thermal Simulation eliminates that wasted time entirely. With just a click of a mouse design engineers are off and running, simulating the function of their product design. It's fully associative at all application levels, with a consistent user interface that optimizes the design engineer's productivity.

As design engineers begin to use Structural and Thermal Simulation in their everyday design routine, many will want to engage its full capability and optimize its performance. Because of its native application structure, scaling up to the Advanced Structural and Thermal Simulation capability is as easy as flipping a switch. Because it's part of the Pro/ENGINEER family, the more powerful, advanced structural and thermal capability is available within the same design environment, making it a truly scalable application where design engineers can progress from simple to advanced at their own pace, as their needs develop.

Valuable Gains to be Realized

With Pro/ENGINEER Structural and Thermal Simulation, every design engineer can:

- Easily test, analyze, and optimize their design—every time
- Design confidently, knowing that the design will not break under normal – even extreme – conditions
- Optimize their design for whatever initiative is currently underway – be it design for cost, design for quality, or design for reliability

Working Without Precise Loading Values

Often, engineers who are new to simulation software will ask: 'What if I don't know the loads or how to constrain them?'

This is a common concern. Even if the exact values of the loading or methodology of constraining cannot be obtained, it is often valuable to apply the loads and constraints you think the models will be subjected to, and gain a fundamental understanding of where the failure areas may end up. It boils down to the question, 'Is any information better than none?'

Others often ask:

'Are you advocating not building physical prototypes?'

Clearly, building physical prototype still adds value to testing and validating your final design and manufacturing techniques, but design concepts should be tested through frequent simulation, not through frequent physical prototypes.

Better Designs — Faster

At the end of the day, design engineers are always looking to create the best design in the shortest time. Getting there is easier than ever with Pro/ENGINEER Structural and Thermal Simulation software. And in the end, you can produce a better design, faster.