Carl Zeiss Meditec sees 100% increase in product sales with Creo™ Elements/Direct™ Modeling

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Carl Zeiss, Jena, Germany

For more than 100 years, Carl Zeiss Meditec has been providing products and services to improve people's eyesight. Carl Zeiss Meditec today is one of the world's leading suppliers of complete system solutions in the field of medical technology for ophthalmology. The company is based in Germany and has subsidiaries in the USA and Japan. Recognized service and ongoing innovation have enabled Carl Zeiss Meditec to maintain a high level of customer loyalty and provide a high standard of patient care with maximum efficiency.

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– Chris Baker (far right)
Director of Mechanical Engineering
Carl Zeiss Meditec

The challenge: Redesign existing product for new market

- Compress a large instrument designed for hospitals and universities down to a size suitable to fit into private medical offices
- Incorporate the delay line z-scanner, a promising technology previously considered inherently unstable and hence unsuitable for commercial instruments
- Provide an extreme cosmetic makeover for an outdated exterior casing
- Pass off 30% of project design to a new hire in mid-cycle

The solution: Direct modeling solutions from PTC

- Creo Elements/Direct Modeling design software
- Add-on modules: Creo Elements/Direct Surfacing, Creo Elements/Direct Sheet Metal & Creo Elements/Direct Finite Element Analysis

The results: New product delivers impressive sales results

- Stratus OCT™ introduced, generating consumer sales of more than $100 million in its first two years on the market
- Device size reduced by 50% to fit a single, ergonomically designed workstation
- Reliable, consumer-ready, delay-line technology incorporated as integral product component, greatly increasing scan speed and resolution
- Sleekly curved cosmetic surface created for exterior casing
- New engineer taken from new hire to fully contributing project designer in weeks

Precision matters whenever Carl Zeiss Meditec creates a new product; people's eyesight depends on it.

But the bottom line matters, too. In designing the Stratus OCT, their latest diagnostic imaging device, Carl Zeiss Meditec had to work a little magic. They had to transform an existing, massive instrument into a compact, high-speed and high-resolution instrument for use by ophthalmologists and optometrists. The new device would help detect glaucoma and retinal diseases.

Chris Baker, Director of Mechanical Engineering, and his design team were asked to increase the scan speed by at least a factor of five. There were two technologies available to achieve this. One was expensive and required a spinning precision rotor. The other, using the delay-line principle, was less expensive, but there was a problem: it had never been developed commercially and, typically, it required someone to adjust it every few minutes to keep it aligned. Baker was advised against developing the new product by colleagues who had used this technology before.

With 22 different possibilities for misalignment, the scanner had to be operated in a controlled room isolated from temperature change and environmental factors. Even the gentle breath of the operator could disturb the alignment of its 5-micron fiber-optic component. But it was attractive; unlike the precision spinning disc, the depth of scan could be varied and the resolution was better due to dispersion compensation. Baker decided to "go for it" and began development of a scanner that could survive minus-40 to +70 degree C shipping temperatures and drops equivalent to the packaged unit being pushed off the back of a truck.

Carl Zeiss Meditec provides complete system solutions in the field of medical technology for ophthalmology.

While the scanner was the core technology, the team would also have to cut the size of the existing instrument in half and give its outdated exterior casing a makeover. The finished product needed to be compact enough to fit into small diagnostic offices, and it needed cosmetic appeal.

These requirements made quite a shopping list, but Baker's team knew where to turn: Creo Elements/Direct Modeling and its add-on modules. The company has used Creo Elements/Direct's 3D CAD software for more than 15 years. They prefer Creo Elements/Direct Modeling to other 3D CAD programs because its direct approach streamlines learning, use, and team collaboration.

Creo Elements/Direct Modeling is a key ingredient to the team's productivity. "We just don't have time to spend worrying about our design tools. And with Creo Elements/Direct Modeling, we don't have to. Anybody can pick it up and run with it," says Baker. "Creo Elements/Direct's direct, intuitive approach makes our design process both creative and efficient."

Baker cites the savings he gets from quick training cycles. In Creo Elements/Direct Modeling, he says, in just four weeks, new hires can acquire skills that would require three months to learn in a parametric-based 3D CAD program.

For example, Tim Surber, Senior Mechanical Engineer, was hired when the Stratus OCT project was already underway. He immediately took over responsibility for some 30% of the project design.

"At my last job, their parametric-based design program took me months to learn. Even then, it was complex. If we didn't know the history of someone else's design, it could blow up in our faces when we touched it," says Surber. "It's much easier to come up to speed on Creo Elements/Direct Modeling. I progressed on my designs that first week, and within a month I was completely productive."

Baker's team has built a collaboration-based design approach around Creo Elements/Direct Modeling. "Our team is all about concurrent development and iterative design. We work on each other's designs every day," says Chris Wing, a senior designer at the Dublin, Ireland branch.

Wing also worked closely with Leon Marucchi of the industrial design house Impact by Design, 3000 miles away in New Jersey (USA). The new Stratus OCT, with its complex cosmetic surfacing, required constant refinement. "The design was half about getting a good fit and half about finding the right look," says Wing. "The Creo Elements/Direct Surfacing module gave us the freedom to experiment with those surfaces, and we could pass all our designs back and forth."

Marucchi says that Creo Elements/Direct Modeling is the only 3D CAD software that enables this flexible, iterative process. "With Creo Elements/Direct Modeling, you can design on the fly–shape designs, splice parts, lop off pieces you don't like. I've used parametric-based systems in the past, and they just don't measure up. Creo Elements/Direct Modeling lets me create large assembly designs in two-thirds or even half the time that a parametric-based system would require. With these benefits, any industrial designer will jump at Creo Elements/Direct Modeling."

In the end, Baker's team completely reinvented the original research instrument. The resulting product, the Stratus OCT, greatly improved the resolution and speed of the research instrument. At the same time, the size was reduced by half. The Stratus OCT is a sleekly contoured device that uses one monitor and fits on a single, ergonomically designed workstation–a far cry from its massive predecessor, which included two full-sized monitors and two large tables. In the two years since it hit the market, the Stratus OCT has generated consumer sales of more than $100 million (US), a happy surprise for Carl Zeiss Meditec, which had projected sales of less than half that amount.

Baker attributes much of the product's success to the achievements his team made using Creo Elements/Direct Modeling. Perhaps the biggest of these achievements was their redesign of the z-scanner technology, turning it into a commercially viable technology. Not only does it operate at variable temperatures, but its alignment is always correct–even withstanding the impact from dropping the instrument. Thanks to Creo Elements/Direct Modeling, it will be easy for Carl Zeiss Meditec to reuse the z-scanner design in future products.

"Creo Elements/Direct Modeling is truly team-modeling software," says Baker. "Over the past ten years, our sales have tripled, while the mechanical engineering design team has remained much the same size. Much of this can be attributed to our increased efficiency using Creo Elements/Direct Modeling, which has made effective, collaborative design an everyday part of doing business."

Design for medical technology for ophthalmology is done via direct modeling with high flexibility and ease of use.

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