

ThermoJet Printer Cuts Design Development Cycle by 35% at Symbol Technologies

Sector:	Consumer Goods
Technology:	ThermoJet® printer

Symbol Technologies in Holtsville, N.Y., has completely revised the way it designs handheld computer terminals. The company uses three-dimensional computer-aided design (CAD) software by Alias/Wavefront and SDRC to conceptualize and develop its designs. Rather than making foam mockups, it produces real-time full-size prototypes on the ThermoJet® solid object printer.

Symbol estimates that it has reduced the costs of designing products by eliminating the need for more expensive visual prototypes. The ThermoJet printer has increased the company's ability to explore more design options while reducing its time-to-market by 35%.

The key to this rapid design turnaround is the company's new ThermoJet printer from 3D Systems in Valencia, Calif. The three-dimensional printer uses a thermoplastic material to produce life-size replicas of new handheld terminals directly from computer data, which permits industrial designers, engineers, suppliers and focus groups to see and feel the new design.

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Curt Croley, Symbol Technologies

Handling the Handheld Explosion

Symbol Technologies is a world leader in mobile data management systems and services. It builds a host of laser bar code scanners, handheld computers and wireless communication networks for voice and data. Its products are used in retailing, transportation, logistics, warehousing, manufacturing, health care, education, government, military, hospitality and finance.

Symbol's wireless network solutions are installed at more than 45,000 customer locations, and more than 7 million Symbol scanners and mobile computers are in use worldwide. Thanks to developments over the last several years in electronics, wireless communications and computers, the market for handheld devices of all kinds has virtually exploded. Symbol has managed to keep up with the fast-growing market, remaining the leader with its innovative designs and winning several impressive awards, including the 1999 National Medal of Technology.

"Symbol has been around for 25 years, but the design department has been in existence for less than seven years," says Curt Croley, senior industrial designer. "It started off with one person doing it all, but we've had so much success that we've grown to 10 people."

Delivering Designs by the Dozen

Symbol began its design group by interfacing with outside suppliers for design and modeling services. Typically, it would commission a design to be developed and models to be made on a CNC machine or built out of foam. The CNC models would take three to five days, while the foam models could take a week or more, depending on complexity.

In January 2000, Symbol acquired a ThermoJet printer, and the design task changed dramatically. Suddenly, the industrial designers had prototypes in their hands within hours. "When we're dealing with handheld devices, we need to be able to feel the object," Croley says. "The ThermoJet printer let us obtain the intricate detail needed to evaluate a device. So we started using it at once."



Symbol Technologies created mock-ups of its hand-held scanner by using 3D Systems' ThermoJet printer.

One of the first benefits of the solid object printer they noticed was the speed. The turnaround time for a model decreased from a week or more to a few hours. "In one case, I sent out a design at 9 a.m. and got it back by 3 p.m.," says Jorg Schlieffers, a senior industrial designer. "It came back as a fully assembled, handheld device."

The ThermoJet solid object printer builds three-dimensional models from CAD files by rapidly depositing layers of a wax-like thermoplastic from the bottom up. In many cases, three-dimensional parts are fabricated full size. If a part is too large for the printer, a scale model can be made, or a large part can be made from several smaller parts. Parts made from the material are highly detailed and often can be painted or finished. Because the material used by the ThermoJet printer is opaque and the layering is fine, the resulting parts are ideal for designers and engineers to evaluate complex contours. In some cases, the result is a model that is indistinguishable from a real part.

"These prototypes are not just for designer use," Schlieffers explains. "We use them for day-to-day building assignments, engineering and evaluation of the ergonomics."

With so many hands involved, the design gets changed very often. "For one design of a handheld scanner," says Schlieffers, "we cranked out seven iterations. Every single day the design got changed, and we produced new models – sometimes one or two a day."

This design process would have been impossible with foam or the CNC system. "In the old days, we would build one model, with one or two revisions," Schlieffers says. "Now, it's not unusual for us to get 20 or 30 models generated in a one- to two-week period."

Industrial Designers Lead the Way

"What we've done here at Symbol is compress the development time," says Shane MacGregor, an industrial designer. "In the same amount of time it would take other designers to create a two-dimensional set of engineering drawings, we get back a model that you can hold in the palm of your hand."

MacGregor continues, "The engineers make sure that the tolerances will work and the design can be manufactured. Everything we do is concurrent with engineering. It's not based on me finishing the design and then having them take over." The industrial designers are getting very good at understanding the engineering requirements, so they're turning the designs around much faster. "We have a more refined design, so we spend much less time than we did previously," Croley says. "We can catch nuances very early. The fact that we can design something in one day and have a prototype of it the next means that we can evaluate our designs very early."

Croley estimates that they have cut the new product development time – which previously required from eight to 12 months – by two-and-a-half months. This covers starting with a blank sheet of paper, moving through the design and evaluation process, straight to tooling for manufacturing.

"Thanks to the ThermoJet printer, we've removed all the inefficiencies from the process. We can attribute at least 35% of the time savings to the printer," Croley says.



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