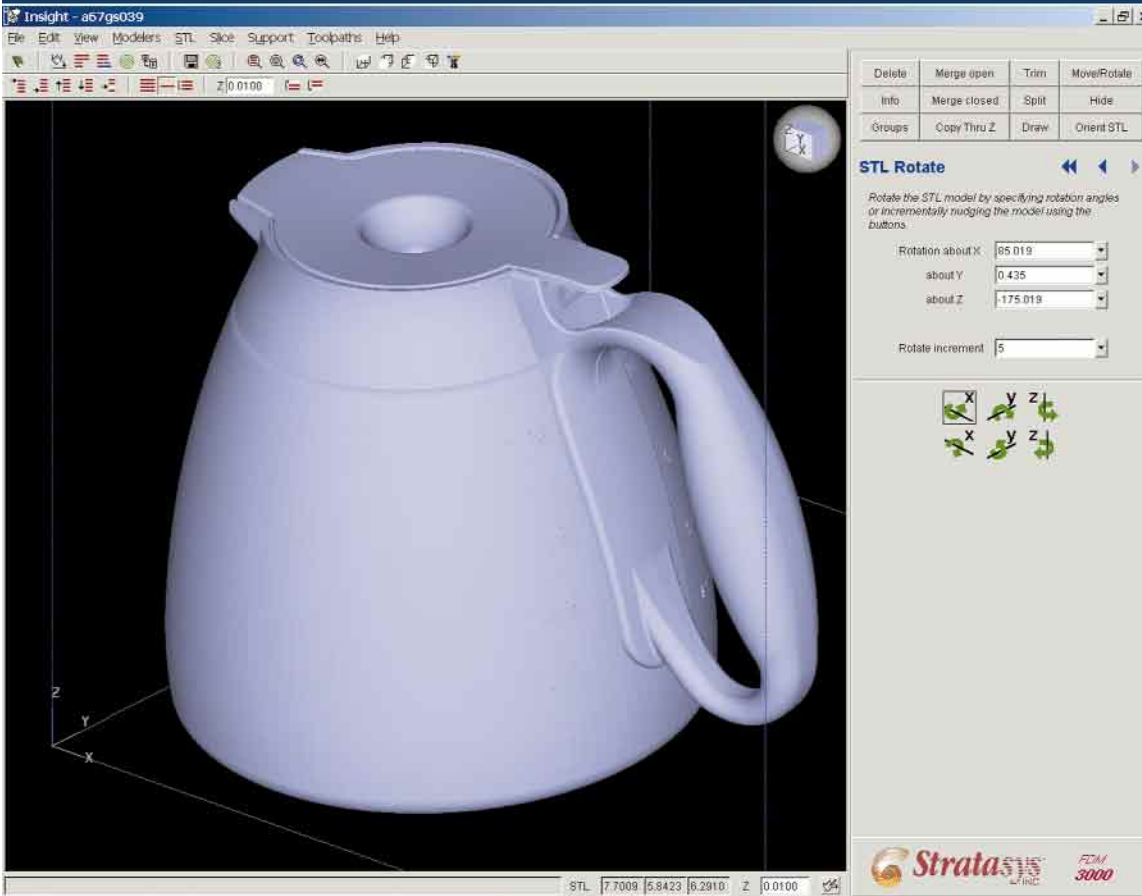




STRATASYS®

CASE STUDY



MANUFACTURER:

*Access Business Group,
development division*

APPLICATION:

*Build prototypes for
appearance and
functional tests*

PRODUCTS:

Small appliances

CHALLENGE:

*Improve dimensional
accuracy and reduce
product-development time*

SOLUTION:

*Rapid prototyping with
fused deposition modeling
(FDM®) process*

RESULTS:

*New products reach
market faster*

*Improved quality of
products*

*Nearly 1/4 million dollars
saved in 19 months*

**MANUFACTURER SAVES
NEARLY ONE-QUARTER-
MILLION DOLLARS BY
BRINGING FDM RAPID
PROTOTYPING IN-HOUSE**



“You can build an entire assembly at one time – even with interlocking parts,” says Rudy Kool, Group Leader at Access Business Group’s Development Division. “You can also build pressure vessels and functional parts that can be tested.” Kool helped make the decision to bring FDM (fused deposition modeling) rapid prototyping to Access, and he recently retrofit the system with the WaterWorks™ soluble support system. Rapid prototyping has enabled Access to design in ways they previously couldn’t.

Access is a unit of the Alticor family of companies, which includes Amway Corp., Quixtar Inc. and Pyxis Innovations Inc. Alticor had estimated retail sales of \$5.1 billion in its fiscal year ending August 2000.

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Eric Bartkus
Access Project Engineer

Access has a world class operation and facilities from which it develops, manufactures, and distributes high-quality products worldwide. It is supported

by 3,600 employees.

Although the company is known for its consumable products, it also makes durable products, such as coffee makers, vacuums, and water filters. Development and manufacturing for most of Access’s products takes place at headquarters in Ada, Michigan.

Like many companies that have purchased rapid prototyping (RP) systems, Access made the move gradually from constructing models by hand to using an RP service bureau, to bringing RP in-house.



THE CHALLENGE:

Improve dimensional accuracy and reduce new-product development time

According to project engineer Eric Bartkus, the main reason for Access’s migration to rapid prototyping several years ago was to reduce the difficulty in achieving dimensional accuracy and to reduce the time needed to create models. “We wanted to get physical models more quickly and ones that looked more like what the real parts would look like,” he says. “We first started using service bureaus in about 1991. Before FDM, we used bureaus that modeled primarily with SLA, but we also tried SLS.”

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Access first considered purchasing one of the two kinds of RP systems that they had used through service bureaus. “The laser-based RP systems weren’t conducive to an office environment,” Bartkus says. “And we didn’t have a laboratory dedicated to rapid prototyping. Nor could we support a trained resource dedicated to the process. We just didn’t have the budget available to support a piece of equipment like that.”

“When FDM arrived, it could do everything we wanted it to,” Kool says. The biggest advantage that the FDM process offered Access was the durability of the ABS models. “Back when we were considering different systems,” says Bartkus, “we compared the strength of the parts built with the FDM process to parts built using the other processes. Models built with the SLS process didn’t have anywhere near the strength of the FDM models.”

“The Stratasys FDM process is the only rapid prototyping method able to model in ABS plastic,” says Kool. We knew it would help us gain a competitive advantage on design.” So in 1997, Access purchased a Stratasys FDM 2000.

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Eric Bartkus
Access Project Engineer

THE SOLUTION:

Access brings FDM rapid prototyping in-house

After purchasing the FDM 2000, Access kept it busy. One advantage of the system is its ability to build parts unattended, according to Kool. "For a while, we were averaging building a part a day," he says. "At times, we had it running around the clock: overnight and on the weekends. It's a fairly robust machine."

Access has found that ABS models make good liquid container models. "When we were developing a water



purifier," says Bartkus, "we were able to make a working model of a pressure vessel. Once sealed, it could hold water at 40 psi of pressure."

More recently, Access used the FDM system to model a coffee carafe for one of its products, the KAHVE coffee maker, introduced last year. One of the project's challenges was to design a stylish handle that would have a good fit and feel for all sizes of hands. "The FDM 2000 gave us immediate feedback to help us fine-tune the design," says engineer Steve Mork.

Access also created an RP model of the coffee maker itself to use in a rapid tooling process. The tool was poured around the model to form the cavity and the core. From the mold, Access built a short run of 100 units for testing. "The FDM 2000 has enabled us to achieve faster production-tool delivery," says Bartkus. "And it has allowed us to get better products to market faster."

During development of the coffee maker, Mork estimated that using the FDM system shaved 15 days off the schedule. "At an average program cost of \$1,000 a day, that adds up quickly. The result of using the FDM system is that we can get products to market quicker and bring in revenue returns earlier."

Last year, Access retrofit its FDM machine with the WaterWorks soluble support system from Stratasys. With this system, users place their parts in a water-based solution that dissolves the support material. "We've found that we get a smoother surface finish from the parts made with the soluble support material. And we save time by dropping the part in the tank and letting it do the work of support removal."

Referring to FDM's ability to build an entire assembly in one piece, Kool says. "It has a major advantage over other rapid prototyping processes. It gives you the economy of speed because you don't have to do multiple builds or assemble the parts. And with the soluble support process, you can dissolve out any difficult-to-reach support material inside the mechanism." Because the support material dissolves wherever water can reach, users can now make parts that were previously impossible to build.

"Over the course of 19 months, we built about 450 models. This would have cost us nearly a quarter million dollars through a service bureau. The FDM system has paid for itself several times."

***Rudy Kool
Access Group Leader***

Kool says typical development time for a consumer product can range anywhere from 9 to 24 months depending on the product. "Of course we're always trying to make improvements," he says. "The FDM system has helped tremendously in reducing development time." "Over the course of 19 months, we built about 450 models. Had we not brought RP in-house, this would have cost us nearly a quarter million dollars through a service bureau. The FDM system has paid for itself several times."



STRATASYS®

The FDM Process

The FDM process begins with Stratasys software, which processes an STL file in minutes, mathematically slicing and orienting the model for the build process. If required, support structures are automatically generated. The machine dispenses two materials, one for the model and one for the support structure.

The modeling material comes as a roll of filament wound on a spool. During operation, the filament is fed into an extrusion head and is heated to a semi-liquid state. The head then extrudes the material and deposits it accurately in thin layers. The model is built from the bottom up – one layer at a time.

FDM systems come with one of two support-creation systems: Break-away support system (BASS) or soluble support system (WaterWorks). BASS supports are manually removed, leaving a smooth surface. WaterWorks supports are dissolved in a water-based bath for easier finishing.

ABS parts made with the FDM process can be functionally tested, sanded, painted, and drilled. FDM machines can also create tooling patterns and masters. Depending on the model, FDM systems can build parts from Polycarbonate, ABS plastic, ABSi (medical-grade) plastic, investment casting wax, or elastomer.



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