

SITUATION

Hamilton Beach (HB) wanted an innovative way to filter the water used in its automatic drip coffee makers. The company determined the basic concept for the product, which was to be fish-shaped and inserted into the coffee maker water chamber. It also established the performance requirements for the filter, including absorbing impurities such as chlorine. Due to HB wanting to stay focused on the design of its coffee makers and keep progress moving on the filter, it turned the filter project over to Leyshon Miller Industries, Inc. (LMI). HB contracted with this Cambridge, Ohio-based firm to create and optimize the design, build and refine prototypes, and create the production tooling. LMI had to do it very quickly because HB's goal was to introduce the fish at the same time as the new coffee maker (which was already in tooling). To meet these challenges, LMI relied on an integrated CAD/CAM/CAE software system.

OBJECTIVE

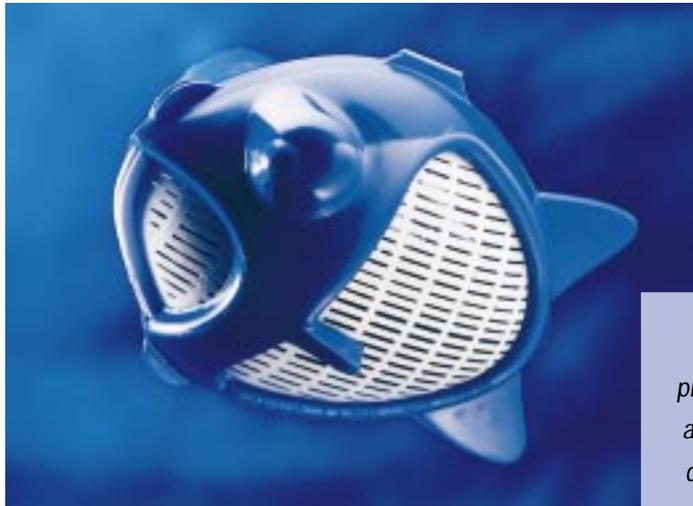
Get client's concept into production as efficiently and quickly as possible.

PROCESS VISION

- ✓ Use the design-for-manufacturing approach in which manufacturing considerations are brought to bear on the product at the beginning of the cycle.
- ✓ Support design-for-manufacturing by permitting widespread access to design data. Use one CAD/CAM/CAE system to simplify data access by project members.

ACTIONS

- ✓ HB's industrial design team had rendered the fish concept in Alias conceptual design software. They then exported it to LMI in IGES format.
- ✓ From the client's IGES file, LMI engineers created a solid model of the water filter in I-DEAS™ software. The model was analyzed and optimized for fit, function, manufacturability, and adherence to strength specifications in only eight weeks.
- ✓ Early client reviews were performed electronically. LMI sent CAD data to HB, which also uses I-DEAS Master Series™ software, via e-mail or FTP software. In keeping with the design-for-manufacturing philosophy, the production molder also reviewed the initial design.
- ✓ LMI created a prototype of this design from the I-DEAS model using Stratasys' fused deposition modeling (FDM) system. The two-part



LMI Puts Hamilton Beach Design in the Swim

"SDRC's software provides a platform that allows our engineers to do everything required for the job: cosmetic renderings for design reviews, solid models for easy translation to rapid prototyping, finite element modeling for analysis, detail drawings, and toolpath generation."

- Frank Leyshon
President, Leyshon Miller
Industries, Inc.



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LMI Puts Hamilton Beach Design in the Swim

prototype was generated on two Stratasys machines running concurrently and was ready in less than 24 hours.

- ✓ Prototypes were sent to the client, where focus groups used them to determine market potential. They were also sent to the production molder for performance testing. Two problems were found: the fish floated and it wasn't large enough for the performance the client wanted. LMI modified the I-DEAS file to reflect a change in material (to polypropylene to solve the floating problem) and to increase the size of the device. The ease with which geometry can be modified in I-DEAS software enabled them to make these changes quickly. LMI could change and grow the entire fish design easily – by just changing a few design drivers, everything else changed associatively and updated automatically, eliminating the need for massive changes.
- ✓ After a second prototype reflecting these modifications was approved, LMI converted the design into production injection mold geometry in I-DEAS. Then, using I-DEAS Generative Machining™ software, that geometry was used to create the toolpaths for cutting the injection molds.

RESULTS

- ✓ The new product, called the Puranha™, was on store shelves six months after LMI took on the job. Using I-DEAS, LMI had accelerated its production schedule to produce the fish.
- ✓ One of the advantages of using I-DEAS on this project was its ability to import and export good clean IGES files, such as the conceptual design from the client and the tooling data for the mold maker.
- ✓ Early detection of the two problems using the FDM prototypes saved LMI between \$20,000 and \$30,000 in retooling costs alone; and the schedule would have increased by more than eight weeks had they proceeded without the rapid prototyping capabilities.
- ✓ The tooling was complex with mostly freeform surfaces and small rib details that were difficult to machine, and this project was the first time LMI had used I-DEAS Generative Machining. Even so, they were cutting steel within one week.

PLANS

LMI is making I-DEAS its total manufacturing solution and is also expanding its use of the I-DEAS analysis tools. LMI will be busy using I-DEAS on many new projects. By meeting the goals established by Hamilton Beach, LMI has landed more contracts.

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