

## SITUATION

Intense competition among laser printer manufacturers keeps driving prices down. Unless development and production costs also drop, prices become uncompetitive. That was the situation Lexmark International faced when it began the design of a new line of printers. To remain competitive and grow market share, Lexmark International re-engineered the way it develops products. This required an integrated modeling, analysis, and manufacturing process that permits time for reducing weight, minimizing part count, designing for manufacturability, and otherwise optimizing designs.

## OBJECTIVES

- ✓ Develop a higher performance, lower-cost laser printer family by:
  - reducing the number and weight of plastic components;
  - combining multiple functions into single plastic parts wherever possible; and
  - bringing aspects of development and manufacturing in-house to reduce dependency on foreign suppliers.
- ✓ Deliver 24 pages-per-minute speed and true 1200 x 1200 dpi print quality.
- ✓ Create a bold new appearance and improve ease-of-use.
- ✓ Implement the new product development process and tools, while still delivering the product on time.

## PROCESS VISION

- ✓ Start from a clean sheet to develop and prove a new product development process that:
  - Integrates design with up-front analysis to reduce weight while maintaining structural integrity.
  - Uses modeling and simulation capabilities to reduce assembly costs and part count.
  - Enables the transfer of electronic design data directly to manufacturing to shrink tooling and production costs, and also reduce turnaround time.
  - Eventually will enable the elimination of drawings.
- ✓ Assemble the tools and empower the talent to implement the plan.



# LEXMARK DESIGNS TO DRIVE DOWN COSTS

*“Our challenge in designing the new Optra S line of laser printers was to meet or surpass industry standards for performance and print quality, while cutting costs everywhere we could. SDRC I-DEAS® software contributed to our success at meeting those goals, which included achieving a 15% cost reduction.”*

— Dave Buckles, Manager,  
CAD/CAM System and  
Analysis

## ACTIONS

- ✓ Lexmark and SDRC's consulting group worked together to develop a new concurrent approach to product engineering, with I-DEAS Master Series™ software as the core CAD/CAM/CAE technology.
- ✓ The company then assembled a team of approximately 100 people to prove the new process in the development of the Optra S line of printers.
- ✓ The team used Master Series™ tools and concurrent engineering practices to create more than 1,000 new parts. This included certain components that had been outsourced, as well as a new “look” and new toner/paper path technology.
- ✓ Lexmark analysis engineers then conducted stress analyses on many parts and used results to indicate areas where weight could be reduced.
- ✓ Plastics vendors, who normally received the information they needed late in the process, were brought in-house to work concurrently with designers, and tool makers with Master Series were given I-DEAS™ software solid models rather than IGES translations or drawings.

## RESULTS

- ✓ Even with the implementation of the new processes and tools, the new Optra S product line was completed on time. This line included seven different models, all with unique, rounded contours.
- ✓ By reducing plastic part count and weight, Lexmark engineers reduced the costs by approximately 15% per printer.
- ✓ By bringing print-head design and production in-house, the company eliminated its dependency on a foreign, single supplier and the fluctuations of the Yen.
- ✓ The integrated process and design tools reduced the time needed to prepare information for tool makers from 64 minutes to two minutes. This was accomplished by replacing formal drawings with Master Series wireframe models supplemented by drawings showing only critical dimensions.

## PLANS

Lexmark plans to continue refining its new product development process to make it even more seamless and powerful by integrating I-DEAS with Alias/Wavefront conceptual design software, and Mentor Graphics printed circuit board design software. The company is also striving to eliminate drawings entirely by supplying tool makers with annotated I-DEAS surface models.

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