February 2006

BOOTHROYD DEWHURST dfma® Insights

News from the Frontlines of DESIGN FOR MANUFACTURE AND ASSEMBLY

A DFMA New Year

Want to improve the manufacturability and cost-effectiveness of your product designs in 2006? Make some DFMA resolutions. Here are a few best practices to add to your list:

- Analyze designs thoroughly with DFA software
- Look into alternative materials and shapeforming processes
- Dig out all the costs for automatic versus manual assembly

As for the other resolutions you make every January (eat less, exercise more), those we just can't help you with.

Best wishes for the New Year.
Sincerely yours,
Nick Dewhurst, Executive Vice President

ROBIN COOPER, a widely published expert in the field of activity-based costing and strategic cost management, will be the keynote presenter at the upcoming International Forum on Design for Manufacture and Assembly in June 2006. Dr. Cooper is presently on the faculty of the Goizueta Business School at Emory University. Stay tuned for more details.

Original design for an **antilock brake valve** (top) and the same valve redesigned for **automatic feeding and orienting** (bottom).

To Compete Better, AUTOMATE

An interview with DFMA pioneer Geoffrey Boothroyd

Q. Why is automatic assembly important for U.S. manufacturers?

GB: I have seen a renewed interest in exploring assembly automation as an alternative to offshoring. The main objective of automatic assembly is to reduce direct labor costs. Many U.S. manufacturers attempt to cut direct labor by sending production to offshore factories that offer low-cost manual assembly. But perhaps they can cut their costs just as much, or maybe more, by automating and keeping production here. They should do the studies. The other important advantage of automatic assembly, of course, is that it tends to reduce scrap and rework and give you a product with higher quality.

Q. What are the issues for U.S. manufacturers that use automatic assembly?

GB: In general, their volumes are not high enough. They need to improve their competitiveness. But product design is also a key issue. People still consider the development of feeding and orienting equipment for automatic assembly to be a black art. I have always felt that assembly equipment developers should be more closely involved during product design. But this sort of collaboration is still rare.

Q. What advice do you have for product engineers who design for automatic assembly?

GB: The first thing, just as for manual assembly, is to reduce the number of parts. This reduces the number of workstations on the machine, resulting in an immediate considerable reduction in total investment in the cost of assembly. In fact, reducing the number of parts in automatic assembly has a much more marked effect on costs than it does in manual assembly. Next, design the parts for automatic feeding and orienting.

Q. Bottom-line last word?

GB: Successful assembly automation depends on appropriate product design. You can't get away from that. When you read articles about a successful automation project, how it saved so many dollars, what they usually don't tell you is that the design was changed. Automation and product redesign go hand in hand. That's what saves the money.

To read a 2005 paper about automatic assembly and product design coauthored by Geoffrey Boothroyd and Brian Rapoza, please **CLICK HERE.**

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DFMA Forum News

The International Forum on DFMA, sponsored by Boothroyd Dewhurst, is the foremost conference worldwide on early design analysis methodologies and implementation. The 2006 International Forum on DFMA is scheduled for June 20-21 at the Crowne Plaza Hotel, Providence-Warwick, Rhode Island. For more information or to register, please **CLICK HERE.**

DFMA News Briefs

In his story "Inside Outsourcing," *Design News* editor Joe Ogando looks at the trend toward sending product design offshore, especially to India. He summarizes a 2004 Boothroyd Dewhurst study showing how offshoring may not always lead to a lower-cost product. To read the article, please **CLICK HERE,** and then scroll down to the sidebar, titled "Manufacturing: Should It Stay or Should It Go?"

Do companies sometimes rush to outsource manufacturing before they should? Nick Dewhurst talks to the editor of *IndustryWeek* about the economic benefit of taking costs out of products by redesigning them instead. To read "Before Offshoring, Try This," please **CLICK HERE.**

Abbott Laboratories used DFMA software to help redesign key subsystems of a medical testing machine for better assembly. Among a number of improvements, they even managed to combine an assembly of 19 parts into a single extruded component. To read the case study in *Mechanical Engineering,* please **CLICK HERE.**

DFMA Software Update 2006

The upcoming release of DFMA software contains many technical enhancements and usability improvements. In particular, version 2.2 of DFM Concurrent Costing features new processes for estimating manufacturing costs:

The *Automatic Assembly* process estimates the cost of assembling a product on an automatic high-speed assembly machine. For comparison purposes, the program also estimates costs for a manual assembly line.

The *Printed Circuit Board* process incorporates cost models for bare board manufacture as well as population, or assembly, of the board. The cost estimate for bare board manufacture is based on complexity and includes costs for internal and external circuit generation, lamination, AOI testing, hole drilling, solder masking, legend printing, and final circuit testing. Population of the board as well as operations carried out on the whole board, such as wave or reflow soldering, solder paste application, cleaning, and testing, are included in the Operations Library.

Minimum Part Count

New Books Available

Assembly Automation and Product Design, Second Edition, by Geoffrey Boothroyd. A thorough consideration of design for manual assembly, high-speed automatic and robot assembly, and electronics assembly. Includes the popular Handbook of Feeding and Orienting Techniques for Small Parts, published at the University of Massachusetts, as an appendix. For more information or to order this book, please CLICK HERE.

Fundamentals of Machining and Machine Tools, Third Edition, by Geoffrey Boothroyd & Winston A. Knight. A guide to state-of-the-art industry practice in metal cutting, machining, machine tool technology, machining applications, and manufacturing processes. For more information or to order this book, please CLICK HERE.

New Webex Training Sessions

Get up to speed on new DFMA tools and techniques, and sharpen your software skills. We've recently posted three new Webex training sessions to our DFMA Implementation Center page. CLICK HERE.

- DFM Concurrent Costing: Assembly Fabrication analysis
- DFM Concurrent Costing: Using the Machine Library
- DFM Concurrent Costing: Using the Material Library

You can access all our free online training sessions at your convenience. Each one demonstrates useful DFMA steps and shortcuts to maximize your efficiency.

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