

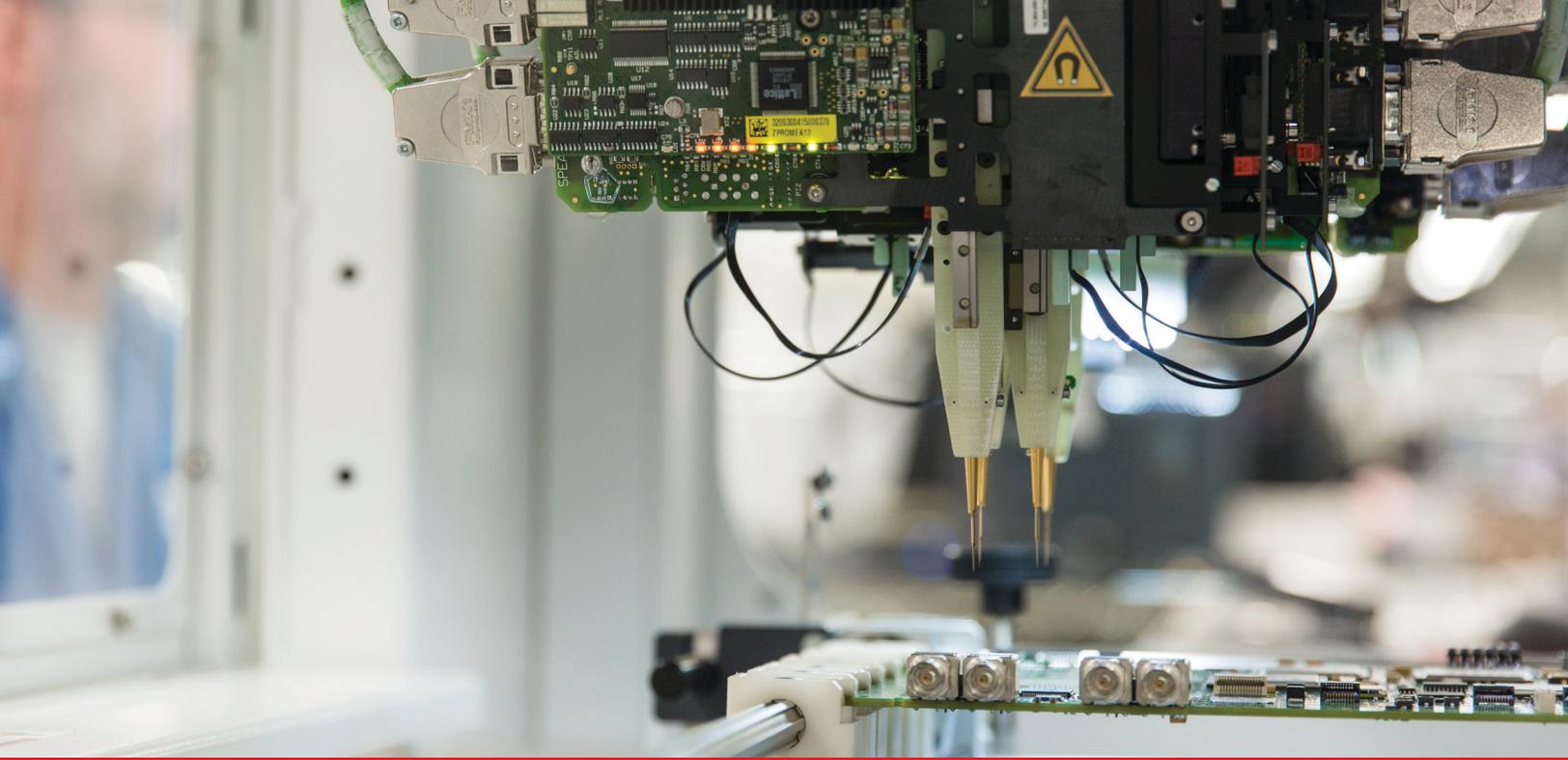


sparton

Design for Manufacturing:

Solving Tomorrow's Problems Today

Conquering Complexity[®]



Too often, product design engineers find themselves under pressure — whether it's cost, time or other factors — and they might exclude manufacturing considerations from their design phase. However, Design for Manufacturing (DFM), an established industry best practice, takes a different and more effective approach that can dramatically improve design and could be the difference between commercial success and failure.

With DFM, a product's design is assessed early on for its manufacturability. Will the manufacturing be simple or complex? Can parts be altered to lower their cost and number? Can any parts or raw materials be standardized?

This critical step helps mitigate risks *before* the initial build, and delivers unexpected value: higher quality, greater profitability and

true competitive advantage. What's more, design engineers don't need to have an in-depth knowledge of the potential pitfalls or opportunities of manufacturing their product. If brought in early, an experienced Contract Manufacturer (CM) has the manufacturing expertise and historical product knowledge to draw out the most value from a DFM approach.

“When it comes to efficient manufacturing, *how* a product is designed can be as important as *what* is designed.”

Aaron Lounsborough
Engineering Supervisor,
Sparton Corporation



The Design for Manufacturing ROI

Partnering with a CM to take a DFM approach is an investment that may increase costs incurred at the beginning of a project. However, a design developed for ease of manufacturing accumulates savings throughout the product lifecycle and provides a generous return on the initial investment. DFM even shortens the product development lifecycle and reduces the intensity level of all related activities throughout the product's life. Even when a DFM approach increases design-cycle time slightly, it is typically offset on the production side.

“Experienced CMs know all of the pain points ... we can identify and address them right from the start, when it's least expensive.”

John Volk
Manufacturing Engineer,
Sparton Corporation



Advantages of Partnering with a CM Early On in Your Project

1 FEWER AND/OR BETTER PARTS

By working closely with an experienced CM, those involved in the design phase get invaluable advice on the parts they need for manufacturing. The CM has the knowledge needed to suggest alternatives that cost less, work better, simplify assembly or require less space. They will recommend materials, assemblies or components that better match how the product will be used, such as: stainless-steel parts designed for extreme weather conditions or frequent washing, or universal parts that are more readily available. A responsible CM will also alert the developer of potential supply issues and find alternatives.

2 HIGHER, MORE RELIABLE QUALITY

DFM helps create an elegant, longer-lasting product by eliminating unnecessary or trouble-prone parts and ensuring everything fits where it's supposed to. By thinking everything through from the beginning, manufacturing can be streamlined — such as using ultrasonic welds rather than mounting multiple parts with screws. Brackets and other hardware, with the potential to cause problems, may be eliminated. As a result, product defects are minimized while end-user satisfaction (and the developer's reputation and brand) is enhanced.



3 STREAMLINED REGULATORY APPROVALS

Submitting a complete and well-designed prototype will increase a product's chances of quick approval with regulatory, safety or qualification agencies. By selecting components that last longer, a developer may avoid the need to resubmit applications when components have reached the end of their life. Discussing the right components earlier in the project also avoids resubmitting a design change that might delay approvals.

Ultimately, product designs that have first gone through a robust DFM process will make their way to market sooner: they're designed with parts for ease of manufacturing, with fewer details that can go out of spec-type tolerance. Additionally, the number of parts to physically assemble is reduced, with less opportunity for assembly defect.

“With design for manufacturing, it's not only about creating a product that works, it's about creating a product that's *better*, longer lasting and easier to update.”

Brian Launer

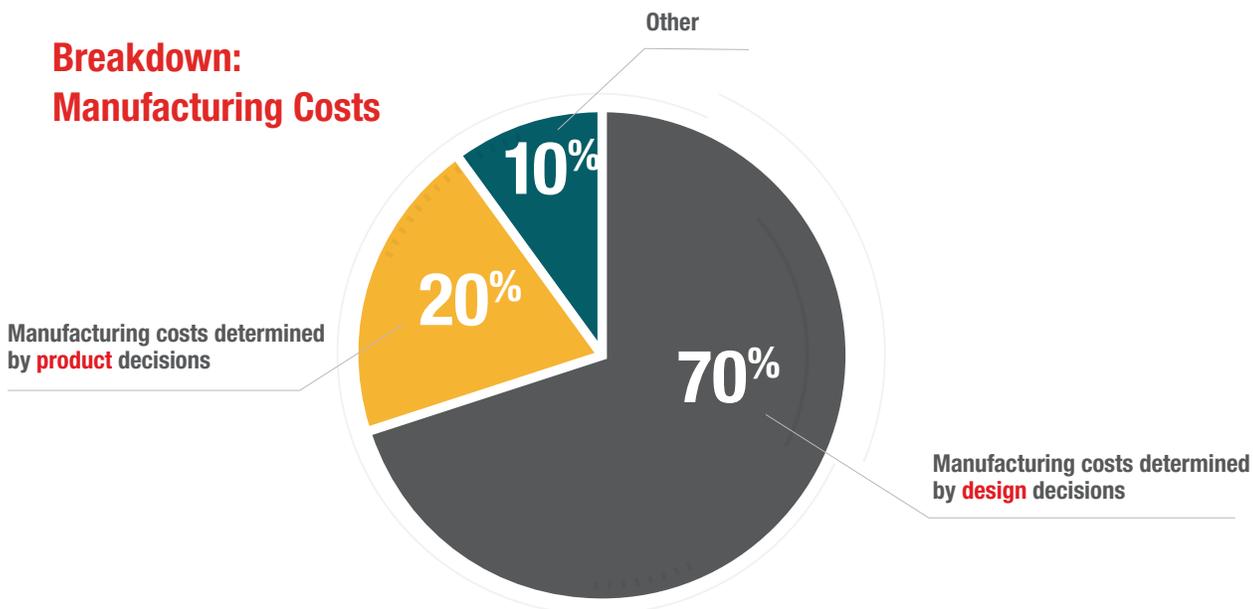
*Engineering Supervisor,
Sparton Corporation*

4 LOWER COSTS

It's much easier — and far more cost effective — to modify a design during the design phase than after the build has already started. Even a small cost reduction in a part can have a huge impact during mass production. Combine this with other DFM savings — such as fewer components, simplified assembly and accelerated approvals — and the savings add up quickly.

“I'm working on a product now where our DFM process led to making a change with a snap-type press fit,” says John Volk, Manufacturing Engineer at Sparton. **“It took about \$8.00 out of a \$20.00 component — nearly 40 percent less. And that's not even counting assembly time savings, which changed from 15 minutes to 3-5 minutes.”**

Breakdown: Manufacturing Costs



Source: University of New Mexico, *Design for Manufacturing - Guidelines*



The DFM Differentiator: Contract Manufacturing Partnerships

Contract design manufacturers, who support a wide variety of companies on design, manufacturing or both, are in the unique position of seeing how different design flaws play out in the later phases of development. Products without a DFM approach start revealing issues as early as three to six months into production. The value that CMs bring to the DFM process is differentiated from the in-house design engineering team, an off-the-shelf software solution, or even an outsourced design firm. Contract design manufacturers see products with extraneous parts when a company begins the manufacturing, or they can notice design defects that cause a delay in shipment and assembly.

Objective, Full-Scale DFM Reporting

Any responsible CM will always run a DFM analysis on a design, even if they are brought in after the design phase. But ideally, customers would bring the partner in as early as possible and invest in a full-scale, robust DFM report. This report includes warnings and indications of the severity of a design flaw, modification suggestions and recommendations for “perfect class” components.

A CM partner can also provide an invaluable, objective perspective to a design team invested in its design and focused mainly on functionality. They are engineers themselves and know how easy it is to get attached to an initial design and feel reluctant to change it.

The CM can help the design team take a step back and remember that the design is just a prototype built in a lab. The design needs to accommodate building in volume with non-engineering staff and assemblers.



CMs vs. Design Firms

If you have outsourced your product idea to a design firm, chances are the firm has also offered to conduct a DFM review or analysis. This is a good option, but keep in mind that design firms are less involved with manufacturing and may lack real-world manufacturing knowledge.

“The better DFM approach is with someone like a CM, who has a vested interest in making the manufacturing seamless and efficient and knows the parts firsthand,” says Ed Simon, Engineering and Quality Manager at Sparton. “If you’re the one who’s responsible for manufacturing the product, then you’re going to think more about how it’s made.”

What’s more, design firm software and even commercial software packages don’t always provide the essential human touch — the customer service and long-term relationship that a CM provides and the manual intervention needed in this type of analysis. Experienced CMs know that you simply can’t run everything through a software package.



“Manufacturability software has its place. But in good DFM there’s some manual intervention ... you’d have to have the tools and the expertise to analyze the data and someone who has come to know your company.”

*Aaron Lounsbrough
Engineering Supervisor,
Sparton Corporation*



DFM — Questions to Ask



To get the most value from DFM, it's important to work closely with the CM and ask the right questions throughout the process.



What is the full market situation for the product?

Identify market needs that the product will fulfill. Consider competitors' strengths and weaknesses.



Are there ways of simplifying assembly?

Streamlined assembly will reduce costs while improving product longevity and quality.



Has the product's life expectancy and usage environment been fully considered?

It is essential to understand how and where the product will be used in order to create the optimal design and select the right parts.



Are there any lingering intellectual property issues?

A careful examination of applicable patents and other intellectual property rights will avoid problems later.



Have the packaging, labeling and shipping needs been evaluated?

Consider every aspect of a product's distribution to streamline the process through greater efficiency.



Have regulatory requirements, in every region in which the product will be distributed, been reviewed?

Global regulations are complex. By examining them early, potential obstacles are identified and overcome long before it becomes necessary to make changes to the build.



Have certification and third-party testing requirements been considered?

By anticipating these requirements during DFM, certification and testing can be streamlined, saving time and money.

Conclusion

When it comes to DFM, it's never too early to start. Planning ahead and thinking through the entire product lifecycle is the best way to reap all the benefits that come from excellent design — including better part selection, improved product quality, streamlined approvals and cost savings. Start by identifying an experienced CM that understands the importance of good DFM and who will work with the product developer at every step.

About Sparton

Sparton Corporation (NYSE: SPA), now in its 118th year, is a provider of complex and sophisticated electromechanical devices. We use our experience and our Sparton Production System (SPS) to produce breakthrough products and address complex manufacturing challenges — faster and more cost effectively. We have experience in many industries, including medical and biotechnology, industrial and commercial, and military and aerospace. Headquartered in Schaumburg, Illinois, Sparton has 13 design and manufacturing facilities worldwide. For more information, visit www.sparton.com.



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