aPriori

What Will My Design Cost to Produce?

How Digital Manufacturing Simulation Provides Early Visibility to Cost Drivers

WHITE PAPER

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REAL-TIME DIGITAL MANUFACTURING SIMULATION MAKES DESIGN ENGINEERS HEROES FOR INCREASING PROFITS

As a design engineer, you are under tremendous pressure to create quality products in today's ultra-competitive environment. You are tasked with meeting requirements for form, fit, and function within urgent product development timelines. Of course, your company is under tremendous pressure too. Shareholder expectations are high, profit margins are tight and, as a result, budgets are even tighter.

In the never-ending battle for market-leadership, design engineers play a pivotal role in determining a company's success. This success is determined not only by product quality, but product cost. Lower costs mean more competitive products and higher profit margins.

For manufacturing and product companies, the biggest expense on the quarterly income statement is Cost of Goods Sold, or COGS. COGS represents the amount of money required for producing the goods your company sells. Typically, this number is between 70 percent and 90 percent of the gross revenue your company earns. Because COGS in manufacturing is so high, a company that could reduce its product costs by just one percent would see its profit rise substantially.

Why is Reducing Products Cost Important?

Typical Income Statement for the Discrete Product Industry

Income Statement	Percentage of Revenue
Revenue	100%
-COGS	80% 79%
Gross Profit	20%
-SG&A	8%
EBITDA	12%
-D&A	5%
EBIT	7%
Interest	2%
-Tax	2%
Net Income	3% 4%

COGS = The Majority of Product Costs
- Material
- Factory Labor
- Direct Overheads
- Tooling

1% Reduction in COGS = 33% Increase in Net Income

Figure 1. A mere one-percent reduction in Cost of Goods sold can have a tremendous effect on overall net income.

An inefficient process for generating manufacturing cost estimates effectively prevents considering many design changes that will ultimately result in a lower cost.

So where do you fit in? 80 percent of the cost of a product is generated in the first 20 percent of the development process. That means that the design engineering team is directly responsible for the majority of your company's product costs. You and your colleagues are in the best position for increasing corporate profitability by reducing the cost of the products your company sells.

Design engineers looking to optimize costs, however, face a real challenge. Current practices for modeling manufacturing costs of design alternatives can be imprecise and prohibitively time consuming without the right tools.

DESIGN STAGE COST MODELING CHALLENGES

When you are working in your CAD program, every change you make to a design has an impact on how much the finished product will cost to produce. You may have a general idea how a particular change might affect cost, yet the only way to know with certainty is to have someone generate an estimate or a quote. That requires either calling in a cost expert or having the purchasing department contact your suppliers.

Obtaining cost estimates can be a frustrating back-and-forth process that typically takes days or weeks. With deadlines looming, this time expenditure represents a delay that design engineers cannot afford. This inefficient process for generating manufacturing cost models effectively prevents considering the full breadth of potential design changes that could ultimately result in a lower cost without sacrificing functionality, performance, or quality.

Fortunately, digital manufacturing simulation software has emerged as a powerful alternative to traditional cost modeling practices. This software analyzes CAD models using simulated production in a "Digital Factory." This manufacturing simulation provides a detailed account of how design choices affect a product's cost.

Figure 2. Digital manufacturing simulation from aPriori can rapidly and precisely determine the cost of a design by simulating production of a a CAD model.

Using digital manufacturing simulation, engineers can better understand the price tag for design changes as they are being considered to find the optimal balance between functionality, performance, quality, and cost.

DIGITAL MANUFACTURING SIMULATION: A MORE EFFICIENT AND EFFECTIVE DESIGN-STAGE COST MODELING SOLUTION

aPriori is the market leading provider of digital manufacturing simulation software that unlocks the potential of cost-optimized design. Simulated manufacturing incorporates the cost of materials, labor, tooling, manufacturing and more to create a precise assessment of the cost to manufacture the part or product you are currently designing.

Using digital manufacturing simulation, engineers can understand the precise price impact of design changes to find the optimal balance between functionality, performance, quality, and cost that delivers the maximum value to the customer.

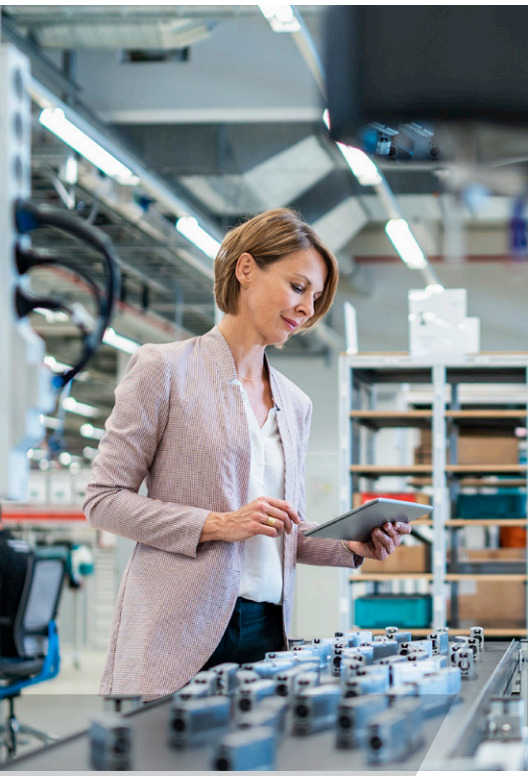
Your CAD system remains the primary data source used to generate and analyze the digital twin of your product. This real time CAD integration generates detailed manufacturing data and cost directly from your design. Crucially, these simulations are delivered in real-time and can be quickly recalculated each time you make modifications to your design.

The most impactful cost-saving choices are often associated with more fundamental changes to the design. These changes are typically only viable early in the product development cycle. By analyzing manufacturability and cost during the early design stages, companies can drive the most possible cost out of their products prior to production. You can explore more design alternatives, rooting out inefficient design choices earlier while minimizing changes later in development, when making changes gets incrementally more expensive.

Real-time digital manufacturing simulation capabilities help reduce product costs, and ultimately COGS, bolstering the company's bottom line. It directly helps you and your company avoid a number of pitfalls that can hurt profitability:

- Missed cost targets
- Delayed product launches
- Late-stage product redesign
- Post-launch cost reduction projects

On average, design engineers using aPriori have successfully reduced costs of targeted parts and products by 18%



With aPriori, the days of waiting for cost estimates and quotes are over. Engineers don't have to wait weeks to see how a simple change will affect cost, leaving them free to develop innovative design alternatives and analyze these different choices for potential savings. You always know how much your design is going to cost.

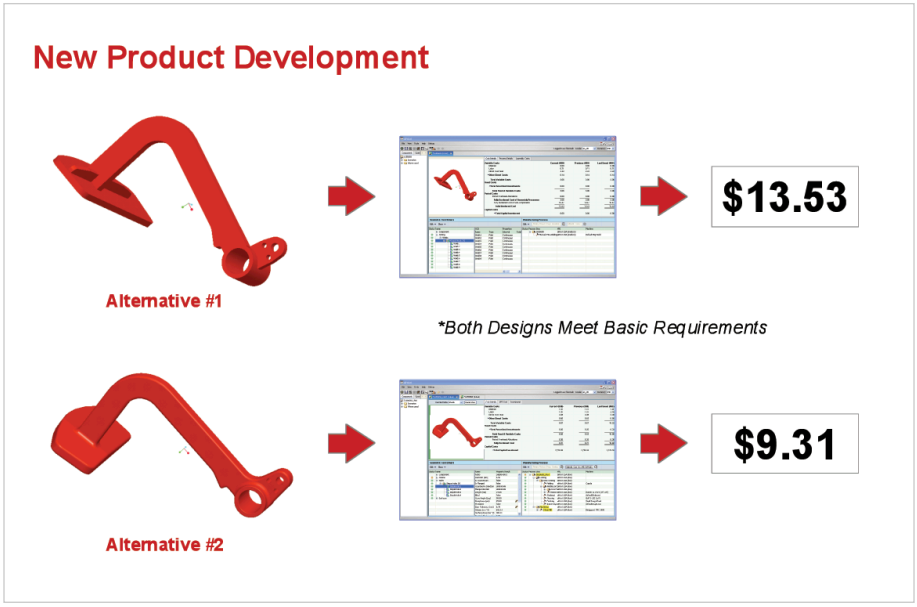


Figure 3. Make cost-optimized design decisions earlier in the development process with real-time access to manufacturing cost models.

SUMMARY

Design engineers face the daunting task of designing quality parts and products that fulfill form, fit, function, and safety requirements even as they navigate shorter development timelines than ever. This challenge is compounded by the need to simultaneously meet cost targets that have a direct impact on profitability.

aPriori's digital manufacturing simulation software allows engineers to analyze manufacturability and cost of new product designs when they can have the most impact: early in the design process. Digital manufacturing simulation allows engineers to design more cost effectively than ever without sacrificing quality or development timelines. Rather than striving for incremental cost savings after the fact, now design engineers can find more cost savings from the start. On average, design engineers using aPriori have successfully reduced costs of targeted parts and products by 18%.

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aPriori is the leading provider of digital manufacturing simulation software that brings product design and sourcing teams closer to production. By leveraging the digital twin within our digital factories, we automatically generate design for manufacturability (DFM) and design for cost (DTC) insights, helping manufacturers collaborate across the product development process to make better design, sourcing and manufacturing decisions that yield higher value products in less time. aPriori solutions are now available either in the cloud or on-premise.