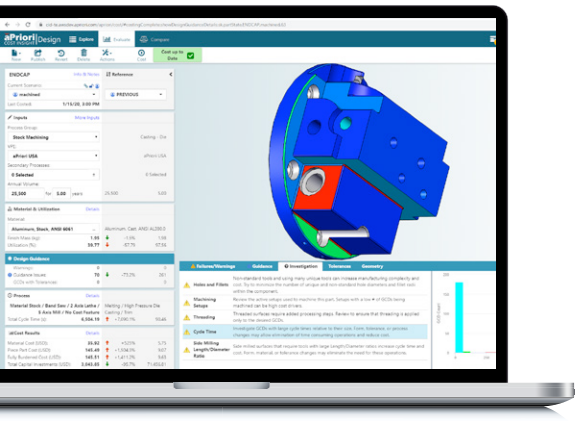
aPriori

Meeting and Beating New Product Cost Targets

WHITE PAPER

CONTENTS



The inability to provide robust design for manufacturability analysis early in the design-cycle is at the root of many fundamental challenges for NPI projects.

NPI AND PRODUCT COST TARGET CHALLENGES

If you are working on a new product development initiative (NPI) for a discrete manufacturer, you are likely under increasing pressure to develop those products within specific cost, weight, market, and quality targets (and to do so under very tight timeframes). Developing and producing products that can meet all of these criteria, particularly cost, can be extremely challenging:

- Setting cost targets and continually estimating product costs for design variance as a design progresses over time is very time consuming and resource- intensive. Engineers are already overwhelmed with an ever-expanding scope of work and typically don't have time to evaluate the manufacturability of their designs on a regular basis. As a result, cost roll ups are often conducted on a limited basis and cost overages may not become apparent until the product nears release to manufacturing.
- You may not have the resources and tools to understand the roots of a product's key cost drivers nor the time to evaluate multiple design alternatives. As a result, features that are complex to manufacture and add little market value may go undiscovered until it is too late to change them.
- New government safety regulations may also impact your design requirements and increase product costs without necessarily adding value for your customers. You may not have a way to accurately identify the full impact of those requirements. And if you do not have visibility into other cost aspects of the product, it is difficult to know how to offset those increases.
- Most manufacturers today employ sophisticated supply chains and outsource some or all of their manufacturing. Strategic Sourcing Managers, however, have little insight into early stage product designs, often resulting in designs that are not optimized to leverage the company's value chain.
- Recent times have vividly illustrated how a global crisis can rapidly alter vital supply chains. Disruptions can upend the assumptions that underly NPI efforts, but traditional tools don't afford a capability for rapidly re-analyzing manufacturing costs to reflect new supply chain realities.

These challenges are very common in manufacturers' product development processes today, but their impact is often more significant than most manufacturers realize. Profit margins are reduced due to product cost overruns, or time to market is delayed due to the need to firefight manufacturing surprises. This often triggers an expensive and time-consuming value engineering process to eliminate costly manufacturing features from the product design. These challenges share a common root cause: the inability to accurately identify, assess, and manage manufacturability and product costs early enough in a product's lifecycle.

Effective design for manufacturability analysis can drive significant time efficiencies in engineering, sourcing, and manufacturing.

INCORPORATING DETAILED MANUFACTURABILITY INSIGHTS INTO YOUR NPI PROCESS

Best-in-class companies are applying effective design for manufacturability strategies at the earliest stages of their product design process and collaborating on cost analysis cross functionally. As a result, they are realizing huge repeatable benefits in both hard and soft cost savings including:

- Making detailed manufacturability insights available when they can generate the most value: while a product is still being designed.
- Setting and managing cost targets appropriately before products or parts go into production.
- Evaluating the cost of new product design alternatives quickly so they can focus more time on innovation and less on cost analysis.
- Identifying the real cost drivers behind a product design and minimizing engineering changes later in the release cycle where they cost more to address.
- Creating should-cost estimates used to support vendor selection, quote validation, and supplier negotiation.

The value of these benefits is readily apparent, but it is not uncommon for engineering, sourcing, or manufacturing team members to worry about design-stage manufacturability analysis slowing them down. With the right technology tools, however, effective design-stage analysis of manufacturability can actually drive significant time efficiencies for these teams.

Case Study | Honeywell Aerospace

Background

One of the world's leading makers of aircraft engines and avionics, with revenue of approximately $10 billion.

Business Challenge

Honeywell was confronting rising customer expectations for product cost reductions and needed expanded capabilities to design new parts as cost-effectively as possible.

Solution

aPriori was deployed to a cluster of cross functional teams including a cost engineering group and different design teams for electrical, mechanical, and advanced manufacturing.

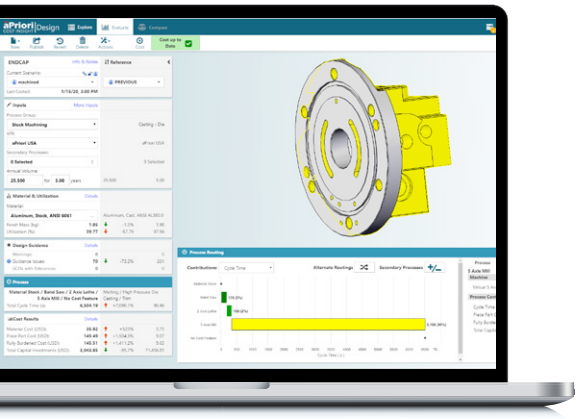
Results

- ✓ aPriori provides designers with timely feedback on cost drivers in the earliest design stages. Savings on many initial designs range from 8-20%.
- ✓ aPriori is accurately predicting supplier quotes for new designs, allowing for rapid but precise design-stage estimates of costs for outsourced parts.
- ✓ Data generated when designing new products is shared with the sourcing team, where it can be used to find additional savings for existing products.

CONSISTENTLY MEETING TARGET COSTS: CORE REQUIREMENTS

The core requirements presented below are fundamental to effectively managing new product designs to ensure they consistently meet target cost goals:

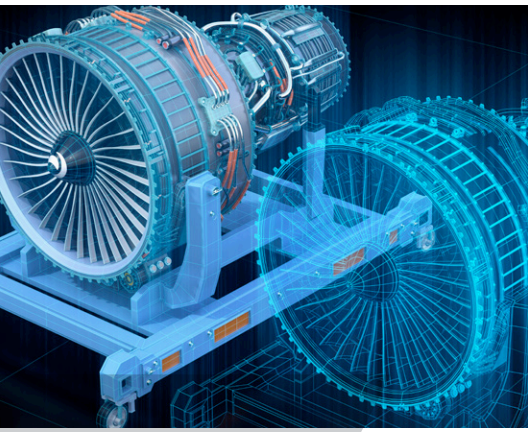
- **Early Cost Visibility:** To effectively manage product costs, NPI teams must have early visibility into the cost impact of different design decisions:
  - Companies should evaluate tools that enable engineers to quickly and precisely determine the cost of a new part or product design by automatically pulling geometric and feature information from a "digital twin" 3D CAD model. Using this twin, digital manufacturing simulation enables the rapid generation of a detailed cost estimate to determine how close they are to established target costs. A fully simulated digital factory can capture the full spectrum of manufacturing costs associated with a given set of design choices.
  - Costs should also be regularly re-assessed as features and design ideas are added or subtracted. This enables individuals to quickly evaluate the cost impact of various tradeoff decisions, change orders, or accommodate new marketing requirements. A simulation-driven approach helps rapidly capture, for instance, how changing a specific material will effect overall manufacturability.
  - Cost evaluation milestones should be established at stage gates in the NPI process to assess and discuss the specific cost implications of various design ideas and alternatives.
  - Strategic Sourcing Managers and Manufacturing Engineers should also have access to product designs and the most current cost estimates so they can provide input into alternative designs, sourcing options, and manufacturability. The most impactful technology tools should enable seamless data sharing between sourcing and design teams.



A digital manufacturing simulation tool is crucial for launching new products at or below target cost and accelerating time to market.

- **Cross-Functional View of Product Cost:** Providing cross- functional teams with a common view of product cost at each stage of the development process is also extremely important. This ensures that all parties impacting product cost are collaborating early, accessing the same information, and working to prevent late stage cost surprises. The resulting benefits of this cross-functional view are substantial.
  - Strategic Sourcing Managers with a view into current product design and cost are able to consider Make vs. Buy decisions earlier in the process. This can improve profitability and better leverage the design and manufacturing expertise of supply chain partners.
  - Manufacturing Engineers that have access to a common product cost platform can regularly evaluate designs for manufacturability and suggest changes that can have a profound impact on cost and time-to market.
  - Cost Engineers get access to a broader range of information than ever before and are able to increase their overall economic impact on the company.
- Given how overloaded your product design team is today, look for digital manufacturing solutions that can automatically trigger a simulation event upon check of a new or updated CAD design to your PLM system. Automatic manufacturability and cost analysis ensures every design will be evaluated, but minimizes the input requirements for the end user who is only alerted when the system identifies a design with potentially costly manufacturing issues.
- **Integration with Enterprise Systems:** Since most new product initiatives are not a green sheet program and build on a current platform, being able to load a BOM (bill of material) and carryover part costs from PLM or ERP systems is very important to successful new product initiatives.
- Furthermore, after an NPI team member calculates cost for a new product design, it is important that your manufacturing simulation solution be capable of storing that data back within the existing PLM or ERP systems of record to create a closed loop flow of information.

Without these core practices, processes, and tools, design to cost remains a highly manual and decentralized function. Often, cost engineering teams focus on only a portion of the product because they do not have the resources to cost all components. In addition, they do not complete the process until the design is nearly finalized, severely limiting the opportunity to identify and operationalize product cost savings. This also leads to inconsistent estimation methods with static information that is difficult to update, manage, and share.



Forward thinking companies are already implementing digital manufacturing simulation solutions across their global product development and delivery teams.

APRIORI'S APPROACH TO DIGITAL MANUFACTURING SIMULATION

aPriori's software platform incorporates these best practices, processes, and tools to address the challenges that come with executing a robust design to cost process head on. It enables engineering, sourcing, and manufacturing personnel to quickly and precisely determine the cost of a new part or product design by automatically pulling geometric and feature information from its digital twin. The software leverages intelligent, manufacturing cost models based on highly detailed simulations of the specific process, materials, and facility where a product or part will be produced.

This simulation captures nuanced cost drivers like manufacturability concerns, cost differential across different geographies, and facilities costs for different production processes. aPriori's latest innovative new application - Cost Insight Generate - can automatically run a simulation on new or updated part designs upon check in of the CAD model to your PLM system.

Using this level of cost knowledge, product engineers are able to make more informed new product design decisions and launch new products at or below target cost while accelerating time to market

Key benefits of aPriori include:

- Simulating manufacturing using a digital factory approach captures the full cost of complete product assemblies to help engineering teams quickly understand how design decisions drive manufacturing costs.
- Enabling design teams to rapidly perform detailed simulations of design alternatives to help project teams understand cost implications of different options and pick the most cost-effective option for the target customer's functional requirements.
- Generating product cost rollups and analyzing current designs against cost and weight targets, while also providing detailed component estimates to support decisions in design, manufacturing, and sourcing.
- Keeping your new product on schedule by enabling design teams to perform simulation-driven cost evaluations automatically upon check in to your PLM system vs. waiting hours and days for cost estimates to come back from cost engineering, manufacturing, purchasing, or an external supplier. It also eliminates post-launch re-work.

aPriori

300 Baker Avenue
Concord, MA 01742

Tel: 978.371.2006
Fax: 978.371.2008

www.aPriori.com
info@apriori.com

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.