

WHITE PAPER

Reduce Cost & Supply Chain Risk

How Digital Manufacturing Simulation
Reduces Supply Chain Cost & Risk



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The events of this past year spotlighted—and strained—weak links in operational strategies and associated supply chains. So, it's not surprising that 60% of executives say the pandemic has increased their supply chain's strategic importance, according to consulting firm [Ernst & Young](#).

Successful companies will take steps to increase supply chain resiliency, agility, and visibility. And how companies develop new products—and optimize aging product lines—through design for manufacturability (DFM) will play a central role in determining both product profitability and supply chain resilience.

How products are designed will play a critical role in determining downstream manufacturing costs and how quickly companies can reroute supply chain operations when needed. Brands that can design new products with a readily available and interchangeable bill of materials (BOM), and optimize manufacturing and assembly, will be well-positioned to address future supply chain disruptions quickly and decisively.

HOW DIGITAL MANUFACTURING SIMULATION REDUCES SUPPLY CHAIN COST & RISK

aPriori's digital manufacturing software allows design engineers and sourcing teams to work with granular cost and manufacturability insights while a design is still in development. aPriori directly analyzes a CAD model or digital twin by simulating production in a fully configurable digital factory.

This simulated production process offers insights into virtually every cost driver which will ultimately determine what a design "should cost." This manufacturing cost model can be used to analyze cost variations across different design alternatives, geographies, production facilities, and more. We examine Should Cost in much greater detail in our in-depth guide [here](#).

Simulated production at the digital factory allows engineers to see which manufacturing process will be most economical before it is approved for manufacturing. Once a design has been approved, it is often too late to make the most impactful design changes. By catching potential cost and manufacturability issues in the design stage, the full breadth of potential design alternatives are preserved.




These design-stage capabilities are so valuable for manufacturers that it can be easy to overlook the full array of benefits that digital manufacturing simulation can offer.



Modeling manufacturing in the digital factory can help catch issues that would be difficult to anticipate otherwise.

In this paper, we look at the broader value that aPriori's digital manufacturing simulation capabilities can offer the supply chain.

Key benefits include:

-  Enhanced strategic planning for internal manufacturing, such as capacity planning and build-buy analysis.
-  The ability to identify alternative supply chain options more effectively, more quickly, and with more agility when responding to urgent supply chain problems.
-  Dramatically streamlined quoting (with the potential to cooperate with suppliers and institute a true zero-RFQ process).

Strategic Planning for Internal Manufacturing

Digital manufacturing simulation supports strategic decision-making around how that design will be manufactured. For instance, simulated manufacturing cost models are a great way to analyze build-buy decisions. Modeling manufacturing in the digital factory can help catch issues that would be difficult to anticipate otherwise.

For example, a design may appear cost-effective for in-house manufacturing; bottlenecks will be inevitable. If this issue is only caught after a design is verified and being prepared for manufacturing, it may be too late to respond effectively. Sourcing teams are now faced with an emergency sourcing decision with little time to find the most efficient supplier (and virtually no leverage to negotiate on price).

If the same issue is recognized earlier in the digital factory, options are far more flexible. The business can consider the viability and efficiency of capital investments to expand internal manufacturing capabilities. If these investments do not appear cost effective, then a third-party supplier can be sourced with far more time and leverage to find the most efficient option possible.



aPriori's digital factory allows users to easily compare materials costs for suppliers to rates available internally.



How Digital Manufacturing Simulation Helps Source the Right Suppliers

aPriori's detailed digital manufacturing simulation software offers insights into not only which machines will be required for a particular design, but also the cycle times that are required by each part of the process. With this information in hand, engineers can determine how many machines a supplier will need to have available to achieve on-time delivery over a given period.

This capability provides a great example of how digital manufacturing simulation can help build a more responsive, efficient supply chain. aPriori makes it simple to filter suppliers based on variables such as regional labor rates and machines available. With this information, sourcing professionals have rich data that can not only inform the selection of a supplier able to support on-time production, but also help match each component to the most efficient supplier possible.

Maximize the Efficiency of Third-Party Suppliers While Catching Potential Manufacturability Risks

In addition to choosing efficient suppliers to fill out an organization's own supply chain, digital manufacturing simulation can even help suppliers deliver the most cost-effective final product possible. For example, aPriori's digital factory allows users to easily compare material costs for suppliers to rates available internally. In many cases, a manufacturer may have access to an advantageous material rate; when they do, drop shipping materials directly to third-party suppliers can offer direct savings.

Manufacturing simulation in the aPriori digital factory can also help identify manufacturability issues that could lead to excessive scrap rates and/or slow-cycle times. Catching these issues early leaves more time to solve them via re-design. In other cases, the design itself is not the issue; the supplier simply lacks the right equipment for quality manufacturing of the component as designed. In this case, once again, the earlier this issue is recognized, the easier it is to find an optimal alternative (whether that is sourcing a different supplier, or the supplier investing in upgraded equipment).

Digital manufacturing simulation is also an essential risk-management capability, because some suppliers will not necessarily have the expertise to recognize subtle design issues until problems begin unfolding on the factory floor. These issues can lead to excessive defect rates, cost overruns, and a supplier desperate to re-negotiate the contract. In the worst-case scenario, the supplier will be unable to deliver at all, which can potentially create serious delays and harm customer relationships.

To better understand the zero-RFQ process, read this case study about how aPriori customer, Alstom, benefits from near instant quotes without sacrificing accuracy.

[Click here to read the Alstom case study](#)

aPriori is used to simulate production and choose suppliers for more and more designs over time, as it can help optimize the supply chain as a whole. Valuable data is generated on which suppliers can support which types of parts most cost-effectively. Instead of simply sourcing an entire assembly from one supplier out of habit, for instance, it may make sense to strategically allocate simpler components to a lower-cost supplier, while sourcing more complex ones from a supplier with more cutting-edge manufacturing capabilities.

Simulation Enables a Dramatically Streamlined Quoting Process

Digital manufacturing simulation is a powerful tool for streamlining the quoting process with third-party suppliers. aPriori directly limits the operational delays associated with waiting for quotes and can even be used to implement a zero-RFQ process.

First, using digital factories to catch manufacturability and cost issues at the design stage means that quotes are far less likely to result in cost surprises. Issues can be caught early rather than waiting weeks to receive a quote back from supplier(s). Design-stage manufacturing cost modeling also helps limit the risk of back-and-forth design churn with suppliers after a quote comes in above expectations.

Second, if quotes do come in above cost targets, aPriori's manufacturing cost models provide a great touchstone for rooting out the underlying issue. In many cases, aPriori can actually help suppliers understand inefficiencies in their own operations or supply chain. In others, it may simply reveal that a supplier was charging too much. In either case, simulation-driven manufacturing cost models enable negotiations to transcend gamesmanship and move toward a more transparent, productive, fact-based model for negotiation.

Finally, by working directly with suppliers to understand their precise cost drivers and manufacturing capabilities, aPriori's models can be fine-tuned to allow for the highly confident modeling of a supplier's quotes. With an open-book process for favored suppliers, aPriori models can be so precise that the quoting process can be eliminated altogether. In this zero-RFQ process, a purchase order can simply be issued to the supplier without waiting for a quote at all—the supplier can have confidence that aPriori's digital factory will accurately model their real facility and provide a strong first-pass quote to the customer.



Learn more about how aPriori helps link the supply chain to manufacturing and product development

Digital manufacturing simulation offers benefits for the entire product development process—from engineers iterating design alternatives, to sourcing teams, to executives monitoring progress via aPriori’s integrated reporting capabilities. Manufacturing cost models create a true digital thread connecting every member of the product development team together.

To learn more about aPriori, how it works, and how it is helping manufacturers understand cost, manufacturability, and sourcing better (and faster) than ever, click the button below.

How the aPriori
Digital Factory Works

Enabling Agile Supply Chain Decision Making and Strategic Issue Resolution

aPriori drives savings in design and sourcing that can be directly quantified; however, this final benefit is more difficult to tie a specific dollar value, but its strategic importance should not be overlooked. In short, the speed of digital cost modeling promotes unparalleled agility and precision for supply chain decision making.

aPriori’s powerful design-stage simulation capabilities may command the most attention, but it can also drive real value informing supply chain decisions that have nothing to do with a design change. The COVID crisis showed us all just how systemic and unpredictable supply chain disruptions can be. If a long-time supplier can suddenly no longer deliver, a business can find itself having to identify a new supplier to source hundreds of new parts on an incredibly urgent timeline. With digital manufacturing simulation, a business can quickly evaluate other supply chain partners to see if they have the capability to make the parts, or look at other regions of the world and have a good understanding of how much they would have to pay if the sourced from Mexico, or China or Brazil.

Specifically, aPriori helps you to quickly find viable suppliers by verifying:

1. The suppliers have the equipment needed to build design(s) cost-effectively.
2. That the supplier will have the capacity to support anticipated production volumes.
3. That production is being sourced from the optimal region: aPriori’s regional data libraries allow for comparisons between geographic variables like labor rates.

Collectively, verifying these facts is the best way to select a new supplier that is not only functional, but cost-optimized and well-suited to the business’s longer-term supply chain strategy.





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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.

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