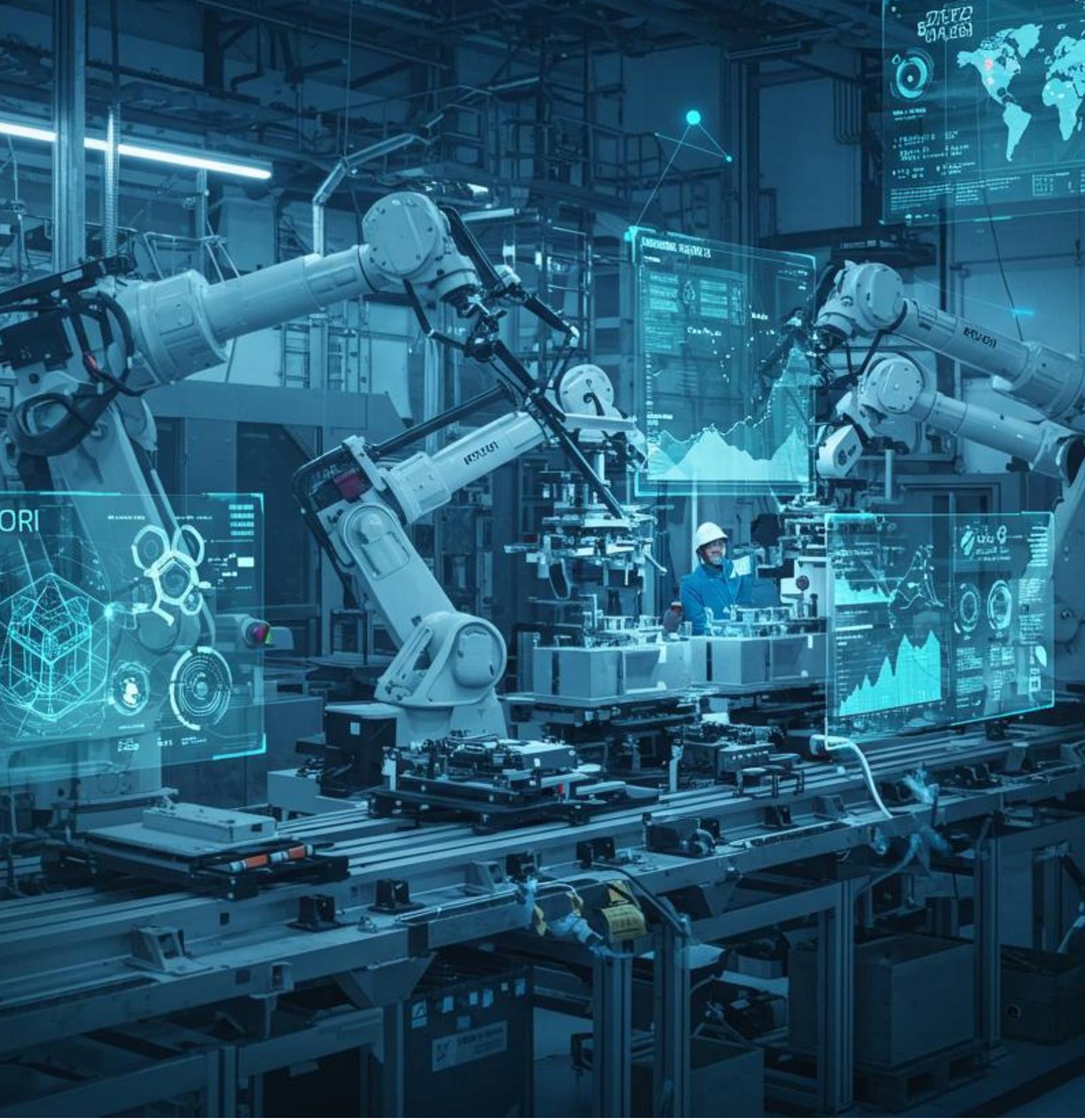


STATE OF THE INDUSTRY: PRODUCT DESIGN AND MANUFACTURING 2025

Presented by aPriori Technologies



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INTRODUCTION

The landscape of product design and manufacturing has never been more complex. With increasing integration of electronics into traditionally mechanical products, the industry must now consider both software and hardware in development processes. The rise of connected products has introduced security concerns while evolving customer expectations demand higher performance at competitive prices.

Additionally, sustainability regulations and the imperative for rapid time-to-market create mounting pressure on companies to remain agile and compliant.

To better understand these evolving challenges, aPriori Technologies conducted a comprehensive industry trends, survey with key challenges and strategies for overcoming barriers in product development.



SURVEY METHODOLOGY

To ensure a robust and representative dataset, the survey was designed with input from industry experts, targeting a range of sectors and company sizes. The survey was promoted through email campaigns and LinkedIn advertising, gathering 188 responses from professionals across 14 industries, 28 countries, and 19 different job functions. Additionally, follow-up interviews were conducted with selected respondents to gain deeper insights beyond the initial survey results.

From the number of responses relative to the population, it is calculated that the results within this report represent a **6% margin of error** and a **90% confidence level**, ensuring statistically significant findings that accurately represent industry trends.

DEMOGRAPHICS OVERVIEW

- **Job Functions:** Respondents included professionals from design engineering, manufacturing, cost/value engineering, operations, sourcing, procurement, and sustainability. The survey showed a slight overrepresentation of cost engineers due to aPriori's established reputation in this area.
- **Company Size:** While responses were distributed across small, medium, and large companies, there was a skew toward larger enterprises where aPriori's tools are more commonly used.
- **Geography:** The majority of respondents were from North America, with additional participation from Europe and Asia. The survey was conducted in English, which influenced regional response rates.
- **Industries Represented:** The survey saw balanced participation across various industries, with notable mentions of **automotive, aerospace & defence, industrial equipment, and high-tech electronics**.

Respondents spanned multiple job functions, including design engineering, manufacturing, cost/value engineering, operations, sourcing, procurement, and sustainability. There was a slight overrepresentation of cost engineers, likely due to aPriori's established reputation in this area, which attracts professionals with a focus on cost control and value optimization. While responses were distributed across small, medium, and large companies, there was a noticeable skew toward larger enterprises, as aPriori's tools are more commonly utilized by these organizations, which tend to have more structured cost engineering and manufacturability processes.



Geographically, the majority of respondents were from North America, with additional participation from Europe and Asia. The survey was conducted in English, which may have influenced regional response rates, favoring English-speaking markets. The industries represented were well distributed, with strong participation from automotive, aerospace & defence, industrial equipment, and high-tech electronics. These industries, known for their reliance on advanced manufacturing techniques and regulatory scrutiny, naturally align with the themes explored in the survey.

KEY FINDINGS AND TRENDS

1. PRODUCT DEVELOPMENT TIMELINES AND COST ASSESSMENTS

- The survey revealed variations in development cycle durations across industries. **Concept design timelines varied significantly, while detailed design and prototyping phases tended to be the longest.**
- Cost assessments were conducted predominantly in the early design stages, with **80% of product cost determined at this phase.**
- Despite early assessments, many companies relied on **spreadsheet-based cost analysis, internal experts, or supplier estimates**, leading to inefficiencies and delays.
- Companies using **automated cost analysis tools** experienced **greater efficiency and accuracy in cost forecasting.**



The survey revealed that development cycle durations varied widely across industries, with concept design timelines demonstrating the most fluctuation. This variation is likely due to differing regulatory environments, technological complexities, and market expectations. While detailed design and prototyping phases tended to be the longest, this is expected, as companies invest significant time refining product functionality and ensuring performance viability. Cost assessments were conducted predominantly in the early design stages, with 80% of product cost determined at this phase. This reflects industry awareness that cost decisions

made early in development have the most significant impact on final pricing. However, despite this awareness, many companies still relied on spreadsheet-based cost analysis, internal experts, or supplier estimates, leading to inefficiencies and delays. This reliance on manual methods suggests a gap between the recognition of cost impact and the availability of tools to streamline the process. Companies that used automated cost analysis tools experienced greater efficiency and accuracy in cost forecasting, demonstrating the benefits of digital transformation in design processes.

2. MANUFACTURABILITY AND PERFORMANCE EVALUATION

- Manufacturability assessments were largely conducted in design review meetings, often using CAD screenshots or PowerPoint, rather than dedicated software.
- Many organizations depended on **supplier feedback for manufacturability insights**, introducing late-stage surprises and cost escalations.
- Performance evaluations (FEA, CFD, etc.) were often **delayed until later design phases** due to cost and time constraints.
- A significant percentage of companies **relied on physical testing**, increasing time-to-market and development costs.

Manufacturability assessments were largely conducted in design review meetings, where teams often relied on CAD screenshots or PowerPoint presentations rather than dedicated software solutions. This practice suggests a lack of formalized manufacturability assessment tools within many organizations, leading to inefficiencies and subjective decision-making. Additionally, many organizations depended on supplier feedback to gauge manufacturability, which, while valuable, introduced late-stage surprises and cost escalations due to unforeseen production constraints. Performance evaluations, such as FEA (Finite Element Analysis) and CFD (Computational Fluid Dynamics), were frequently delayed until later design phases, primarily due to cost and time constraints. This delay may be linked to the high expense and time-consuming nature of these evaluations, which discourages early-stage analysis. A significant percentage of companies continued to rely on physical testing, which, while essential for validation, increases both time-to-market and overall development costs. These findings indicate an opportunity for organizations to adopt more integrated manufacturability and performance assessment tools earlier in the development process.

3. COLLABORATION AND EFFICIENCY GAINS

- The **majority of respondents used traditional collaboration tools** such as **email, phone, and office communication platforms like Teams and Slack**.
- Only a small fraction adopted **specific interdepartmental collaboration tools**, but those who did reported **notable reductions in development timelines**.
- The most significant efficiency gains were observed in **design decision-making and sourcing/procurement**, likely due to better supply chain coordination.

The survey results highlighted that most respondents relied on traditional collaboration tools such as email, phone, and office communication platforms like Teams and Slack. While these tools facilitate basic communication, they lack the structured data-sharing capabilities required for efficient cross-functional collaboration. Only a small fraction of respondents used specific interdepartmental collaboration tools, but those who did reported significant reductions in development timelines. This suggests that structured collaboration tools improve communication efficiency, particularly in complex product development environments. The most notable efficiency gains were observed in design decision-making and sourcing/procurement, likely due to improved supply chain coordination and faster response times. These findings underscore the need for more widespread adoption of specialized collaboration platforms to streamline decision-making and enhance cross-functional team interactions.

4. CHALLENGES AND DELAYS ACROSS THE INDUSTRY

- **Biggest Challenges:**

- **Time-to-market pressures** were cited as the most significant challenge.
- **Cost control and manufacturability** were also top concerns, closely interlinked with overall efficiency.
- The reliance on **manual cost estimation methods and supplier input** created bottlenecks.

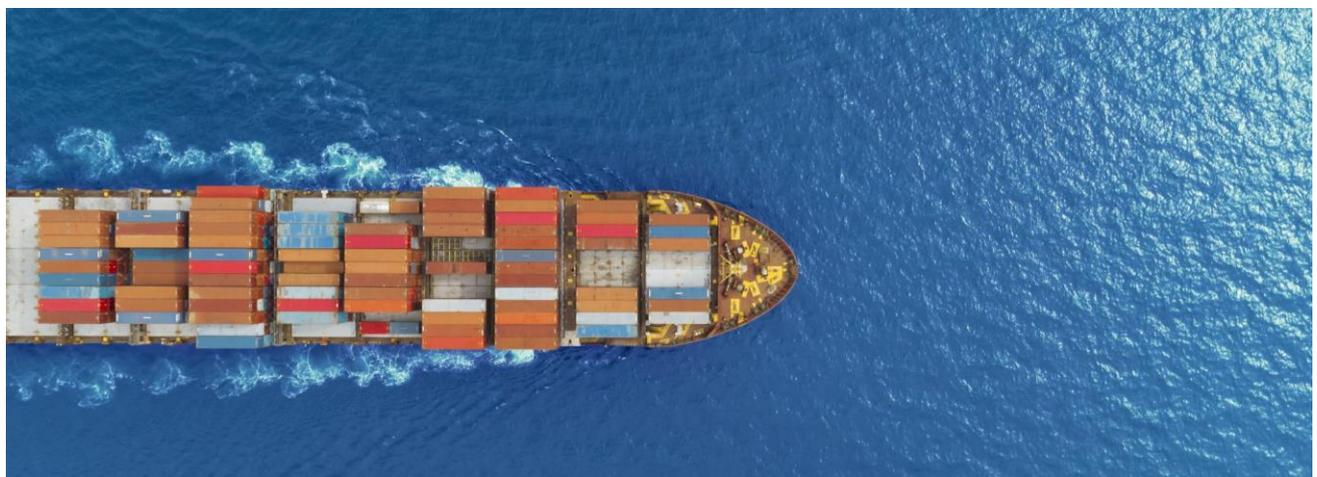
- **Causes of Delays:**

- **Supplier negotiations and cost visibility issues** led to prolonged development cycles.
- **Manufacturability and sustainability compliance challenges** contributed to increased design iterations.
- **Regionally, North America faced supplier-related delays, Europe dealt with sustainability regulations, and Asia encountered sourcing and manufacturability constraints.**



The most pressing challenge cited by respondents was time-to-market pressures. This aligns with the growing need for companies to accelerate development cycles to stay competitive. Cost control and manufacturability were also key concerns, emphasizing the critical role of early-stage cost assessment and manufacturability evaluation in ensuring profitability. Many organizations still rely on manual cost estimation methods and supplier input, creating bottlenecks that slow down development. Supplier negotiations and cost visibility issues were the most frequently reported causes of delays, highlighting the need for better tools to forecast and manage costs in real-time.

Manufacturability and sustainability compliance challenges also contributed to increased design iterations, particularly in highly regulated industries. Regionally, North America faced supplier-related delays, Europe grappled with sustainability regulations, and Asia encountered sourcing and manufacturability constraints, reflecting the unique challenges faced by different global markets.



INDUSTRY COMPARISONS AND TRENDS

- **Aerospace & Defense:** Longest development cycles due to regulatory compliance and stringent testing.
- **Automotive & Transportation:** Moderate development times, benefiting from extensive simulation tools.
- **Industrial Equipment:** Balanced across phases but with significant cost and manufacturability challenges.
- **High-Tech Electronics:** Generally, the development cycles are the fastest, often completing phases in **1-3 months**.
- **Sourcing & Procurement: Consistently long across industries,** particularly high in regulated sectors due to complexity and compliance requirements.



STRATEGIC RECOMMENDATIONS

Based on the survey results, the following strategies can help companies overcome industry challenges:

- **Early and Automated Cost Estimation:** Transitioning from spreadsheets to **automated cost estimation tools** can significantly reduce inefficiencies and improve cost accuracy.
- **Proactive Manufacturability Assessments:** Utilizing **manufacturability analysis software** instead of relying on late-stage supplier feedback can help identify production issues earlier.
- **Enhanced Collaboration Tools:** Implementing **interdepartmental collaboration platforms** can improve cross-functional communication, reducing decision-making bottlenecks.
- **Sustainability Integration:** Given increasing regulatory pressures, companies should proactively embed **LCA (Life Cycle Assessment) and EPD (Environmental Product Declaration) analysis** into early-stage design.
- **Investment in Digital Twins & Simulation:** Companies should increase reliance on **virtual prototyping and FEA/CFD simulations** to reduce dependency on costly physical testing.

To address these challenges, companies should prioritize early and automated cost estimation by transitioning from spreadsheets to advanced cost analysis tools, reducing inefficiencies and improving cost accuracy. Proactive manufacturability assessments should be implemented through specialized software, rather than relying on late-stage supplier feedback.

Organizations should also invest in enhanced collaboration tools that enable real-time data sharing and cross-functional decision-making. With regulatory pressures increasing, companies must integrate sustainability analysis into early-stage design through LCA (Life Cycle Assessment) and EPD (Environmental Product Declaration) tools.

Additionally, investment in digital twins and simulation technology will help companies reduce dependency on costly physical testing while enabling more accurate performance evaluations and optimizing the product development process.

CONCLUSION

The 2025 State of the Industry survey highlights the evolving challenges in product design and manufacturing. While companies recognize the importance of early cost and manufacturability assessments, many still rely on outdated and manual methods, creating inefficiencies. The adoption of automation, collaboration tools, and proactive sustainability strategies will be key differentiators for success in the coming years.

As we look ahead, future surveys will track industry shifts and technological advancements that shape the product development landscape. **Companies that embrace digital transformation will remain competitive, delivering high-quality, cost-effective, and sustainable products at speed.**

We encourage industry professionals to participate in next year's survey to further refine insights and guide innovation in product design and manufacturing.

About aPriori Technologies: aPriori Technologies specializes in providing automated solutions for cost estimation, manufacturability analysis, and sustainability assessments in product development. By integrating advanced AI-driven insights, aPriori helps companies optimize designs, reduce costs, and accelerate time-to-market. For more information, visit www.apriori.com

