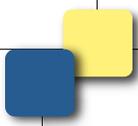


The logo for Tech-Clarity, featuring the word "Tech-Clarity" in a bold, sans-serif font. "Tech" is in white and "Clarity" is in yellow, both set against a dark blue rounded rectangular background.

Tech-Clarity

Composite Trends in the A&D Industry

Two overlapping squares, one blue and one yellow, positioned at the intersection of the horizontal and vertical lines.

***Identifying
Opportunities to Save
Cost and Time***



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***This summary is an abbreviated version of the report and does not contain the full content. A link to download the full report is available on the Tech-Clarity website, www.tech-clarity.com.**

If you have difficulty obtaining a copy of the report, please contact the author at michelle.boucher@tech-clarity.com.



Executive Overview

Composites have become increasingly important to the Aerospace and Defense (A&D) industry. In fact, Tech-Clarity's Composite State of the Market study, found that A&D companies overwhelmingly turn to composites to help with light weighting so that they can improve performance and realize better fuel economy. The study also found that while composites offer significant benefits, the expense of the material means companies should look at ways to get better insight. This way they can make better decisions during design to produce better composite parts. This is especially important to the A&D industry, which is under significant pressure to manage costs.

To further examine the use of composites in the A&D industry, Tech-Clarity surveyed 181 A&D manufacturers. The study examines two areas that can be a source for bottlenecks when working with composites: springback and manufacturing planning.

The study examines two areas that can be a source for bottlenecks when working with composites: springback and manufacturing planning.

Springback can cause significant issues for A&D companies. Springback is a manufacturing defect that can occur while the composite part is curing. Due to shrinkage, the material can deviate from the original molded shape. When this happens, the part is out of tolerance. Depending on how severe the distortion is, manufacturers have to spend extra time correcting the part to get it within tolerance so that they can assemble it. In a worst case scenario, they may even have to scrap the part. This results in a lot of wasted time and excess cost.

The good news is that companies who have adopted best practices for composites are much less likely to experience springback.

The good news is that companies who have adopted best practices for composites are much less likely to experience springback. One of those best practices includes using design guidelines. Another best practice involves communicating ply level design information by providing direct access to the composite data in the engineering model.

Manufacturing planning is another important part of producing quality composite parts.

Manufacturing planning is another important part of producing quality composite parts. With composites, it is especially crucial to produce parts exactly as designed. Even a slight deviation in fiber orientation significantly impacts part strength. By following manufacturing planning best practices you are more likely to produce composite parts as-

designed. Best practices involve leveraging an accurate engineering model. In addition, manufacturers should look at ways to automate changes to avoid wasted time manually reworking manufacturing plans.

This report examines design and manufacturing trends in the use of composites in the A&D industry. It also offers advice to overcome common problems to help A&D companies lower cost.

Conclusion

Many A&D companies have turned to composites to help them improve performance and realize better fuel economy. However, the A&D industry is also under significant pressure to lower costs. Addressing manufacturing defects such as springback as well as better manufacturing planning can help A&D companies take advantage of the benefits of composites while improving design and production efficiency and lowering costs.

Springback can be a considerable source of excess cost and waste. Typically, springback causes parts to be out of tolerance so manufacturers have to waste time correcting parts, or worse, scrapping them. By adopting best practices, such as using design guidelines, A&D manufacturers can avoid springback.

By adopting best practices, such as using design guidelines, A&D manufacturers can avoid springback.

Adopting best practices for manufacturing planning is another area where A&D manufacturers can improve quality. It is crucial that composite parts are manufactured as designed to ensure performance. By adopting practices such as leveraging the engineering composite model for manufacturing planning and automating changes, A&D manufacturers will be better positioned to produce parts as designed without quality issues.

Recommendations

Based on industry experience and research for this report, Tech-Clarity offers the following recommendations:

- To avoid springback, focus on identifying potential occurrences during design.
- Take advantage of design guidelines to help avoid springback.
- Consider solutions that offer embedded intelligence to provide guidance and support better decision to reduce the occurrence of springback.
- Communicate ply level design data to manufacturing via the engineering model.

About the Author

Michelle Boucher is the Vice President of Research for Engineering Software for research firm Tech-Clarity. Michelle has spent over 20 years in various roles in engineering, marketing, management, and as an analyst. She has broad experience with topics such as product design, simulation, systems engineering, mechatronics, embedded systems, PCB design, improving product performance, process improvement, and mass customization. She graduated magna cum laude with an MBA from Babson College and earned a BS in Mechanical Engineering, with distinction, from Worcester Polytechnic Institute.

Michelle began her career holding various roles as a mechanical engineer at Pratt & Whitney and KONA (now Synventive Molding Solutions). She then spent over 10 years at PTC, a leading MCAD and PLM solution provider. While at PTC, she developed a deep understanding of end user needs through roles in technical support, management, and product marketing. She worked in technical marketing at Moldflow Corporation (acquired by Autodesk), the market leader in injection molding simulation. Here she was instrumental in developing product positioning and go-to-market messages. Michelle then joined Aberdeen Group and covered product innovation, product development, and engineering processes, eventually running the Product Innovation and Engineering practice.

Michelle is an experienced researcher and author. She has benchmarked over 7000 product development professionals and published over 90 reports on product development best practices. She focuses on helping companies manage the complexity of today's products, markets, design environments, and value chains to achieve higher profitability.

About the Research

Tech-Clarity gathered and analyzed 181 responses to a web-based survey on designing and producing composite parts. Survey responses were gathered by direct e-mail, social media, partners, and online postings by Tech-Clarity. Tech-Clarity also interviewed leaders from leading manufacturers in order to share their experience and knowledge.

The respondents were comprised of about one-third (35%) who were individual contributors. Nearly one-half (45%) were manager or director level, and the remaining (20%) were VP or executive levels.

The respondents represented a mix of company sizes, including 36% from smaller companies (less than \$100 million), 32% between \$100 million and \$1 billion, 32% greater than \$1 billion. All company sizes were reported in US dollar equivalent.

Of the responding companies all (100%) were from the Aerospace and Defense industry.

The respondents reported doing business globally, with over a third of companies doing business in North America (39%), a little less than one-half doing business in Western Europe (45%), a little less than two-third doing business in Asia (61%), Eastern Europe (15%), Middle East (9%), Latin America (8%), and Australia (6%).

Only responses from those determined to be directly involved in designing and/or producing composite parts were included in the analysis.

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