



MODERNIZING MACHINING PREPARATION: TAPPING INTO CLOUD-BASED SOLUTIONS

Traditional mechanical products are transforming into smart, connected products. This change ripples across the product development lifecycle, introducing new challenges in many engineering domains and across increasingly multi-domain systems.

Companies need to use modern machining techniques to keep up with demand for smart products. Innovations such as high-speed machining and automated functions are reducing turnaround times and machining costs. Having the right toolpath is key, but it is just as important to quickly generate numerically controlled (NC) toolpaths. To achieve this, manufacturers must plan their machining strategies early in the product development lifecycle, accessing and working on the fine details while the project is still in the design phases, and updating the deliverables accordingly.

To develop smart, connected products on time and on budget, organizations must have the right product development IT ecosystem in place. A Lifecycle Insights study shed light on the types of machining IT stack solutions leading organizations are using. This brief discusses those solutions and provides recommendations to improve organizational performance across the product development lifecycle.

APPROACHES THAT DELIVER VALUE

Lifecycle Insights' 2020 Product Development IT Ecosystem Study investigated the impact of employing more progressive IT ecosystems in place of established ones, including those for machining strategies.

The Lifecycle Insights' benchmarking method categorized the respondents into three groups of equal size. Each organization is ranked as either most progressive, moderately progressive, or least progressive, according to the types of solutions in its product development IT ecosystem. When comparing these different organizations, the report revealed significant differences in the number of product-level prototypes built and tested, change orders executed after design release, and electronics respins. In total, the most progressive companies saved more than \$1,038,000 per year compared to the least progressive.

Machining solutions play a critical role in the development process. The study found that the most progressive organizations use a more diverse mix of solutions than their less progressive counterparts. They employ cloud-based solutions at a higher rate than the other respondent groups, but these are not the only solutions they use. The most progressive organizations commonly use file-based, locally installed applications as well. They also use applications connected to on-premise servers. The most progressive companies are not replacing traditional solution types altogether. They are simply augmenting them with cloud-based solutions.

AUGMENTING TOOLPATH GENERATION WITH CLOUD SOLUTIONS

The study cohorts are clearly differentiated by the mix of traditional versus cloud-based applications they employ for the machining IT stack. The groups diverge further in their approaches to design release, the handoff from engineering to manufacturing. Once the machinists receive the designs, they can develop the relevant tooling and machining solutions.

Traditionally, design models are exported and imported into computer-aided manufacturing (CAM) solutions. However, this strategy is fraught with issues. The translation between different solutions often results in broken geometries, and machinists must spend hours fixing the resulting models. When any change is made to the design, the whole process must be repeated. The necessary fixes can be costly both in terms of money and product development delays. This places pressure on both the project budget and deadlines.

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The study revealed that the most progressive organizations mitigate translation issues between applications by using cloud-based solutions. Some 64% of the most progressive companies open mechanical design models using an integrated cloud solution. The same proportion open native files using an integrated suite. These solutions provide a smooth transition between the design and manufacturing stages. The design models do not need to be exported and imported across multiple CAD and CAM solutions, eliminating transition-related geometry errors.

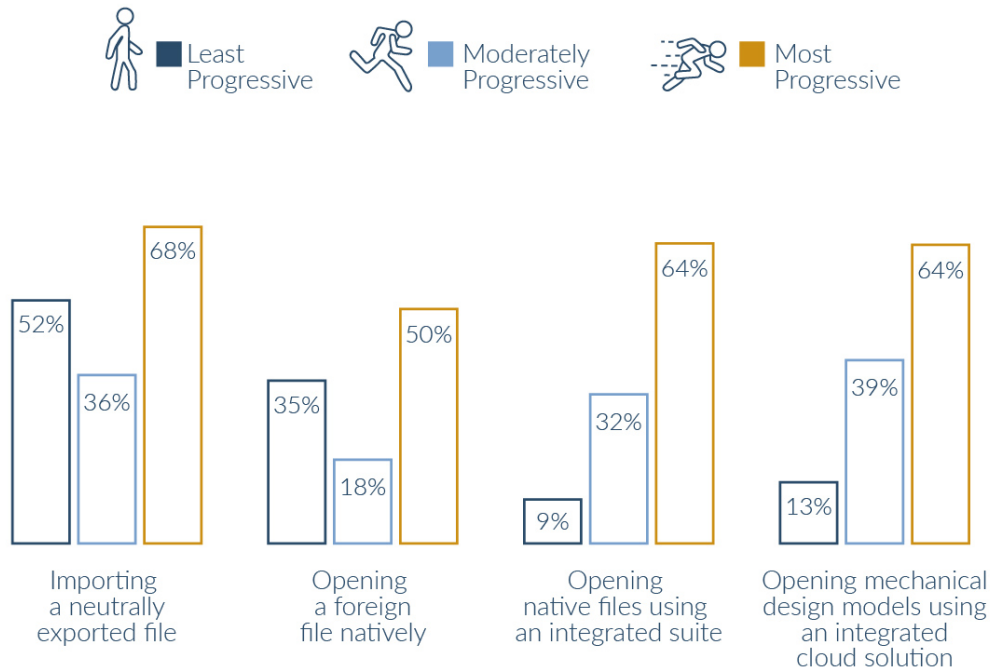


Figure 1: Integration Approaches to Mechanical and Machining- The most progressive use cloud-based solutions to share mechanical designs with machinists developing manufacturing models and numerically controlled toolpaths. Lifecycle Insights' 2020 Product Development IT Ecosystem Study

There are many benefits to this strategy. Cloud-based solutions enable seamless late-stage changes. What's more, machinists can complete prep work earlier in the development lifecycle, even before design release. These integrated solutions allow companies to resolve issues as early as possible in the product development lifecycle, saving time and money. And thanks to the highly scalable nature of the cloud, organizations can deploy additional compute resources to keep pace with the demands of their computationally intensive machining models.

EMPLOYING CLOUD-BASED SOLUTIONS FOR COLLABORATION

Machining is growing in complexity, increasing manufacturing times. High-speed machining can help, improving organizations' manufacturing efficiency and throughput levels.

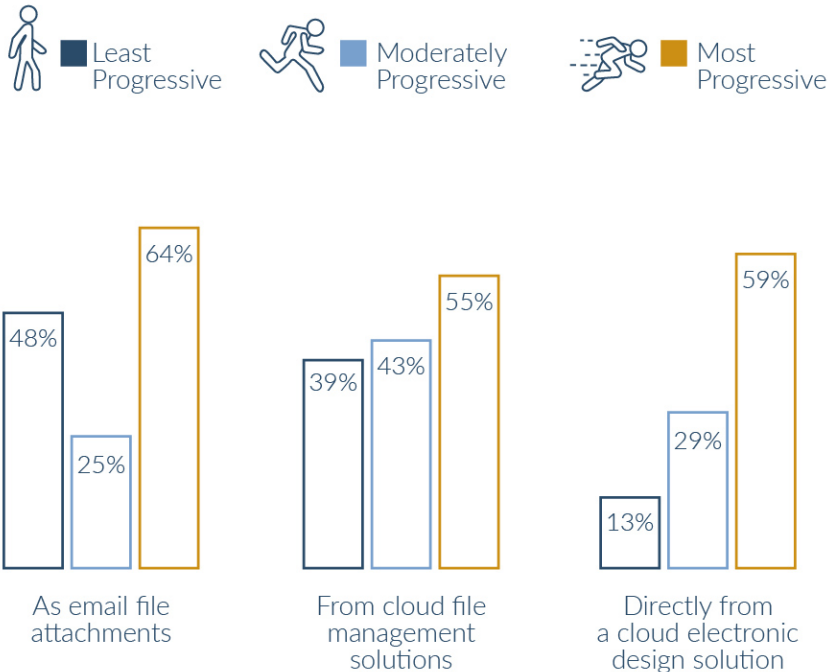


Figure 2: Approaches to Sharing Machining Models - The most progressive use cloud-based solutions to share and collaborate on machining models with suppliers, customers, and partners. Lifecycle Insights' 2020 Product Development IT Ecosystem Study

When implementing high-speed machining, companies must ensure there are no clashes with other equipment that could lead to catastrophic damage on the factory floor. To achieve this, machinists must verify their toolpaths with simulations of the high-speed machining equipment at work. This allows them to predict, catch, and resolve clashes virtually before they ever get to the manufacturing floor.

Unfortunately, traditional file-based workflows work against these new approaches. They introduce time lags as files are transferred from one application to another. What should be a fast verification of a toolpath turns into days of waiting. In contrast, cloud-based technologies allow for a

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seamless workflow in which machinists can easily develop, simulate, and verify high-speed toolpaths.

RECOMMENDATIONS

- Companies should determine the monetary and time impact of working on out-of-date information when creating machining toolpaths. How frequently do change orders result in scrap and rework on the production floor?
- Companies should augment existing CAM applications with cloud solutions that enable sharing and collaboration with others in the development process. They should make sure to select solutions that synchronize and do not duplicate models and files.



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