FUTUREPROOF YOUR PRODUCT DESIGN:

7 Technologies Your Design
Solution Should Support

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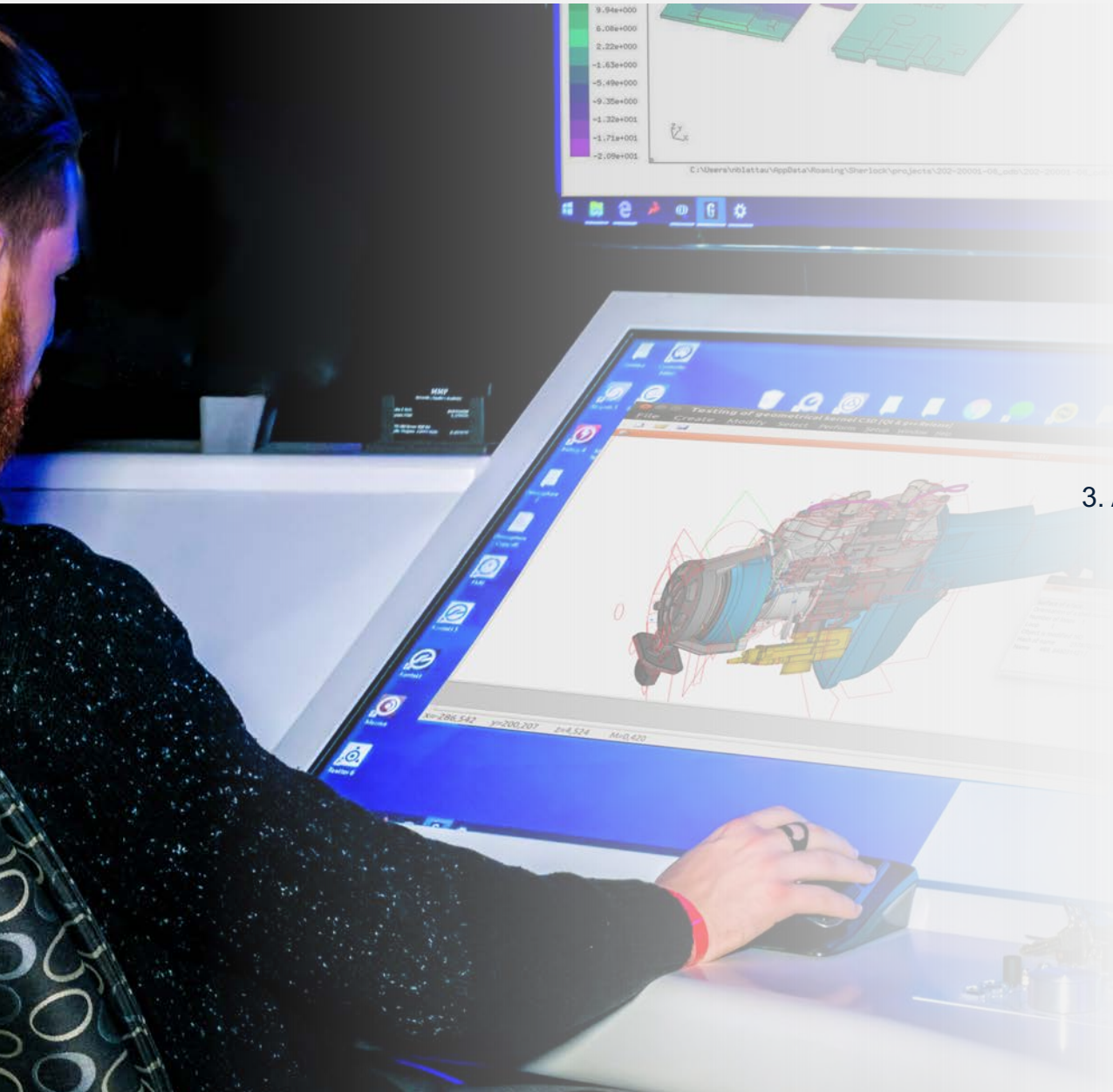
Is Your CAD Tool Ready for the 2020s?

Which Technologies Will Make Your Products More Competitive?

As you look to stay relevant in the 2020s, which technologies will impact your product's competitiveness of your products the most? What are your competitors doing? What should you look for in design tools to make it easier to incorporate new technology into your products? What other capabilities should your company have to ensure it stays competitive through the 2020s? These are questions you must consider and prepare for now to stay competitive in the 2020s. Tech-Clarity research shows that companies will frequently rely on new technology to increase innovation over the next decade. To support new technology, an overwhelming 98% of companies agree that software tools will help, but which ones will have the most impact?

Based on a survey of nearly 200 manufacturers, this research study examines industry plans for the 2020s to stay competitive. It identifies the top technologies that Top Performing companies believe will make them most competitive and how these technologies will impact development. It also looks at how to get the most out of existing engineering teams and manage the resulting complexity. This research is an updated look at a study conducted in 2018 and examines how trends have evolved over the last two years.

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How Will You Stay Competitive in the 2020s?

The Pace of Innovation Has Accelerated

As companies plan for the 2020s now, there is much to consider, especially with an uncertain economy. New technologies have created innovation opportunities, making it an exciting time for product developers. In fact, Tech-Clarity research finds that 84% of Top Performing companies rate new technology as very or extremely important to their innovation goals. Companies need to prepare now with the right design processes and tools so that they can take advantage of the latest technology.

Those who ignore the latest trends risk their survival. Just over half of Fortune 500 companies in 2000 have already disappeared,[1] and the failure rate will only accelerate. A study conducted by Innosight[2] projects that nearly 50% of the current S&P 500 will be replaced over the next decade. They partly attribute decreasing corporate lifespans to disruption from technology, failure to invest in growth areas, and slow responses to disruptive competitors.

The Rules of the Game have Changed

These startling statistics indicate that companies that stay with the status quo, trusting that what has worked in the past will carry them into the future, may find themselves at a competitive disadvantage. They risk losing out to those who are strategically planning for their company's success in the 2020s.

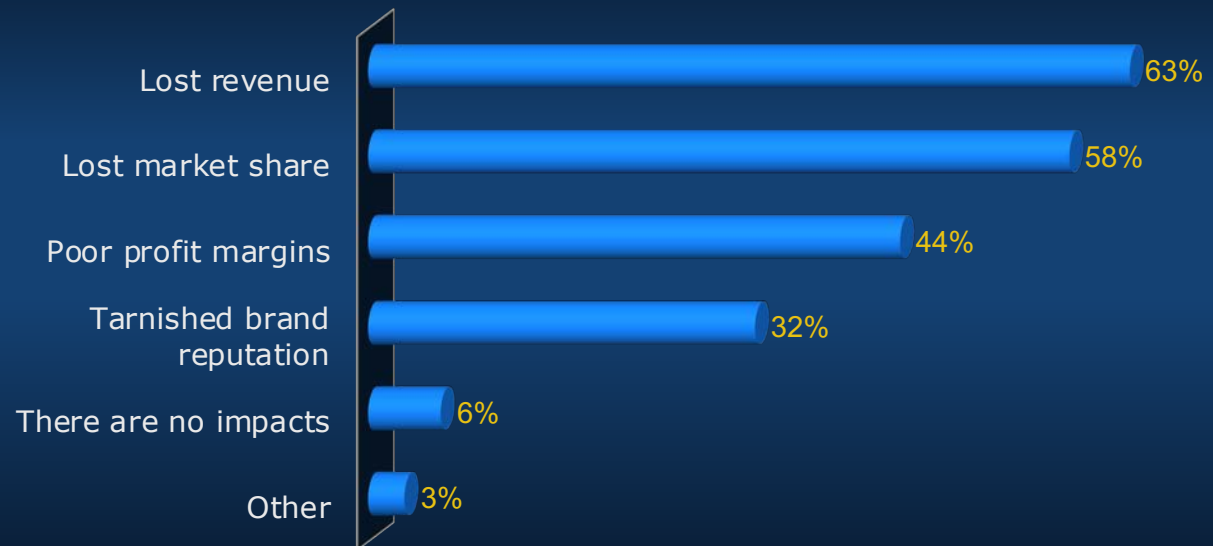## New Technology Will Be a Major Driver of Innovation

Companies must continue to innovate to stay competitive. Tech-Clarity's research study, Seven Practices to Achieve Great Innovation, finds that if companies do not meet their innovation goals, they will lose revenue and market share, and profit margins suffer (see graph).

You Need the Right Software

While the right strategy around cutting-edge technologies is critical to avoid these negative impacts, you must also empower your teams with proper processes and technology. You also need capabilities to manage the resulting complexity. This research reveals what the most successful companies do to help them succeed and stay ahead of the competition while preparing for the next decade.

IMPACTS IF YOUR COMPANY DOESN'T MEET ITS INNOVATION GOALS

Impact	Percentage
Lost revenue	63%
Lost market share	58%
Poor profit margins	44%
Tarnished brand reputation	32%
There are no impacts	6%
Other	3%

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Identifying Best Practices

How Top Performers Were Defined
To identify the top technologies that the most successful companies are evaluating, Tech-Clarity categorized survey respondents as Top Performing companies and Others. We defined Top Performers as the top 20% of companies who outperform their competitors in metrics that indicate product development success:

- Develop products efficiently
- Design high-quality products
- Develop innovative products
- Meet products cost targets

We then focused on which technologies Top Performers value, what they do, and especially what they do differently to develop recommendations.

The Top Performer Advantage
Top Performers do a better job of simultaneously balancing quality, cost, and innovation while still meeting deadlines. By staying on schedule and effectively managing this critical design criteria, their products are more successful.
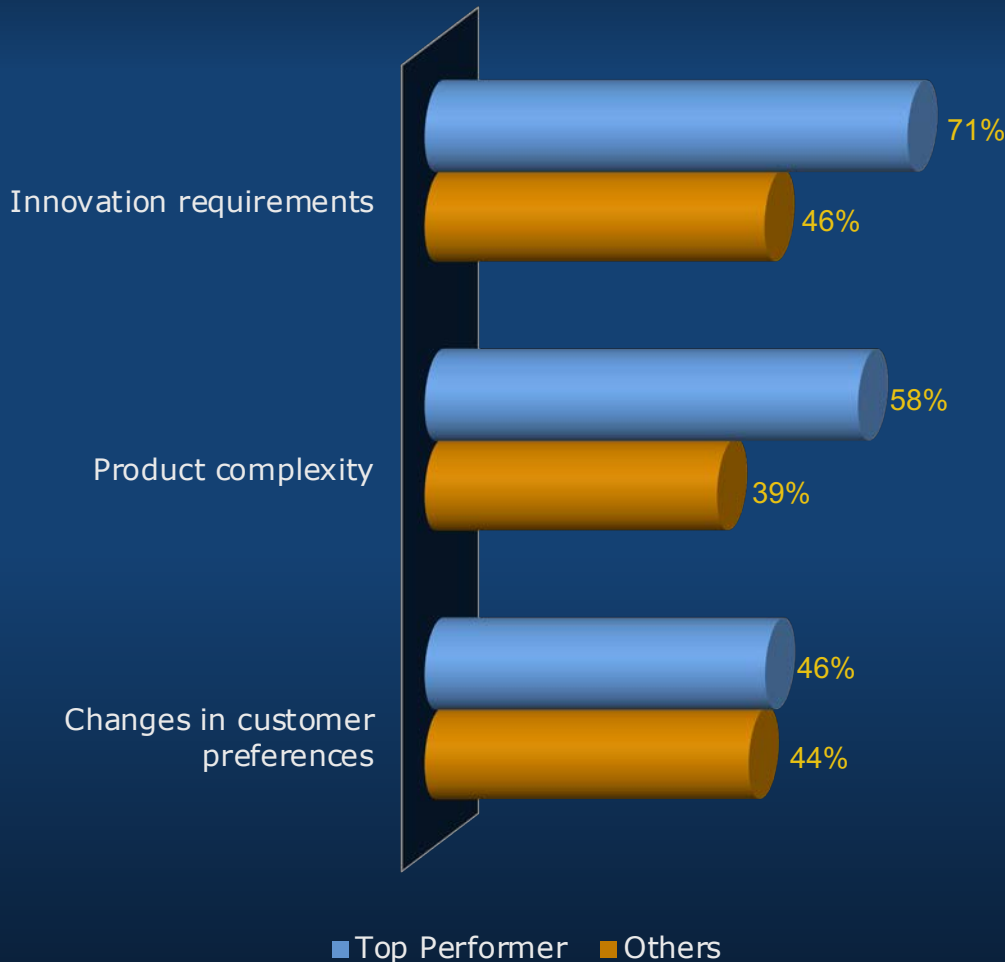
Top Performer Benefits
Because of their superior product development processes, Top Performers bring more competitive products to market faster, empowering them to capture market share. This leads to higher revenue growth (see table on the right). Since Top Performers also meet their cost targets and do a better job of reducing product cost, the higher revenues combined with lower cost leads to greater profitability. Their ability to innovate better also leads to a larger share of their revenue coming from new products, which helps them establish future revenue streams and remain relevant in the market.

Compared to their peers, Top Performers enjoy **6 times the revenue growth**.

METRIC	TOP PERFORMER	OTHERS
Revenue growth over last 24 months	14%	2%
Product margin expansion over last 24 months	9%	2%
Product margin expansion over last 24 months	11%	2%
Percent of sales from new products (<3 years old)	14%	4%

Plan for Design Changes in the 2020s

TOP FACTORS IMPACTING HOW PRODUCTS WILL BE DESIGNED IN THE 2020s

Innovation requirements — 71% (Top Performer), 46% (Others)

Product complexity — 58% (Top Performer), 39% (Others)

Changes in customer preferences — 46% (Top Performer), 44% (Others)

■ Top Performer ■ Others

Top Ways Your Design Process Should Change

Many of the latest technologies will have a significant impact on how we design products. As you prepare to update design processes now, what should you prioritize? The graph on the left reveals the top areas Top Performers believe will impact how they design in the 2020s: innovation, increased complexity, and connecting with customers. To be successful, they will need the right design tools to support them.

Top Performers Are Visionary

Top Performers are more visionary when they think about the design process. They expect innovation requirements to be the primary driver impacting how they design products. They recognize it will drive company success in the 2020s. In the 2020s, much innovation will come from new technology. To take advantage of it, companies need design tools that will support it, thus evolving their design process. As products become more innovative, they will likely become complex, and companies will need the right tools to support that complexity. Finally, all companies realize that meeting customer needs will be critical. They will need to connect with customers to validate those needs and quickly adapt when preferences change, while keeping the design coordinated across all engineering disciplines, others in the company, and suppliers and partners.

Seven Technologies Will Change Products

While many technologies offer innovation opportunities, Top Performers rate seven as having the most significant impact on their ability to compete in the 2020s. We will now reveal these seven technologies and assess how they will impact design.

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7. Virtual and Augmented Reality

The AR/VR Potential

Augmented and virtual reality are exciting technologies with potential. Augmented reality (AR) superimposes a computer model over a person's view of the real world. This creates a composite view of reality that has been augmented with a digital model. Virtual reality (VR) is a complete three-dimensional computer-generated environment that you can interact with in a way that seems real.

With 24% of Top Performers saying AR/VR will help them become more competitive, the technologies come in at number seven on our list. Top Performers believe it will help them with training (52%), design (48%), sales (43%), manufacturing (33%), and service (29%). With so many potential applications, companies should pay attention to these technologies as adoption will likely increase as more solutions become available and people explore the possibilities.

The Impact on Design

With an AR/VR environment, engineers can test their design themselves. This will give them insights into design choices to ensure they are engineering the right customer experience. AR/VR can also offer a great way to improve collaboration with customers as you can offer your customers a realistic experience that isn't possible when viewing a 3D model on a 2D screen. Customers can then provide feedback early on in the design lifecycle so that engineers can consider their input before physical prototypes even exist.

Extend Engineering CAD Model Value

With AR/VR, manufacturing and service can prepare in advance or conduct training exercises in a realistic, cost-effective environment. Salespeople can wow customers with an immersive demo to help close the deal.

AR/VR technology that leverages CAD models provides everyone with an accurate digital model that updates as the design evolves. This way, not only is product information up-to-date, but engineers don't need to interrupt their design work to create individual deliverables for other groups.

48% of respondents believe AR/VR will help design teams.

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6. Internet of Things (IoT)

IoT Is Driving Change

The Internet of Things adds connectivity and intelligence, so that products can interact with their environments in innovative ways. Over a quarter of Top Performers (28%) said IoT will help them make products more competitive. Part of this is because the IoT creates opportunities to extend product value with innovative services.

With IoT, companies can stay connected with their products, which in turn means connecting with their customers. Consequently, engineers can get insight into how customers actually use the product. With this insight, engineers can base their design decisions on proven customer use cases.

The Impact of IoT on Design

Developing IoT-enabled products also requires changes to design. Developing smarter and connected products involves the expertise of multiple disciplines. It is hard to overcome the silos of knowledge that exist within each discipline, yet developing smart products requires a united development team that covers several disciplines. Not only are the knowledge silos challenging to overcome, but people don't know what they don't know, so effective and efficient collaboration is required. Together, the team can come up with the best solutions that leverage expertise across disciplines. To support this collaboration, 52% of Top Performers adopt software that supports tighter integration between MCAD and ECAD data as a top strategy to develop more competitive products. Integrated design tools make it easier to share models across disciplines and also improve communication as it is easier to see what others on the team are doing.

Integrated design tools not only help with collaboration, but they also help manage complexity as the team can work on a single integrated model. This will make it easier to find issues such as detecting interferences between the PCB and its enclosure or optimizing routing and accurately calculating lengths for wires, cables, and harnesses.

52% of Top Performers adopt software that supports tighter integration between MCAD and ECAD data

5. New Materials

Opportunities with New Materials

New materials will contribute to innovation with 36% of Top Performers reporting that materials will improve competitiveness. Many factors contribute to this. Advances in material technology create more applications and opportunities for additive manufacturing. Materials also create opportunities to reduce weight, improve energy efficiency, and increase durability. Plus, they enable innovations such as flexible electronics, smart materials that react to their environment, improved sustainability, and more. All of this can help companies offer something their competitors may not have.

How New Materials Impact Design

While new materials enable innovation, 30% of Top Performers also say these materials will change how they design products. New materials have different properties that impact strength, integrity, weight, and performance. Engineers need to understand those properties to avoid over-engineering products while still meeting both requirements and cost targets.

In fact, Top Performers view material data as so important, 85% embed material data into their CAD models, a significant increase over 2018 when only 68% did. Seamless integration between CAD tools and an up-to-date material library will empower engineers to make better decisions around materials.

Related to this, 67% of Top Performers rate simulation tools as the top software capability to help technology adoption. This also represents an increase since 2018 when 51% of Top Performers identified simulation as a top software enabler to support technology adoption. As an example of how software helps, the combination of simulation and material libraries allow engineers to evaluate different alternatives and materials to understand the impact on the design. This combination will help them improve decisions while balancing cost, performance, and quality.

67% of Top Performers rate **simulation tools as the top software capability** to help technology adoption

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4. Smart Factories

The Value of Smart Factories

Smart factories use data, automation, connectivity, IoT, sensors, and other technologies to rapidly respond to production and demand changes. They then adapt and optimize processes in real-time. This leads to greater flexibility, efficiency, higher quality, repeatability, and the ability to better meet customer needs. Products get to market faster and at a lower cost. Also, machines can "self-monitor" to proactively send notifications when maintenance is required, minimizing downtime. These efficiencies lead 36% of Top Performers to identify smart factories as a leading technology to improve competitiveness.

How Smart Factories Will Change Design

While smart factories are rated as an important technology to improve competitiveness, fewer companies view it as impacting design. However, there are some considerations. Since smart factories can quickly adapt to change, it will become far more

economical to tailor products to specific customer needs. Although this will allow companies to serve their customers even better, engineers will need to design more modular products to take advantage of the opportunity. As it was in 2018, the number of configurations continues to be a top source of complexity, reported by 45%, and it will only get more complicated. Engineers will need the right design tools to manage configurations and modular designs. Other changes will come from manufacturing requirements, which will also grow in complexity.

With manufacturing relying on more data, engineers may need to embed more data into their CAD models. In fact, there has been significant growth in the percentage of Top Performers who embed manufacturing details into their CAD models.

Back in 2018, only 33% of Top Performers were doing it. Now, 70% of Top Performers do, representing one of the most significant shifts over the last couple of years. Back in 2018, we speculated that demand to embed more manufacturing data into

CAD models would drive adoption of Model Based Definition (MBD). This seems to have started as 57% of Top Performers say that MBD is a top CAD capability to manage the expected increase in product complexity, compared to only 40% two years ago. Forty-four percent of Top Performers also report that manufacturability checks will help to adopt new technology and catch problems before parts reach the production floor and hurt the smart factory's efficiency.
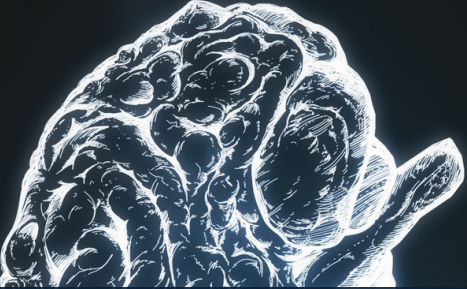
Impact on Industrial Equipment

While smart factories will drive changes across all industries, industrial equipment manufacturers will likely see the most significant impact. They will need to engineer the features that enable the smart factory. All of the changes described in the IoT section will be required for industrial equipment manufacturers to design the machinery for smart factories, so it will be vital that they have the right collaboration capabilities as well as MCAD and ECAD integration.

49% of Top Performers say that **MBD is a top CAD capability** to manage complexity

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3. Artificial Intelligence (AI) / Machine Learning (ML)

Potential AI/ML applications include assembly, CAM, and generative design.

AI/ML Wil Drive the Future

Artificial intelligence and machine learning will have a major impact on the future, and 40% of Top Performers indicate it will help them become more competitive. In 2018, only 19% indicated this, showing how rapidly expectations evolved.

AI enables machines to perform tasks that usually require human intelligence. Tasks include activities such as making decisions, reasoning, drawing inferences, and predicting. Machine learning uses algorithms and statistical modeling to analyze new information, learn from it, and adapt. Together these technologies will create incredible opportunities to improve competitiveness. First, it opens doors for new categories of products, from driverless cars to virtual assistants like Alexa. It also offers significant opportunities to improve how engineers work.

The Impact on Design

AI/ML will help engineers in many ways. It can improve efficiency by automating tedious tasks. For example, it could simplify assembly constraint definition so that after placing a component, the system will automatically define which surfaces align and mate. It might also automatically recognize which bolt to insert based on hole diameter and material or which fittings to use on a pipe assembly. It could also identify existing brackets to use based on hole locations and weight requirements to support greater reuse.

With many experienced engineers approaching retirement, their knowledge could be lost without help. AI can capture that knowledge to empower less experienced engineers. For example, a CAD/CAM tool with feature recognition and embedded manufacturing knowledge could automatically generate the toolpaths. Further, feature recognition capabilities can make it easier to work with multi-CAD data so that rather than treating imported models as "dumb geometry," the system understands design intent.

AI/ML could also help by providing guidance and knowledge to assist engineers design better parts. Rather than a time-consuming, iterative trial-and-error process, AI-driven technology such as generative design can quickly evaluate thousands of options to produce solutions based on desired criteria. In a fraction of the time, engineers develop better, more optimized products. Engineers can then focus more energy on true innovation rather than just incremental innovation, resulting in greater revenue opportunities.

Some of these capabilities exist, some are in development, and some are potential opportunities. The important thing is to understand a vendor's vision for AI/ML and how to apply it inside CAD, CAE, and CAM. Some of the most significant opportunities could come from leveraging intelligence across all three in an integrated platform.

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2. Cloud

The Benefits of the Cloud

The cloud can fundamentally change how we operate and interact with each other. This is likely what's has led 44% of Top Performers to identify it as a top technology that will improve their competitiveness over the next decade. The cloud is another area that's seen a significant shift over the last few years. In 2018, only 29% felt this way, but as more visionary Top Performers have gotten more exposure to the cloud, they are recognizing benefits, especially in engineering. They are now 84% more likely than their lesser performing peers to point to it as a technology that will help them in the 2020s.

The cloud lowers IT and maintenance costs and can minimize the requirements for high-end workstations, while making CAD more accessible on mobile devices. It offers greater flexibility, making it easier to add team members or functionality based on project needs. This allows engineering needs to drive software requirements rather than IT decisions. Most importantly, from an engineering perspective, it breaks down silos and makes it easier to share data and collaborate.

The Impact of the Cloud on Design

Collaboration is critical during product development. In fact, 73% of Top Performers said that improving collaboration across engineering disciplines will be essential to develop more competitive products. Further emphasizing the impact of collaboration, Top Performers identified improving collaboration across departments outside engineering (59%) and third parties (64%) as critical to becoming more competitive. Traditionally, collaboration has been a challenge. Different disciplines use different tools, non-engineers don't have access to CAD, and design data quickly becomes outdated the minute you send it to a third party. The cloud changes all of that.

With the cloud, engineers can simply send someone a link to the data, and both parties can immediately access the data in real-time. Tech-Clarity's, *What's the Cost of Poor Engineering Collaboration?* finds that engineers work with outdated data 28% of the time. That creates risks for wasting design efforts and can lead to design rework. The study also finds that the combination of collaboration and design rework makes up 40% of engineering time. Some of that time is just wasted waiting for design models and new information from others. With an integrated engineering platform on the cloud, everyone can access the latest design data in real-time. They can then focus more energy on developing better products in less time.

Top Performers are **84%** more likely than Others to **identify the cloud as a technology that will help them become more competitive**.

1. 3D Printing/Additive Manufacturing

How 3D Printing Helps

Forty-eight percent of Top Performers rate 3D printing as the top technology to help them become more competitive. 3D printing will create many opportunities. Respondents report that it leads to reduced development time due to faster creation of rapid prototypes (64%), reduced manufacturing lead time since tooling isn't needed (41%), and better designs because manufacturing limitations don't inhibit designs (39%). All of these create a competitive advantage. This is consistent with views from two years ago.

3D Printing Will Bring Changes

Additive manufacturing will significantly impact the design process because it removes traditional manufacturing restrictions so that geometry that previously could not be produced is now manufacturable. Engineers now have more freedom to let engineering requirements drive the design. For example, there are more possibilities for topology optimization to produce strong, yet lightweight shapes.

While there are lots of opportunities, 3D printing adds more complexity as companies must develop new rules of thumb for manufacturing. To establish these rules, manufacturing and engineering will need to collaborate closely, and they will need the right tools to support that.

It can be hard to think about new ways of designing when the old rules have been so well ingrained. This is another area where software can help by proposing solutions based on your defined requirements. Forty-three percent of Top Performers rate generative design as a top software capability to support technology adoption. Generative design can be particularly helpful when designing for additive manufacturing as it lets the software define the geometry based on design parameters. Generative design is another area that has grown significantly over the last two years when only 29% of Top Performers identified it as a top software capability to support technology adoption. This is likely reflects how generative design has matured and proven its value.

With more possibilities, engineers must also determine the best manufacturing technique and design accordingly. This increase in the number of options contributes to why 47% of companies rate manufacturing techniques as the top source of product complexity. Again, the right software tools can go a long way to make it easier to evaluate options and determine when 3D printing would be best.

48% of Top Performers rate **3D printing as the top technology** to help them become more competitive.

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How Do You Avoid Challenges?

The graph shows the many challenges you should try to avoid to make technology adoption a success.

Support Continuous Education on Technology

A significant barrier is the lack of awareness and training on new technologies. One way to overcome this is to take advantage of online training. Fifty percent of Top Performers rely on online training to help support their adoption of new technology, allowing them to become more familiar with new technologies. However, to be successful, engineers need management support.
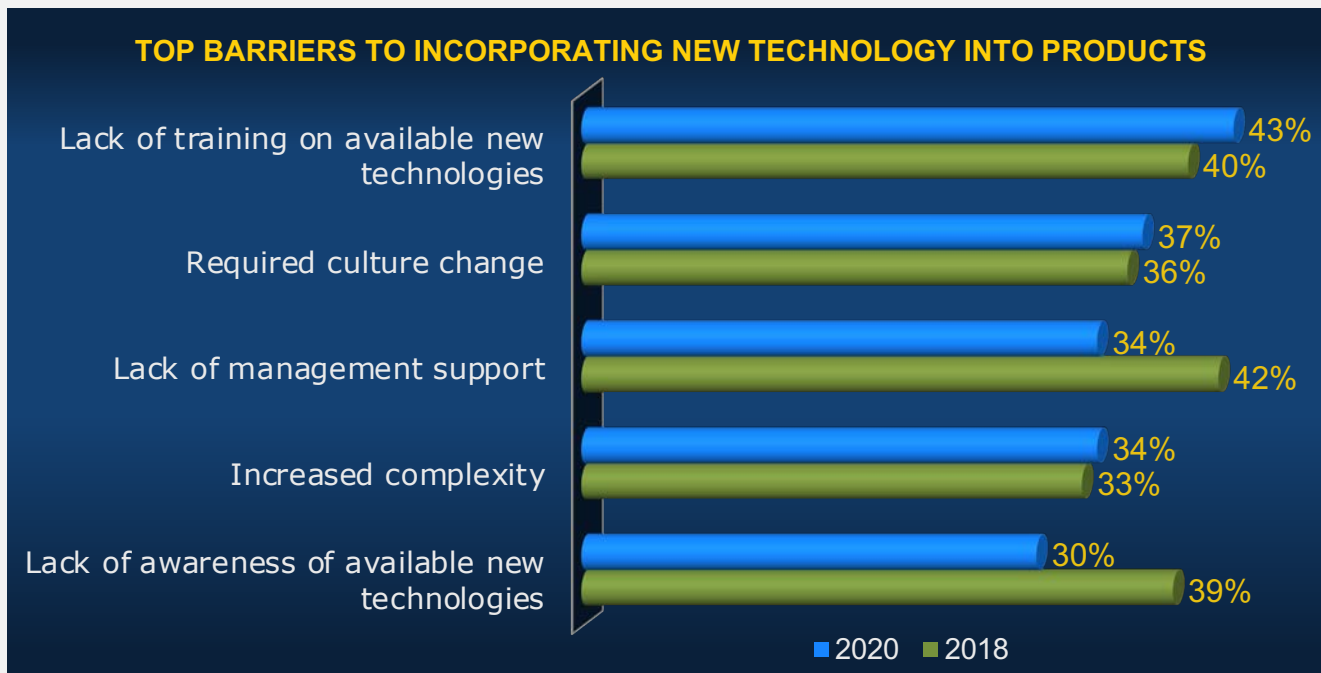
Encourage the Right Culture

Staying current with new technology requires a culture of constant learning and curiosity. Without this culture, it's difficult to overcome the barriers of technology adoption. Cultivating this culture without adequate management support is hard. Compared to Top Performers, Others are 56% more likely to indicate culture as a top challenge, suggesting they struggle with it more. Access to the right user community can be a great asset to improve culture as 45% of Top Performers report that their user community is a great resource to help them with technology adoption.
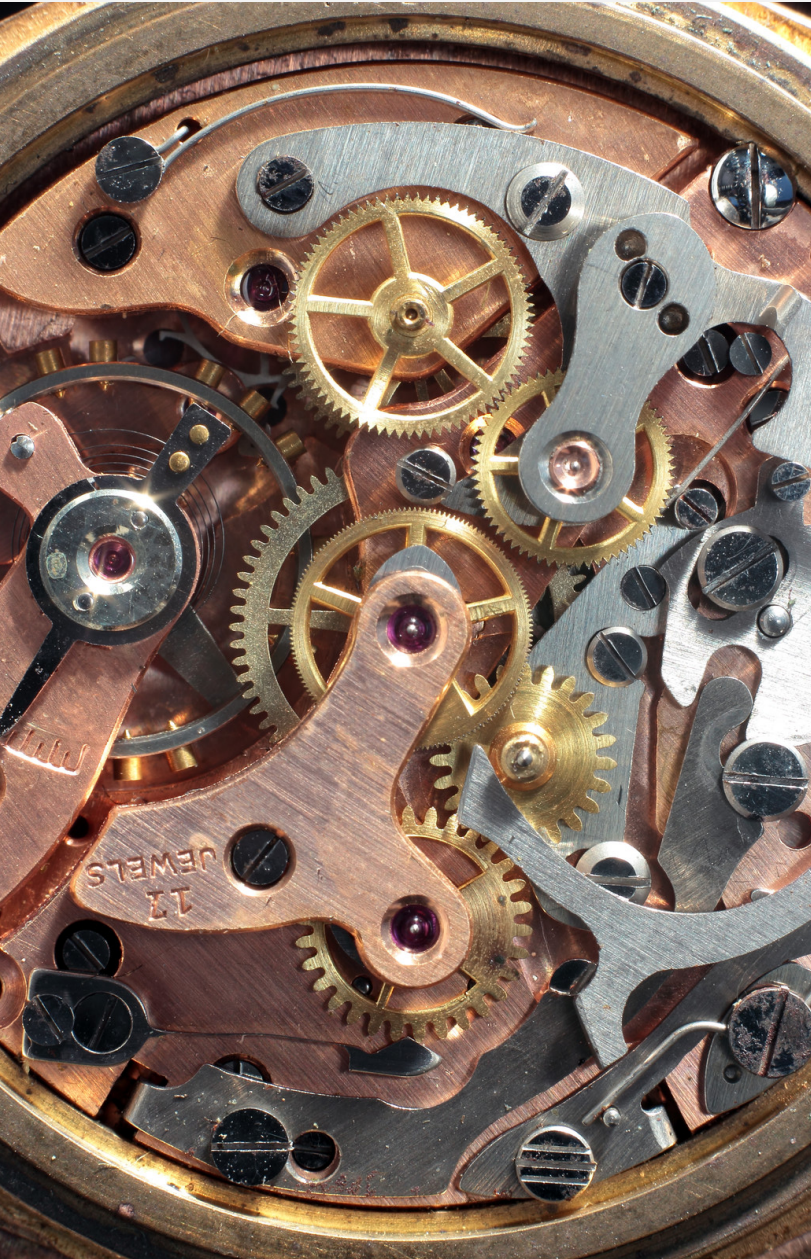
Get Management Support

New technology brings a certain amount of risk, which can make it less appealing to management. However, it is critical to meet innovation goals and create future revenue streams. Interestingly, compared to Top Performers, Others are 66% more likely to rate lack of management support as a top barrier. This indicates that management teams at Top Performing companies recognize the importance of new technology and it helps them become more successful. Reinforcing this, only 14% of Top Performing companies indicated this is a barrier, significantly increasing the gap between Top Performers and Others from two years ago. This is the primary reason this barrier isn't rated as highly as it was two years ago.

Manage Complexity

As you add new technology, product complexity increases. Having the right tools to manage this complexity will help to overcome this barrier.
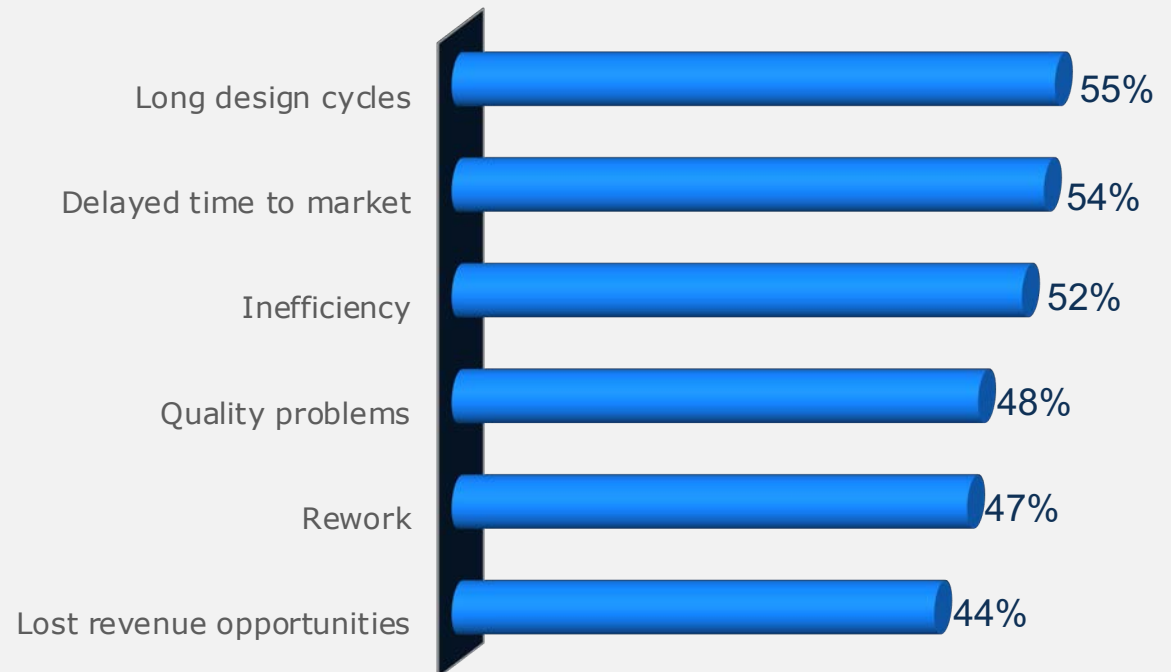
TOP BARRIERS TO INCORPORATING NEW TECHNOLOGY INTO PRODUCTS

Barrier	2020	2018
Lack of training on available new technologies	43%	40%
Required culture change	37%	36%
Lack of management support	34%	42%
Increased complexity	34%	33%
Lack of awareness of available new technologies	30%	39%

■2020 ■2018

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When Increasing Complexity Is Ignored
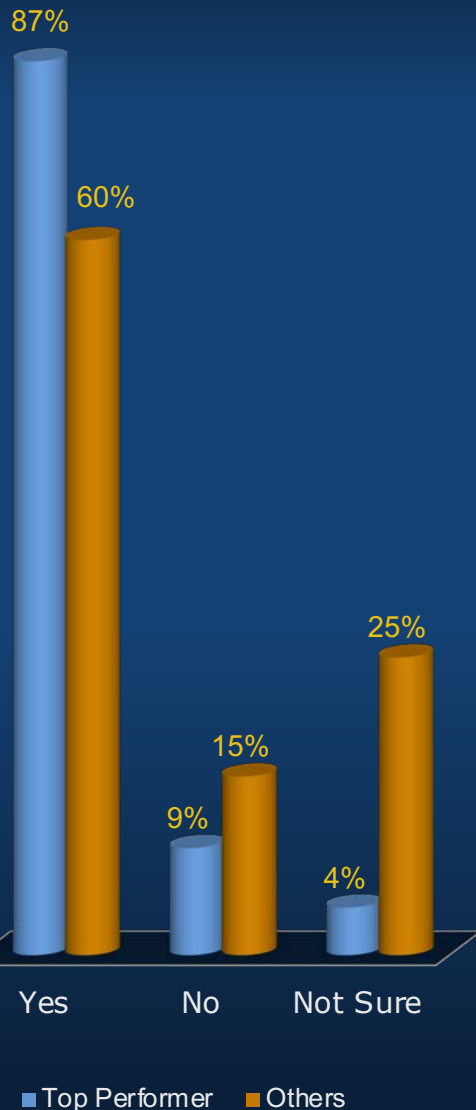
The Negative Impact of Not Managing Complexity

While adding new technology to products makes them more competitive, products also become more complex. If you do not manage that complexity, you can put yourself at a competitive disadvantage. Problems resulting from complexity can lead to delays and higher costs. The window of opportunity for new products continues to decrease, and there is less time for a product to capture market share before newer products supersede it. When you are late-to-market, that window becomes even shorter, and you lose revenue opportunities. When engineers struggle with complexity, design cycles are longer, processes are less efficient, and when the inevitable errors occur, it leads to costly rework.

IMPACT OF NOT MANAGING COMPLEXITY

Long design cycles	55%
Delayed time to market	54%
Inefficiency	52%
Quality problems	48%
Rework	47%
Lost revenue opportunities	44%

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Let Software Assist You

87%
60%
9%
15%
4%
25%

Yes   No   Not Sure

■ Top Performer   ■ Others

Ensure Tools Meet Future Needs

To support technology adoption and manage the resulting complexity, you need the right software tools. The graph (left) shows that most Top Performers believe their tools will meet their needs in the 2020s. On the other hand, their peers are less likely to feel this way. They may want to consider a tool change so that they are not held back by tools.

Interestingly, 93% foresee CAD tools as helping to manage product complexity. A few CAD capabilities in particular stand out in particular as making the most difference.
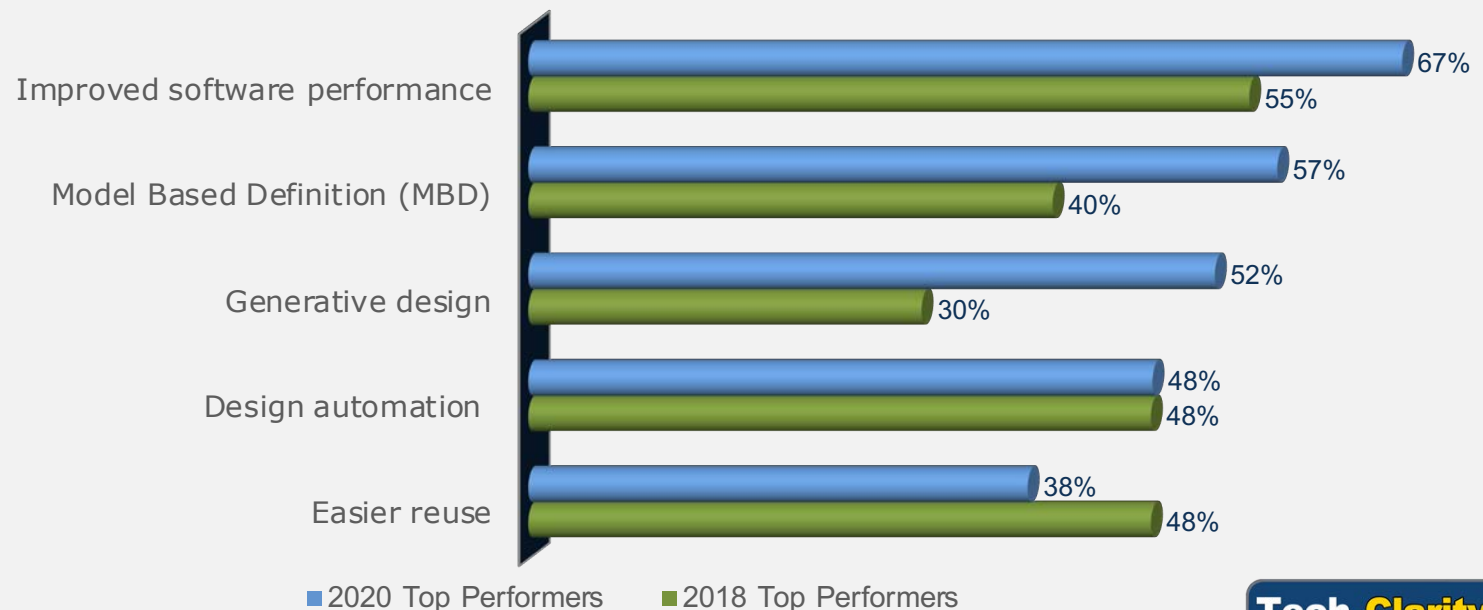
The lower graph shows the top five capabilities Top Performers rate as most important for

managing the products they expect to develop in the 2020s. These are capabilities companies should look for in a CAD tool.

Performance

Software with the right performance enhancements will make it easier to work with large assemblies. It should also handle complex models with more data embedded in them, such as material and manufacturing data. Large models shouldn't slow down the software, so engineers don't waste time waiting to retrieve models or features to regenerate. This was most important to Top Performers in 2018 and has only grown in importance.

TOP WAYS CAD TOOLS WILL HELP MANAGE EXPECTED PRODUCT COMPLEXITY IN THE 2020s

Improved software performance — 67% / 55%
Model Based Definition (MBD) — 57% / 40%
Generative design — 52% / 30%
Design automation — 48% / 48%
Easier reuse — 38% / 48%

■ 2020 Top Performers   ■ 2018 Top Performers

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Leverage Intelligence

One of the biggest differences between 2018 and 2020 Top Performers' view of intelligence to manage complexity. MBD supports better collaboration with manufacturing. It makes it easier to take advantage of the intelligence embedded in the CAD model, and streamlines access to manufacturing details, minimizing the risk of miscommunication and errors.
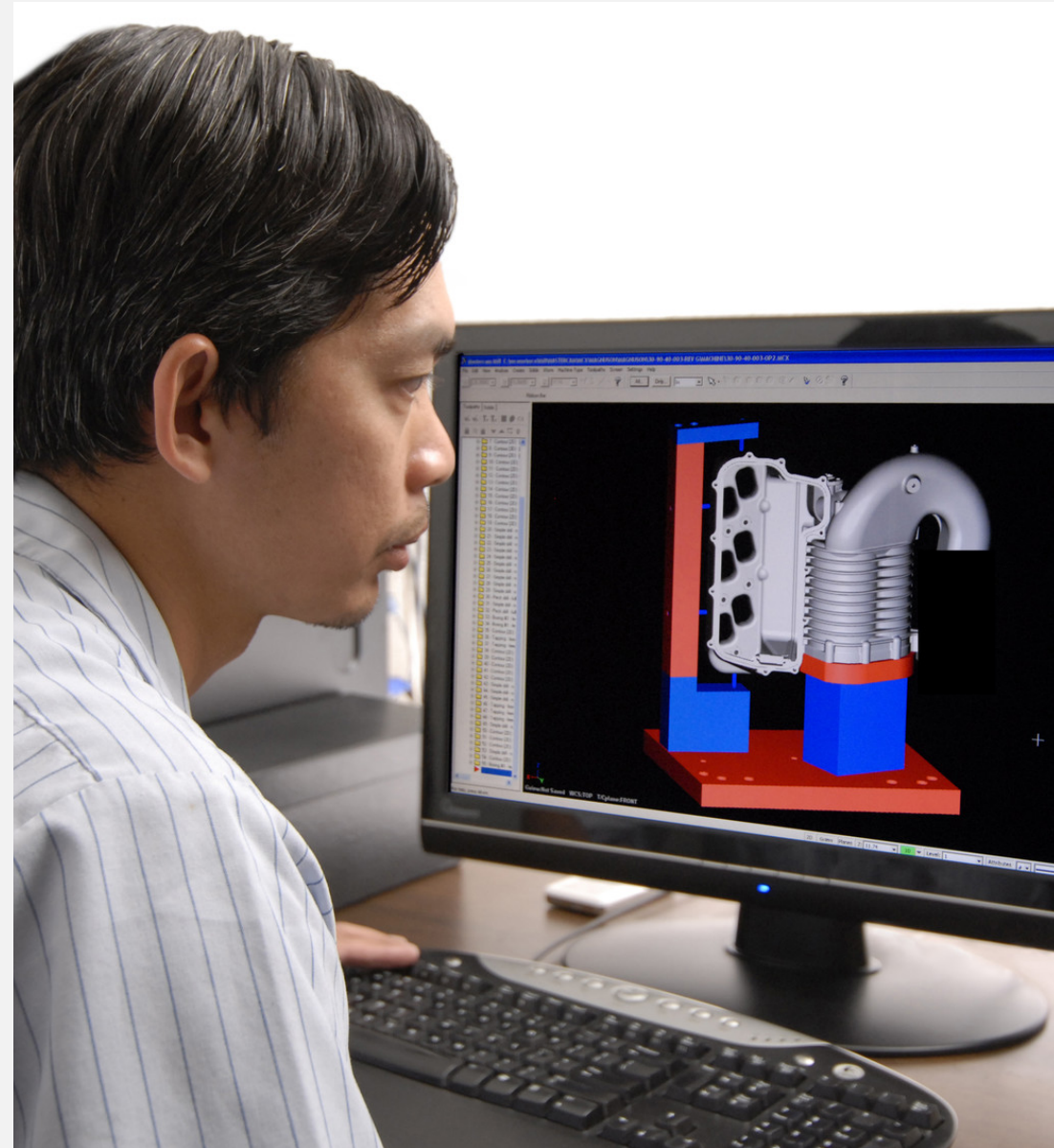
Generative design leverages intelligence in the CAD tool. It frees up engineering efforts from working through the more tedious parts of determining the best design and lets the software do the optimization work.

Avoid Tedious Tasks

The number of configurations is a top source of complexity. With design automation, you can automate the creation of configurations based on design rules, which saves time and reduces the chance of errors.

Reuse

CAD tools that make it easier to reuse older models also save time and reduce errors. You can take advantage of proven and tested design details without wasting efforts recreating work that was previously done.

Complementary Applications to Support Design

Manage Complexity and Extend CAD Model Value

In addition to the right CAD tool, complementary software tools can further help to manage complexity. Consider the top complementary and integrated options that Top Performers expect will help manage complexity as they design products in the 2020s.
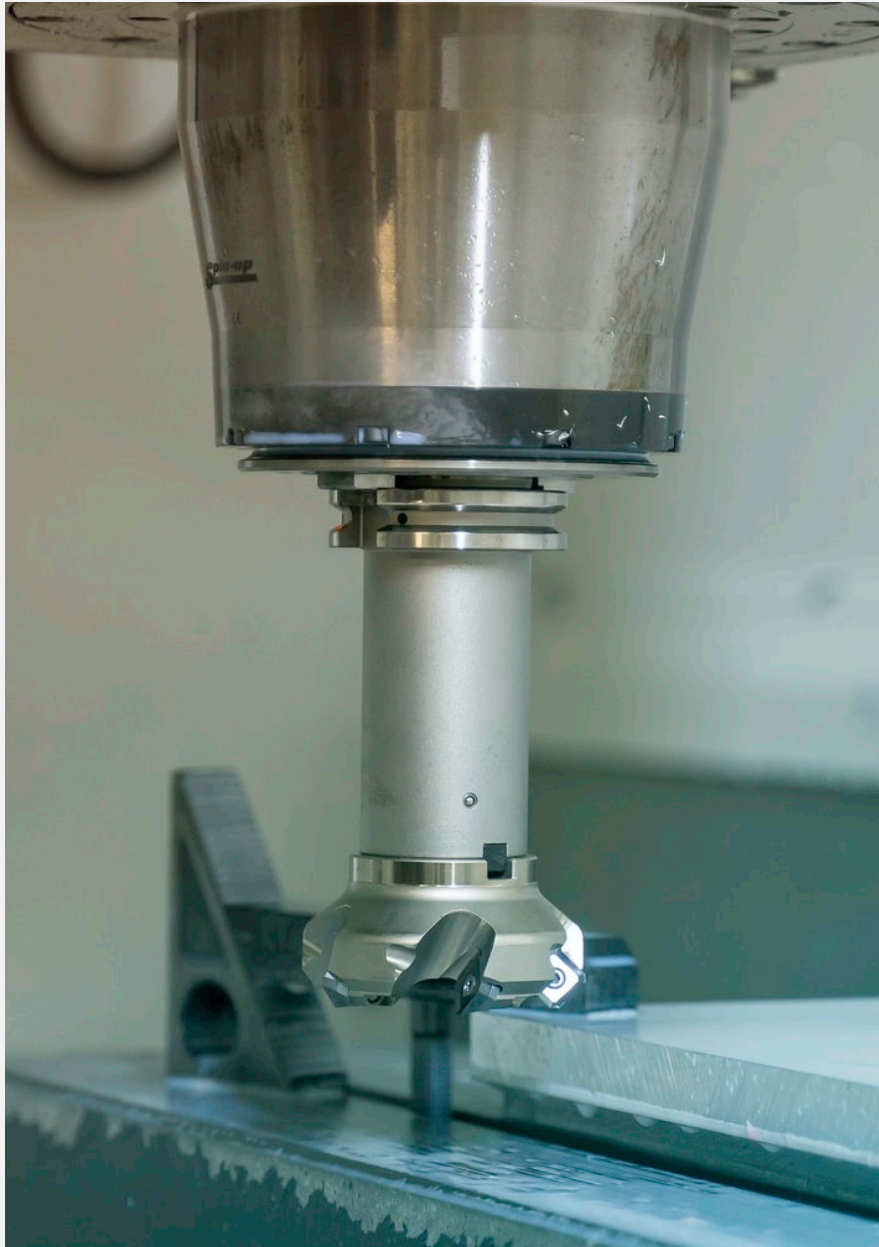
Collaboration Tools

Collaboration tools are a top way Top Performers manage complexity, as reported by 55%. Manufacturing techniques and more electronics and embedded software are top sources of complexity. With collaboration tools, engineers can connect more easily with manufacturing and other engineering disciplines to make it easier to work together. Improved collaboration is also a critical requirement for incorporating new technology. Improved collaboration is also an inherent part of an integrated cloud platform. It is likely a primary driver why the cloud is viewed by Top Performers as one of the top technologies that will help them become more competitive.

Data Management

Product data management (PDM) and Product Lifecycle Management (PLM) provide a way to centralize data and control access to it so that it is easier to find. PLM extends the value of PDM by also supporting processes such as change management and managing workflows. To avoid duplication of efforts and errors, especially for complex products, it helps to manage versions and understand dependencies. Sixty percent of Top Performers rate it as a top way to manage complexity. This can also be part of an integrated cloud platform.

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Native Production Support

Support for production processes will make it easier to manage different manufacturing techniques and leverage the CAD model's intelligence to support production. Fifty-five percent of Top Performers identify it as a top method to manage complexity. It will also support the adoption of smart factories and 3D printing and can also be a perfect application for AI/ML. An integrated cloud platform can be a useful way to flexibly manage which production capabilities you need access to, especially across difficult manufacturing facilities. Integrated ERP and MES can provide further value.

Integrated Design Solutions

MCAD solutions that integrate with other solutions such as industrial design tools or ECAD make it easier to collaborate. Bringing the complete design together in one model saves time, avoids duplicating work, and prevent errors due to misinterpretation and translation. You can also share ideas more easily and identify design problems that will cause issues later on. As a single integrated solution, you can also streamline the handoff across different teams or disciplines. This is another area in which an integrated cloud platform can be ideal because of the ease with which files can be shared without additional infrastructure. Fifty percent of Top Performers say that it is a top way to manage complexity.

Visualization Tools

Visualization tools make it easier to share 3D models with others, especially non-technical stakeholders, while keeping data secure. Plus, the recipient doesn't need access to the native CAD tool to view it. This makes it easier to share with others and solicit feedback. The result is better communication. Forty-five percent of Top Performers find this to be a useful capability for managing complexity.

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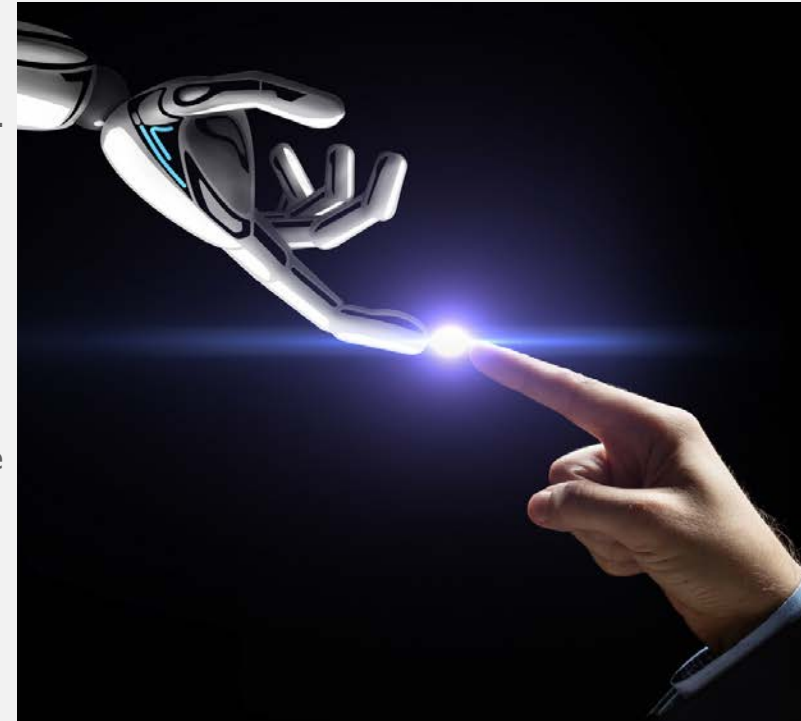# Conclusions and Recommendations

Next Steps

Times have changed. The pace of innovation continues to accelerate, and the pressure from global competition is so significant, corporate lifespans have shrunk. Companies must work harder than ever to stay relevant.

With this decade, staying on top of the latest technologies will be crucial for innovation. However, while new technology will make your products more competitive, it will also increase product complexity. To be successful, you will need the right design tools to support development.

Old ways of working may no longer be enough. Evaluate your current design environment to ensure you have the right capabilities to empower development teams to innovate. This may include evaluating new design solutions that will have the capabilities to carry you through the decade.

Based on this research and our experience, we recommend that companies:

- Use design tools that will support your innovation requirements in the 2020s.
- Identify the impact of new technology on innovation requirements. Examine the design impact of 3D printing, the cloud, AI/ML, smart factories, new materials, IoT, and AR/VR as these technologies will likely become increasingly important in the 2020s. Ensure you have the tools to support these technologies as needed.
- Facilitate collaboration, especially across multi-disciplinary teams, other departments, and third parties. For the technically advanced products of the 2020s, development teams will need to include experts from multiple disciplines. It will be impossible for any one person to be an expert in everything so, effective and efficient collaboration will be critical to strengthen the expertise of the entire team.
- Consider design tools that can manage the resulting complexity of modern products. Tools should offer high performance, leverage intelligence to drive design and embed it into design models, automate tedious tasks, and support reuse.
- Evaluate extended software capabilities and applications that complement CAD to support collaboration and provide additional ways to manage complexity.

Old ways of working may no longer be enough in the 2020s. Evaluate your current design environment to ensure you have the capabilities in place to empower development teams to innovate.

About the Research

Data Gathering

Tech-Clarity gathered and analyzed 196 2020 responses and 207 2018 responses to a web-based survey on technology, innovation, and product development. Survey responses were collected by direct e-mail, social media, and online postings by Tech-Clarity.

Industries

The respondents represented a good mix of industries, including 37% Industrial Machinery, 19% Automotive, 17% High Tech and Electronics, 16% Durable Consumer Goods, 15% Aerospace & Defense, 16% Engineering Services, 13% Life Sciences, 9% Consumer Packaged Goods, and others. Note that these numbers add up to greater than 100% because some companies are active in more than one industry.*

Company Size

The respondents represented a mix of company sizes, including 43% from smaller companies (less than $100 million), 25% between $100 million and $1 billion, and 32% over $1 billion.

Geographies

The respondents reported doing business globally, with most doing business in North America (76%), over one-third (35%) doing business in Western Europe, 24% doing business in Asia, 14% in Eastern Europe, 14% in Latin America, 9% in Australia, 6% in the Middle East, and 3% in Africa.*

Title

The respondents were comprised of about one-half (46%) individual contributors, nearly one-quarter (24%) manager, 18% vice president or director level, 12% who indicate they are executive levels, and 1% other roles.
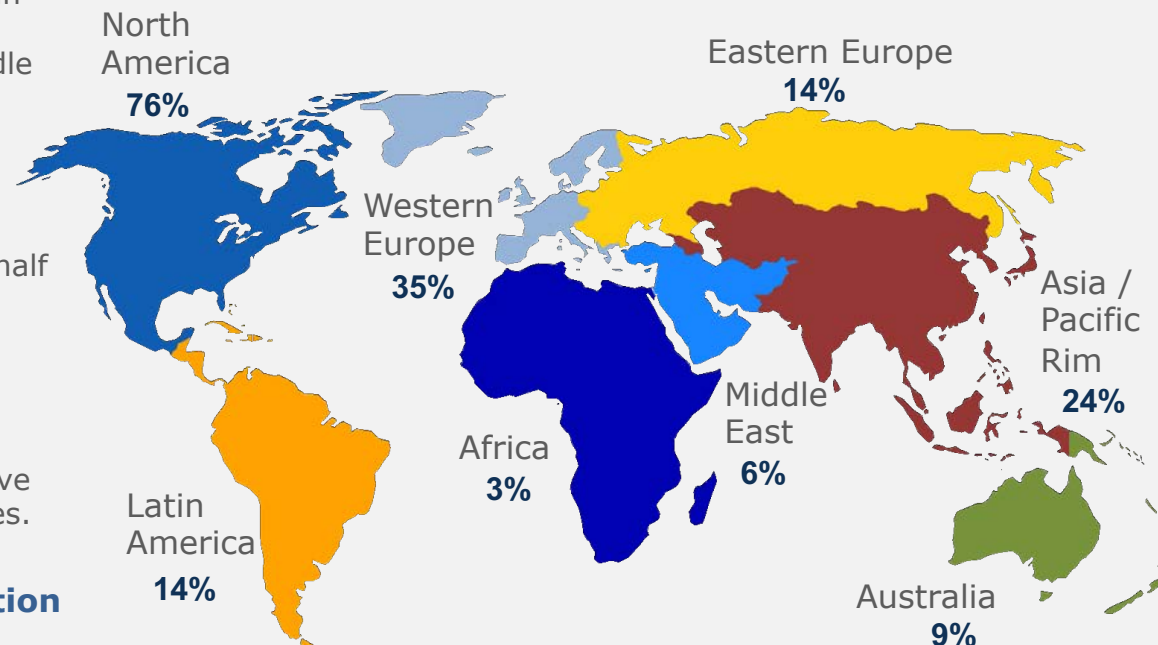
Organizational Function

Of the respondents, 43% were in engineering or design roles, 11% Program/Project/Product Management, 7% Management/ Administration, 9% Manufacturing, 7% Manufacturing Engineering, 6% Industrial Design, and the remainder were from a variety of roles including Simulation Analysts, CAD Administration, IT and other roles.

The respondents represented a mix of industries, company sizes, and geographies.

* Note that the values may total greater than 100% because companies reported doing business in multiple industries and geographies.

North America
76%

Western Europe
35%

Eastern Europe
14%

Latin America
14%

Africa
3%

Middle East
6%

Asia / Pacific Rim
24%

Australia
9%

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Acknowledgments

About the Author

Michelle Boucher is the Vice President of Research for Engineering Software for Tech-Clarity, an independent research and consulting firm that specializes in analyzing the business value of software technology and services. Michelle has spent over 20 years in various engineering, marketing, management, and analyst roles

Michelle graduated magna cum laude with an MBA from Babson College and earned a BS in Mechanical Engineering, with distinction, from Worcester Polytechnic Institute. She is an experienced researcher and author, having benchmarked over 7000 product development professionals and published over 90 reports on product development best practices.

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Tech-Clarity is an independent research firm dedicated to making the business value of technology clear. We analyze how companies improve innovation, product development, design, engineering, manufacturing, and service performance through the use of digital transformation, best practices, software technology, industrial automation, and IT services.

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About this eBook This is an update to our "How to Futureproof You Product Design: 5 Technologies Your CAD Tool Must Support" originally published in 2019.

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