



PRINTING TRENDS REPORT

A SURVEY OF MANUFACTURING DECISION MAKERS
OCTOBER 2017

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TRENDS IN 3D PRINTING AMONG MANUFACTURERS

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Introduction

From its initial conception, 3D printing has had the potential to completely change the way goods are manufactured. The potential benefits have strategic impacts: flexibility, speed, customizability, location production, part consolidation and more. But even 20 years after 3D printing was introduced, there remain significant challenges for mainstream manufacturing use. Will 3D printing end up stalled as a point solution for prototyping and niche use cases, or will it completely replace existing manufacturing processes? What is getting in the way of accelerated adoption and can those issues be solved?

This research goes beyond the hype associated with predictions about the future of 3D printing and takes a practical look at the current realities. It represents the actual experiences and opinions of the people who are “in the trenches” making decisions about adoption.

The following report, sponsored by Jabil, is based on a survey of 303 individuals responsible for decisions around 3D printing at manufacturing companies. Questions were asked on a variety of topics related to the adoption of 3D printing, as well as opportunities and challenges.

Key Findings

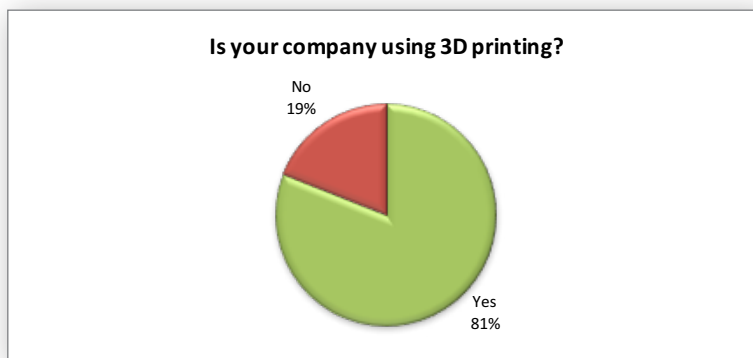
- **3D printing is changing the face of manufacturing**
 - 81% are using 3D printing
 - 70% use 3D printing for prototyping
 - 63% expect use of 3D printing to more than double in the next few years
 - 67% expect to adopt 3D printing quickly once they see success
 - 91% say 3D printing will change the way their industry thinks and operates
- **3D printing has begun the move to production**
 - 29% are using 3D printing for production parts
 - 93% expect to grow their use of 3D printing for production parts in the coming years
- **Challenges with 3D printing are expected to be solved**
 - 96% face challenges with 3D printing
 - 98% say challenges can be solved
 - 55% expect challenges to be overcome within the next 3 years



Detailed Findings: 3D printing is changing the face of manufacturing

Most manufacturing companies are using 3D printing

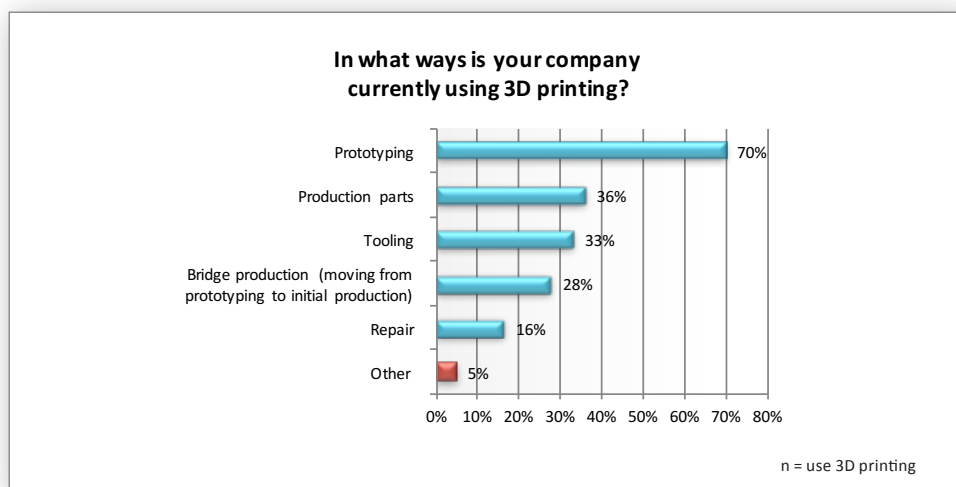
Manufacturers are not sitting on the sidelines watching the evolution of 3D printing, they are already using the technology. Most manufacturing companies (81%) report that they use 3D printing today. The industries most frequently reporting use include Aerospace (93%) and Medical Devices (91%). Large manufacturing companies, those with more than 1,000 employees, are notably more likely to use 3D printing (92%) than small ones with less than 100 employees (60%).



Prototyping is the most common use for 3D printing

Although use of 3D printing is common, the extent of use is limited for most manufacturing companies. Among those that have adopted, far and away the most common use is prototyping (70%). Only a handful (16%) use 3D printing for repair. There is also limited use for bridge production (28%) and tooling (33%). Only just over a third (36%) are using 3D printing for production.

Several participants took the time to write in other uses. Those answers included mostly product development activities such as testing and R&D.



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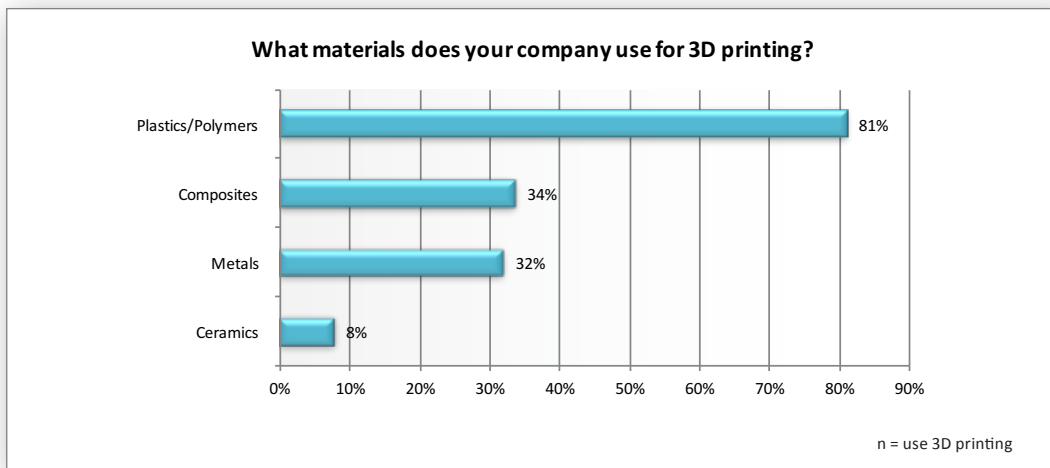
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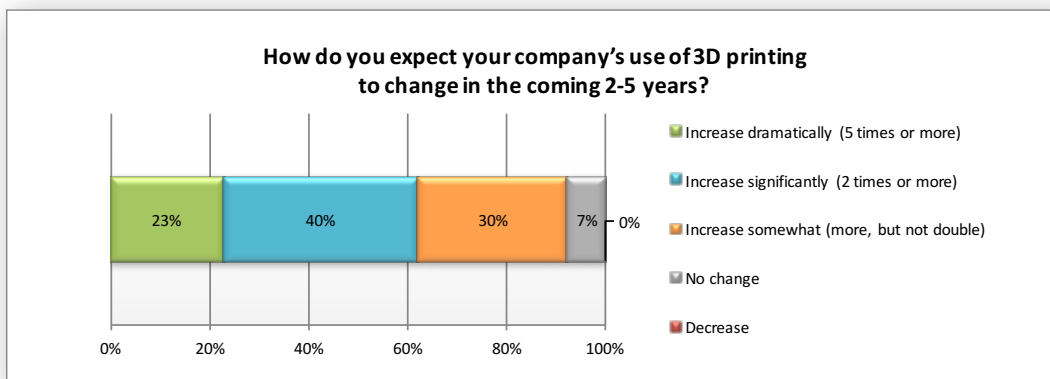
Plastic is the most common material for 3D printing

Some of the most dramatic innovation in recent years has been the evolution in the materials available for 3D printing. The ability to work with metals, ceramics, and composites instead of just plastic opens a world of potential. However, despite this, the mainstay material for 3D printing remains plastics and polymers (81%). Only about a third use metals (32%) and the same is true of composites (34%). Ceramics are being used by only a small number of manufacturing companies (8%).



3D printing expected to grow dramatically

The manufacturing stakeholders involved in decisions around 3D printing do expect significant growth. The clear majority (93%) expect their use to grow within the next five years. Most expect that growth to be significant, including 40% that report they will more than double their current 3D printing levels plus a remarkable 23% that expect their use of 3D printing to increase by a factor of five or more.



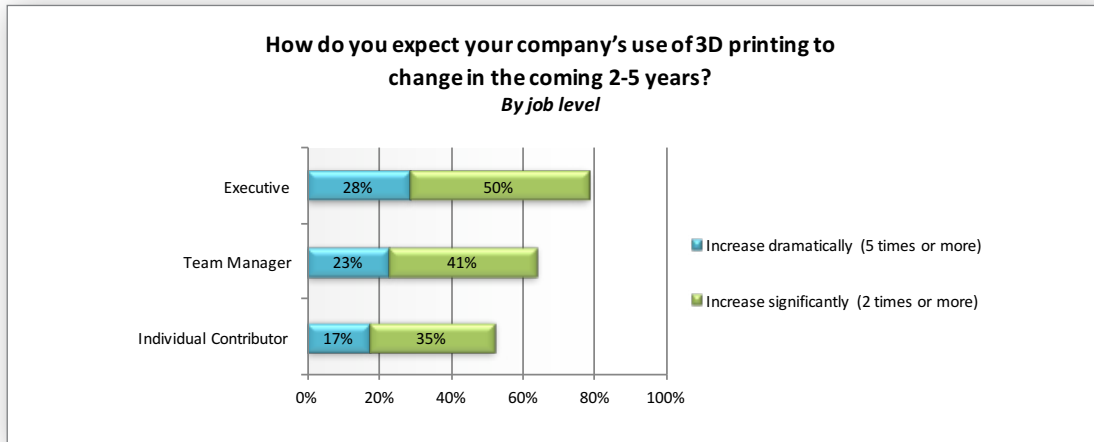
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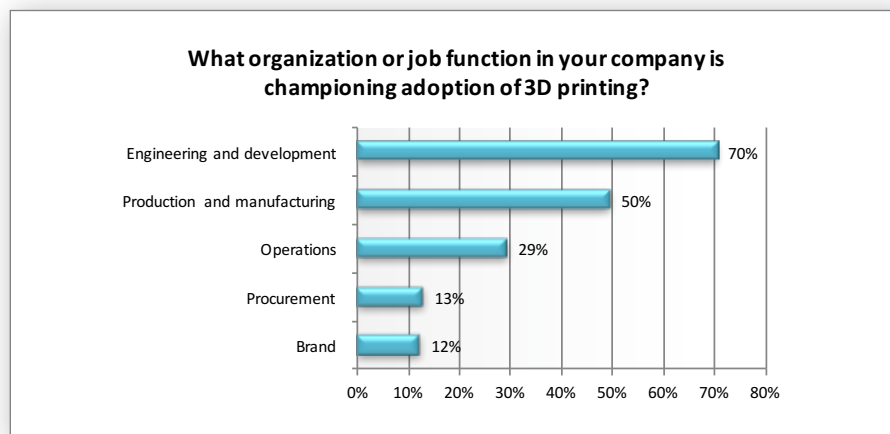
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Executives are the most bullish on 3D printing growth. More than three quarters (78%) report that they expect to at least double their use, including over a quarter (28%) that expect to increase printing by five times or more. Individual contributors were somewhat more conservative with their growth estimates. Even so, more than half (52%) reported that they expect significant or dramatic growth in the coming years.



Engineering and development are championing adoption

While 3D printing has the potential to offer benefits throughout the organization, it is the engineering and development teams that are the most interested. These teams, usually responsible for product innovation, are the champions for adoption at most companies (70%). Production and operations are also very interested and half (50%) report that it is their department pushing for 3D printing adoption. On the other hand, there are still only a few manufacturing companies where the brand (12%) or procurement (13%) teams are seeing enough advantages with 3D printing to become the champion for adoption of the technology.



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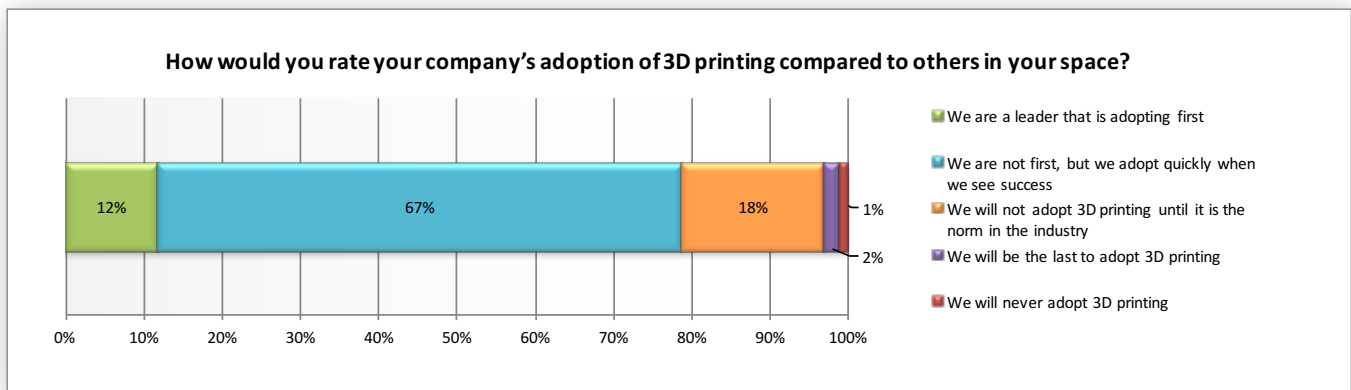
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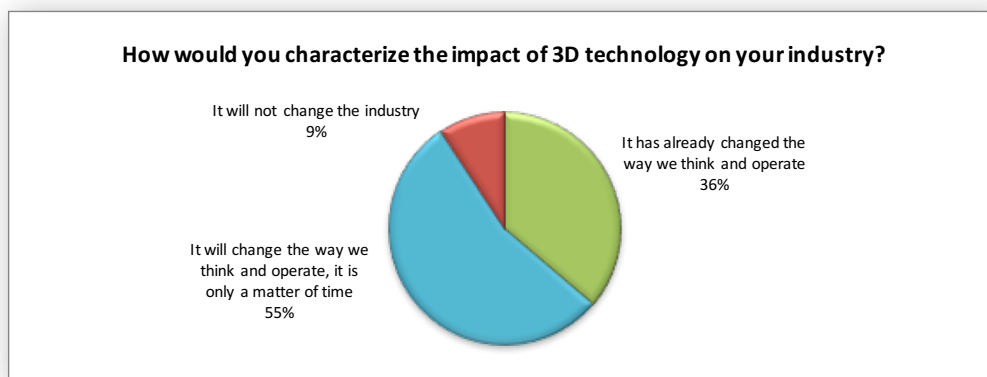
Most want to be the second to adopt

Manufacturing companies are lined up to dive into 3D printing as soon as they start to see success in their industry or among their competitors. Only a few (12%) consider themselves to be leaders in adopting 3D printing. The majority (67%) characterize themselves as being able to move quickly, but only once they see others having success. Less than a fifth (18%) expect to wait for 3D printing to become the norm to adopt.



3D printing is changing manufacturing

The impact of 3D printing is expected to impact the way the entire industry thinks and operates. Most manufacturing stakeholders (91%) report that there will be a big impact. Most remarkably, for a third (36%), this impact has already happened. The remaining 55% believe it will come, and is only a matter of time.



3D printing offers many benefits

Almost all manufacturing stakeholders (97%) do see benefits of 3D printing for their company. The top benefits reported range from faster time to market with new ideas (52%), ability to innovate with product design and performance (52%), faster production times (50%), better customization and personalization (48%), design freedom (43%) and cost reduction (41%).

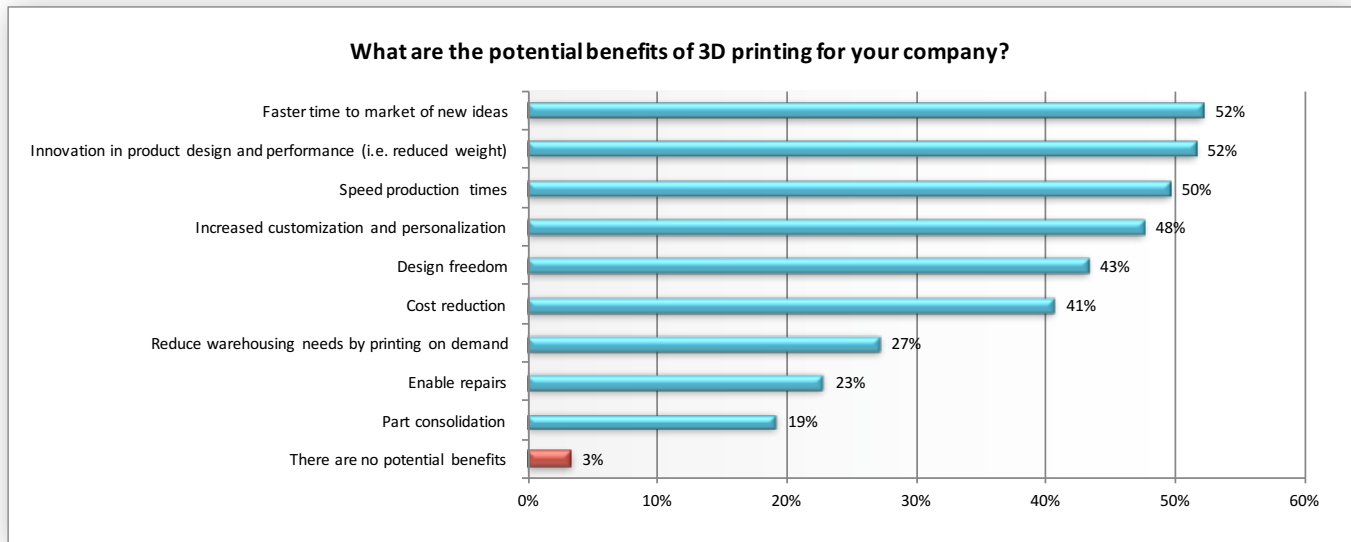
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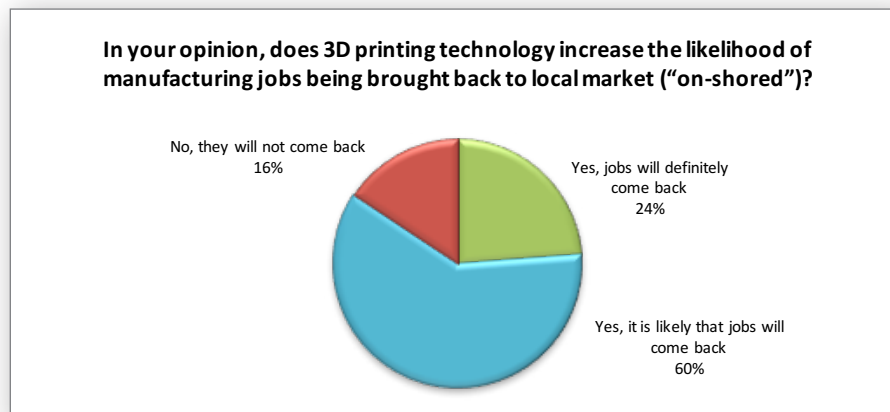
While 3D printing has the potential for a wide range of benefits, not all companies expect to realize all potential benefits. The benefits expected are unique for different companies. For example, Aerospace companies will benefit most from innovation in product design and performance (75%), Tooling companies have a greater likelihood of benefiting from faster time to market for new ideas (56%), and Automotive companies expect the greatest benefits in cost reduction (55%).



3D printing expected to impact “on-shoring” of manufacturing jobs

One of the interesting potential uses of 3D printing is the ability to efficiently manufacture products in local markets. This has clear benefits for reducing transportation and speeding delivery times. It has also been speculated that this may be a way for countries that have traditionally off-shored manufacturing jobs to “on-shore” those jobs back to the local market since that is where production will be done.

Most manufacturing stakeholders agree that this will happen. Only 16% think that manufacturing jobs that have been off-shored jobs will stay there. About a quarter (24%), are confident that jobs will come back because of 3D printing with a further 60% saying that it is likely.



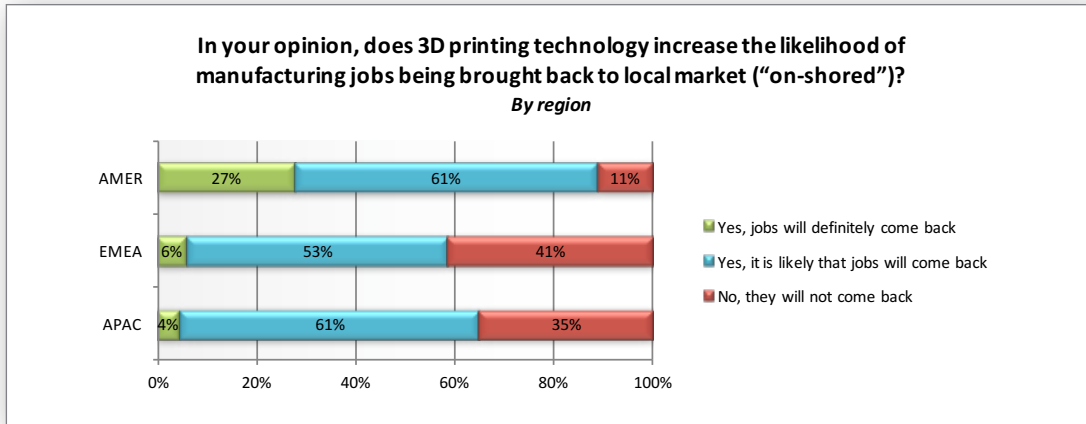
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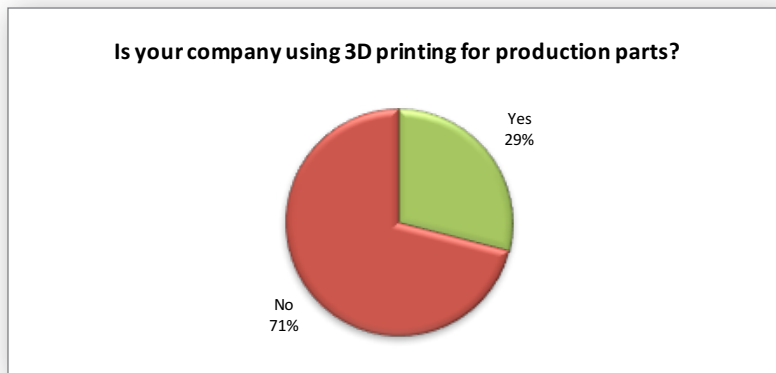
While all regions see this trend, individuals that work at manufacturing companies in the Americas are much more confident that jobs will definitely come back (27%) than those in other regions.



Detailed Findings: 3D printing has begun the move to production

A minority of manufacturers are using 3D printing for production

While most manufacturing companies are using 3D printing, it is not yet the norm to use 3D printing in production. Less than a third (29%) report that they are currently printing production parts.



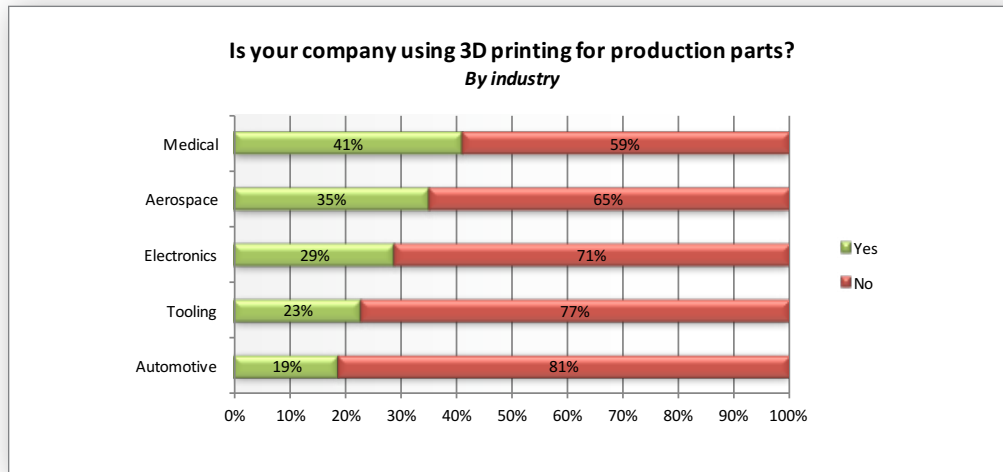
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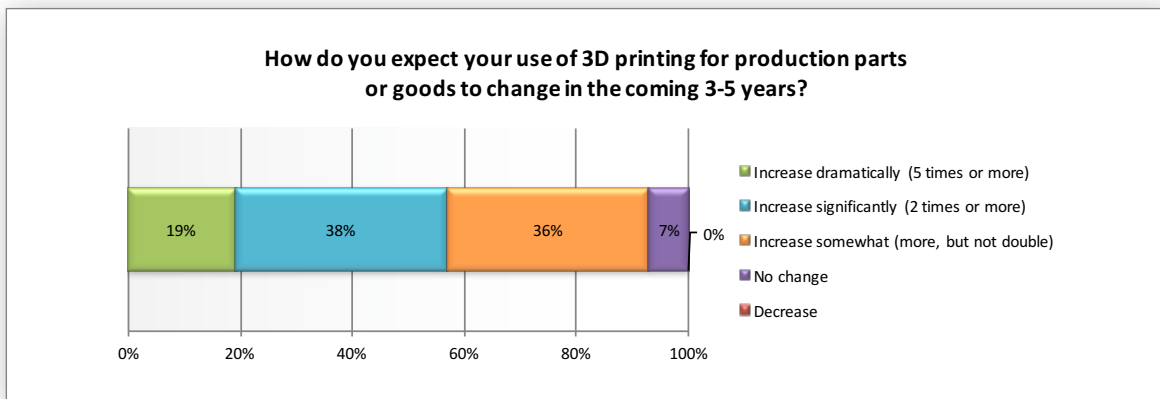
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Different industries report different rates of printing production parts. For example, manufacturers of Medical Devices (41%) and Aerospace companies (35%) are most likely to report 3D printing in production, while Automotive companies are much less likely (19%).



Production parts made with 3D printing are expected to grow

Using 3D parts for production is an area where growth is expected. Most manufacturing stakeholders (93%) report that they expect growth, including 38% that expect to at least double their use of 3D printing for production parts and 19% that expect their product use to increase dramatically by a factor of 5 or more.

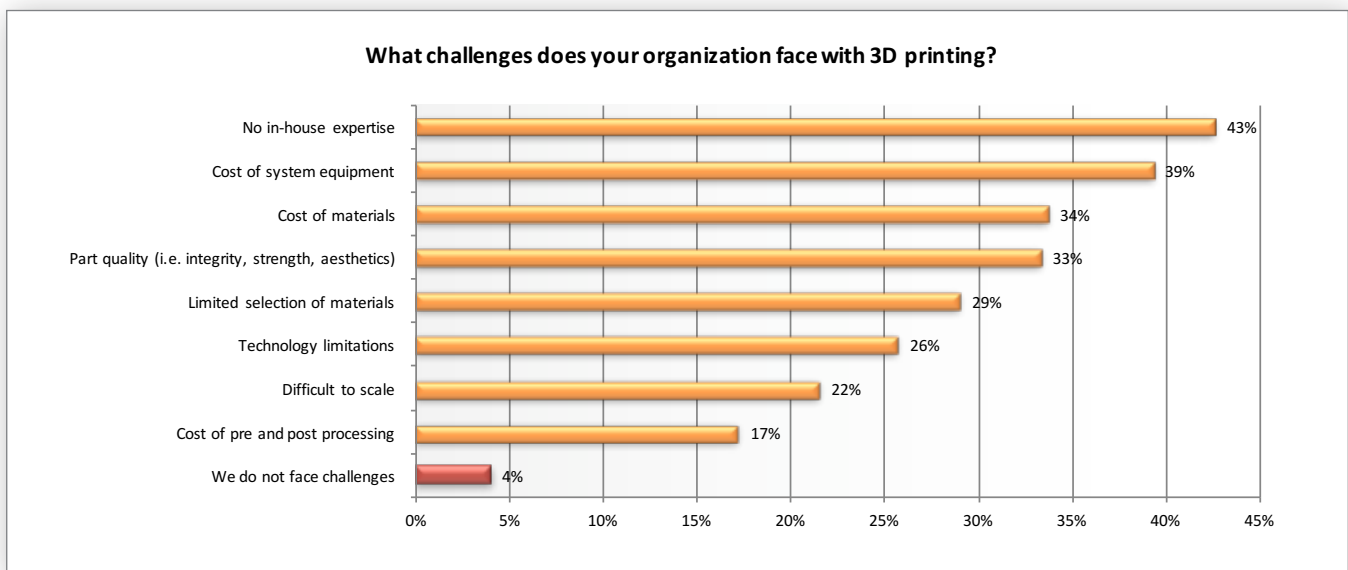




Detailed Findings: Existing challenges with 3D printing are expected to be addressed

Manufacturers face many challenges with 3D printing

Despite the bullish attitudes towards growth of 3D printing reported by manufacturing stakeholders, there remain a plethora of issues with existing solutions. Almost all manufacturing stakeholders (96%) report that their organization faces challenges. Top challenges include lack of in-house expertise (43%), cost of system equipment (39%), and cost of materials (34%).



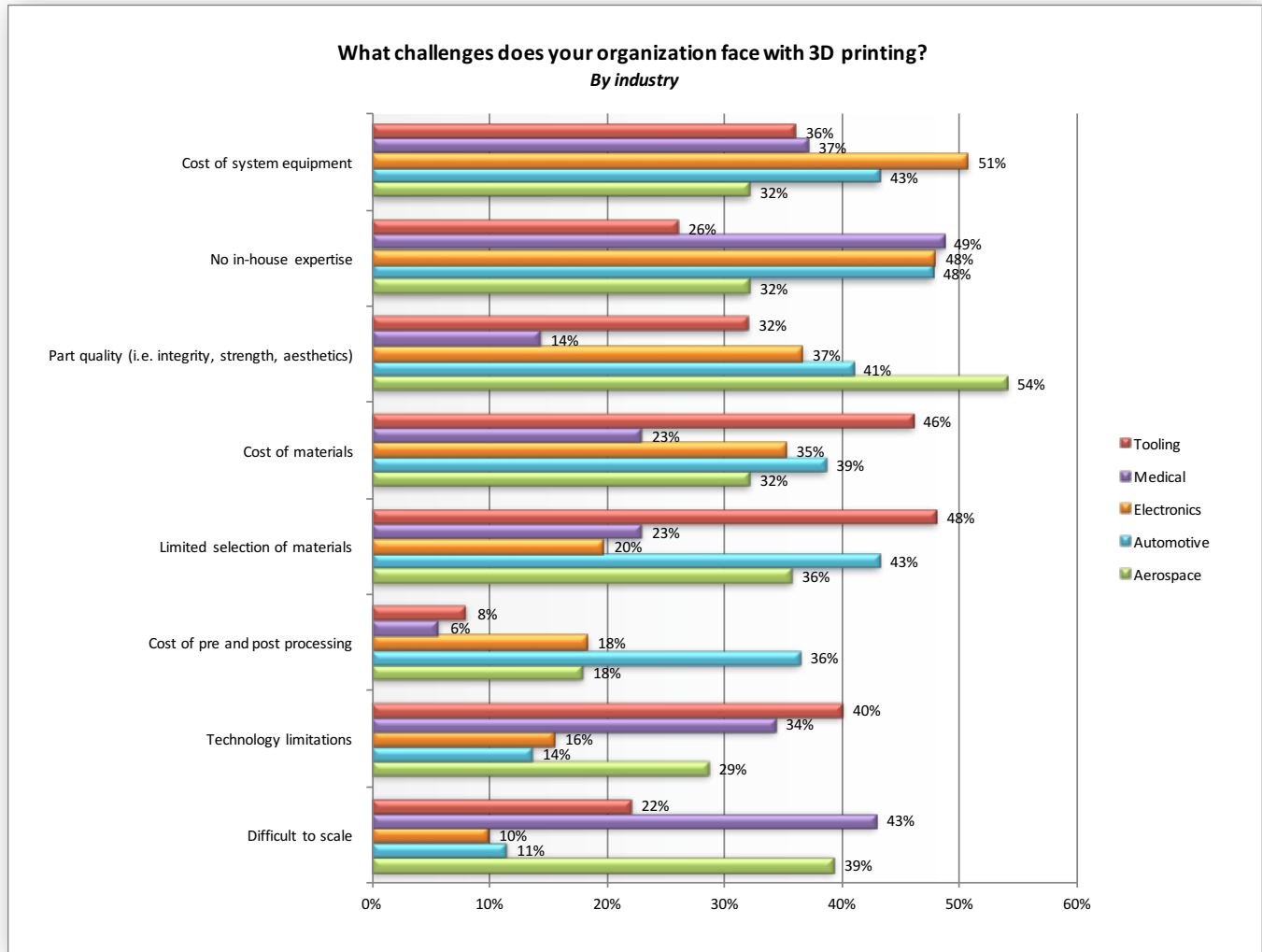
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Challenges do vary greatly by industry. Aerospace companies report the most issues with part quality, and Medical manufacturing companies are more likely to face challenges around scalability. Challenges with the cost of system equipment is experienced mostly by Electronics companies, Automotive companies are sensitive to the cost of pre and post processing, and Tooling manufacturers are more likely to face issues around the cost and selection of available materials.



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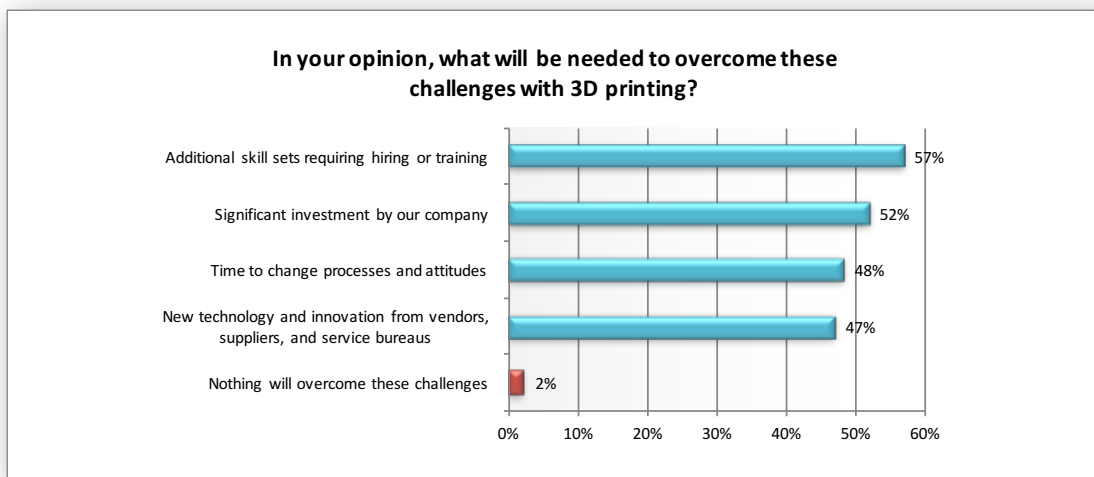
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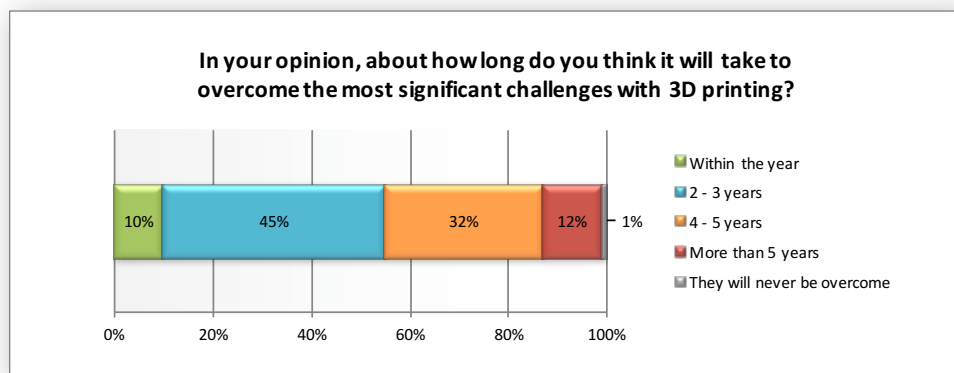
A mix of training, investment, time, and innovation needed to overcome challenges

While manufacturing companies do face challenges around 3D printing, there is good news. Almost everybody (98%) believes these challenges can be overcome. A wide range of factors will need to evolve. These include acquiring needed skills through hiring or training (57%), making additional monetary investments (52%), and implementing organizational changes to processes as well as attitudes (48%). It should also be emphasized that many manufacturing companies (47%) expect their vendors, suppliers, and service bureaus to have a role in helping them overcome the challenges they face with 3D printing.



Challenges with 3D printing expected to be addressed soon

Manufacturing stakeholders do not expect it to take long to solve challenges with 3D printing. While only few expect them to be solved as quickly as this year (10%), more than half think the changes will happen within the next three years (55%).



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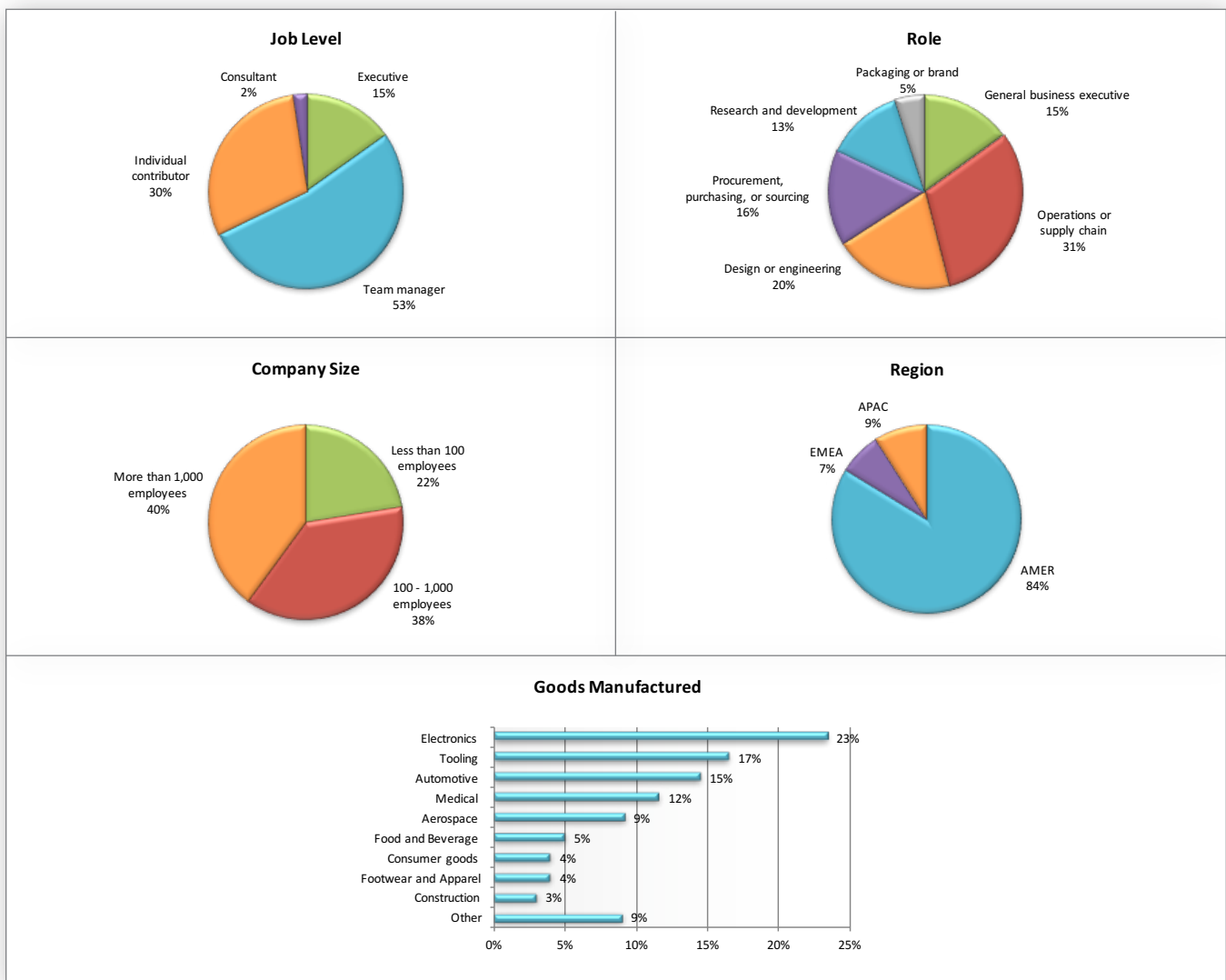


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Survey Methodology and Participant Demographics

In September 2017, an online survey was sent to manufacturing professionals responsible for 3D printing decisions in roles including business leadership, operations, supply chain, procurement, and packaging. Questions were asked on a variety of topics related to the adoption of 3D printing, as well as opportunities and challenges.

A total of 303 qualified individuals from around the globe completed the survey. Participants included a mix of roles in packaging decisions, job functions, types of good manufactured, and company size.



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