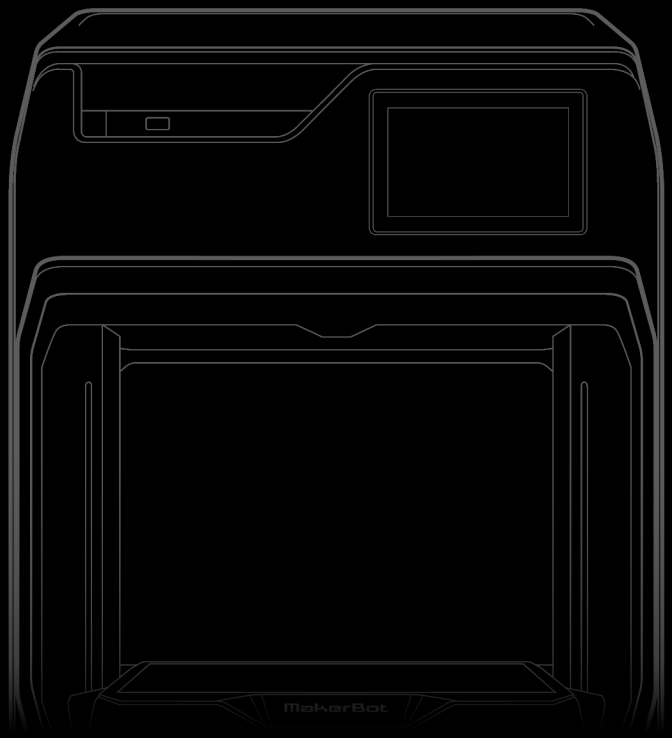
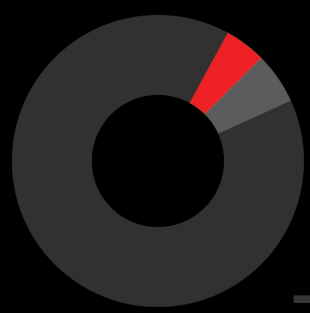
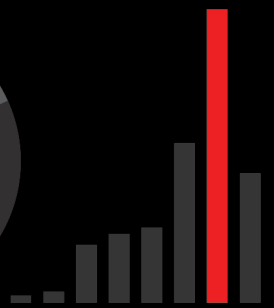
MakerBot

# 3D PRINTING TRENDS REPORT 2020





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# Introduction

3D printing has come a long way since the early days of the technology in the 1980s. The industry has experienced significant changes, from the availability of materials to the advancement of the machines to the rise in new applications and software.

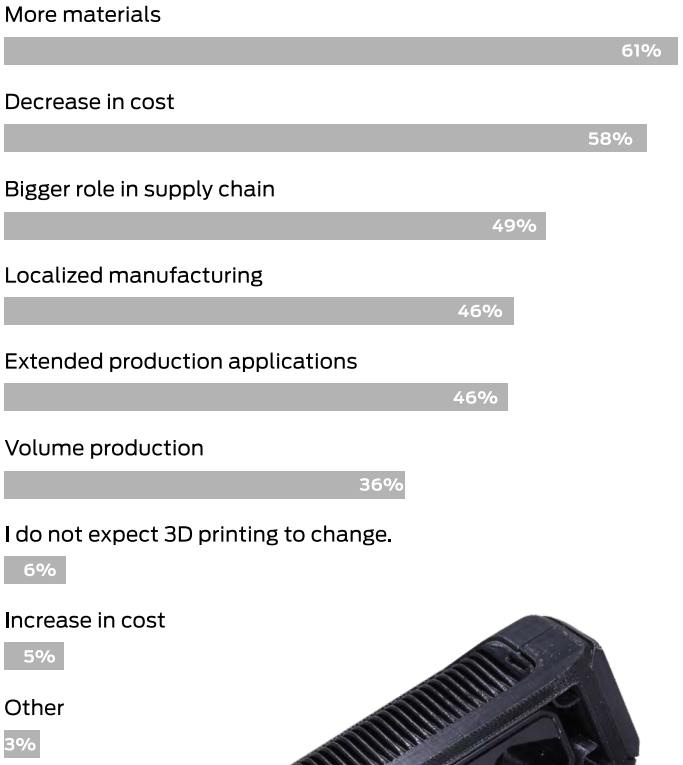
Today, we see it used across a number of sectors—aerospace, automotive, medical, military and defense, consumer goods, fashion, sciences, architecture, and more. It is transforming traditional manufacturing and production processes through its ability to be utilized across the entire supply chain.

MakerBot's 3D Printing Trends Report aims to identify the 3D printing behaviors and preferences of professionals across different sectors. This report highlights trends on usage and applications, industry adoption, impact, and investment of over 1,200 respondents from our global network. The report aims to provide insights into the factors that influence 3D printing use.

As 3D printing's journey moves from prototyping to production, we can expect to see the expansion of its use and applications continue to grow at an exponential rate. The democratization of this technology has evolved beyond the availability of the hardware and now encompasses the full 3D printing ecosystem.

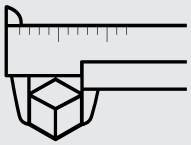
# Key Findings

The future of 3D printing is optimistic. Respondents expect the technology, materials, and uses to grow over the next 3-5 years.



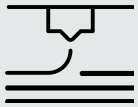

Customization is the number one reason respondents use 3D printing

- Ability to create custom, low to mid volume production parts **(68%)**
- Ability to print complex geometries **(57%)**
- Rapid design iterations **(56%)**



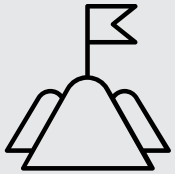
Print quality and printer performance are considered the top factors when choosing a 3D printer

- Dimensional Accuracy **(61%)**
- Reliability **(65%)**



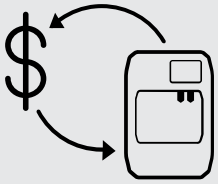
FDM 3D printers are king

- **77%** of respondents use FDM/FFF printers
- **27%** of respondents use SLA printers



Despite market challenges, companies still plan to invest in 3D printing in 2021

- **74%** of respondents said they plan to invest in 3D printing over the next year
- **56%** of respondents said that COVID-19 did not impact their investment plans in 3D printing



Costs and technical expertise were among the top barriers preventing wider adoption

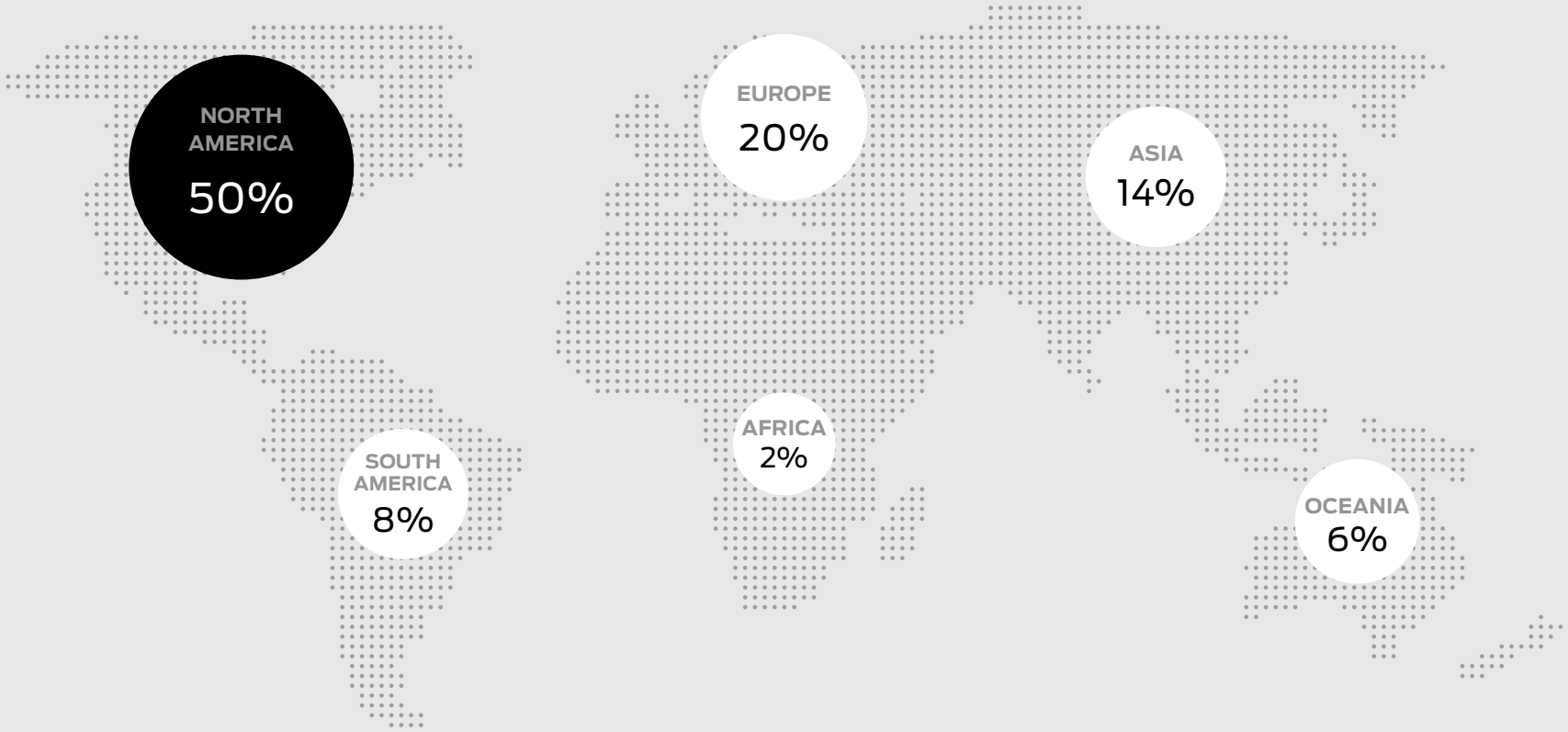
- Lack of budget **(53%)**
- Little value or need **(29%)**
- Lack of training or expertise **(29%)**

# The Rise of 3D Printing Users

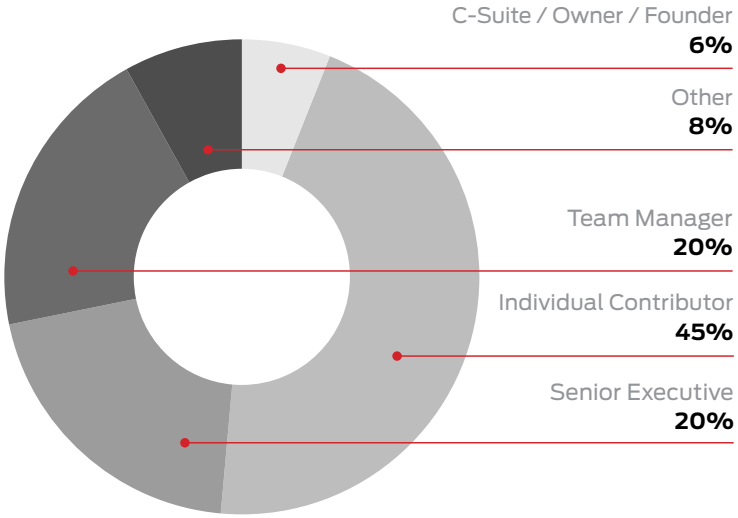
When 3D printing was first introduced, it was confined to select sectors due to the sheer size and cost of the machines and materials as well as the technical knowledge needed to operate them. But now, smaller, more cost-effective, and easier to use solutions have made 3D printing accessible to a broader population. This is evident in the global response we received from respondents who work in more than 20 different sectors.

Professional desktop 3D printers that offer the capabilities of an industrial 3D printer are now available, but at a fraction of the cost and size. As a result, 3D printing has found its way into smaller manufacturers, machine shops, and businesses, giving them a chance to be more competitive.

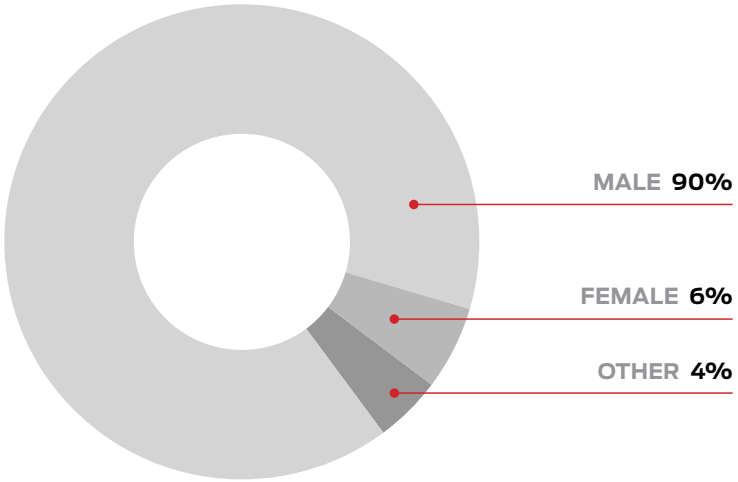
## Location



## Job Level




## Gender

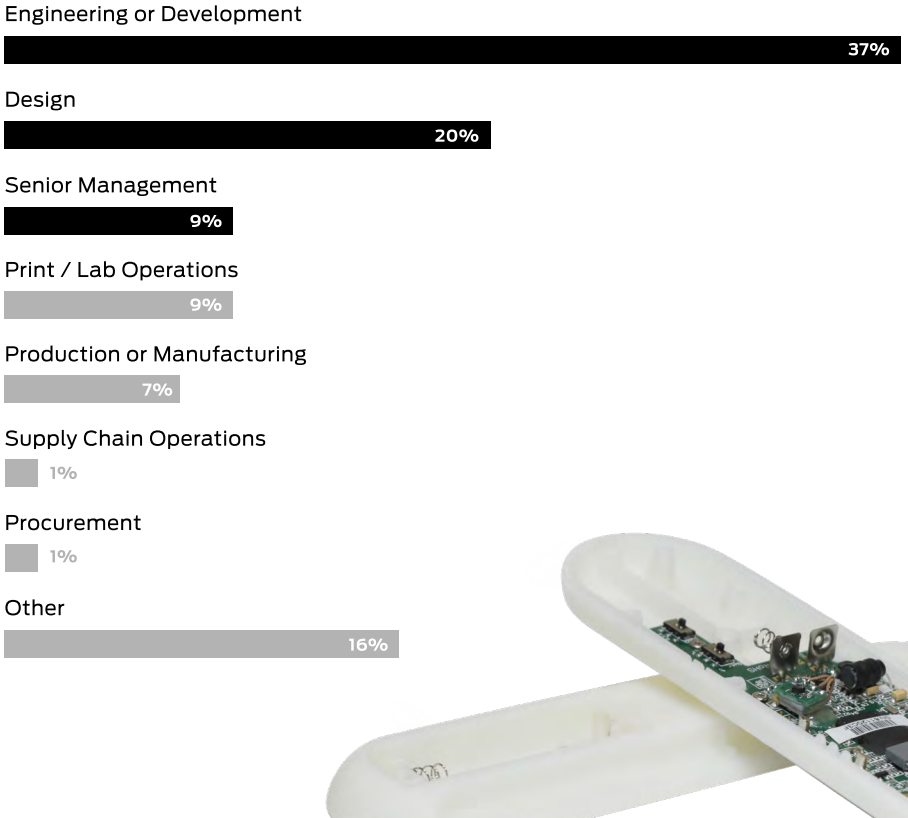



## Job Role

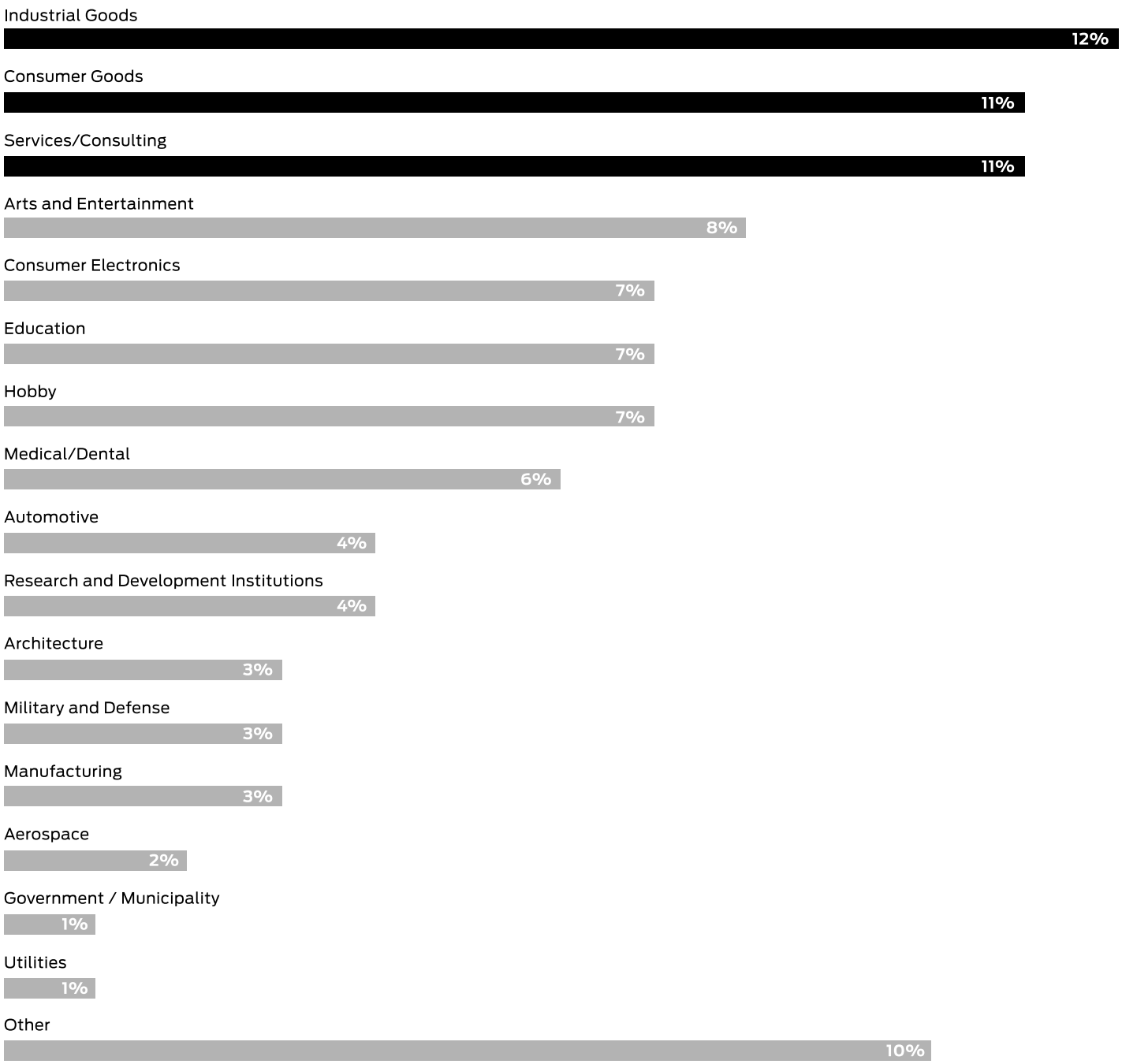
ENGINEERING OR DEVELOPMENT
37%

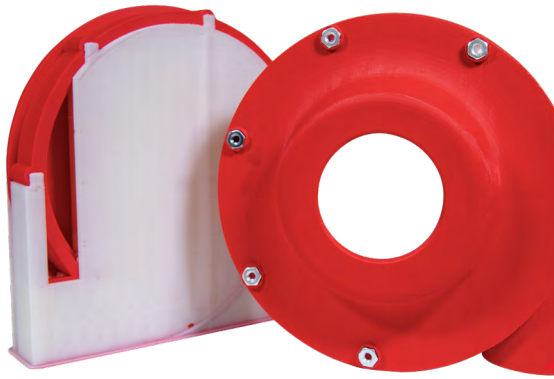
DESIGN
20%

SENIOR MANAGEMENT
9%



## Sector


Industrial Goods
12%
Consumer Goods
11%
Services/Consulting
11%
Arts and Entertainment
8%
Consumer Electronics
7%
Education
7%
Hobby
7%
Medical/Dental
6%
Automotive
4%
Research and Development Institutions
4%
Architecture
3%
Military and Defense
3%
Manufacturing
3%
Aerospace
2%
Government / Municipality
1%
Utilities
1%
Other
10%

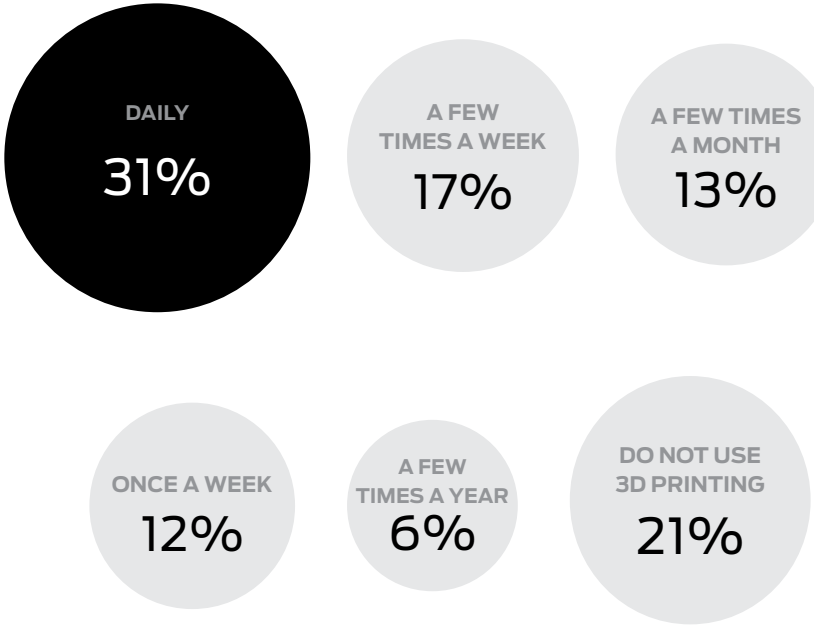


# The Many Uses of 3D Printing

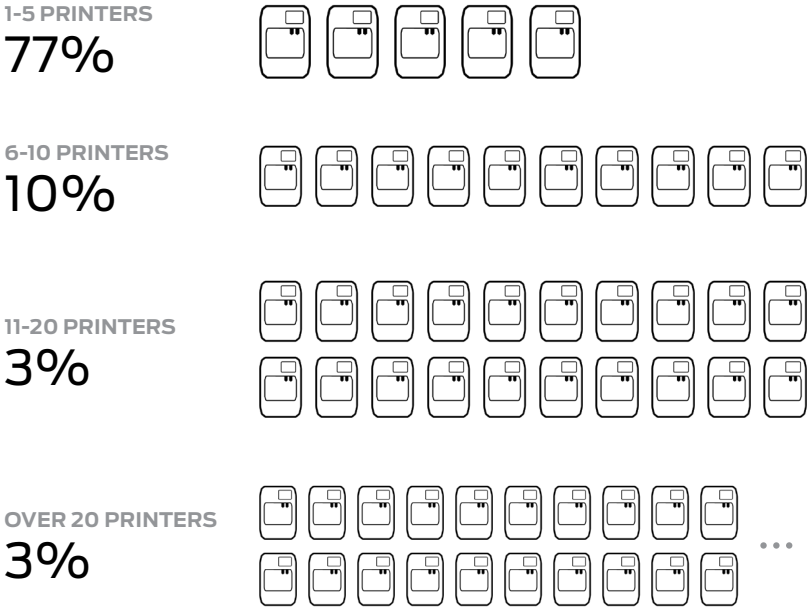
The versatility of 3D printing has made it a more popular method of prototyping than hand tools. This has led to an expansion of creativity beyond jigs, fixtures, and other traditional manufacturing applications. Its ability to go from concept modeling to functional prototyping to end-use part production has made it essential in any designer's or engineer's workspace. From rocketship valves to apparel to medical supplies to food, there is a world of possibilities with 3D printing.

Access to 3D printing has increased since the introduction of affordable desktop 3D printers. This meant that prototyping can be done in-house rather than outsourced to 3D printing service bureaus, shortening development time. In fact, the vast majority of respondents, nearly 93%, have at least one 3D printer in-house, with over 50% using it at least weekly.

## How often do you 3D print?




## How many printers do you have?




**6%** None, we use a 3D printing service bureau / outsource our 3D printing needs

**2%** I don't know

While there are a variety of 3D printing technologies, FDM remains the most frequently used. Not only does it tend to be less costly than other technologies, some FDM 3D printers offer industrial capabilities that can produce end-use parts nearly as well as injection molding. Materials for FDM printers are also less costly in comparison to others and offer more variety to meet the requirements of different applications. All of this has made FDM an attractive option for many engineers.

## With which materials do you print?

- Biomaterials 7%
- Ceramics 2%
- Composites 14%
- Paper 1%
- Plastics 93%
- Metals 7%
- Resins 25%
- Wax 4%
- Other 2%

## What type of 3D printing technologies do you currently use?

- FDM/FFF 77%
- SLA 27%
- DLP 11%
- SLS 8%
- MATERIAL JETTING 8%
- BINDER JETTING 5%
- MSLA 4%
- SLM 3%
- EBM 3%
- OTHER 6%

Mass manufacturing has yet to arrive for 3D printing but it can be used alongside other traditional production methods. In fact, the majority of the respondents use one or more manufacturing tools in addition to their 3D printers.

## Which other manufacturing methods do you use?

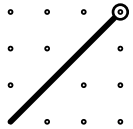
| Manufacturing Method | % |
|---|---|
| CNC machining | **48%** |
| Milling | **30%** |
| Casting | **21%** |
| Injection molding | **19%** |
| Joining/welding | **26%** |
| Woodworking | **28%** |
| Forming | **15%** |
| Laser cutting | **37%** |
| I do not use another manufacturing method. | **2%** |
| Other | **4%** |

When 3D printing first debuted, it was used as a way to visualize, iterate, and test ideas. That is still true to this day, with most respondents primarily using it for concept modeling and prototyping in their discovery and design phases.

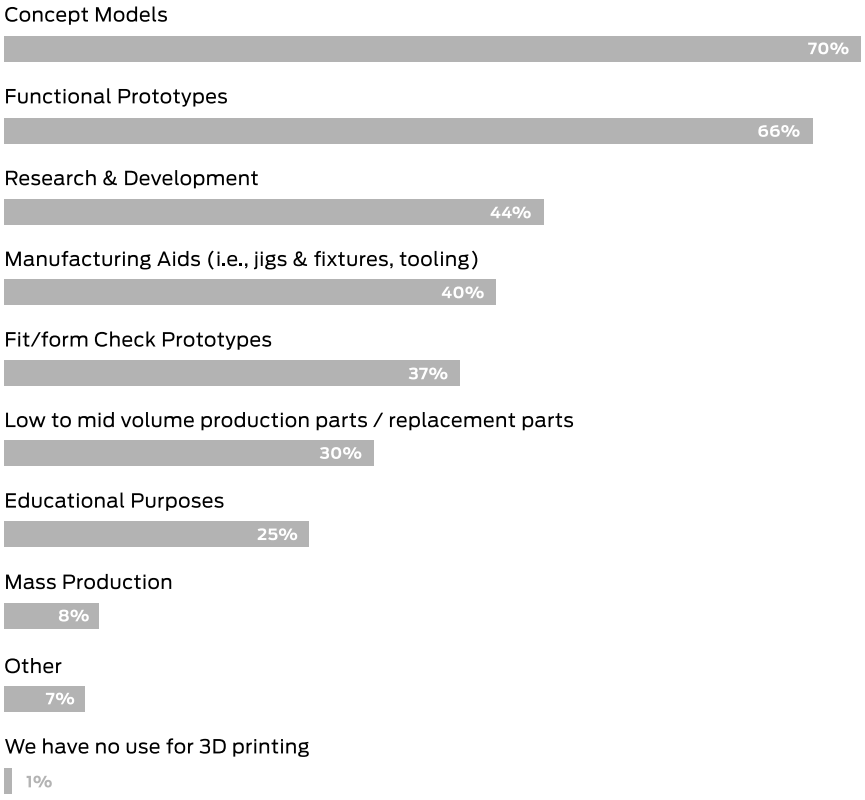
## For which primary applications do you use 3D printing?

CONCEPT MODELS
70%

FUNCTIONAL PROTOTYPES
66%

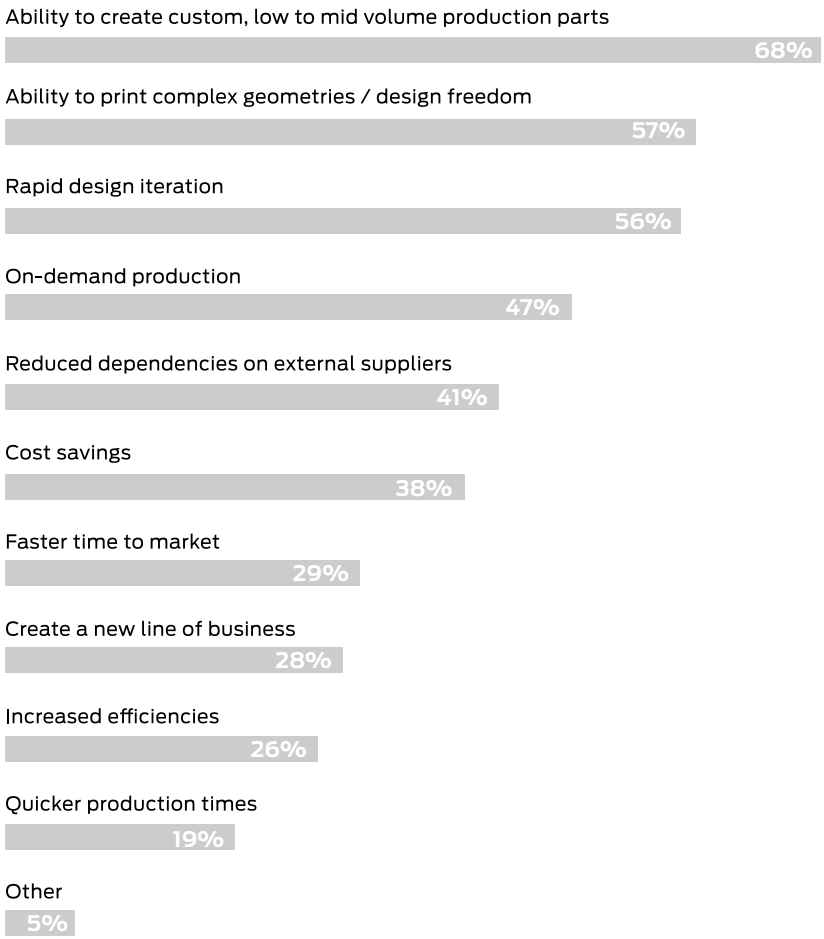


RESEARCH & DEVELOPMENT
44%



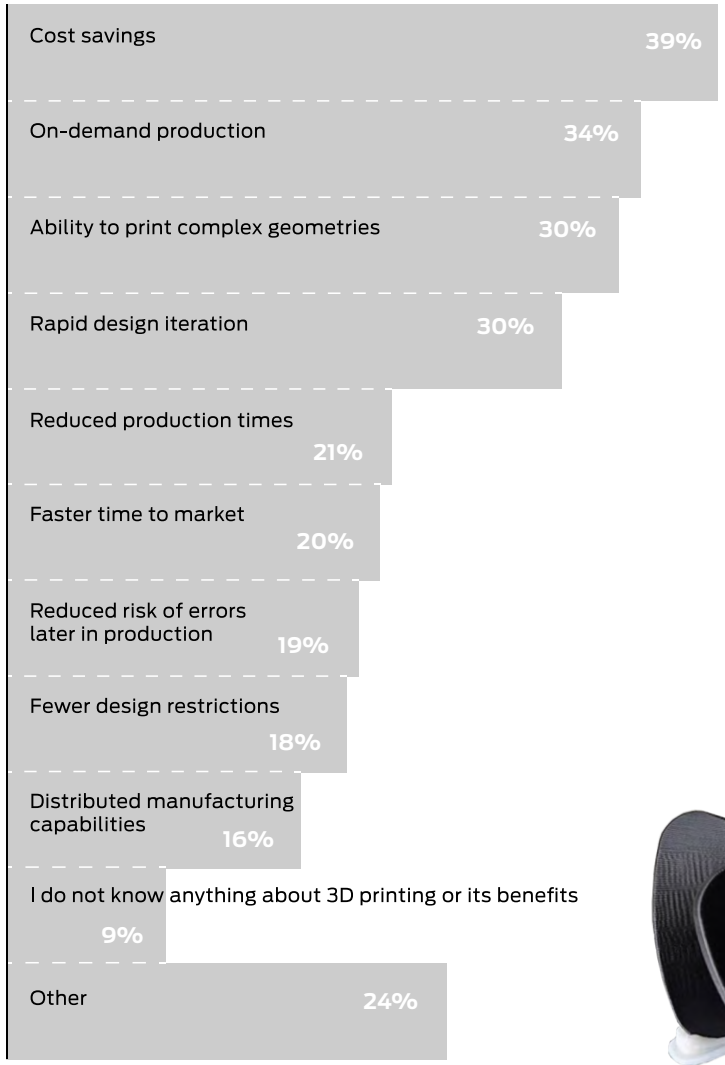
According to the report, the ability to create custom, low to mid volume parts (68%), print complex geometries (57%), and iterate quickly (56%) were the main reasons respondents 3D print.

## Why do you use 3D printing?




3D printing has the potential to deliver significant benefits to companies. One of the biggest savings could be cost, according to nearly 39% of the respondents who are not currently using 3D printing. Enabling on-demand production (34%) and having the ability to print complex geometries (33%) were a close second and third, respectively.

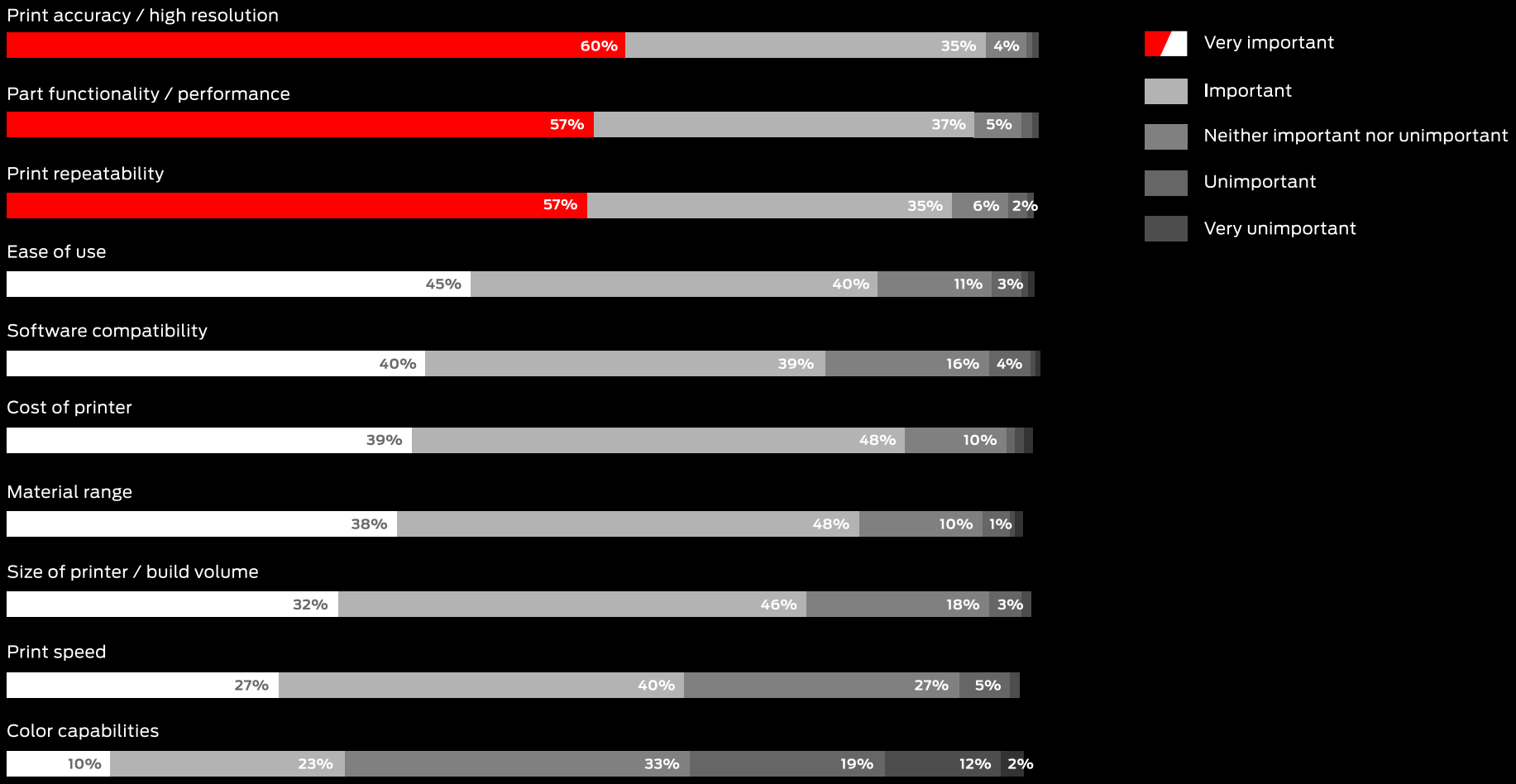
## How could 3D printing potentially benefit your company?



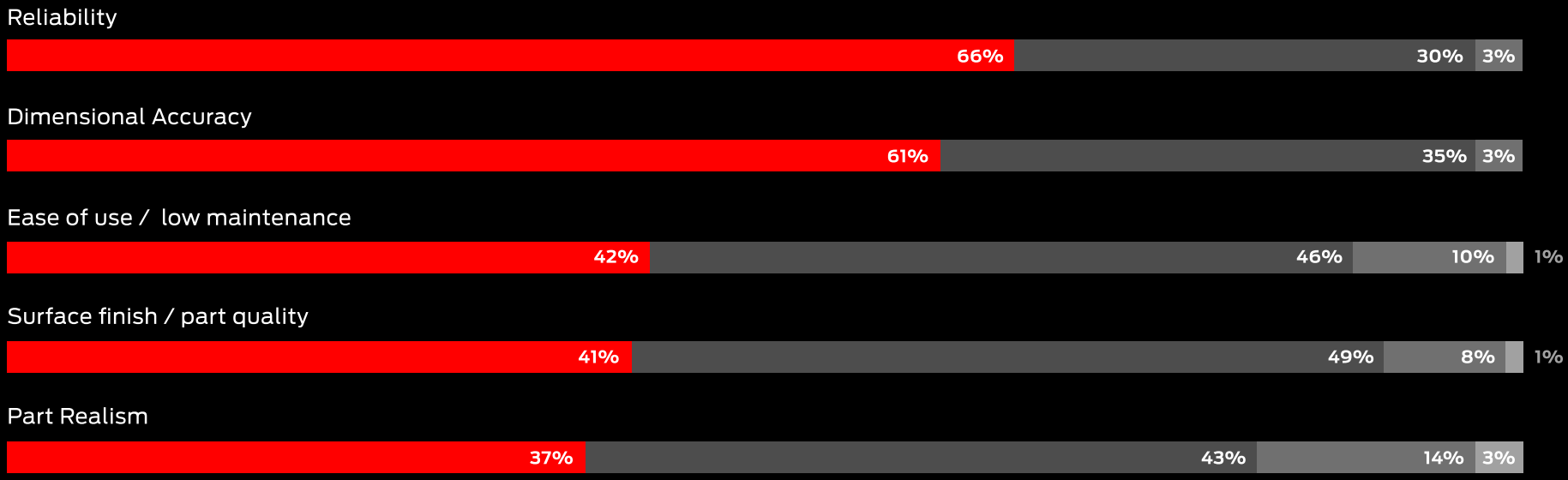

Selecting a 3D printing solution can be overwhelming, but understanding your needs and criteria can help make the process a little less daunting. Respondents were asked to rate the importance of printer features and benefits. Print repeatability (57%), part functionality (57%), print accuracy (60%), and ease of use (45%) were selected as very important attributes, while color capabilities and speed were considered the least important. At the same time, print reliability (66%), dimensional accuracy (61%), and low printer maintenance (42%) were selected as the most important benefits. These points underscore the importance of print quality and printer performance over ancillary features.

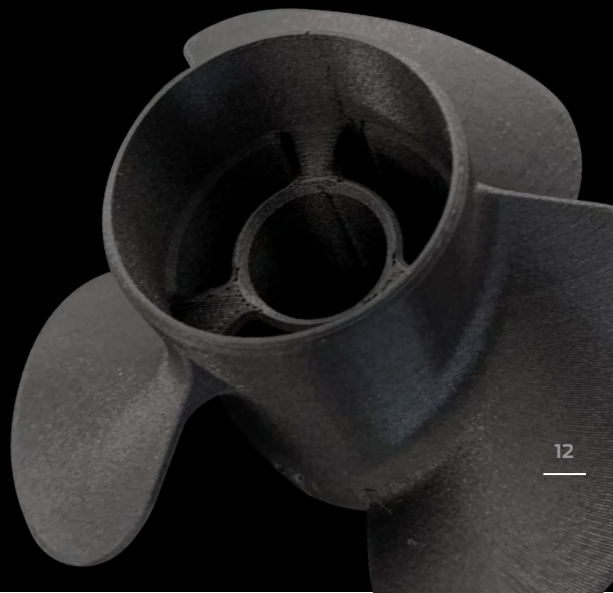
How important do you view the attributes when selecting a 3D printer?

## USERS



How important do you view the benefits when selecting a 3D printer?

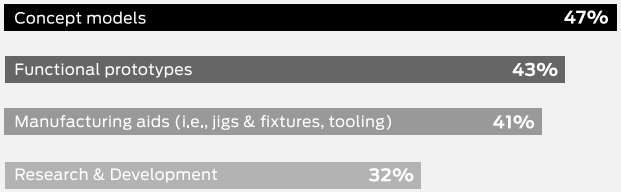


3D printing advancements have helped to drive innovation across segments. Engineers can print with a multitude of materials with different mechanical or thermal properties to assess the viability of the part. Whether it is being utilized for prototypes and parts at lower costs or creating designs unachievable with traditional manufacturing, 3D printing is fast becoming essential across many sectors.

## Industrial Products

### Primary application

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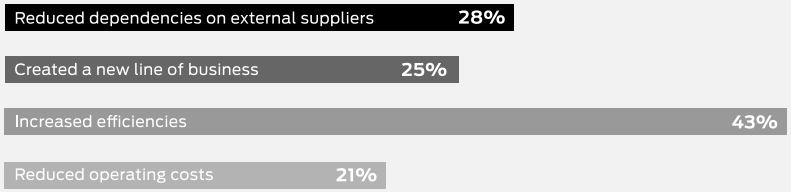
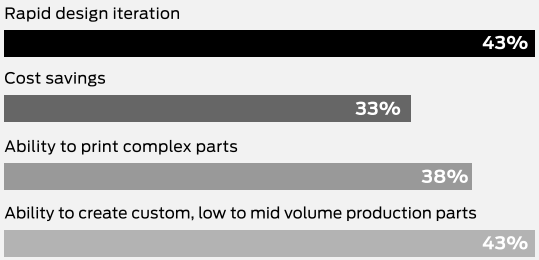
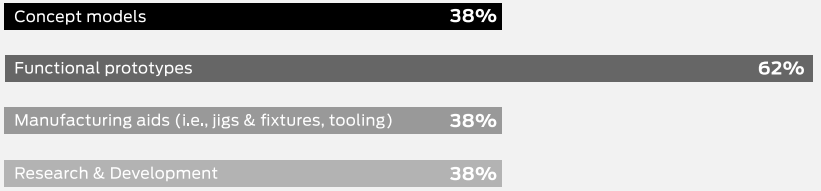



### Impact




## Aerospace

### Primary application

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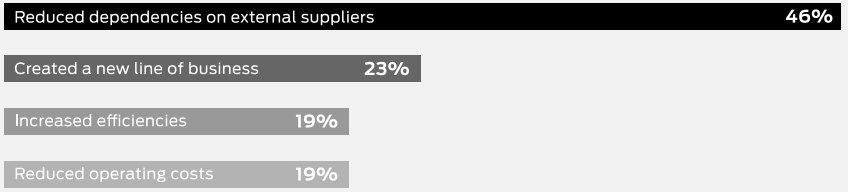


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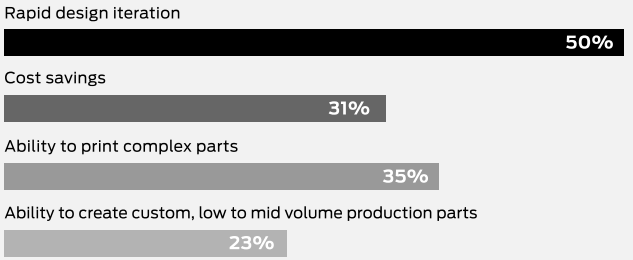
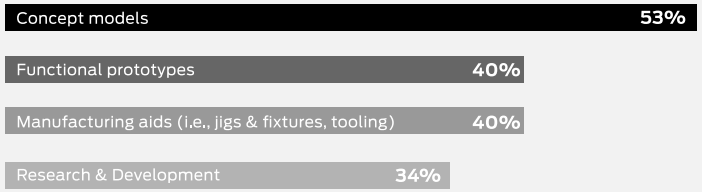


## Automotive

### Primary application

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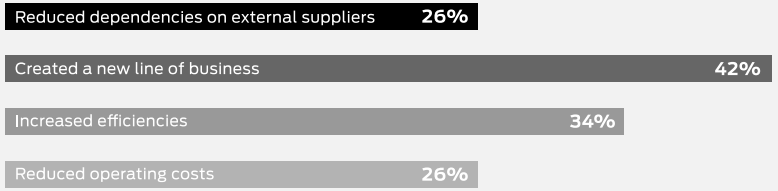


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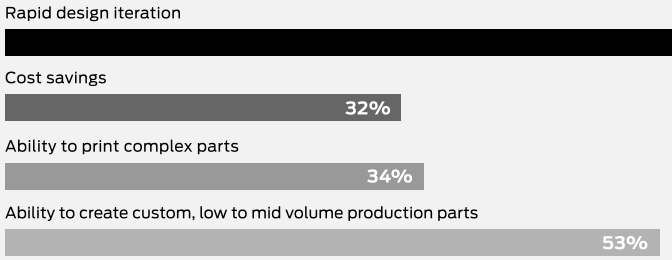
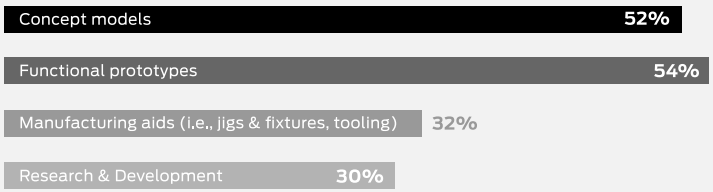



## Consumer Goods

### Primary application

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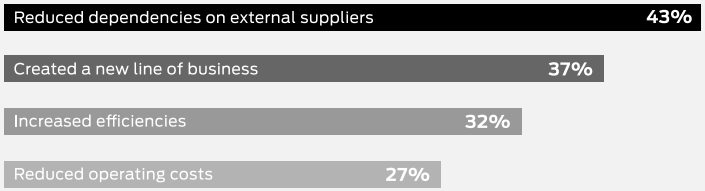


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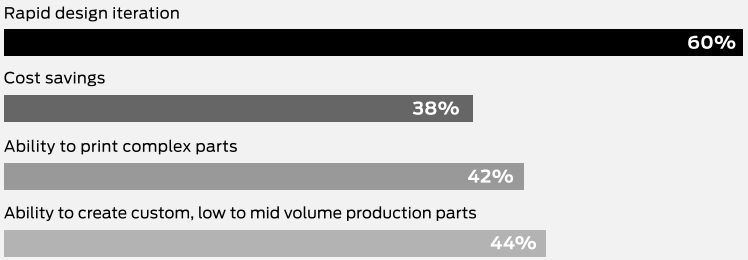
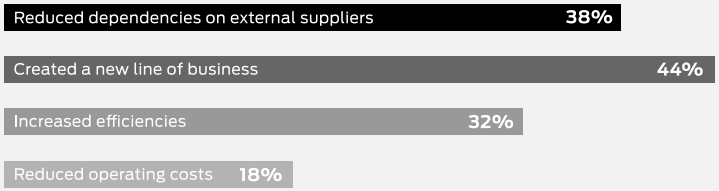


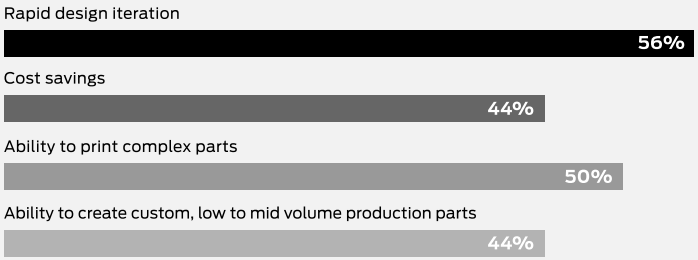
## Military & Defense

### Primary application


### Reason

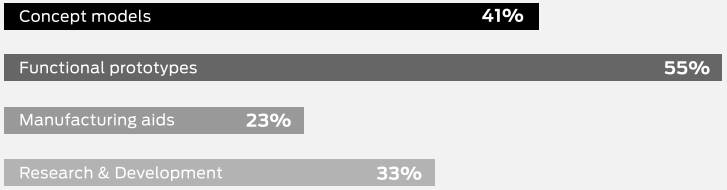



### Impact




## Manufacturing

### Primary application

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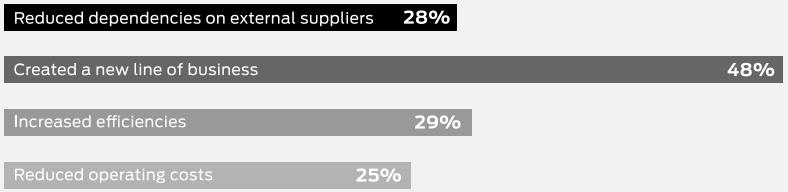
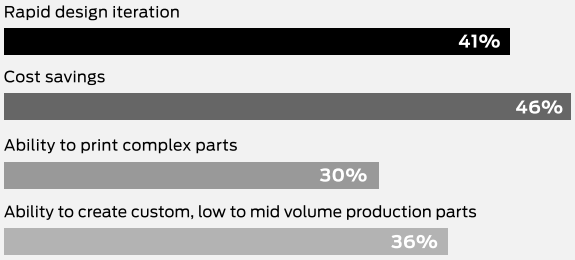



### Impact



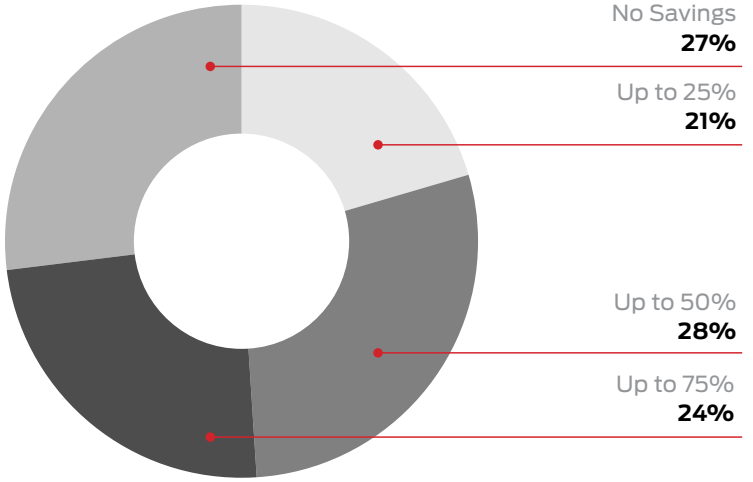
# Investing in Innovation

Businesses still plan to invest heavily in 3D printing, even as the global health pandemic continues to disrupt lives. The pandemic brought with it a global health crisis, supply chain shut downs, and a massive shortage of medical supplies and personal protection equipment. The world almost came to a standstill. However, in times of need, people tend to become innovative to solve a problem. 3D printing stepped out from the shadows and into the spotlight to support on-demand production of these critical supplies.

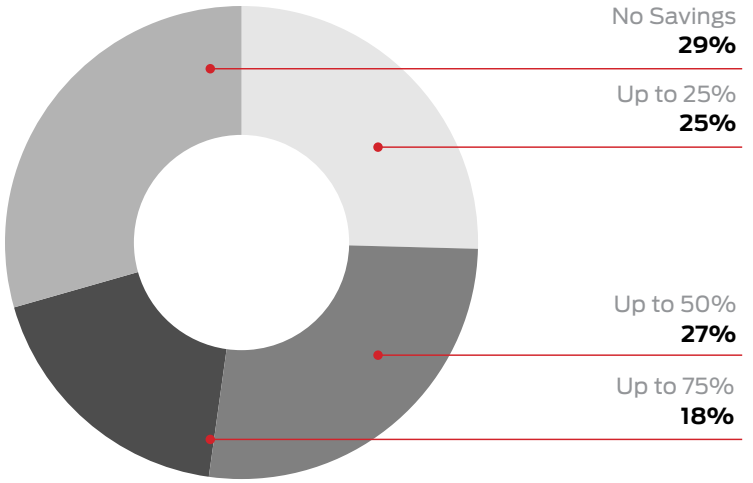
73% of respondents reported saving up to 75% of their time from using 3D printing, when compared to their previous method. Simultaneously, nearly 71% saved up to 75% on costs when using 3D printing compared to their last method used.

The business impact of 3D printing is widespread. 52% of respondents reported increased efficiencies, while 41% cited a reduction on external suppliers, and 40% stated to have created a new line of business with 3D printing.

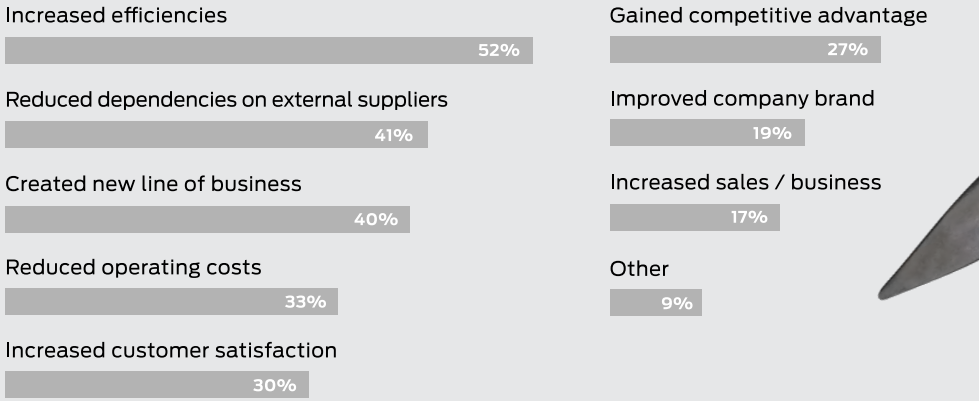
On average, how much time did you save when using 3D printing per project compared to your previous method?




On average, how much were costs reduced per project when using 3D printing compared to your previous method?

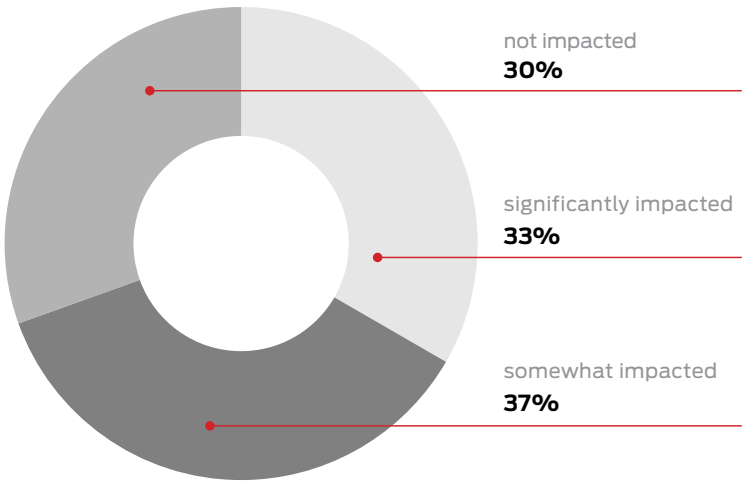


## What type of impact has 3D printing had on your business?

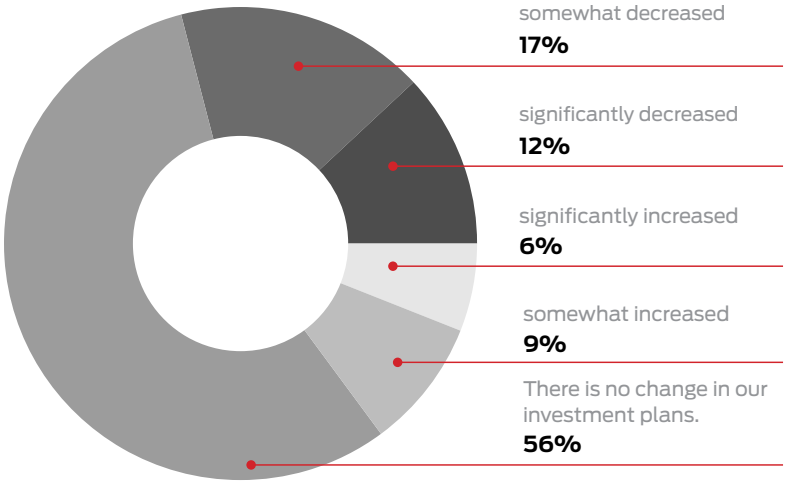



Market challenges will continue to hinder wider use of 3D printing. COVID-19 has impacted the business operations of nearly 70% of the respondents. This, however, has not impacted their investment plans. 56% have no plans to change their 3D printing investments, with 15% actually planning to increase spending.

## How has COVID-19 impacted your business operations?

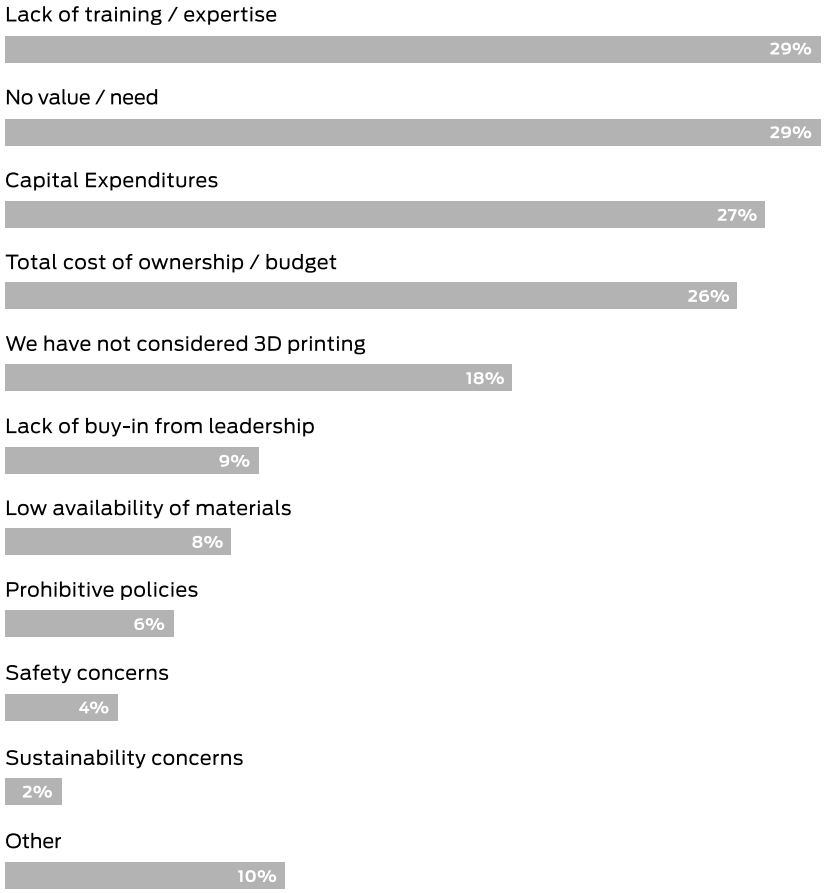



## How has COVID-19 impacted your investment plans in 3D printing?



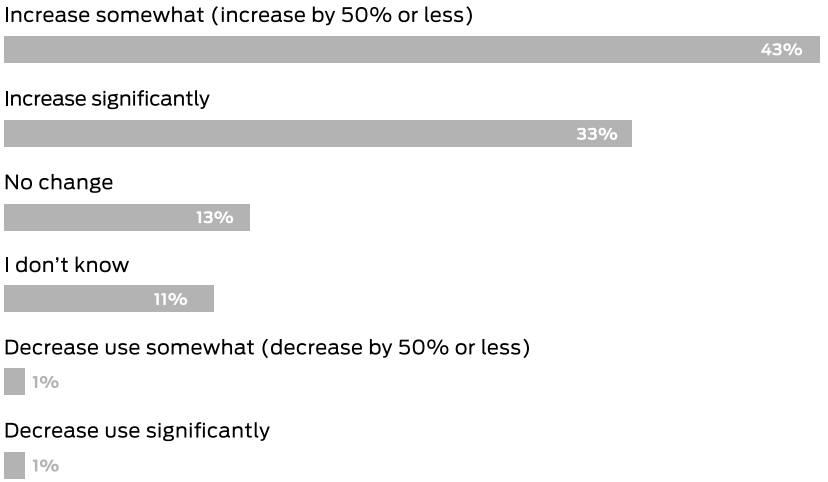
Costs and lack of technical training will continue to prevent many businesses from implementing 3D printing in their organization

## What are the primary barriers that are preventing you or your business to implementing 3D printing?

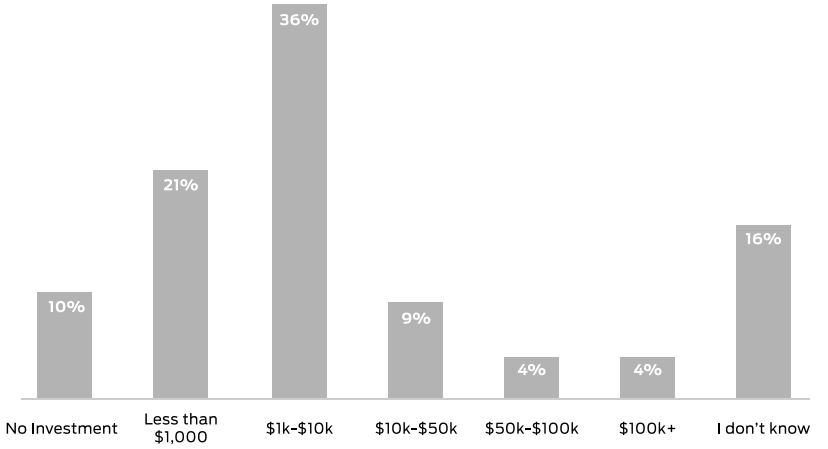



43% of respondents are confident that their company's use will change by up to 50% over the next few years, while 33% expect their use to change significantly. In addition, 74% plan to continue to invest in 3D printing over the next year.

## How much do you expect your company's use of 3D printing to change in the next 3-5 years?



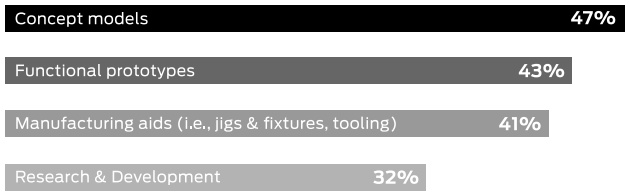

## How much do you expect your business to invest in 3D printing over the next year?



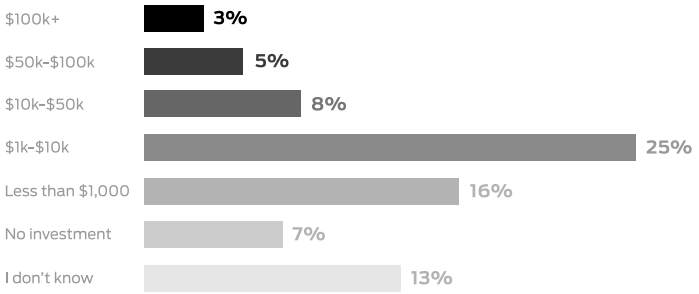
3D printing is increasingly used by companies across multiple industries to improve the design, production, quality, and costs of manufacturing goods. As businesses continue to see the benefits and savings from 3D printing, they are also increasingly willing to invest more in the technology.

## Industrial Products

### Cost savings using 3D printing

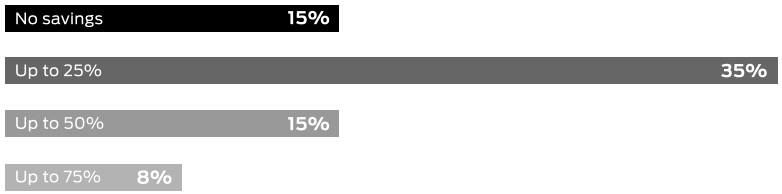



### 2021 planned investments

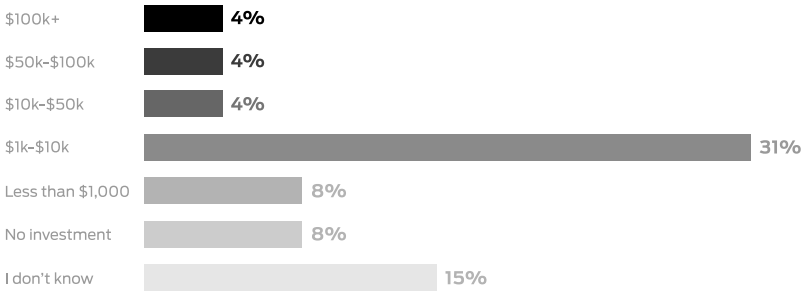



## Aerospace

### Cost savings using 3D printing

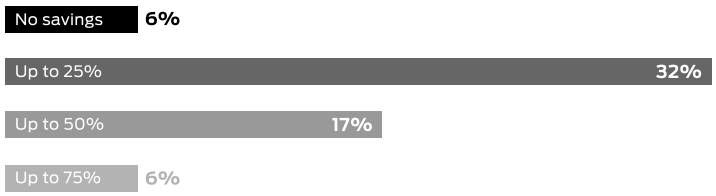



### 2021 planned investments

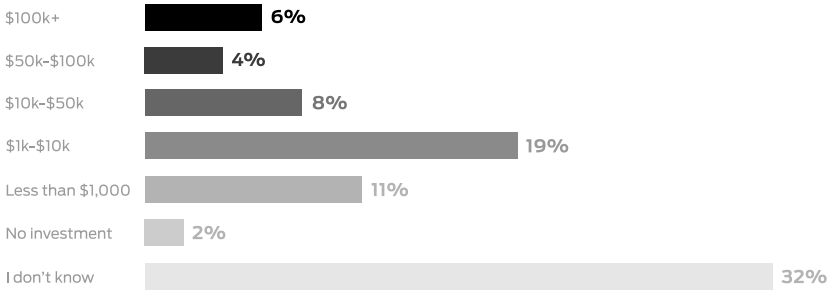


## Automotive

### Cost savings using 3D printing

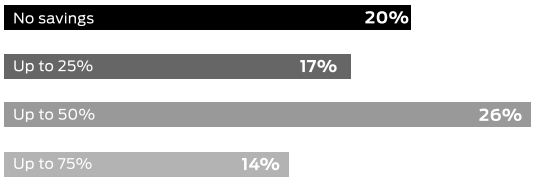



### 2021 planned investments

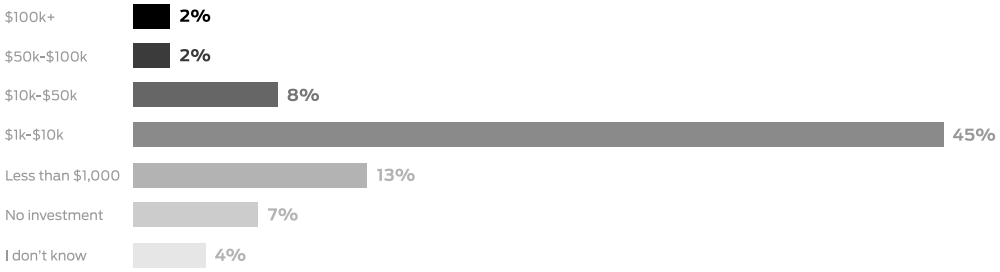



## Consumer Goods

### Cost savings using 3D printing

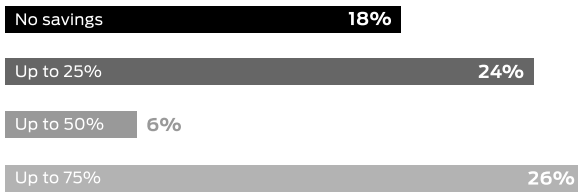



### 2021 planned investments

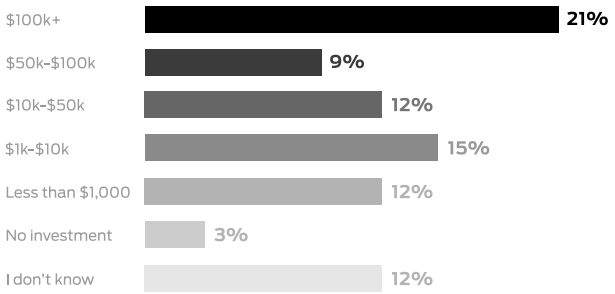



## Military & Defense

### Cost savings using 3D printing

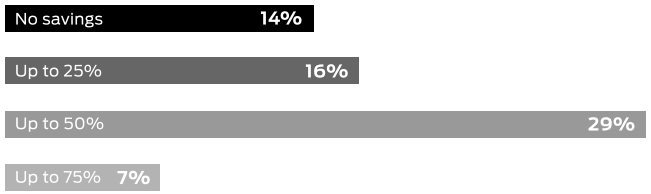



### 2021 planned investments

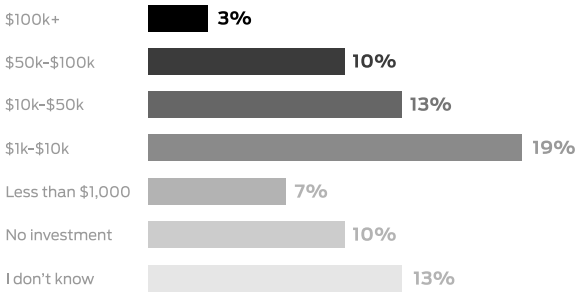



## Manufacturing

### Cost savings using 3D printing

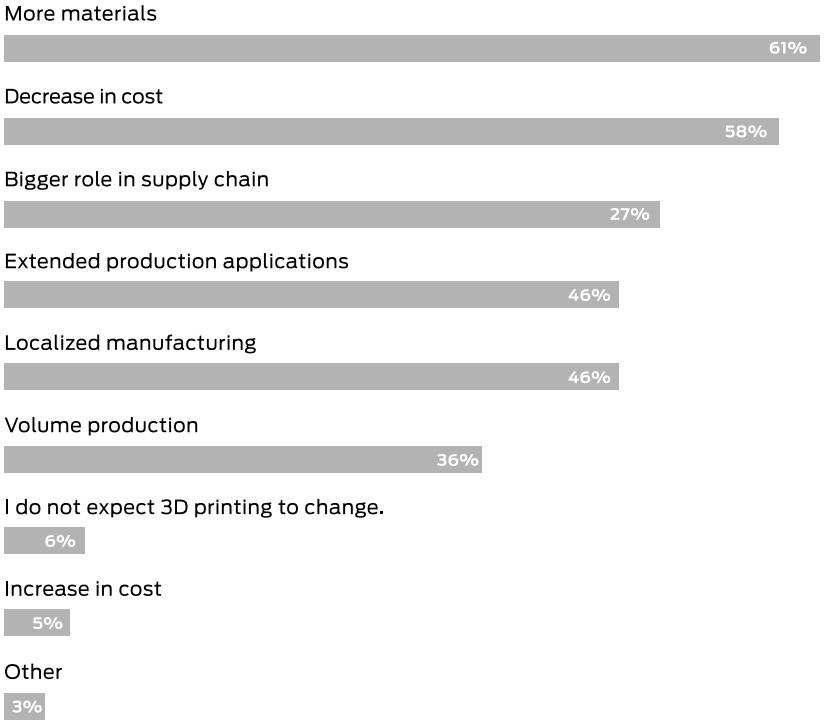



### 2021 planned investments

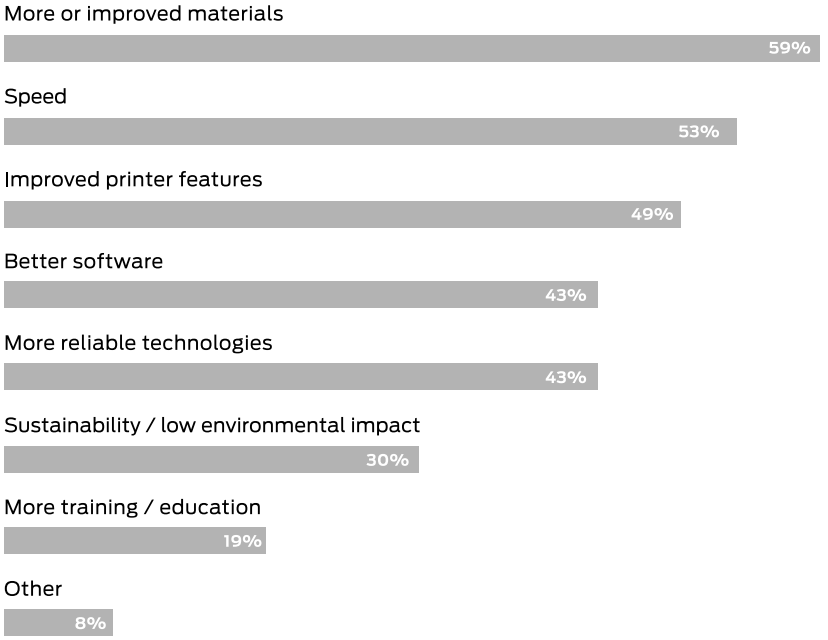



Like any technology, 3D printing will continue to change to deliver stronger capabilities, better performance, and more variety in terms of materials and accessories. Some of the top preferred features include improved printer capabilities (49%), better material varieties (59%), and increased printer speed (53%). Respondents expect 3D printing to play a larger role in the supply chain (49%), expand in materials (61%) and production applications (46%), and decrease in cost (58%).

## How do you expect the use of 3D printing to evolve in the next 3-5 years?




## What improvements would you like 3D printing to have?




MakerBot helps create the innovators of today and the businesses and learning institutions of the future through its connected 3D printing solutions. MakerBot strives to redefine the standards for 3D printing in reliability, accessibility, precision, and ease-of-use. Through this dedication, MakerBot has one of the largest install bases in the industry and also runs Thingiverse, the largest 3D printing community in the world.

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