

# Alumni's Diary

## Additive Manufacturing: A Technology to Print the Future

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Modern design techniques and innovation scale call for on-demand components fabrication in various industries. Additive Manufacturing (AM) is a layer-by-layer deposition technique to create parts using data from a CAD model to fulfill this requirement. AM provides many advantages over the subtractive manufacturing process for creating complex geometry and on-demand components. With the shifting to Industry 4.0, rapid prototyping and on-demand fabrication are becoming the need of the hour. Many companies are incorporating AM to build new-age components. In early-stage, AM processes are typically used for prototyping. However, functional components are created using the process nowadays. AM has a lot of applications in different industries such as aerospace, medical, automotive, consumer goods, electronics, construction, and oil and gas. The adoption rate of AM is increasing rapidly across different industries as shown in Figure 11.

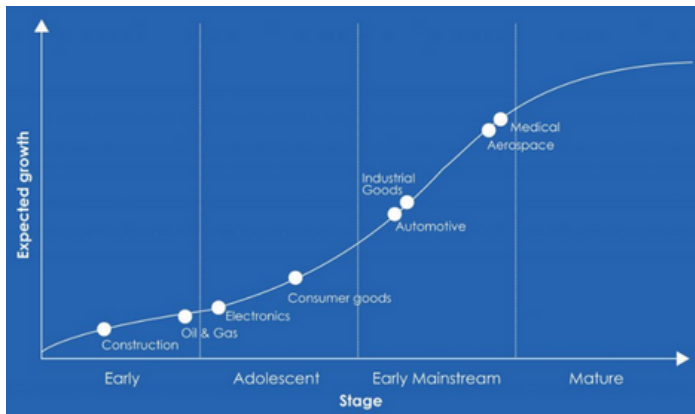


Figure: 11 The adoption rate of AM across different industries [1]

These industries have already been using AM techniques for rapid prototyping and have started producing functional components on-demand that can be directly put to use. Some of the aerospace applications of AM include rocket engines with conformal cooling channels, and regenerative design components to reduce payload. The medical industry also has a lot of applications such as different implants, prosthetics, and even artificial hearts and kidneys created using AM. The Automotive industry is the next field to be tapped by this technology, wherein certain complex design or weight reduction components can be created. The area of AM also shows futuristic promise in constructing houses on-site, building oil well structures offshore, and even in consumer households. Additive manufacturing has also significantly contributed to the initial time of COVID-19 by producing various personal protective equipment (PPE) as shown in Figure 12.

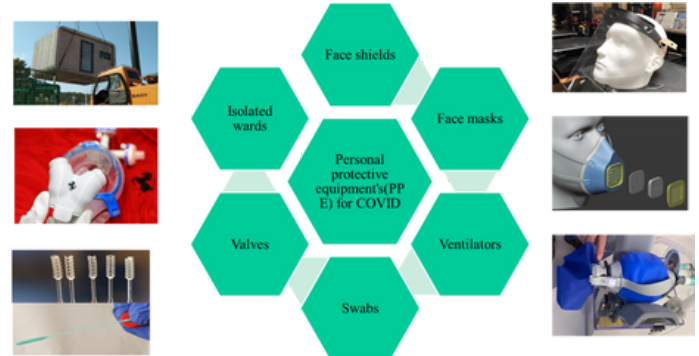


Figure 12: Personal protective equipment's (PPE) developed by AM processes for COVID-19

Various researchers are working to understand the science and improve the technology of different AM processes. Some promising fields of research are numerical modelling and simulation of various AM processes, process parameters optimization, design for AM, the effect of various parameters on mechanical and microstructural properties, the feasibility of printing new materials, and even using machine learning models to predict the output properties. Additive Manufacturing is a disruptive technology with many potentials to create a difference in the future as illustrated in Figure 13.

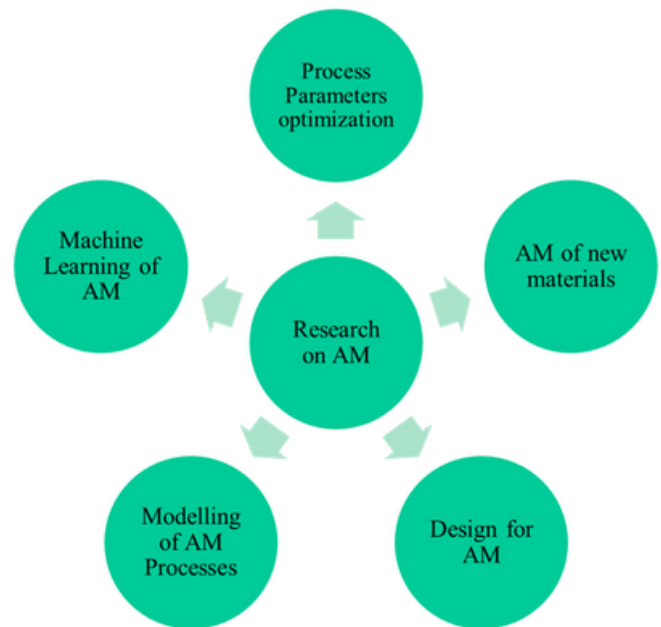


Figure: 13 Few key areas of AM research

### References

1. <https://amfg.ai/2019/10/04/connecting-the-digital-thread-scaling-additive-manufacturing-with-workflow-software/> access on 22nd April 2022