

3DP Teacher

THE WAR OF 3D PRINTERS AGAINST THE PANDEMIC

With the start of 2020, the Covid-19 virus affected the whole world in a short time, bringing heavy burdens to the health systems of countries. In the fight against the epidemic, many countries have experienced difficulties in accessing protective health equipment and caused the deaths of millions of people. (Çetinkaya C., Boumaraf H., 2020).

Being one of the components of Industry 4.0, 3D printers are used in many industrial areas such as architecture, furniture, aviation, automotive, fashion, health, and have entered education systems as the profession of the future. During the epidemic process, 3D printers took their place at the forefront of the stage, once again examining how important and functional technology is for human life. With the spread of the epidemic on a global scale, the technology sector, along with numerous scientists around the world, responded to the World Health Organization's call for cooperation to combat the epidemic. Selected manufacturers around the world have started to use 3DP technology for the production of personal protective equipment, which is one of the most important protective tools of epidemic protection, and medical tools used in the treatment of the virus.

Masks, protective visors, which are indispensable parts of our lives and used as personal hygiene tools since the day the epidemic started, are used as tools that make human life safer against the virus. While the efforts of scientists to find the vaccine, which is an effective weapon against the virus, to protect human health and many medical devices such as ventilators, respirators, which are needed by health systems, have been produced by 3D printers and have relieved the health systems to some extent. The visors



produced by many voluntary organizations using 3DP technology have been the indispensable protectors of healthcare professionals as they cover the entire face and minimize the risk of contamination.

According to the statements made by HP, one of the giants of technology, it is possible to produce 1 visor in 2 hours with home 3D printers in the most severe periods of the epidemic, but with 3D printing solutions, 300 visors per day can be produced at 65% lower cost. The list of medical devices and personal protective equipment that support health systems and the protection of human health by producing more than 2.3 million 3D printed parts globally in the fight against the epidemic (Techinside, 2020) is given in Table 1.



Table 1. List of notable 3DP technologies' implications against COVID-19

<i>Type of 3DP</i>	<i>Application(s)</i>	<i>Material category</i>
<i>Fused filament fabrication (FFF)</i>	Critical face-shields, masks, mask adjusters, respirator parts, hands-free door openers, and nasal swabs	Plastic
<i>Selective laser sintering (SLS)</i>	Ventilator parts, face masks, and face shields	Medical grade nylon
<i>FFF</i>	Disposable face shields	Plastic
<i>FFF</i>	Medical devices and protective clothing	-
<i>FFF</i>	Medical equipment	-
<i>FFF</i>	Printed fixtures for diagnostic equipment development	Metallic
<i>FFF</i>	Face masks	Plastic
<i>FFF</i>	Medical supplies	Poly-lactic-acid (PLA)
<i>FFF</i>	Face shields	Plastic
<i>FFF</i>	Quarantine booths	-
<i>FFF</i>	Ventilators	-
<i>FFF</i>	Hospital visors	-
<i>FFF</i>	Medical visors	-

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<i>FFF</i>	Design for medical gadgets	-
<i>FFF</i>	Headbands for face masks	-
<i>FFF</i>	Door openers	-
<i>FFF</i>	Headbands for face masks	-
<i>FFF</i>	Open source ventilator	-
<i>FFF</i>	Respirator	-

As a result, 3D printers continue to fight with us in protecting healthcare workers and human health in our global war with the virus, which affects the whole world and poses a great danger to humanity. Therefore, 3D technology has played a leading role in the epidemic process by proving that it is a strong solution partner in protecting and facilitating human life.