

Schools Step Up

The COVID-19 pandemic exposed an acute shortage of personal protective equipment (PPE) within the U.S. stockpiles. Universities have made significant contributions using their additive manufacturing capabilities, machine tool laboratories, knitting labs, and testing facilities as resources.

Louisiana State University

LSU ramped up production of PPE as part of a statewide response to support medical professionals on the front lines of COVID-19. The focus was on gowns and face shields.

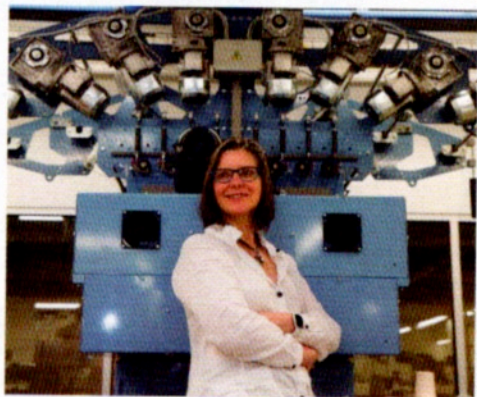
Working with Biomedical Engineering senior Meagan Moore, LSU Medical Physics Program Director Wayne Newhauser Newhauser began developing gown prototypes. Meagan and her mother, Kathryn Moore, also modified a mask pattern they found online, using two layers of tightly woven cotton fabric with elastic bands that go over the ears.

In the midst of her mask making, Meagan received a call from Newhauser, asking if she could help him create a 3D printed part for a COVID-19 ventilator. Moore said, "yes" without hesitation.

"In the war on COVID-19, LSU has found our own modern-day equivalent to Rosie-the-Riveter, 'Meagan the Maker,'" Newhauser said.

Drexel University

In Pennsylvania, Genevieve Dion, Drexel University design professor & director



Drexel Center for Functional Fabrics' Genevieve Dion in front of a Comez warp knitting machine.

Photo: Charles Fox

of Drexel's Center for Functional Fabrics (CFF), sprang into action. She saw this as an opportunity to show what advanced manufacturing and rapid prototyping can do. Much of Drexel's textile creativity is done at the CFF, which also incorporates the Pennsylvania Fabric Discovery Center. Dion shifted 3D knitting machines from a Department of Defense project to rapidly begin developing PPE masks and respirators.

While the immediate goal was to develop surgical masks that could be washed, sized, or made of anti-bacterial/anti-viral material, the long-term goal is to develop a washable and reusable respirator mask with an air filter that provides much more protection.

Tennessee Tech University

In response to a call from Tennessee state officials and Governor Bill Lee, eight higher education schools and universities were contacted to fight COVID-19 with 3D printing.

Tennessee Tech University is one school that is making hundreds of face shield headbands for medical workers. The purpose of the face shields is to allow healthcare workers to extend the use of face masks when dealing with COVID patients. Within a few hours, production of the headbands had begun, under the leadership of Michael Aikens, director of the Tennessee Center for Rural Innovations. TTU student, Hunter Hinshaw, operates six machines, and each 3D printer makes four headbands at a time.

Colorado State University

As COVID-19 pandemic patients began to fill Colorado area hospitals, several apparel manufacturers began to shift their production to making PPE medical gowns. For guidance, they turned to the high-tech textile laboratory at CSU for its expertise in testing materials that could be used for the gown production.

CSU's Smart Textiles and Nanotechnology Research group was contacted. Led by Associate Professor Vivian Li, the CSU Lab is the only lab in Colorado that can do the type of testing required for this project.

According to Li, the objective was twofold: to help companies choose the right type of material to manufacture the gowns, and then to test the completed gowns to ensure they meet the PPE standards set by the FDA, ASTM International, and the AATCC. ●

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