

# Video: Additive manufacturing—3-D printing beyond plastic

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At Virginia Polytechnic Institute and State University (VT), Christopher Williams heads the effort to further advance 3-D printing—known among engineers as additive manufacturing—with copper, a widely used conductor in electronics. Williams is using a process called binder jetting in which an inkjet printer selectively jets glue into a bed of copper powder, layer-by-layer. The printed copper product is then taken to a furnace to fuse the particles together

With support from the National Science Foundation (NSF), Williams is addressing a major challenge in the 3-D [copper](#) printing process, which is to eliminate the porosity that develops in the part during the process. These microscopic pockets of air weaken the finished product.

Williams's goal is to create an additive [manufacturing process](#) for copper that would be practical for widespread use. If successful, the results gleaned from this project can also be used to educate future engineers in designing systems with 3-D printing. Beyond the already functioning "3-D printing vending machine" available to students at VT, researchers hope to integrate their findings into an undergraduate/graduate additive manufacturing course, as well as summer workshops for K-12 science, technology, engineering and mathematics (STEM) teachers. These proposed programs will not only instruct students through inquiry-based learning methods but also study how teacher/student perceptions of manufacturing evolve.

Provided by National Science Foundation

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