

# BUILDUPS, MOCKUPS, AND OTHER TALES OF FABRICATION

**If you can dream it,  
MITRE's Fabrication  
Shop can build it.**



The Fabrication Shop at MITRE specializes in rapid-prototype development.

**I**NSIDE E-BUILDING ON THE Bedford campus, a vast 9,000-square-foot facility provides one-stop shopping for prototype design, fabrication, and testing at MITRE. “We’ve built everything here from clocks to cockpits,” says Paul Normandy, who oversees the Fabrication Shop in his position as director of MITRE’s Applied Engineering Technology Center.

The shop includes all the usual suspects: milling machines, lathes, drill presses, and numerically controlled sheet metal machines. A painting booth, large curing oven, woodworking station, and welding operation provide further evidence of the shop’s resources. There are even two garage bays that can house large vehicles. “We can drive Humvees into the



bays and work on them year round, regardless of the weather,” says Normandy.

Five full-time metal-smiths, as well as several design engineers and a draftsman, staff the shop. “We can work with all metals, plastics, ceramics, and wood,” says Normandy. “Sometimes we fabricate piece parts that are part of a total buildup, and other times we build the whole item.”

### A model workplace

Part of the Center for Air Force Command and Control Systems (CAFC2S), the Fabrication Shop has been in existence for as long as MITRE. Several years ago, it was absorbed from MITRE’s corporate operations, and now the shop is an adjunct to the CAFC2S Applied Engineering Technical Center and Normandy’s group, which specializes in engineering design.



The testing and modeling capabilities at the Fabrication Shop contribute significantly to work performed for MITRE sponsors. “We can put theory into practice quickly and demonstrate how we can enhance war-fighters and add to their capabilities,” says Normandy. By making it possible to rapidly put experiments in the field, the Fabrication Shop can expedite sponsor programs and, as Normandy says, “ultimately satisfy sponsors more quickly.”

Prototypes make up a large part of the work in the Fabrication Shop. “Prototype-driven specs seem to work better than spec-driven prototypes, and prototyping encourages cross-collaboration among MITRE employees,” says Normandy. A three-dimensional printer can create a live view of what a design will look like in hard copy (referred to as an actual production unit). Typi-





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cally used prior to “bending metal,” the 3-D printer produces actual production units in a material similar to plaster of Paris. “Taking this first step reduces the rate of rework,” says Normandy.

During a recent project for the Electronic Systems Center, the 3-D printer created an actual production unit of an air traffic control facility. “We created a scaled-down replica of a mobile air traffic control facility to determine if more equipment could be housed in it,” says Normandy.



“Recently, we constructed an extension for a cockpit mockup for CAASD [the Center for Advanced Aviation System Development],” says Normandy. “The cockpit was extended to fit more avionics equipment.” The shop also built a full-size cockpit mockup for a transport plane.



what would happen on aircraft in a real flying situation,” says Normandy.

### No job too far, no job too small

Sometimes their work takes the staff offsite. MITRE fabrication experts traveled to Shaw AFB in South Carolina to integrate racks, power sources, and air conditioning units into ready-made shipping shelters. “We integrated the 24 ISO [Inter-



The Fabrication Shop also includes an Environmental Product Evaluation Lab. Prototypes can be tested in different simulated environments in the lab’s temperature, vibration, and altitude chambers.

“This is how we test national Standards Organization] shelters that made up the transportable AOC [Air Operations Center] that was shipped to Al Udeid base in Qatar in 2002,” says Normandy. The AOC was designed to be easily unpacked upon its arrival in Qatar. “Everything was laid out in a grid,” says Normandy. “Shelters were placed on a concrete pad, connecting cables were run to build a network, and the command and control functions inside the network were operable.”



Ultimately, the Fabrication Shop performs an invaluable role at MITRE. Prototype design, fabrication, and testing are all key resources required to meet customer needs. “The type of work performed at the shop really can’t be done anywhere else,” says Normandy.

—Cheryl Balian