First AFCEC 3D Printed Test Structure at Tyndall AFB

By AFCEC Readiness Directorate

Construction of the first Air Force 3-D printed structure is currently underway at Tyndall AFB. Personnel from the Air Force Civil Engineer Center, Readiness Directorate (AFCEC/CX) are printing a 31ft L by 22ft W by 9ft T explosives reaction test structure at the AFCEC Sky X blast range. When complete, the 3D printed structure will be used as the walls to support cold formed steel roof trusses for blast testing to the Anti-Terrorism/Force Protection (AT/FP) standards.

Cold-formed steel roof trusses are an emerging technique for blast resistance construction that is starting to be considered for military construction projects. This work is critical to ensure that these types of roof trusses will meet DoD specifications and perform as designed in the unlikely event of an explosive attack.

The printing is being accomplished using the AFCEC-owned BOD2 system, a commercially available large scale cement printer. Purchase of the BOD2 printer was supported by the Tyndall Base of the Future initiative and was delivered to Tyndall in November 2021. The AFCEC research team completed training on the new COBOD printer within two weeks of arrival and finished the planned test prints the following

week. After training, the printer was set up at the Sky X blast range to begin the construction of the reaction test structure.

A MEP-1070 60kW Advanced Medium Mobile Power Source (AMMPS) Generator and a 1,000 gallon water truck were used to provide the power and water for the system since there are no utilities in the middle of the explosives range. This simulated an austere location and provided a great experience to understand how this technology could be used for expeditionary missions.

The construction of this structure is a multidisciplinary effort combining the expertise of AFCEC/CXAE Airbase Technologies Branch personnel and the University of Missouri who designed the truss system and provided feedback for the project. Charles Nikon, AFCEC Additive Manufacturing Engineer, and Kevin Wise, AFCEC Hardened Infrastructure Engineer, are the co-leads for printing of the reaction test structure. Future plans for the printer include the construction of prototype facilities and expeditionary structures to evaluate this emerging technology for potential Air Force use.