



Warrant Officer Russ Mangels runs a computer numerical control toolroom lathe during the Warrant Officer Basic Course at the Ordnance School at Fort Lee, Virginia, on Oct. 29, 2015. Warrant officers and allied trades instructors were the first to train on the equipment that will replace manual machines in the schoolhouse and in the field. (Photos by Julianne Cochran)

Advanced Shop Sets for Soldiers' Advanced Skill Sets

■ By Sgt. Travis M. O'Brien

As a military occupational specialty (MOS) 91E (allied trades specialist), I fabricate, repair, and modify both metallic and nonmetallic parts. Nine years ago, I was trained to use manual lathes and milling machines to fabricate various parts and special tools. I was also trained to repair metal using various welding processes such as shielded metal arc welding (SMAW), gas metal arc welding (GMAW), and gas tungsten arc welding (GTAW).

Despite this training, the outdated equipment available to me in the field throughout my career has prevented me from fully using my skills. And at each of my assignments, the unit's modified table of organization and equipment usually allowed for either welding equipment or machining equipment, not both. This structure limits the capabilities for allied trades specialists.

Times and equipment are changing, however. Not only have Soldier

skills evolved, but the equipment they use is changing to accommodate their expanded skills.

Evolving Jobs

Prior to July 2010, the Army trained two MOSs to meet its metalworking needs: MOS 44E (machinist) and MOS 44B (welder). Machinists were trained to manufacture metallic and nonmetallic parts using machines such as manual lathes and milling machines. Welders were trained to

repair metal using SMAW, GMAW, and GTAW welding processes.

In July 2010, the Army combined MOSs 44E and 44B into MOS 91E. Allied trades specialists are trained in both welding and machining skills. However, equipment configurations assigned to units in the field remained separated into equipment sets for MOS 44E and 44B Soldiers.

Evolving Equipment

Equipment has evolved, but today's shop equipment is designed more for welding than machining. The most common piece of equipment is the shop equipment welding (SEW) trailer. The SEW consists of a welding generator and various welding tools. The SEW is capable of supporting all welding processes, but the generator's design prevents an allied trades specialist from performing quality welding, and it has no machining capabilities.

Very few shop sets in the field are designed for machining. Two examples are the shop equipment, general purpose repair, and the aviation intermediate maintenance machine and welding shop set. These sets feature a manual lathe, drill press, and various hand tools. Both machining shop sets were acquired by the Army in the mid-to-late 1980s and are extremely outdated. Most of these sets are unserviceable because their repair parts no longer exist.

Units often turn in this obsolete equipment as unserviceable and are left with no machining capabilities whatsoever. Machining equipment that remains in the field hinders the capabilities of allied trades specialists because they are trained on modern, technologically advanced equipment in addition to manual equipment.

MWMSS

The Army recognized the need for up-to-date equipment that would complement all of the capabilities of MOS 91E Soldiers. In fiscal year 2015, the Army started fielding the metal working and machining shop set (MWMSS).

The MWMSS consists of two expandable mobile containers. Type 1 contains a computer numerical control (CNC) toolroom lathe (TL-1), multiprocess welding equipment, thermal cutting equipment, air-arc gouging capability, an air compressor, a mobile electric power generator for shop power, an environmental control unit (ECU), and an assortment of hand tools. Type 2 augments type 1 and contains a CNC toolroom mill (TM-1), CNC plasma cutting table, ECU, and various hand tools.

Together the two sets create a metalworking repair complex that will be located in field and sustainment maintenance units. Once fully fielded, the MWMSS will replace over 20

types of outdated tool kits and shop sets within the Army's inventory.

MWMSS Specifics

The MWMSS equipment will allow allied trades specialists to manufacture and repair parts with speed and accuracy that is not achievable with current shop sets. The MWMSS will be the most versatile piece of equipment that allied trades specialists have ever had at their disposal and make them capable of supporting any mission. The CNC technology and computer-aided design and computer-aided manufacturing (CAD/CAM) software, never available in the field before, allows allied trades specialists to create vir-



Hortansia Zaccheus, an Advanced Leader Course instructor for allied trades specialists at the Army Logistics University, checks a measurement before manually making a cut with a computer numerical control toolroom mill during train-the-trainer instruction at the Ordnance School at Fort Lee, Virginia.



Computer numerical control toolroom lathes, like these at the Ordnance School at Fort Lee, Virginia, will be part of the metal working and machining shop set that will soon replace manual equipment sets in the field. (Photo by Julianne Cochran)

tually any part for any piece of equipment in the Army's inventory.

CNC technology. The MWMSS inventory of tools and equipment features up-to-date machining and welding technology. The Haas Automation, Inc., CNC toolroom lathe and toolroom mill are the focal point for the MWMSS. CNC technology allows allied trades specialists to manufacture parts with greater speed and accuracy compared to any shop set currently in the field. Haas CNC machines feature the Intuitive Programming System, a proprietary operating system that guides the op-

erator through the steps necessary to machine a part.

CAD/CAM software. To complement the powerful CNC technology, the MWMSS contains a laptop computer with CAD/CAM software. Delcam FeatureCAM provides an allied trades specialist the CAD software to design a part, and then the CAM software takes over to generate the code that the CNC machine will use to make the part.

The allied trades specialist can then upload the part program to the Haas CNC machine and fabricate that part using the cutting tools, which

were previously operated by a machinist, and let the machine perform all of the calculations needed to produce a perfect part.

Welding. The welding capability of the MWMSS is also state of the art. The inverter welding equipment allows for precise welding on all steel and alloy materials. The Miller XMT350 and Dynasty200 welding machines are multiprocess welding machines for SMAW, GTAW, and GMAW operations. These machines offer allied trades specialists advanced welding options, such as GMAW pulse, GTAW pulse, and flux core welding. The MWMSS also features metal cutting ranging from thermal arc cutting to CNC plasma cutting.

The Track Metalworking and Recovery Division located at the Army Ordnance School at Fort Lee, Virginia, received two MWMSSs in late 2015 to incorporate into advanced individual training. Conducting this training should be straight forward since the same equipment is already used throughout the training.

When fully fielded, the MWMSS will provide the Army with a metalworking repair complex that is the first of its kind. It will be a shop that provides current industry standard metalworking technology tailored for both welding and machining.

With CNC technology and inverter welding capability, the allied trades specialist will be able to manufacture and repair parts for nearly all military equipment. Having this capability will expedite the return of equipment to operational readiness, and in turn, enhance the Ordnance Corps' ability to help the Army win on the battlefield.

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