With more than 50 academic programs and 21,000 graduates per year, the Medical Education & Training Campus (METC) at Fort Sam Houston in San Antonio, TX, produces more trained biomedical equipment technicians (BMETs) than any other institution worldwide. Serving the Tri-Services (Army, Navy, and Air Force) and international students from various nations, this state-of-the-art facility uses an exacting, rigorous training configuration to educate students on a range of essential skills for the repair, maintenance, calibration, and installation of medical and dental equipment.

Program Overview
During AAMI’s late-summer tour of Heroes Hall, the home of the METC BMET program, the phrase “like drinking from a firehose” was heard repeatedly to describe the program’s intense pace of learning. The BMET consolidated basic training program consists of a 41-week program (12 courses) for all three services and visiting international students. In addition, at the conclusion of the basic course, Navy students continue with training for a total of 54 weeks, which involves taking five of 10 advanced courses. The advanced courses focus on topics such as telemedicine, computer-based medical systems, ultrasound, advanced radiology, and mammography.

From the program’s inception (February 1999), military training of BMETs has been Tri-Service. Originally, the program was located at Sheppard Air Force Base in Wichita Falls, TX, but moved to its current home at Joint Base San Antonio–Fort Sam Houston in 2010.

The BMET program at METC is certified by the Community College of the Air Force (CCAF)—a federally chartered, degree-granting institution. Michael Hayes, Chief...
Warrant Officer Four in the Medical Service Corps and BMET Training: Program Director, explained that to meet CCAF requirements, a stringent set of objectives have to be satisfied. “We have a very robust, high-interest program that requires multiple objectives to be fulfilled, including consistently demonstrating the proficiency of management, faculty, and students. An example is that students go through a rigorous testing process that is demonstrated to the accrediting agency, CCAF, that graduating students are meeting educational requirements that have been developed by the three services,” he said.

For graduating students, the result is receiving CCAF credits that can transferred to just about any college, where students can finish off the requirements needed for an associate’s or bachelor’s degree. The rigorous pace of the program, said Hayes, means that students have the capability to receive the majority of an associate’s degree program in a short span of time (i.e., less than one year).

**Overview of Student Population**

Chief Hospital Corpsman Robert C. Bell, MTS, CBET, CRES, a BMET instructor and curriculum developer, served as chaperone during AAMI’s visit. Bell spent his first 10 years in the Navy as a submarine electronics technician before learning of the BMET program. “After switching over, I had no regrets whatsoever. It was definitely the best career decision I made, not just for the military but for the long term,” he said.

Bell noted the diversity of the student body, which ranges from 18- to 19-year-old Soldiers and Airmen “right out of boot camp” to reservists in their 30s and 40s.

“At METC, we don’t pick who comes in to the program or how they come in,” said Hayes. One common element among branches of the military is that the Armed Services Vocational Aptitude Battery (ASVAB) test—which determines the Soldiers, Sailors, and Airmen “customer base” for a nearby university or college is primarily the local metropolitan hospitals, meaning that the education students receive will be geared more toward the needs of the immediate area.

In 2015, the program expects to train 405 students based on service-specific quotas established by the Defense Health Agency. Currently, the school has 235 Army students (58%), 90 Air Force students (22%), and 80 Navy students (20%).

A typical class can vary considerably in terms of the age of its students, consisting of 18-year-old Soldiers and Airmen, 25- to 35-year-old Sailors, and Army and Air Force reservists ranging in age from 18 to older than 40 years. The differences in learning styles of this broad student base can provide instruc-
tors with challenges in implementing course material. However, Hayes said that overall, all groups are learning and succeeding at the same rate.

In addition, each branch of service has requirements that students must fulfill outside of their BMET training. Military requirements include barracks duty, physical readiness, and additional service-specific training. Single students tend to live in the barracks/dormitories, while married students and their families reside in privatized base housing or the nearby civilian community.

Bell described how the long hours spent apart can be challenging for students whose families are along for the ride. “They’re at physical training at 5 a.m. and not done until 5 p.m. So you’re looking at a standard 12-hour day, with a lot of different requirements, and that’s not counting other service requirements such as standing duty at the barracks after work,” he said.

This stress, said Bell, can be heightened for incoming students who have just returned from a deployment. “You could have just returned home to your wife and children, but then wait a minute—you’re off to San Antonio, enrolled in the program, and due to the rigorous nature of the program you still spend a considerable time away from home,” he said.

To underscore their commitment, Hayes makes special mention of the sacrifices of families at every graduation.

“Our belief is that in the long run, it’s definitely worth it. We never have had a graduate call back and say, ‘I shouldn’t have done that.’”

— Robert C. Bell, BMET instructor and curriculum developer

“Structure of Coursework

During the basic 41-week course, students interact with 50 to 60 different types of medical technology and undergo a minimum of 188 evaluations (written/performance tests), with Navy students requiring additional evaluations during their five additional advanced courses. The maximum allowed class size is 20 students, and the BMET program currently convenes 22 classes per year. On average, the program graduates a class, and begins a new one, every 11 days.

The rigorous schedule is charted out far in advance via a “waterfall schedule”—a tool used by the educators to display exactly when classes begin and end. Scheduling to this level of exactitude can be critically important for
students, many of whom have families on base. Assuming they don’t “wash back” (i.e., need to retake a course), students can see exactly when courses will be completed via the waterfall schedule.

Training is provided through didactic instruction, demonstrations, labs, and computer-based learning. Materials are provided via laptops, books, and workbooks. Upon entry, students are acclimated to the goals for the entire course, which are posted on the wall as a constant reminder of the rigorous and fast pace of learning.

“It may seem like we’re beating them up with 188 minimum tests, but when they graduate, the sense of accomplishment among students is huge,” said Hayes. “Our graduates realize that they can transfer the credits they earned, fulfill a couple other course requirements, and then have an associate’s degree. When they make that connection, what they’ve accomplished in a short span of time really hits home.”

Rolando R. Brown, an instructor in the program, noted that the ultimate goal is to develop sound BMETs who not only possess robust technical knowledge but also are well-rounded individuals. “It takes a special person to be a BMET,” said Brown. “Having book smarts and a high IQ is not enough. That’s why we also teach the soft skills, because they are an important part of a technician’s success.”

Building on this notion, Bell pointed out that to be an effective technician, BMETs really have to want to know how a piece of equipment ticks. “A true BMET wants to get their hands dirty and troubleshoot problems, not solve them in their minds,” he said.

When asked about communicating the effectiveness of the program, Bell and Hayes said that there’s no better example than the students themselves.

“We’re confident that when our students reappear, whether it’s in a military or civilian setting, they have the ability to not only survive but also thrive—to do their job at a high level of competency. When others see that finished product, it speaks to the brand. That’s our core mission here: to train, mentor, and develop students so that the product that goes out the door speaks for the brand, and the brand speaks for METC,” said Hayes.

Bell added to this concept, noting: “When you look at the requirements for high-level BMET jobs in the civilian sector, a lot of them say ‘associate’s degree or DoD BMET military training.’ In fact, this should be updated to ‘associate’s degree or METC training.’ That speaks to the high quality of students we’re producing, because some civilian hospitals are willing to hire our graduates without an associate’s as long as they’ve been through METC.”

Student Support/Mentoring
Given the intense rigor of the program, student attrition is inevitable. Regardless of service, students may “derail” in the program for a variety of reasons, including academic, personal, medical, financial, family, legal, integrity/ethical lapses, and/or service requirements (e.g., physical readiness). For the 42-month period from August 4, 2010, through April 2, 2015, the attrition rate was 10.6% for all causes, with 6.2% being for academic-related reasons.

To support them along this demanding path, Bell said that the instructors, staff, and administrators work with students to address all possible barriers to training, before a decision is made to “relieve them from training.”

“As their instructors and mentors, we work with them daily to help with personal issues, financial, family, legal—pretty much whatever it takes to keep them focused in the
classroom and lab and on seeing the task to completion,” he said.

In some cases, temporary leave is granted (e.g., maternity or paternity leave), after which the student may resume the program where they left off.

As the knowledge center and repository for BMET training information, the program continues to support its students after graduation. Students therefore are encouraged to continue their education following graduation. They are provided with information about continuing education, apprenticeships, certifications, career paths, and overall guidance. Every graduate also is provided with a list of resources and contact information.

In addition to the mentors and instructors, the program convenes an Academic Oversight Board (AOB) consisting of a minimum of three BMET staff members/instructors/mentors. The AOB reviews all material related to student failure or inability to complete course material. After reviewing all pertinent information and interviewing students, the board makes appropriate recommendations to Hayes (the program director). The recommendations can include continuing with the current class; “recycling” to another class, which enables the student to begin the specific course again at day one; or removal from training.

Program Staffing
Attaining the level of instructor in the METC is a prestigious feat. “When they reach that level, our instructors are able to take their life experience, their degree, and their passion to train, teach, and mentor—and I say those three words each time because that’s what they do and they do it well—and pass on those skills and intangibles. The professionalism and work ethic they exude is a powerful lesson for students,” said Hayes.

The program is staffed by three types of instructors: 1) representatives from each branch of service, 2) government civilian instructors, and 3) contractors. Currently, the program has 82 instructors, including 65 military personnel, 10 civil service, and seven contractors (Table 1). All instructors will have served as BMETs, though their experience varies based on length of tour and duty assignments.
Before an instructor is allowed to teach a course, he or she must:
• Take and pass a training skills course.
• Observe the course that they will be teaching.
• Take and master the exam for the course that they will be teaching.
• Teach the course while being observed by a qualified instructor.
• Undergo three evaluations by subject matter experts/course leaders and achieve approval.

In addition, instructors must possess an associate’s degree or higher. Those who do not have an associate’s degree when they are assigned to the BMET program must meet the requirement within one year or be removed from the instructor pool.

The time crunch and sacrifice by instructors also is noteworthy. Hayes estimated that following completion of classes, instructors will spend another two or three hours prepping for the next day, meaning they’re probably not off work until 7 or 8 p.m.

First-year instructors experience a good deal of stress, said Hayes, and senior staff and program leaders strive to enable appropriate leave/vacation time. “As program director, I’m always concerned about instructor burnout. That’s why we always encourage each other to take R&R,” he said. “Every month, we try to have a weekend outing—we might go up to Canyon Lake and camp, fish, and have a barbecue. That not only gives everyone a chance to unwind, but also creates a fellowship among the instructors.”

Hayes said that the Tri-Services are currently in the midst of preparing for the annual curriculum review and, with that, are once again engaged in focusing the area and scope of practice for the BMET METC program. With the increased attention on information technology (IT) and networking, several instructors have been fortifying their knowledge in these areas, picking up certifications such as A+, Network+, and Security+ (i.e., three of several certifications available from CompTIA). This constant adaptation and commitment to lifelong learning underscores the passion of instructors at the BMET program, said Hayes.

The BMET program includes a fully functioning field equipment performance lab, where students are trained on equipment used in deployment situations. A variety of equipment can be found at the training site, including a full combat support hospital, X-rays, ventilators, anesthesia machines, a sterilizer (dubbed “Big Bertha” [image A]), a water recovery system (image B), and power distribution equipment.
Cover Story

HTM Managers: Hone Your Skills with the CHTM Certification

In 2015, the AAMI Credentials Institute began offering the Certified Healthcare Technology Manager (CHTM) certification. This certification focuses on two major areas: the management of healthcare technology operations and the management of personnel. The functions of the healthcare technology manager include participation in the “leadership” of the business enterprise. The manager also is expected to have the skills and understanding needed to perform strategic, business, and change management as well as employee relations.

Receipt of the CHTM designation is based on successful passing of a closed-book, two-hour exam. Recertification requirements for this certification are a combination of work experience and continuing education to demonstrate sustained competency and knowledge in the HTM field.

To learn more about the CHTM certification and other professional development opportunities from AAMI, visit www.aami.org/professionaldevelopment.

Reservists and National Guardsmen
“We produce a product, and that product serves three areas: active duty, the National Guard, and reservists,” said Hayes.

After successful completion of the BMET program, reservists and National Guardsmen often go on to complete additional certifications and work for major companies, fine-tuning their craft in the process. Later, when deployed, they bring these refined abilities to the battle space.

“It really helps us in deployment situations to have somebody come in who has been doing the job on a day-to-day basis in the civilian sector, because they’re able to transition into that setting comfortably, as well as train and mentor their peers,” said Hayes. “While the guy on the active-duty side is probably going to be a ‘jack of all trades,’ that reservist or guardsman is more likely to have expertise in one or more specific areas, like X-ray, anesthesia, or infusion pumps.”

In the long run, training reservists and National Guardsmen to be BMETs creates a win-win situation for both the student and the military. Students are well on their way to garnering these well-paying jobs, while the military can avoid the cost of having to, for example, send someone for a $20,000 computerized tomography scanners.

Effectiveness of the Program
Within the sphere of training BMETs, the cat might already be out of the bag: Others are gaining awareness of the effectiveness and prestige of the METC program. Earlier in 2015, the program was visited by the chief of economic development for the City of San Antonio. “He told us that based on his department’s analysis, there aren’t enough BMETs to meet the needs of hospitals, healthcare treatment facilities, and urgent care centers in the city,” said Hayes. “So here we are, within the Tri-Services, trying to develop and deploy high-quality BMETs, and the City of San Antonio apparently is scratching its head over the same thing. And they are asking us: ‘How do we do it? Where should we start?’”

In addition to the need for skilled BMETs to meet society’s high demand, the exploratory nature of the questions asked by the city’s economic development chief spoke to the relative obscurity of the field among the general populace. Hayes said the questions asked were along the lines of: How do I get a student from high school to take interest in healthcare technology? What is the aptitude needed to get into a field like this?

To help the city along, Hayes said the METC is working on a program that will allow students from the community to visit the training facility, in order to see whether it sparks an interest in the field.

As alluded to by Hayes, the breadth and strength of the program may mean that its delving into ground more recognizable as “clinical engineering.” And Bell said that program leadership is well aware of the industry’s push toward embracing the terms “healthcare technology management”/“HTM.” As a result, he is seeing a greater capacity for the program to teach computer technology and networking.

“We are seeing a push to get our BMETs prepared and certified on the IT side—to become 100% across-the-board ‘healthcare technology management,’” said Bell. As a result, the program has been revamped over time to include an increased focus on IT.

“We’re putting them in a position to be able to fix an X-ray machine, without having to call in IT for the administrative password to get into the computer that it’s hooked up to,” Bell noted.
Working hand in hand with U.S. Army Reserve (USAR), the goal of the GE Military Partner Externship Program is to provide reservists with the tools needed to master competencies in both their military and civilian careers.

Gary Haulotte, the U.S.-Canada service technical training manager for GE Healthcare, serves as a liaison between the company’s U.S. and Canada field service organization and GE Healthcare Institute—its main training facility located in Waukesha, WI. “I drive the training needs back to the GE Healthcare Institute, as well as oversee the training compliance for the field organization,” said Haulotte.

Both Haulotte and Julia Wainscott, a human resources manager for the U.S.-Canada service at GE Healthcare, have been with the program since its inception. Wainscott said that her role is to continually cultivate the relationship between the USAR and GE Military Partner Externship Program. “My goal is to ensure that the soldiers are getting the right experiences in the field and then, hopefully, placing them in different service jobs that are available throughout the country,” she said.

Following about eight months of planning, the externship program was launched in July 2011.

**Demand for the Program**

“From the perspective of the Army Reserve, soldiers would enlist, go through boot camp, then enroll in the METC BMET program at Fort Sam Houston. However, upon completion, many had little to no experience and were having difficulty finding jobs. They would end up working as welders, plumbers, whatever, and the only time that they would get any experience and training as BMETs is when they would be on their active duty, which is one weekend a month and two weeks in a year,” explained Haulotte.

He said that during initial discussions, the USAR noted that only about 40% of their “68 Alphas” (i.e., the 68A–Biomedical Equipment Specialist military occupational specialty [MOS]) were finding jobs in the biomedical field.

Keeping these reservists engaged and ready for possible deployment was a challenge. “At the time, in 2011, a very heavy emphasis was being placed on reservists being deployed to Iraq, Afghanistan, and other locations,” said Haulotte.

As a result, because these reservists’ BMET skills had grown rusty from lack of use, the military was having to provide another 60 to 90 days of training to get them ready for deployment.

Therefore, said Haulotte, the number one priority of the GE Military Partner Externship Program is engagement. “We give them the experience. Along with that, hopefully, they will ultimately come work for us. But moreover, the program keeps them engaged in the field, which is important for the military because it means the reservists are staying current with the technology and providing service in the field.”

**Program Structure and Focus**

The total duration of the GE Military Partner Externship Program is nine months. During the first week of the program, the goal is to provide professional and operational training at the GE Healthcare Institute. Participants complete on-boarding tasks, such as taking GE Integrity training and participating in a Global Services 101 class.

Then, they are sent out for a four-month rotation working as a BMET within a GE Healthcare biomed team. This period, said Haulotte, is when an enrollee will become a “jack of all trades,” learning on the fly in a real-world shop.

After the biomed rotation, the externs return to the training institute for another week’s worth of classroom-based training, in order to prepare for field engineer rotations. They also are placed in a modality; currently, the programs offers modalities in X-ray, computed tomography, and anesthesia.
Participants then go on a second rotation for another 120 days, receiving specialized operational training from field service engineers. During this rotation, the externs also are required to complete specific competencies as stipulated in a handbook that contains GE requirements, as well USAR requirements for the 68A MOS.

"We use the handbook to come up with specific competencies that they're required to go through in their career. The competencies that GE requires during the rotation are dovetailed with those of the USAR. Therefore, the learning they receive is directly related to their career paths within the 68 Alpha job specialty," said Haulotte. Also, during both the first and second rotations, participants are paired with mentors, who provide coaching and facilitate experiential learning opportunities.

Wainscott noted that the program is structured so that two waves of externs are on rotation at all times. "Generally, while one wave is working on their biomed rotation, we have a second wave working on their imaging rotation. So, there is some overlap," she said.

Following this second rotation, participants then return to the training institute for a third time to commemorate their graduation from the program, receiving a certificate recognizing their achievement.

In addition to the classroom-based learning and the hands-on experience of the rotations, Wainscott said that GE Healthcare offers continuing education through its online learning catalog. "We offer supplemental online courses dealing with regulatory compliance and health and safety requirements, among other areas," she said.

The program also teaches participants the communication skills needed for success in a corporate environment, such as how to interact with customers. "It's really more than just a technical training program," said Haulotte. "It also teaches assimilation into a corporate world and provides the skills that they need to operate professionally outside the military."

**Cultural Relevance**

"The quality of soldier that we're getting has been and continues to be stellar," said Wainscott. "They come with a good set of skills out of the schoolhouse [i.e., METC BMET program], and the culture of the military transitions nicely into GE culture. The expectations and vision of military is very transferable to GE," she added.

As a result, the prestige of the program is on the rise. "Every wave, we get more and more soldiers interested. The word is definitely out," said Wainscott.

**Ready When Needed**

The METC BMET program has an annual operating budget of around $500,000–600,000, which covers supplies and consumables but does not include equipment. The last major equipment purchase, totaling around $4.9 million, came in 2010–11 when the program was migrated to Fort Sam Houston. Given the impressive array of technology housed in the facility, Hayes estimated the total cost of equipment to between $20 and $30 million.

In fact, Bell said that with the BMET, radiology, nuclear medicine, and diagnostic sonography programs all housed within Heroes Hall, the building “has to be one of the most technically advanced educational buildings in the City of San Antonio.”

Given its cutting-edge capabilities, the educators said that the school could be used for actual patient care in the event of a local health emergency. Although one hopes that such an incident never comes to pass, it was readily apparent from AAMI’s visit to the METC BMET program that if it did, patients would be in very capable hands. ■