

THE NEW FACE OF MINING

The University of Arizona's Mining and Geological Engineering Program

By Mary Poulton, PhD, UA Mining and Geological Engineering Department

Four years after the shoot-out at the O.K. Corral, Arizona's territorial legislature approved the creation of the University of Arizona (UA), with founding schools of agriculture and mining: a visionary move in 1885 considering there was not a single four-year high school in the territory. The School of Mines was formally launched a few years later in 1888 as the last brick was laid for the iconic Old Main Building.

Much has changed in the UA mining years that have touched three separate centuries, but, at the core, the program's purpose remains rock solid.

Now, in 2013, the UA's mining program is celebrating its 125th

anniversary with a mission still rooted in the old days: to provide advanced education, innovative research and invaluable services to state, national and global mining industries. Perhaps most importantly, AU provides the worldwide mining community with an exceptional workforce – the new face of mining.

From mules to robotics

The exceptional workforce in training in 1888 was learning how to consider mules for material haulage; today students are learning robotics, automation and positioning technologies. In 1888, the School of Mines was providing assay and other technical services to a growing industry scattered across 113,000 square miles of

hostile territory; today the Mining and Geological Engineering Department (MGE) and the Lowell Institute for Mineral Resources are transferring technology and knowledge worldwide via lectures streamed online, startup companies, licensing agreements and short courses.

Using an extensive mineral collection they created themselves, 125 years ago the School of Mines faculty traveled the territory and nation by horse and carriage to teach the public about the region's mineral wealth. That mineral collection is now one of the largest university collections in the United States and today MGE education outreach programs touch more than 6,500 students and teachers in their Arizona classrooms and



Mining student, Ashlyn Hooten, participates in the drilling competition in front of the first mining building, Old Main, during Engineers' Week

after-school programs. Programs like MineZone, in which children from more than 50 school districts interact online with mining professionals, teach students about geology, mining methods, equipment, safety and environmental stewardship.

Partnering for life-changing innovations

The UA, a top-20 U.S. research institution among the top-50 public universities worldwide, has grown from a handful of dedicated faculty and persistent students to more than 40,000 students and 3,300 faculty and researchers in 345 degree programs.

Collaboration is the backbone of UA advancements and more than 85 percent of UA faculty members

work on interdisciplinary problems. Capitalizing on that long tradition of collaboration, MGE partnered with the geosciences department and the Mel and Enid Zuckerman College of Public Health in 2009 to establish the Lowell Institute. Backed by Science Foundation Arizona, J. David and Edith Lowell, and 20 industry partners, the interdisciplinary research center has grown to include 120-plus faculty, staff and students in 23 disciplines across 10 colleges. They are tackling, and solving, the world's most pressing issues for sustainable development of mineral resources. Disciplines as diverse as philosophy for ethics and landscape architecture for reclamation are helping advance the minerals industry.

Health, safety and global reach

The UA's top-ranked management information sciences department partners with MGE on new information technologies. Systems engineering, the first such department in the country, is partnering with MGE on a unique simulator in use at a major U.S. coal mine. The simulator takes mine-specific data and, in seconds, re-creates mine operations to provide analysis for and testing of different operating scenarios. Collaboration with the Mel and Enid Zuckerman College of Public Health, Arizona's first and only accredited college of public health, has resulted in the expansion of MGE's mine health and safety program to



PHOTO COURTESY OF PETE BROWN/UNIVERSITY OF ARIZONA COLLEGE OF ENGINEERING

Women's mine rescue team at the Henry G. "Hank" Grundstedt San Xavier Underground Mining Laboratory supervised by laboratory director, John R. "Ros" Hill. From left to right: Lisa Rzechula, Allison Hagerman, Alyssa Hom, Jamie Mills, Ashlyn Hooten, Sarah Beal. Not pictured: Megan Naff and Danielle Taran.

42 researchers, staff and students working with 15 companies to improve worker training effectiveness, develop new training tools and approaches to serve the needs of an increasingly diverse mining workforce. For example, the program is creating a bilingual gaming simulator for coal mine emergency response based on the NIOSH-developed "Harry's Hard Choices." And, working with the UA's economics department, the Lowell Institute is helping the industry understand the full cost of worker injuries.

Every project in the Lowell Institute has an industry or government partner actively engaged in the research process. Technical advisory committees made up of industry and faculty leaders in mining, or extractive, metallurgy, economic geology, mine health and safety, environmental management and social license to define the research agendas. The

Lowell Institute's Board of Directors is composed of senior leadership of mining companies, the World Bank, original equipment manufacturers (OEMs) and law firms.

In the early days of the School of Mines, faculty taught professional courses to miners, mining engineers and assayers. Today more than 1,000 alumni from 80 companies in 27 countries are involved in the Lowell Institute's professional programs in mineral resources. The 10-day field geology courses are often filled to capacity and 15 two-day short courses, taught by leading industry experts, are delivered on campus and online.

Students at the heart of UA mining programs

Students are, and always have been, at the heart of the UA's MGE programs. The UA has a legacy of producing leaders for the coal sector and, indeed, the entire mining

industry. Students meet stringent admissions standards and 20 percent are chosen for the highly selective Honors College. All MGE students get hands-on experience working at the University's San Xavier Underground Mining Laboratory and are MSHA certified in underground miner safety.

As a student-centered research university, all MGE students have opportunities to work with developing technologies and they take that knowledge and experience into their professional lives. The UA is home to the only integrated operations center laboratory for mining in the world. Students – many interested in the coal mining sector because of its complex operations, logistics, markets and environmental challenges – learn in real-time with real data how to integrate and act on information ranging from train schedules to mine fleet management.

The new face of mining

With the support of industry, alumni and friends, the UA's MGE programs have survived the ups and downs of the mining industry across three centuries, while growing stronger and more diverse. We believe our approach to bringing many disciplines to the table to tackle the complex challenges facing the mining industry today – coupled with diverse faculty and students, innovative research, new approaches to education and communicating with the public – defines the new face of mining. ♦

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