



Partnership Opportunities Prepared for Explosive Engineering Industry , December 2017

Colorado School of Mines (CSM) is a public research university devoted to engineering and applied science located in Golden, Colorado. It has the highest admissions standards of any public university in Colorado and among the highest of any public university in the U.S.

In addition to strong education and research programs in traditional fields of science and engineering, CSM is one of a very few institutions in the world having broad expertise in explosives education and applied research. As such, CSM occupies a unique position among the world's institutions of higher education. CSM offers all the advantages of a world-class research institution through three main colleges that are:

The College of Applied Science and Engineering included departments: Chemical & Biological Engineering, Chemistry & Geochemistry, Metallurgical & Materials Engineering, and Physics.

The College of Engineering and Computational Sciences included departments: Applied Mathematics & Statistics, Civil & Environmental Engineering, Electrical Engineering & Computer Science and Mechanical Engineering.

The College of Earth Resource Sciences and Engineering included departments: Economics & Business, Geology & Geological Engineering, Geophysics, Liberal Arts & International Studies, Mining Engineering and Petroleum Engineering.

Explosive research is conducted through more than one CSM institutional center. Specific centers, PhDs, and graduate student resources used in explosives engineering and research include but are not limited to: **the Advanced Explosive Processing Research Group (AXPRO); the Renewable Energy Materials Research Science and Engineering Center (REMRSEC); the Advanced Steel Processing and Products Research Center (ASPPRC); the Center for Welding, Joining, and Coating Research (CWJCR); and the High Performance Computing Center (HPC) for parallel simulation execution.**

CSM's need to developed interdisciplinary Center of Excellence dedicated to Explosives Research and Education. The Mission is to leverage the research, facilities, processes, capabilities, and experience of CSM to assist the USG, U.S. National Laboratories and Industry with explosive research, testing, and education. Current Explosive program at CSM is involved in a wide-range of research activities. Current explosive research is focused on several areas of study: industrial clean up, avalanche control, resource recovery, explosive welding, explosions, air bags, oil and gas perforators and material fragmentation, atmospheric charge characterization, initiation system evaluations, the physical and chemical characterization of IEDs, and chemical and physical explosive properties validation.

Explosive Engineering "Pilot" Graduate Program:

The proposed Explosive Engineering Pilot Graduate Program is targeting to involve four graduate students starting in January, 2018. This program will serve and target students interested in the explosive, mining, construction, automobile, aerospace, and defense industries. This initiative will serve to attract and develop a incubator for graduate students and future engineers and scientists. We propose the following elements be included in this Explosive Engineering Pilot Graduate Program:

- Target a minimum 15 hour/week student commitment for spring 2018, pilot semester; Planning 40 hour/week internships, summer of 2017 for the first four graduate students
- Potential research project for Master and PhD studies



- Targeting rising juniors and seniors (with a minimum course prerequisites in Explosive Engineering Minor Program)
- The program will compensate students directly (Four students; minimum 15 hour/week spring semester 2017 & four students; 40 hour/week internship at AXPRO)
- **Designated Faculty Advisor**; A proposed faculty advisor will serve as the conduit between the students and the industry partners designated point of contact. In addition, the Academy faculty advisor will be involved in recruiting students and ensuring that objectives and milestones are achieved.
 - **Amount required for 2016-2017 academic year = \$12,000** (for spring and summer)
 - **Amount required for future academic years = \$18,000** (for fall, spring, and summer)
 - **Amount required for explosive laboratory equipment and instrumentation = \$45,000**