

Request for Proposal

Topic: Assessing Mining Industry Readiness for Exoskeletons

Background: Mine workers are known to be at high risk for developing musculoskeletal disorders related to biomechanical stresses including awkward postures, repetitive motion, forceful exertions, and repeated impacts. Exoskeletons worn on the human body can modify these biomechanical stresses in ways that augment human performance and reduce musculoskeletal risk. Practical applications in rehabilitation and military settings have demonstrated potential widespread usefulness of these technologies in a variety of industries and occupations. Despite this promising groundwork, very few efforts have been made to introduce exoskeletons in mining operations.

Goal: The Alpha Foundation is seeking proposals to assess industry interest and readiness for the introduction of exoskeleton technology into mining operations.

Specific Aim: The specific aim is to determine the degree to which cost, functionality, safety and other aspects of exoskeletons represent significant incentives or prohibitive barriers to routine application of exoskeletons for use in augmenting mine worker job duties.

Scope of Study: It is expected that both coal and metal/nonmetal mining operations be included in the study. The focus for this study should be on underground mining.

Proposal Submission Requirement: NIOSH currently has an active project that is investigating exoskeleton applications for mining. The proposal should include a discussion of NIOSH research in this area and any relevant findings. Finally, unless there is a justifiable reason, the proposed efforts should avoid any direct or substantially similar duplication of NIOSH research.

RFP Budget: The Foundation anticipates the cost for this effort will not exceed \$60,000. Any cost proposal above this amount must be highly justified to be considered for award.

Follow up Funding: The Foundation will contemplate the opportunity for follow-up funding if the RFP outcome clearly shows that the mining industry supports the active use of this technology.

Proposals should include the following elements:

- Establish a multidisciplinary study team with members and advisors to determine the feasibility of exoskeleton use in mining. This team should include:
 - Mining industry management representatives and mine workers with recent frontline experience.
 - Experts in mining industry safety and health programs and regulations.
 - Experts in exoskeleton technologies and applications.

- Identify candidate exoskeleton technologies that might be appropriate for consideration for mining applications.
 - Acquire promotional literature of these units that identifies basic performance capabilities and costs of the units.
 - Acquire demonstration units that can be shown/demonstrated to mine personnel.

- The study team shall gather the necessary data, information, opinions, and ideas to achieve the specific aim. It is expected this will include field visits to operational mines whereby demonstrations of the exoskeleton technology can be showcased for feedback.

- Summarize factors that facilitate or inhibit the use of exoskeletons in mining operations, including
 - Potential positive and negative factors affecting technical and economic feasibility of exoskeleton use in mining.
 - Potential positive and negative impacts of exoskeleton use on work quality and productivity.
 - Potential positive and negative factors affecting worker safety and health.
 - Other possible adverse or favorable consequences of exoskeleton use in mining.

- Prepare a report summarizing the overall Industry readiness and acceptance for the introduction of exoskeleton technologies in mining. Draw conclusions as to whether any of the potential barriers to the introduction of exoskeleton technologies in mining would likely be resolved or reduced through further research projects and provide specific examples of such research.

Evaluation Criteria:

- (40%) Depth and quality of the multidisciplinary study team
- (30%) Demonstrated knowledge of potential exoskeleton technologies suitable for this study
- (30%) Likelihood of securing access to mining operations necessary to achieving the scope of work