

# Tech News

## nology

Milestones in Mining Safety and Health Technology  
NIOSH MINING SAFETY AND HEALTH RESEARCH

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## ErgoMine Targets Ergonomics and Safety Issues in Mining

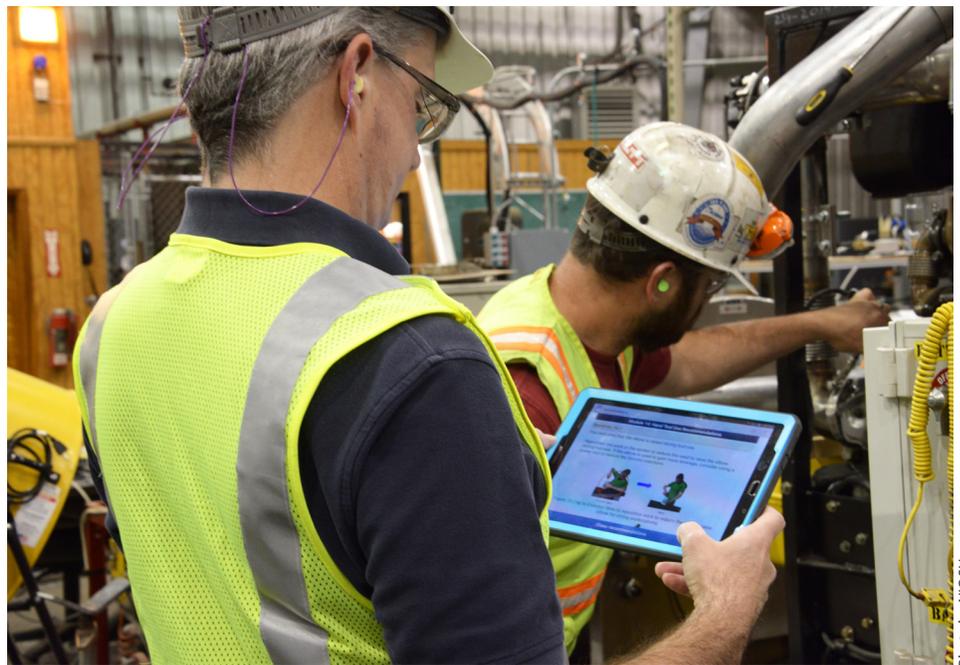
### Summary

*ErgoMine is an ergonomics auditing app for Android currently available in the Google Play store. This audit tool, designed by NIOSH, identifies ergonomics and safety deficiencies for three types of mining operations: (1) haul truck, (2) bagging, including small bag and intermediate bulk container filling and preparation for shipment, and (3) maintenance and repair in coal preparation and minerals processing plants. Unlike most ergonomics and safety audit programs, ErgoMine provides recommendations to address all deficiencies identified by the app. Mines can then implement these targeted recommendations to improve mineworker safety.*

*By Patrick G. Dempsey, Jonisha P. Pollard, and Gregory P. Cole*

### Mobile Audit Technology

ErgoMine was developed by the National Institute for Occupational Safety and Health (NIOSH) as a mobile application that runs on Android-powered smart phones and tablets. This app brings the classic clipboard-and-pencil process of auditing into the digital age, providing for easier input, processing, and sharing of information and an immediate generation of recommendations to address ergonomics and safety issues identified by the app. The app guides the user through



**Figure 1:** A user conducts an ErgoMine audit on an Android tablet while observing a mine-worker perform an equipment maintenance task.

a series of questions and automatically selects the appropriate audit modules (e.g., if a bagging operation does not have a palletizing station, the application will skip the palletizing module). Recommendations generated from a given audit are compiled into a recommendations report that can be easily emailed to other mine personnel.

### Immediate Recommendations

As the user answers the audit questions, ErgoMine instantly generates recommendations for minimizing identified ergonomics or safety issues. The recommendations for completed questions can be read while conducting the audit or viewed after completing an audit. The

audits and related recommendations are based on information from various sources, including laboratory studies, field studies, injury and fatality data and reports, on-the-job observations, and existing solutions currently used in mines to address safety deficiencies. All recommendations in the app were designed to be practical and specific enough to guide the user in addressing the identified deficiencies. Many of the recommendations are simple, low-cost engineering changes to eliminate the issue.

### Flexibility in Conducting Audits

ErgoMine was designed to be a flexible audit tool, allowing individual audit modules to be completed when desired.

Photo by NIOSH

For example, a single bagging station can be audited before and after renovations or other changes by selecting only those modules which may be affected by the changes. Some mines may choose to complete audits annually or on a schedule similar to other safety activities. In summary, the audits can be used in a manner that complements existing ergonomics efforts or as a means of establishing a more formal ergonomics process. Addressing ergonomics and safety deficiencies is a continuous improvement process, and ErgoMine can be an effective tool for mineworkers to document and remediate these deficiencies.

### The Bagging Audit

The bagging audit applies to surface mills and plants with small and bulk bagging and palletizing. At these operations small bags (100-lb or less) or intermediate bulk containers are filled, closed or sealed, and prepared for shipping. This audit consists of 13 modules: (1) Bagging Operation Characteristics, (2) Personal Protective Equipment, (3) Work Posture, (4) Work Environment, (5) Lighting, (6) Mobile Equipment, (7) Small Bag Filling, (8) Small Bag Weighing, (9) Small Bag Sealing, (10) Small Bag Palletizing, (11) Bulk Bag Hanging, Opening, and Filling, (12) Bulk Bag Closing and Sealing, and (13) Stretch and Shrink Wrapping. The Bagging Operation Characteristics module asks a series of questions about bagging processes that are used to partially determine which of the remaining audit modules apply. Modules 2–6 and 13 are related to characteristics of the facility and workstations. Small bag operations are assessed in modules 7–10, and bulk bag operations are assessed in modules 11–12.

### The Haul Truck Audit

The haul truck audit applies to surface mines in the operation of haul trucks, the design of haul roads, and loading and dumping locations at mine sites. This audit consists of 8 modules: (1) Training, (2) Policy, (3) Haul Road/Mine Pit, (4) Pre-shift Inspection, (5) Ingress/Egress, (6) Driving/Cab Layout, (7) Loading, and (8) Dumping. Modules 1 and 2 are completed by discussing training and policy with mine management (e.g. Mine Manager or Safety Supervisor). Module 3 is completed by examining the mine haul roads and pit. Modules 4–8 are completed by observing the driver while conducting the pre-shift inspection and while driving, which includes loading and dumping.

Maintenance and Repair Audit
Module 12: Posture Assessment
0/6

12.1:  
The head/neck is considered bent or twisted if an obvious angle between the neck and back can be observed as a result of performing the task.

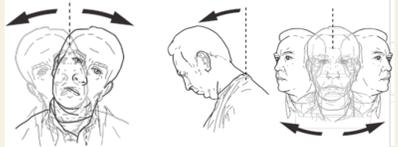


Figure 22 (Tap to Enlarge): Images of head/neck bending and twisting.

- Bent or twisted rarely
- Bent or twisted sometimes
- Bent or twisted frequently

**Figure 2:** A page from ErgoMine showing a question within the Posture Assessment module of the maintenance and repair audit.

### The Maintenance and Repair Audit

The maintenance and repair audit applies to maintenance and repair operations at mills as well as at surface preparation and processing plants. This audit consists of 17 modules: (1) Tools and Safety Devices/PPE, (2) Communication, (3) Lock Out/Tag Out, (4) Working at Heights, (5) Slips, Trips, and Falls, (6) Environmental Factors, (7) Machine Guarding, (8) Equipment Access, (9) Maintenance Preparation and Area Inspection, (10) Housekeeping, (11) Blocking, (12) Posture Assessment, (13) Gross Posture Assessment, (14) Hand Tool Use, (15) Screen Maintenance Checklist, (16) Greasing, and (17) Conveyor Maintenance and Repair. Modules 1–4 cover administrative aspects of safety, whereas Modules 5–7 cover the facility characteristics. Modules 8–10 apply to pre-maintenance activities, Modules 11–14 cover all maintenance tasks, and Modules 15–17 cover specific maintenance tasks.

### How to Download ErgoMine

ErgoMine is available for download in the Google Play store or by accessing this link: <http://www.cdc.gov/niosh/mining/works/coversheet1906.html>. The app's help guide and audits in PDF format can also be accessed from the link.

## For More Information

For more information on ErgoMine, contact Patrick G. Dempsey ([PDempsey@cdc.gov](mailto:PDempsey@cdc.gov)), Jonisha P. Pollard ([JPollard@cdc.gov](mailto:JPollard@cdc.gov)), Gregory P. Cole ([GPCole@cdc.gov](mailto:GPCole@cdc.gov)), or the NIOSH Mining program ([mining@cdc.gov](mailto:mining@cdc.gov)).

To receive NIOSH documents or for more information about occupational safety and health topics, contact: **1-800-CDC-INFO (1-800-232-4636)**, **1-888-232-6348 (TTY)**, or request information at the CDC website at [www.cdc.gov/info](http://www.cdc.gov/info), or visit the NIOSH website at [www.cdc.gov/niosh](http://www.cdc.gov/niosh).

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