Rotation. This schedule (five days on and two days off) rotates every two weeks. Miners interviewed reported that it on improve family life, which can also improve productivity. Often under-addressed by the industry, employee dissatisfaction due to mining family events is a silent hazard of shift work. Improving a worker’s opportunities to spend with their family can boost overall performance.

Sounds like a personal problem

Today’s workers are beginning to account for cultural differences with regards to safety. The realization that family life affects worldwide has caused some companies to offer more support services for those dealing with divorce, bereavement or sandwich generation pressures. Mental tiredness can cause distraction levels that are unsafe to environments whose multi-time machinery is running to life. Encouraging miners to use counselling may not be an eagerly awaited perk, however. It has been suggested that mining industry workers may be more likely than workers in other occupations to experience relationship problems and work-family stress” according to McPhedran and De Lee. In fact, a study in the UK noted that a coal miner has higher levels of emotional instability that often originates from work. The fatigue weighs heavily on their shoulders and contributes to miners’ inability to meaningfully contribute to their family relationships when they arrive home. This is compounded by FIFO workers who commute up to 5, one way, to 10 hours. The physical exhaustion contributes to mental exhaustion, distracting miners from focusing fully at home and work.

Alternative solutions

While many adults responsibly drink caffeine, low levels of energy drinks, the addictive nature of over reliance for shift workers to lead to unexpected waves of fatigue. One study by McIvor investigated the effects of caffeine on pilots’ performance during a demanding task.10 Because they are often faced with trans-meridian flights, their exposure to disrupted sleep cycles is similar to those on shift change. Both catnapped drinks and caffeine pills offer short energy bursts with improved mental clarity and accelerated reaction times that can cause temporary overconfidence. These highs are followed by a hard crash, often with diurnal side effects and gastrointestinal problems, if overused. The advent of fitness tracking technology has changed the face of exercise for many. The development of fitness-tracking devices may do the same for the industrial sector. New sensors can monitor extended eye closures and head orientation. In some devices, fatigue-related eye closure lasts for more than 15 sec, or workers eyes closed for more than 4.5 sec, it will send automatic alerts to both the worker and his family. Depending 100% on technology may not be reliable enough yet for full responsibility for fatigue management.

Recommended solution

Despite the temporary relief from caffeine and technology innovation, safety managers agree that these solutions are only part of an overall solution. Some sites institute fatigue risk management systems as a holistic approach that addresses multiple sources of fatigue, both on and off the workforce. The implementation of this type of plan follows similar project management steps that include getting top level support, developing a training program, and monitoring the results. Like many safety topics, the first part of analysis is to identify the risks and the potential fallout. Successive layers of defense can include barriers and reminder training to keep people-site aware. These can include maintaining sufficient staffing levels to minimize overtime and mitigating the root causes listed above. Other defenses against fatigue come naturally through mental stimulation and muscular activity, environmental temperature, sound, light, and smell. No two sites are alike; however, establishing a fatigue management plan has helped some operations reduce the incidence and severity of their accidents.

Conclusion

The mining of minerals, stone and other materials from the earth has occurred since prehistoric times. Today’s population of coal workers are hardy, often juggling family responsibilities around shift changes and long shifts. Their fatigue is both physical and mental, resulting from stressors on and off the job. Human error causes a large percentage of accidents on sites, with fatigue as the number one cause of distraction. Long commutes to the sites, schedule shifts and other responsibilities off the job can all have an impact on the productivity and alertness of mine staff. Developing a fatigue management plan can create awareness around the root causes of fatigue and distraction-driven accidents.

References

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Joe Sander, ASGCO®, USA, details the company’s ongoing commitment to providing solutions to operators with conveyor belt problems.

In today’s coal mining industry, it is more important than ever to operate with efficiency and safety as the key factors guiding a process. Ineffective material handling leads to many complications, including dangerous working conditions and productivity losses, as well as expensive repairs and downtime. Moreover, the accumulation of dust and airborne particulate can be a source of major fines. ASGCO has been a leading manufacturer and provider of conveyor products and services since 1971, offering innovative solutions to these common and easily avoidable problems that many operations face.

Clean belts; fewer problems

Mining hard materials from the earth, such as coal, has intense challenges that must be overcome to run an efficient and safe operation. The nature of the material, along with the means in which it is moved, leads to unavoidable dust that requires containment and mitigation. ASGCO has developed its own unique technology to capture process gases and dust.
create the highest level of dust control and belt cleaning with its patented Wash Box™ system. This self-contained secondary belt cleaning system is positioned after the head pulley to loosen stubborn coal residue from the belt with powerful water jets. The material is then scraped from the belt with a series of tungsten Razor-Back® blades and then rinsed one more time with powerful water jets. Dust is released from the bulk material residue before it has a chance to leave the belt and become airborne or fall off the return side and contaminate other components.

Case study: Wash Box

ASGCO recently helped a coal-fired power plant to reduce its dust levels by 60%. The company implemented its ASGCO Wash Box secondary belt cleaning system on the plant’s tripper conveyor, which was feeding the coal bunkers, in order to reduce the airborne dust and carryback.

Challenge

Current guidelines for combustible dust control are critical to any safely operating coal-fired power plant, or any operation that is handling materials that can create combustible dust. The tripper floor at the coal-fired power plant had a large unhealthy volume of dust suspended in the air, which made it difficult to see from one end of the room to the other. Operators had to wear dust masks and respirators, and, at times, that was not enough.

Solution

The dust control team from the power plant worked with ASGCO to help with the installation and operating procedures of the Wash Box to help reduce the dust and carryback in the tripper room. They implemented and refined the system, and programmed the water source to turn on upon start-up of the conveyor and then shut the system off 5 min. after the conveyor shuts off.

Results

Air quality tests have proven that the airborne dust levels in this area of the plant showed a reduction of 60% or greater. Operators that were originally hesitant to use the Wash Box system, now insist that it runs every day. Dust levels without the Wash Box averaged 6 mg/m², while dust levels with the Wash Box averaged less than 2 mg/m².

Training to win

Repairs and downtime are two of the largest factors limiting productivity and output. One startling—and yet easily avoidable—problem is catastrophic belt damage due to poor tracking. When loads are properly distributed at the load zone, the most critical components to ensure proper belt tracking are the training idlers. While many common training idlers use belt edge guides to keep belts—especially roughing belts—centred, long-term edge contact can be extremely damaging to the belt itself.

Edge rollers are commonly fouled with carryback and fugitive material and become more problematic than helpful for proper belt tracking. Edge damage leads to many other tracking issues and premature belt failure, which is an expensive and lengthy repair. ASGCO’s patented Tru-Trainer® dual return idlers work to effortlessly track the belt without damaging edge contact. Sealed internal pivot mechanisms are also impervious to fouling by carryback, making them effective and worry-free.

Case study: Tru-Trainer

A mid-western US coal-fired power plant was having conveyor belt tracking issues and needed effective training idlers but had very limited installation space. ASGCO aimed to improve belt tracking, as well as eliminate belt edge damage and product spillage. The ASGCO low-profile dual return Tru-Trainer system was implemented to help eliminate the belt tracking issues.

WASH BOX™ Superior Belt Cleaning System

The ASGCO® Wash Box™ is installed as a secondary belt cleaner and is designed to work on the return side of the conveyor belt. Each steel enclosed box is equipped with a combination of pressure rollers, spray bars and Razor-Back® belt cleaners.

Eliminates Dust and Spillage!

- Complete belt cleaning system that incorporates a series of spray bars, belt cleaners and pressure/deflection roll to maximize the effectiveness and virtually eliminate all carry-back.
- Fully enclosed system that contains the wash waste fluid and carry-back.
- Two spray bars, nozzles and valves soften the carry-back and provide gentle cleaning.
- Large removable service doors allow the system to be easily inspected and serviced.

Need Solutions... to improve efficiency, safety and productivity? ask... ASGCO®

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Challenges
For many years, this conveyor had a hydraulic three return idler belt training system that would not properly keep the conveyor belt in line. The plant was constantly facing downtime to repair the hydraulic system. Even when operational, the belt would veer off-centre and come into contact with the structural supports, leading to critical damage to the belt and costly material spillage. The problem persisted upon installation of a new belt and, within 12 months, it needed to be completely replaced a second time.

To further complicate this application, the conveyor also has less than 13 in. of height to mount any type of return training roller. Options for eliminating the tracking problem were extremely limited by those space restrictions.

Solution
After ASGCO’s technicians performed a complete survey of the conveyor system, the problem issues were identified. It was recommended that an ASGCO Tru-Trainer dual return idler was to be installed on the return side of the conveyor, 30 ft before the tail pulley. This position would allow the belt to run straight around the tail pulley and also be controlled on the conveyor in the load point, reducing spillage and costly material loss. In addition, the rubber disk return idlers were replaced with Tru-Trainer flat return idlers, eliminating resistance to centring.

Results
After installing two low-profile dual return Tru-Trainers about 20 ft from each stationary pulley, the belt is maintaining centre alignment and the problem of belt damage and material spillage has been eliminated. The customer no longer has to shut down operations to repair the belt and the hydraulic system or to spend valuable hours cleaning up spill material. Performance has been greatly improved and productivity is at an all-time high. This particular customer is very satisfied with the performance of the Tru-Trainers and recently placed an order for two additional trainers for a different 60 in. stacker reclaimer conveyor.

Conclusion
Every coal-handling operation has extremely challenging conditions - either large or small, constant or intermittent, open or obscure - but one constant in the need to provide a safe working environment, which maximises output with minimal downtime. The multiple benefits of installing a proper dust mitigation and belt cleaning system, such as the ASGCO Wash Box, will provide immediate benefits to both the safety and productivity of any operation.

Along with a proper belt cleaning system, another critical component on the return side is an effective training idler, such as the patented Tru-Trainer dual return idler, which is specifically suited to the needs of the coal industry. Installation of these key components will ensure immediate improvement in the health, safety and morale of employees, as well as reducing expensive repairs, spillage and maintenance costs.

Getting coal from the ground to the power plants is a messy business, no matter what precautions are taken. The world’s energy needs are only growing each day and coal is integral to satisfying that hunger. In addition, coal producers and handlers are under more pressure than ever before to streamline operations to improve the bottom line. With a few essential precautions and important conveyor component upgrades, it is possible to both improve production and safety, while minimising expenses. ASGCO has been a committed partner to delivering these solutions for over four decades and will be for decades to come.