

MINER IN SAFETY

Focus area

Solutions in the field of underground mining operations and industrial safety

Objective

To develop a technology-based solution that improves the level of safety in mining operations, reduces the number of violations and incidents, and strengthens the culture of industrial safety among employees.

Company Background

SUEK is the largest coal company in Russia and one of the leading coal-energy companies in the world, ranking among the top five suppliers on the global coal market.

In 2021, SUEK was included in *Forbes* magazine's ranking of the "200 Largest Private Companies in Russia", taking 17th place with a revenue of RUB 483.3 billion. The company was founded in 2001 with the idea of consolidating fragmented coal enterprises across Russia and creating a major industry holding.

In 2006, SUEK became the largest coal exporter in Russia. The company produces 110 million tonnes of coal per year, and its proven coal reserves amount to 7.5 billion tonnes (No. 5 globally).

SUEK employs 70,000 people across its coal, energy, and transportation enterprises in 12 Russian regions. The company incorporates 8 mines and 19 open-pit operations in Siberia and the Far East, producing around 24% of Russia's coal (as of 2019). SUEK produces high-calorific coal with low sulphur and nitrogen content, complying with international environmental and industrial safety standards.

Context and Relevance

Safety in underground mines remains one of the key challenges in the mining industry. Violations of industrial safety requirements often occur due to human factors - lack of knowledge, fatigue, insufficient training, or inattention. Each violation can lead to operational downtime, injuries, and significant financial losses for the enterprise.

Modern technologies open up new opportunities for improving safety culture through enhanced training and better compliance monitoring. Artificial intelligence, virtual and augmented reality, machine learning, and computer vision systems enable fundamentally new approaches to risk management and safety training.

Problem Statement

In 2024, one of SUEK's mines recorded 28 downtime days caused by safety violations. Each downtime day costs the enterprise RUB 5 000 000.

Most incidents are related to human factors - failure to follow safety rules, incorrect actions when working with equipment, or worker fatigue.

Challenge for Participants

To develop a set of digital solutions and measures aimed at improving workers' knowledge and motivation in the field of industrial safety.

The project must include:

- modern approaches to training (VR/AR simulators, training simulators, online platforms);
- digital tools to monitor compliance with safety rules (sensors, recognition systems, checklists, mobile applications);
- motivational mechanisms (ratings, internal currency, mentoring);
- an analytics system to forecast violation risks and plan preventive measures.

Goal: reduce enterprise downtime caused by safety violations by half.

Input Data

- Total downtime in 2024: 28 days
- Cost of 1 downtime day: RUB 5 000 000
- Facility type: underground coal mine
- Operations may be suspended by court decision in case of severe safety violations
- Enterprise life-support costs continue during downtime

Constraints

- Project budget: up to RUB 5 million
- The solution must be feasible without complete shutdown of mining operations
- All technologies must comply with industrial safety regulations
- Must take into account staff shortages and the need to train personnel without interrupting production

Expected Deliverables

1. Concept of a digital solution or training programme
2. Sample visual prototype (interface, simulator layout, motivation model)
3. Economic justification and effectiveness calculation (downtime reduction, loss mitigation)
4. Implementation plan and project roadmap

Additional Materials

Appendix 1. Information about SUEK

Information About SUEK

1. Name

Siberian Coal Energy Company (SUEK)

2. Industry

Mining industry, energy, and logistics

3. Mission and Key Values

SUEK's mission is to improve people's quality of life by ensuring safe and sustainable energy supply.

The company adheres to the following values:

- occupational safety and responsibility for human life;
- integrity and professionalism;
- efficiency and technological advancement;
- sustainable development and environmental stewardship.

4. Number of Employees

More than 70,000 employees across Russia.

5. Brief Description of Operations

SUEK is the largest coal company in Russia and one of the leading coal producers globally. Its core activities include:

- open-pit and underground coal mining and processing;
- generation and supply of electricity and heat;
- transportation and export of coal through its own logistics infrastructure.

SUEK's facilities are located in Siberia, the Russian Far East, Kuzbass, and other regions of Russia.

The company actively implements innovations, digital technologies, and solutions in engineering, sustainable development, and environmental management.