Autonomous inspections in mining

Top 10 use cases on driving productivity and increasing safety

Contents

Challenges inspecting mines

Safety

A mining facility is one of the most dangerous facilities, with the International Council on Mining and Metals (ICMM) reporting ~7,000 injuries in 2020 alone. For most managers, sending an employee out to monitor or inspect a facility requires special permits, and even so is undesirable.

Productivity

When mining assets aren't inspected frequently, it often results in failures and unplanned shutdowns. Furthermore, sending an employee out in the field for inspections requires them to abandon their main jobs, reducing employee productivity.

Availability

Typically, mines are located in challenging environments, with extreme temperatures and weather conditions. Getting someone out in the field can be quite difficult especially because mines are often in remote locations.

The result is - inspections at mines are often done when necessary, and very rarely on a scheduled, preemptive basis. So facilities are responding to failures, and the desire to inspect facilities regularly holds the promise of preventing failures and therefore downtime.

Autonomous mine inspections

One of the biggest advantages of autonomous mine inspections is that employees aren't required to be on site to inspect and monitor the mine. That means first and foremost that employees can perform their jobs safer and more efficiently.

It also means that site managers can monitor any of their facilities from one remote operations center. So, what does an autonomous inspection look like at a mine? An employee, say an environmental compliance coordinator, wants to closely monitor the tailings dams at the mine. They would select specific tailings dams they want to monitor, set an inspection schedule, parameters they want to monitor and that's it. They would then receive weekly or even daily reports detailing tailings dams volumes, dam height and more.

That means:

- **Minimized risk**

  Employees don't have to go out to perform risky inspections

- **Increased inspection frequency**

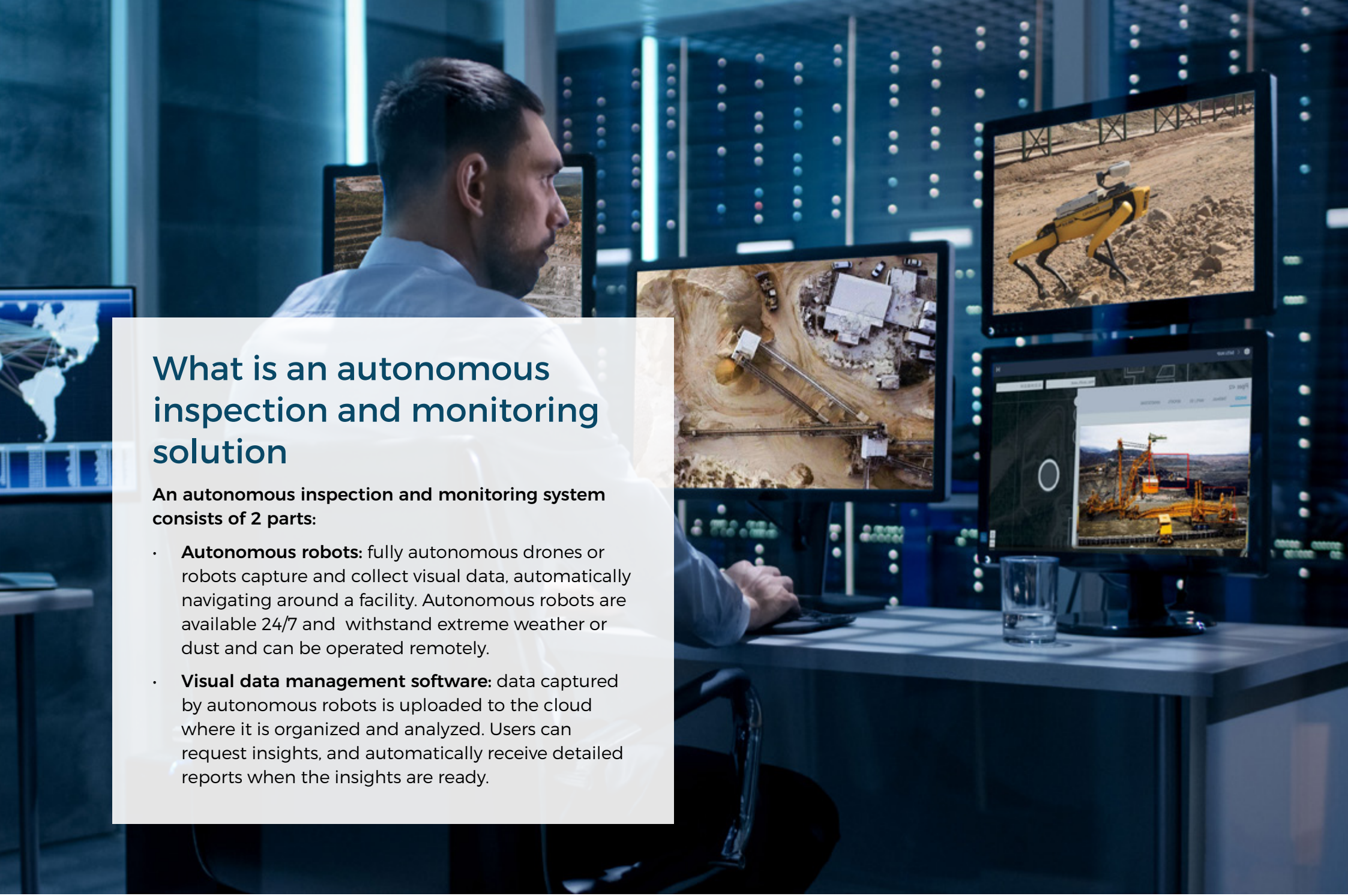
  Inspections are performed more frequently, reducing the risk of failures going unnoticed

- **High quality inspections**

  AI powered inspections significantly enhance the quality of inspections, detecting the slightest faults and failures

- **Data democratization**

  Employees across the company can request data and review the insights gathered from anywhere in the world



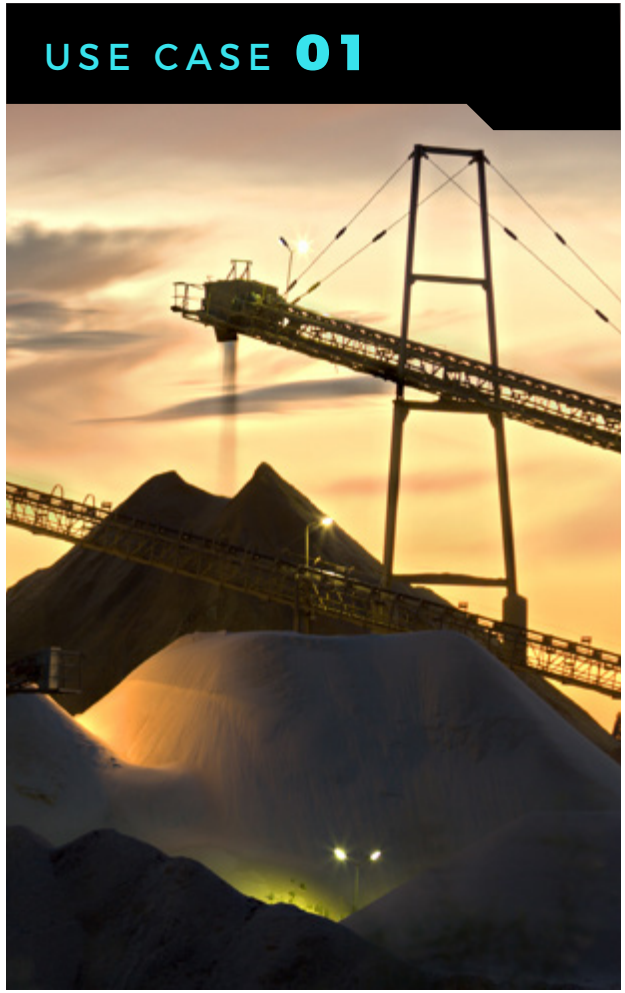
What is an autonomous inspection and monitoring solution

An autonomous inspection and monitoring system consists of 2 parts:

- **Autonomous robots:** fully autonomous drones or robots capture and collect visual data, automatically navigating around a facility. Autonomous robots are available 24/7 and withstand extreme weather or dust and can be operated remotely.
- **Visual data management software:** data captured by autonomous robots is uploaded to the cloud where it is organized and analyzed. Users can request insights, and automatically receive detailed reports when the insights are ready.

TOP 10 USE CASES

Autonomous inspections at a typical mine



Stockpile measurements

Autonomous drones can scan stockpiles on a weekly or evenly daily basis.

When you need to monitor materials for transport, planning or productivity - having frequent, accurate volumetric measurements is invaluable. Whether you're mining for iron ore or precious metals, drones can be dispatched to scan piles of dirt or other materials to ensure the heights, slopes and clearances are up to regulatory standards.

Autonomous stockpile measurements enable:

- Optimized financial planning and reporting
- Enhanced productivity and up-to-date productivity benchmarks
- Accurate materials transport
- Streamlined regulatory compliance

USE CASE **02**

Tailings dam inspection

Monitoring tailings dams is extremely important, yet also really risky for employees.

Autonomous robots can perform those inspections more frequently, efficiently and also much safer. Robots can report on tailings dam wall integrity, amount of solids in the dam, water levels in regards to the dam, deposition patterns and more - ensuring you know exactly what's going on and can prevent serious failures.

USE CASE **03**

Shutdowns and project management

An autonomous inspection and monitoring solution provides 24/7 situational awareness and significantly slims down project timelines.

With autonomous inspections, you cut out the majority of manual project planning - as drones and robots identify assets needing maintenance. During projects, an autonomous monitoring solution provides frequent daily productivity reports, ensuring you stay on top of your teams and projects.

USE CASE **04**

Environmental monitoring

Environmental hazards arise at almost every stage of the open-pit mining process.

That's why it's so critical to have an autonomous robot perform inspections. Not only can they monitor tailings dams, leaks and wastewater, but they also allow site employees to safely perform site inspections, without being exposed to radioactive or toxic elements.

USE CASE **05**

Coal temperature monitoring

Autonomous drones and robots equipped with thermal cameras safely monitor coal temperatures

And they're the available 24/7 to safely inspect and report back to employees. Autonomous coal temperature monitoring prevents explosions and ensures employee safety, by monitoring heat and alerting employees in the event of a hazard.

USE CASE **06**

Emergency response and security

Autonomous robots count people during evacuations, ensure areas are clear of personnel during emergencies.

They also constantly check for hazards such as rock slides - making them your team's newest first responder. Those same robots perform automated security patrols - boosting deterrence and allowing security personnel to remain safely indoors while the drone scans for intruders.

USE CASE **07**

Haul road inspection

Autonomous inspections detect displacements that can lead to haul road structure collapse.

Autonomous drones and robots ensure roads are free from debris, rocks, spillage, puddles and potholes. They also aid in haul road planning, construction and improvement. That includes slope monitoring, critical to ensure compliance and minimize risk.

USE CASE **08**

Pre and post blast analysis

Accurately analyzing and improving the blast process is critical to improve productivity at open-pit mines.

Drones provide a unique, safe method to monitor and analyze blasts, providing elevation models pre and post blast and particle size measurements - empowering teams to improve drilling and blasting.

USE CASE **09**

Stock yard and port monitoring

Autonomous inspection and monitoring solutions fully monitor stackers, stockpiles, reclaimers, and conveyor belts.

Robots and drones provide complete monitoring of material stacking and transporting. Ensuring all materials are accounted for, autonomous drones capture aerial imagery of all port operations, and deliver reports with volumetric measurements to relevant stakeholders.

USE CASE **10**

Fixed and mobile plant inspection & monitoring

Autonomous inspections detect changes and slight faults for all plant assets and equipment.

Drones and robots can be dispatched to monitor conveyor belts, detect corrosion, identify overheating, assess pipelines and monitor autonomous truck fleets. When inspected on a daily basis with AI-powered change detection, plants can be properly maintained, preventing costly downtime.

Benefits of autonomous mining inspections

The benefits of automating inspections and monitoring with autonomous robots are far and wide. Companies benefit from the automation of a large variety of tasks across the site lifecycle.

We've put together the top 8 benefits of automating site inspection and monitoring at mining facilities.

01 Increase safety

Autonomous robots perform risky inspections and detect failures early on, preventing potential accidents.

02 Boost productivity

By automating inspections, employees boost productivity and streamline operations and maintenance workflows.

03 Maximize efficiency

Ensure efficiency across mining operations - from better blast planning to efficient materials transport.

04 Minimize downtime

With high frequency and high quality inspections, failures are detected early on, preventing downtime.

05

Reduce environmental footprint

With high frequency inspections, no environmental breach goes unnoticed.

06

Enhance emergency response

Provide your teams with the intel they need to respond safely to hazards and security breaches.

07

Ensure business continuity

Maintaining assets with regular inspections and maintenance during disasters enables your facility to stay up and running in top shape.

08

Bolster security

Automated security patrols not only boost deterrence, but also allow for security personnel to remain safely indoors while the drone scans for intruders.

About Percepto

Percepto is at the forefront of redefining how industrial sites are inspected and monitored. We do this by harnessing remote robotics to autonomously collect, aggregate, and analyze visual data. Our flagship robot, the Sparrow, is the most deployed drone-in-a-box on the market.

- **Founded in 2014**
- **Offices in Israel, US, Australia**
- **Operating in 6 continents**
- **Deployed in multiple Fortune 500 organizations**

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