ROYAL Eijkelkamp

Meet the difference

Mining Solutions



Meet the difference

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Royal Eijkelkamp Mining Solutions

For more than 115 years, Royal Eijkelkamp has been developing, producing and delivering solutions for soil- and water-related projects. We are constantly launching technologies for various industries, including mining.

Royal Eijkelkamp delivers holistic solutions within all phases of the mining value chain, for operators and contractors.

- ✓ **Sonic Drilling Rigs with MWD capabilities:** perform drilling operations in an efficient and sustainable manner making full use of the data obtained during drilling to achieve further improvements.
- ✓ **Cone Penetration Testing Rigs:** obtain subsurface profiles (including of Tailings Storage Facilities) in an efficient manner, using the test data to characterize the properties as a function of depth.
- ✓ **Geotechnical Instrumentation:** monitor ground parameters at your mine in real time through a wide range of networked geotechnical instruments.
- ✓ **Water monitoring:** characterise and monitor the (ground)water at your mine to have a comprehensive overview of the hydraulic indicators at your site.
- ✓ **ROAK data platform:** access insightful, reliable and tailored data in real time through our data platform.

Turnkey Solutions for the Mining Industry

Our company Royal Eijkelkamp has been active for over 115 years, creating solutions that make a real difference in managing soil and water projects, especially in mining.

For example, our Sonic Drilling Rigs can be equipped with Monitoring While Drilling (MWD) capabilities that not only enhance the efficiency of drilling operations, but also allow us to make real-time improvements based on the data we collect. It's about drilling smarter, not harder.

Then there are our Cone Penetration Testing Rigs. These are crucial for quickly getting accurate subsurface profiles, including for Tailings Storage Facilities, which helps in better planning and safety assessments.

We also offer advanced geotechnical instrumentation to monitor ground conditions continuously, which is vital for operational safety and efficiency. And with our water monitoring technology, mining operators can keep a close eye on water quality and levels, which is key for environmental compliance.

Plus, all this data comes together on our real-time platform, giving operators the insights they need when they need them. It's about integrating technology to empower quicker, more informed decisions in mining.



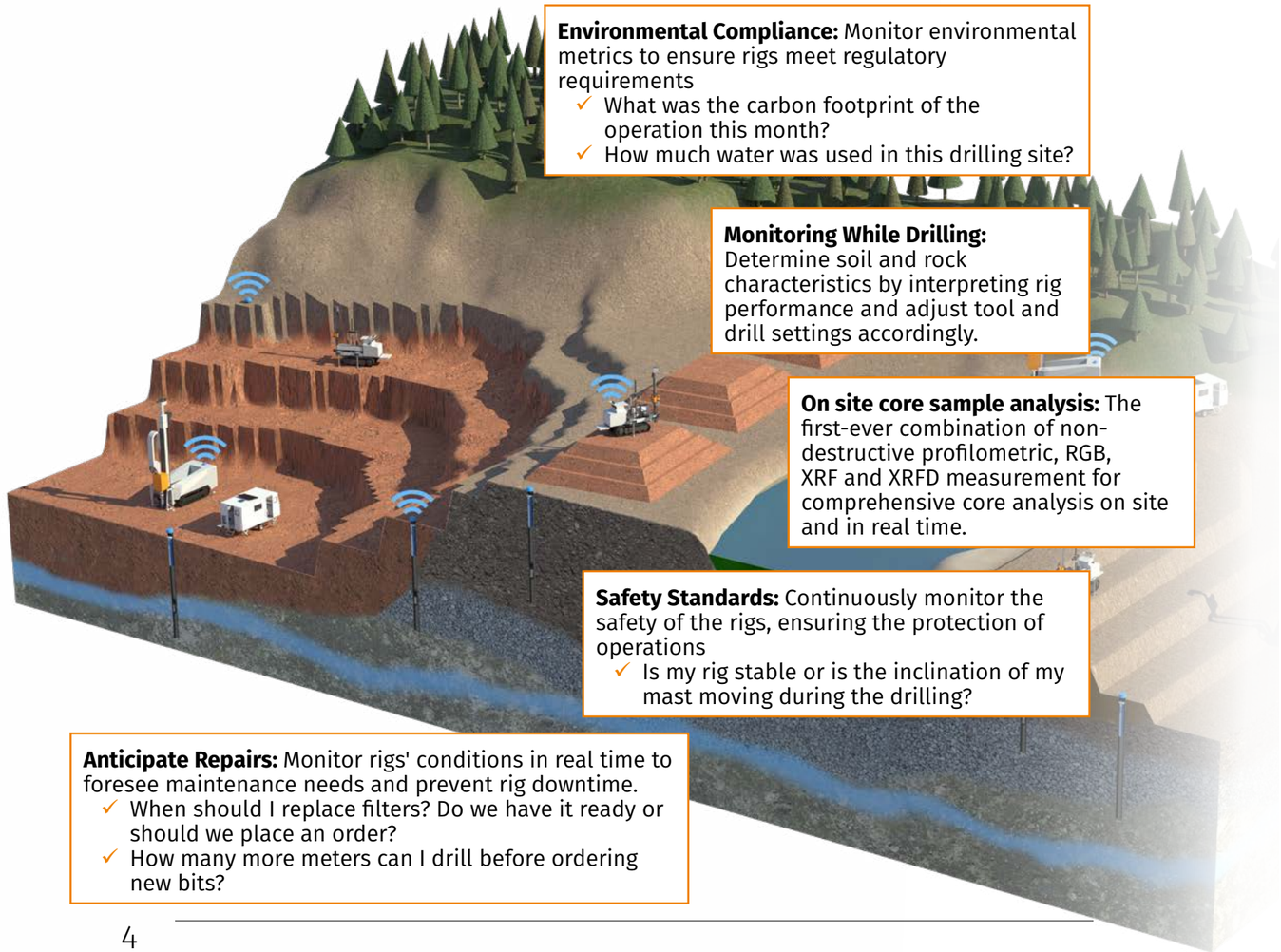


Smart Drilling

Simplified Success Measurement: Easily track and compare the productivity of drill rigs and drilling teams, identifying areas for improvement.
- ✓ How many planned boreholes are still to be drilled in the coming week?

Data Archiving: Ensure operational data is securely stored for historical analysis and future strategy planning.
- ✓ What was the best rig setting and configuration for that specific geology?
- ✓ How many meters did we drill with this machine in the last two years of project?

Obtain Detailed Insights: View extensive operational data from each rig, increasing control over drilling activities.
- ✓ Which rigs are running and operating? Which rigs are idle? Why?
- ✓ How much fuel is being used in my drilling campaign this month?



Environmental Compliance: Monitor environmental metrics to ensure rigs meet regulatory requirements
- ✓ What was the carbon footprint of the operation this month?
- ✓ How much water was used in this drilling site?

Monitoring While Drilling: Determine soil and rock characteristics by interpreting rig performance and adjust tool and drill settings accordingly.

On site core sample analysis: The first-ever combination of non-destructive profilometric, RGB, XRF and XRFD measurement for comprehensive core analysis on site and in real time.

Safety Standards: Continuously monitor the safety of the rigs, ensuring the protection of operations
- ✓ Is my rig stable or is the inclination of my mast moving during the drilling?

Anticipate Repairs: Monitor rigs' conditions in real time to foresee maintenance needs and prevent rig downtime.
- ✓ When should I replace filters? Do we have it ready or should we place an order?
- ✓ How many more meters can I drill before ordering new bits?

Drilling Solutions For High Productivity And Limited Environmental Impact

Compared to traditional drill rigs, sonic drill rigs perform in a more efficient and sustainable manner and provide relatively high-quality samples. With sonic drill rigs, Royal Eijkelkamp can improve your drilling campaign productivity significantly, while reducing the environmental impact.

The stunning drilling speed, low sound level and ergonomically balanced operation of sonic drilling creates an easy working environment for your crew. We design our sonic rigs and tooling in accordance with detailed and demanding international standards. Our engine efficiency and smart sampling tools are the drivers for cost-effective and reliable operations with a small environmental footprint.

Widely applicable

Royal Eijkelkamp developed the state-of-the-art multi-purpose drill rigs for different applications throughout the mining life-cycle: from drilling campaigns (exploration, infill and mine front) and environmental research to geotechnical monitoring of tailings dams and mine sites.

Quick and efficient

The sonic method of fast drilling creates an extremely straight borehole. This makes it an optimal technology for installing instrumentation and monitoring equipment in a quick and efficient manner.



Perfect in combination with Cone Penetration Testing

Royal Eijkelkamp Sonic Drill rigs can also be equipped with Cone Penetration Testing (CPT) units.

This offers a single rig the unique combination of two soil investigation techniques, creating the ultimate geotechnical testing rig for overburden formations and Tailings Storage Facilities' investigations.

Apart from the traditional CPT, the rig can also be used to perform Sonic CPT, which will provide a vibratory movement in addition to the standard downward movement of the cone. This may allow for CPT to greater depths than with standard CPT equipment.

Produce accurate data

Our Sonic drill rigs, together with our special soil samplers and rock coring tools, have proven to produce the correct data in a short amount of time. Samples are long, undisturbed, and show accurate depth information.



Discover Our Drilling Technologies

Below, you can find a selection of our Sonic rigs and tooling.

CRS 170 DUO

The CompactRotoSonic 170 DUO is a compact and powerful drilling rig, designed for heavy-duty drilling. This sonic rig model is equipped with a CompactRotoSonic 34K drill head as well as a four speed rotation head. It is easy to switch from the Sonic drill head to rotary head by means of the trolleyboard. Thanks to the different drill heads, the machine can easily work under different conditions. This machine delivers an extremely powerful True 150 Hz frequency.



ManipAll rod & casing handler

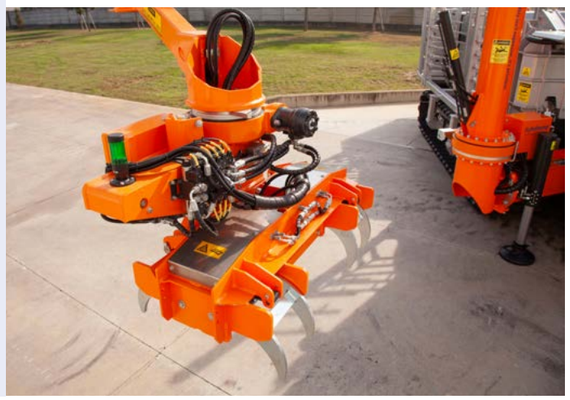
Typically operated by a single assistant, the ManipAll arm lifts and picks up rods or casings. Depending on the size, the ManipAll grabs tooling using clamps or industrial magnets, and it can be safely operated by hand or by remote control. The ManipAll quickly and easily lifts tooling to a vertical position and swings it into place under the drill head. This arm adds significant efficiencies as well as safety. For example, while the driller is busy drilling with the current tooling, the assistant can get the next piece into position.



SonicWireLine

SonicWireLine allows you to take core samples in liners without the use of drill rods. Due to this revolutionary development, sampling production is two to three times faster and has a high core recovery percentage.

The SonicWireLine and core barrel are pumped to the target depth where it locks in place with water pressure. Locking into place is secured and monitored by the water pressure gauge. A conventional overshot is used to unlock the SonicWireLine and core barrel, and retrieve them to the surface.



Monitor Your Drilling Campaign

Boost efficiency and make drilling campaigns more productive thanks to detailed insights on drilling operations. With a fully digital system that tracks your drilling operations in real time and provides data on current and historic drillings, you can build a database of insights. The overview of your (sonic) drilling history provides valuable input and guidelines for future drills.

Monitoring While Drilling (MWD) is not a new technique. But ours is different: the Royal Eijkelkamp MWD system is specially made for sonic drilling. It's also designed to work seamlessly with our ROAK data platform. The data is generated by physical sensors on the rig and collected together with the engine data to deliver real-time insights on every aspect of the rig performance.

Features that make the difference

ROAK
HOME FOR DATA

- Overlay Geo-data on your rig performance data
- Rig details & service dashboard
- Two-way communication wherever internet coverage is available
- Data analysis and predictive power, brought to each individual rig
- A sophisticated data platform for every stakeholder



Benefits of our Monitoring While Drilling system

The data collected with the Monitoring While Drilling system lets you manage your assets more efficiently. The system monitors various aspects of both the drilling process and the machine, offering the following benefits:

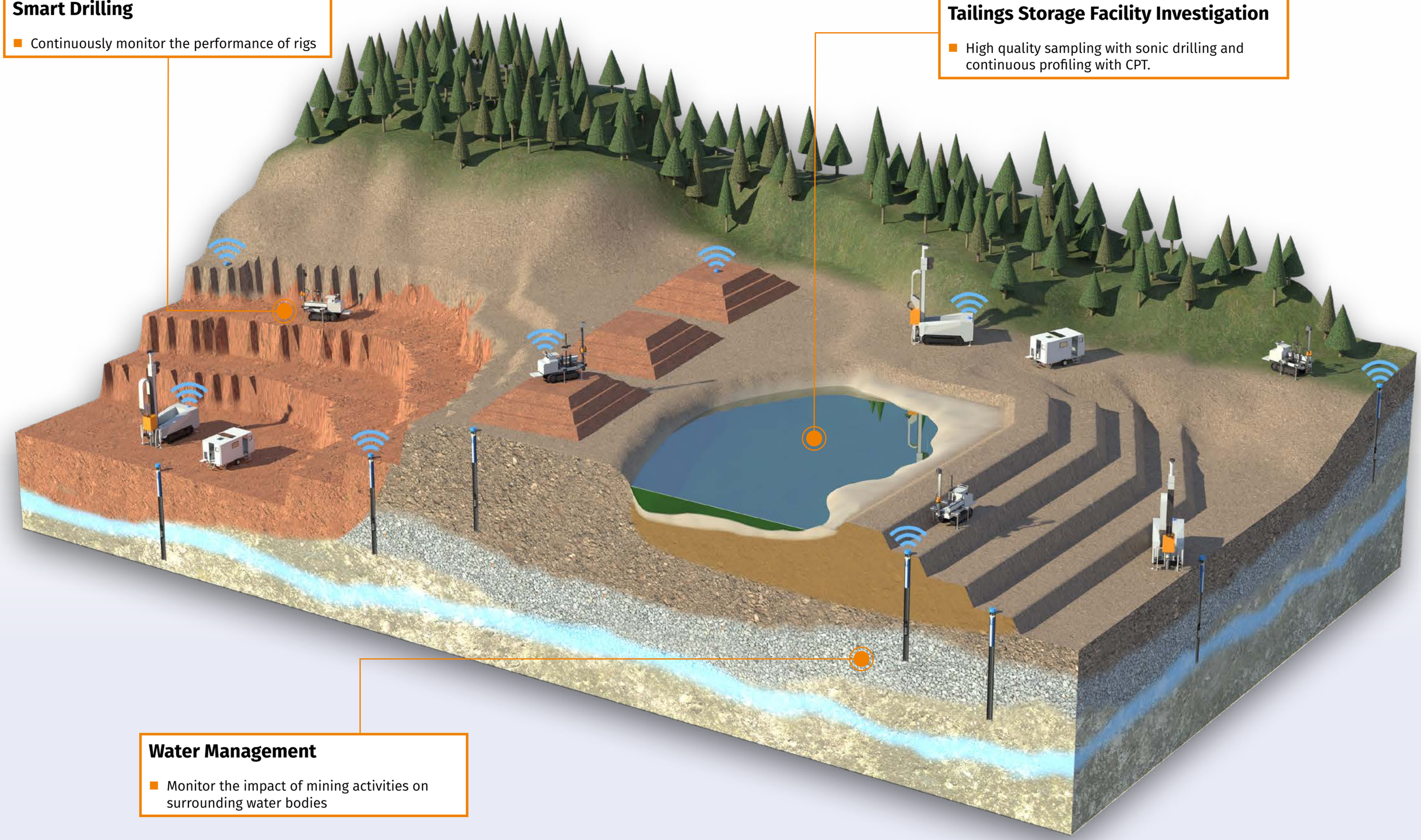
- You learn how your machine performs in different geological contexts
- It's possible to monitor the drilling operations from a distance and thus manage a fleet of rigs more appropriately
- Every drilling project feeds a database with historical drilling data, as well as drill settings for specific geological contexts, drilling equipment and circumstances
- The system predicts when your rig is likely to require maintenance, after a certain amount of operating hours. This predictive maintenance prevents downtime, which is key in projects with a tight deadline or in remote areas with no easy access to spare parts
- Data can be transferred via a generic industrial modem with 4G sim card

Smart Drilling

- Continuously monitor the performance of rigs

Tailings Storage Facility Investigation

- High quality sampling with sonic drilling and continuous profiling with CPT.



Water Management

- Monitor the impact of mining activities on surrounding water bodies

Tailings Storage Facility Investigation

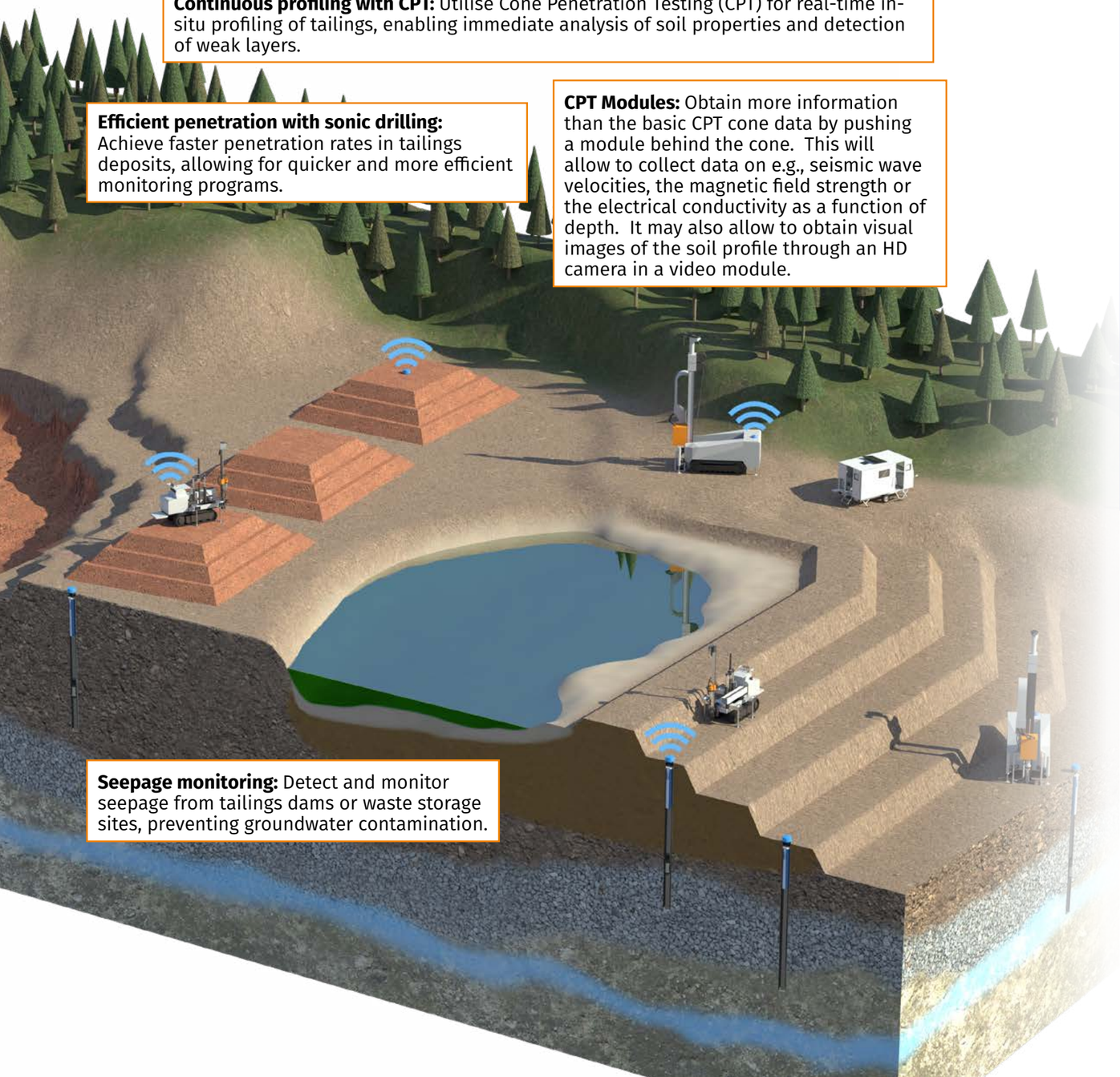
Data integration for predictive analysis: Integrate data from sonic drilling, CPT, and other geotechnical instrumentation for comprehensive analysis and predictive modeling of tailings behavior.

Enhanced sampling with sonic drilling: Without water (or minimum usage of fluids), obtain high-quality, undisturbed samples from tailings for accurate characterisation of materials and assessment of stability.

Continuous profiling with CPT: Utilise Cone Penetration Testing (CPT) for real-time in-situ profiling of tailings, enabling immediate analysis of soil properties and detection of weak layers.

Efficient penetration with sonic drilling: Achieve faster penetration rates in tailings deposits, allowing for quicker and more efficient monitoring programs.

CPT Modules: Obtain more information than the basic CPT cone data by pushing a module behind the cone. This will allow to collect data on e.g., seismic wave velocities, the magnetic field strength or the electrical conductivity as a function of depth. It may also allow to obtain visual images of the soil profile through an HD camera in a video module.



Seepage monitoring: Detect and monitor seepage from tailings dams or waste storage sites, preventing groundwater contamination.

Geotechnical Component of the Mine Site Monitoring Plan

Geotechnical parameters are essential for the monitoring plan of your mine site. The monitoring of geotechnical aspects such as soil stability, ground movement, and pore water pressure helps to ensure safety both on site and in the surrounding area.

Royal Eijkelkamp has a comprehensive portfolio of geotechnical instrumentation.
With our combination of leading soil and water monitoring systems, pioneering sonic drilling technology, and geotechnical solutions we're a one-stop-shop, offering holistic solutions for your mining challenges.

Geotechnical Monitoring

Our product range offers geotechnical instrumentation to monitor tunnels, deep excavations, foundations and tailings dams. These are reliable, robust and highly accurate products, fit for work in extreme conditions for long periods without maintenance.

Our digital and analog sensors allow you to monitor various parameters such as settlement of soil and rock layers, risks of landslides, seepage, pore water pressure and structure stability.Furthermore, our dataloggers are designed to collect, monitor and transmit data in a power efficient manner in a wide range of temperatures and operating conditions.

Cone Penetration Test (CPT)

We manufacture the widest range of high quality CPT cones in the industry. Moreover, we provide specialised CPT software and carry a large stock of spare parts, so we can respond immediately to your requests. Apart from the cones, we also provide a wide range of equipment to push the cone, as well as modules to obtain additional information. In short, we are proud to have a solution for every CPT challenge, regardless of its complexity.

All Royal Eijkelkamp CPT products are designed and manufactured according to the highest standards. Our CPT cones meet all the international standards, including ISO 22476-1 and ASTM D5778.



Visit www.royaleijkelkamp.com for a complete overview of our Geotechnical Monitoring products, CPT rigs and cone modules.

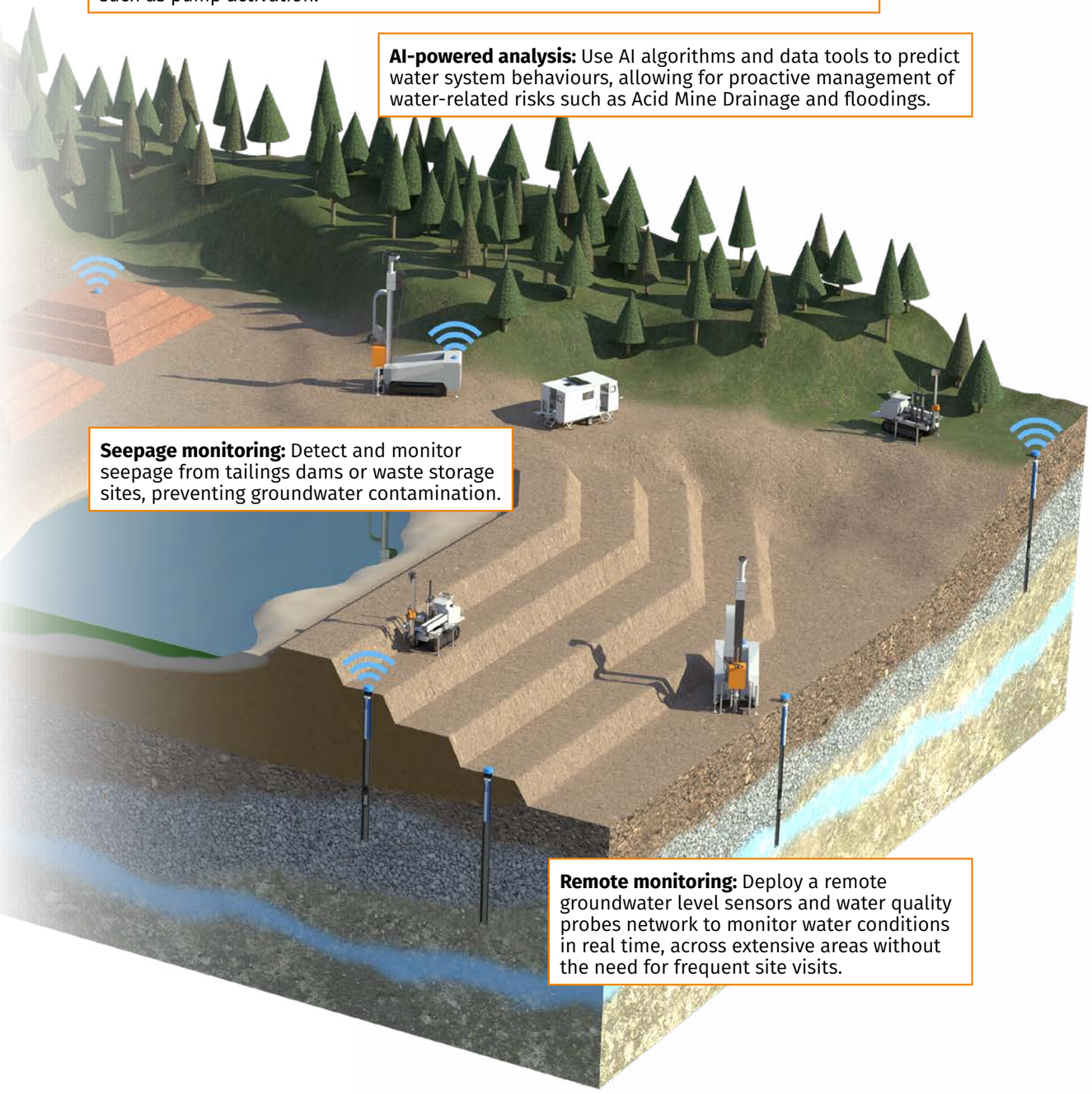
Hydro-environmental Component of the Mine Site Monitoring Plan

Ecosystem protection: Monitor the impact of mining activities on surrounding water bodies to protect local ecosystems and comply with environmental protection policies.

Regulatory compliance: Ensure compliance with local, national and international water management regulations through precise and reliable monitoring equipment.

Customisable alerts and reports: Set thresholds for water levels and quality to receive automatic alerts, enabling swift response to potential issues and triggering actions such as pump activation.

AI-powered analysis: Use AI algorithms and data tools to predict water system behaviours, allowing for proactive management of water-related risks such as Acid Mine Drainage and floodings.



Seepage monitoring: Detect and monitor seepage from tailings dams or waste storage sites, preventing groundwater contamination.

Remote monitoring: Deploy a remote groundwater level sensors and water quality probes network to monitor water conditions in real time, across extensive areas without the need for frequent site visits.

Water Management Solutions for Sustainable Operations

A water management plan is key in mining operations. Compliance with governmental regulations, risks mitigation of water contamination, and wastage prevention are important to ensure production efficiency and long-term cost reduction. Royal Eijkelkamp helps you to obtain and maintain your License to Operate through smart solutions.

Aquifer characterisation and groundwater monitoring

Characterisation of an aquifer, such as its depth and capacity, are crucial for planning and developing a mine site. Moreover, mining activities may compromise the groundwater quality on site and water pollution can be a real ‘showstopper’ for the project. Royal Eijkelkamp helps you characterise aquifers by designing monitoring networks, installing inspection wells, collecting samples and analysing water parameters in situ in real-time.

Around tailings storage facilities

Tailings ponds contain ‘unwanted’ substances which should not come into contact with aquifers. It is important therefore to continuously monitor groundwater hydrochemical values around such dams. Royal Eijkelkamp can provide you with the expertise, products and services you need to measure groundwater quality near tailings facility structures. Our services include delivery, installation, calibration and maintenance of sensors and field measurement equipment.



Royal Eijkelkamp water management solutions allow you to monitor water level and quality. These research activities typically include the following actions:

- ✓ Establishment of the baseline hydrogeological conditions and trends in the groundwater levels;
- ✓ Comparison of the monitoring results with the predicted groundwater depressurisation and associated groundwater inflows;
- ✓ Assessment and quantification of the potential impact of mining activities on private bores around the mine site;
- ✓ Remediation actions, if deemed necessary based on analyses from the monitoring network.

Discover Our Water Management Technologies

Below, you can find a selection of our products that can be used to overcome water management challenges in the mining industry.

Diver water level loggers

The Diver water level logger range provides a robust line of dataloggers for groundwater and environmental professionals. It accurately measures and records water fluctuations in surface and underground, temperature and conductivity.



Smart piezometers

The smart piezometers are used to monitor pore-water pressure and can also be used to monitor water levels. The internal data logger (available in various measuring ranges) stores both pressure and temperature readings.

It operates equally well in both fully-grouted boreholes as filtergravel zones. It has a strong, stainless steel housing and can be installed using a direct push method, but also in a pre-drilled well using the smart piezometer well materials for secure installation.



Scuba water quality probes

Our Royal Eijkekamp water quality range contains an excellent selection of Scuba water quality probes suitable for various applications. All Scuba probes can be used for discrete sampling, profiling, as self-powered loggers, or connected to telemetry stations for continuous real-time monitoring, with water quality data accessible via cloud-based software. In addition to standard configurations, each Scuba probe can be customised for your specific application.



Modems

Connect your sensors, such as Divers, piezometers or Scuba probes, to our Global Data Transmitter (GDT) or Prime PRO modems.

Our modems are designed for extended use in the field and capable of transmitting data on water level, temperature, conductivity, rainfall, soil moisture and various water quality parameters in a secure way.





MP 1 submersible pump

The MP 1 submersible pump is specially designed for quick purging and sampling of monitoring wells with a diameter of at least 50 millimetres or bigger.









Visit www.royaleijkelkamp.com for a complete overview of our products focused on water management.

ROYAL Eijkelkamp

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