GEOTECHNICAL APPLICATIONS

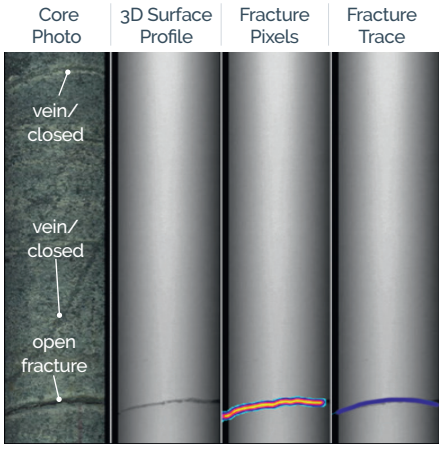
Advanced 3D Surface Profiling System

Core Morphology

Corescan's Hyperspectral Core Imager (HCI) integrates high resolution reflectance spectroscopy, core photography and 3D surface profiling to map mineralogical assemblages and geotechnical parameters, delivering advanced geotechnical and structural datasets that can be used at all stages of a project from greenfields exploration to ore processing/mine optimization to closure and reclamation.

HCI-4 measures high density surface profiles at 50µm spatial resolution (15µm height resolution) acquiring detailed morphological information for geotechnical assessment. This surface profile used in conjunction with Corescan's high resolution photography (25µm) and hyperspectral mineralogy (250µm/500µm) provides significant advantages over geotechnical parameters derived using core photos alone:

- core photos (colour) may not differentiate veins or closed fractures from open fractures
- hyperspectral data provides mineralogy for each fracture and proximal wall rock
- fracture orientations can be plotted with mineral assemblages to assess trends and, using statistical techniques, determine fracture sets.



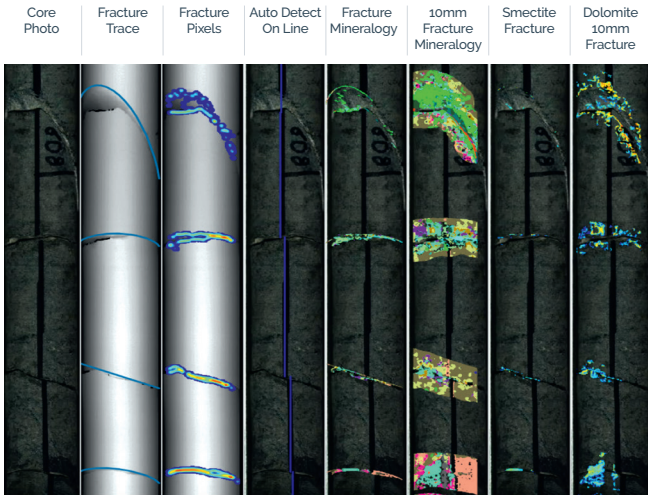
LEFT: The surface profiling system measures the physical surface of the core allowing open fractures to be reliably identified and measured, and positively distinguished from closed fractures and veins seen in the core photo.

CORESHED®

Advanced Geotechnical (HCI-4)

HCI-4's advanced sensors and data processing solution significantly enhances the collection and modelling of deposit-scale rock characteristics and offers:

- fracture identification and calculation of fracture characteristics such as orientation and roughness
- mechanical break detection and fracture classification read directly from core mark-ups
- RQD calculations incorporating marked mechanical breaks
- core segment measurements
- proximal wall rock and fracture mineralogy
- 3D core visualisation with interactive geotechnical assessments (Coreshed)
- numerical drill hole logs (CSV format) for easy integration with third party software.



ABOVE: Automatically detected and measured fractures using 3D surface profiler data integrated with RGB images and hyperspectral mineralogy.

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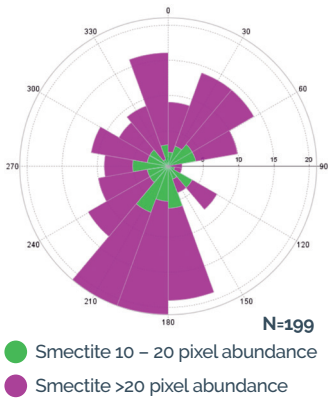
Geotechnical Applications

The accurate characterization of a rock mass is key to predicting the geotechnical behavior of an ore body, is fundamental for mine planning decisions and impacts the economics of ore recovery. Mining projects rely on geotechnical data for:

- developing rock behaviour models
- ground support design
- rock monitoring
- blast and fragmentation analysis.

Geotechnical data are also used by exploration teams to understand:

- vein distribution and density
- fluid pathways
- controls on mineralization
- deposit geometry.



LEFT: Example of a rose diagram with fracture orientations coloured by smectite (a soft, potentially swelling phyllosilicate mineral) abundance within the fracture. Green indicates 10–20-pixel abundance, pink indicates >20 pixel abundance smectite within the fracture. Combining orientation and mineralogy can be used to determine the number of fracture sets present as well as primary fluid pathways.

Automated Geotechnical Data Collection

Geotechnical measurements have traditionally been collected manually from drill core, which is time-consuming and often subjective. Inconsistencies in collection means that not all data meet quality control standards and logistical challenges can prevent all core intervals from being logged.

Corescan's HCI-4 rapidly acquires high volumes of consistent drill core information and is capable of scanning hundreds of metres of core per day, providing:

- rapid, continuous, down-hole geotechnical data, even in areas of poor rock quality
- consistent and objective geotechnical measurements
- the ability to collect a much higher density of data compared to manual methods
- more rigorous quality control as digital datasets can be easily adapted to changes in downhole surveys and orientation line positions etc.

By automating geotechnical data collection, technical teams can be more effectively utilized, focusing on quality control, interpretation and modelling tasks, rather than manual data collection. HCI-4 delivers high volume, consistent data to geotechnical programs, increasing the underlying statistical support for rock mass characterisation.

Contact Us

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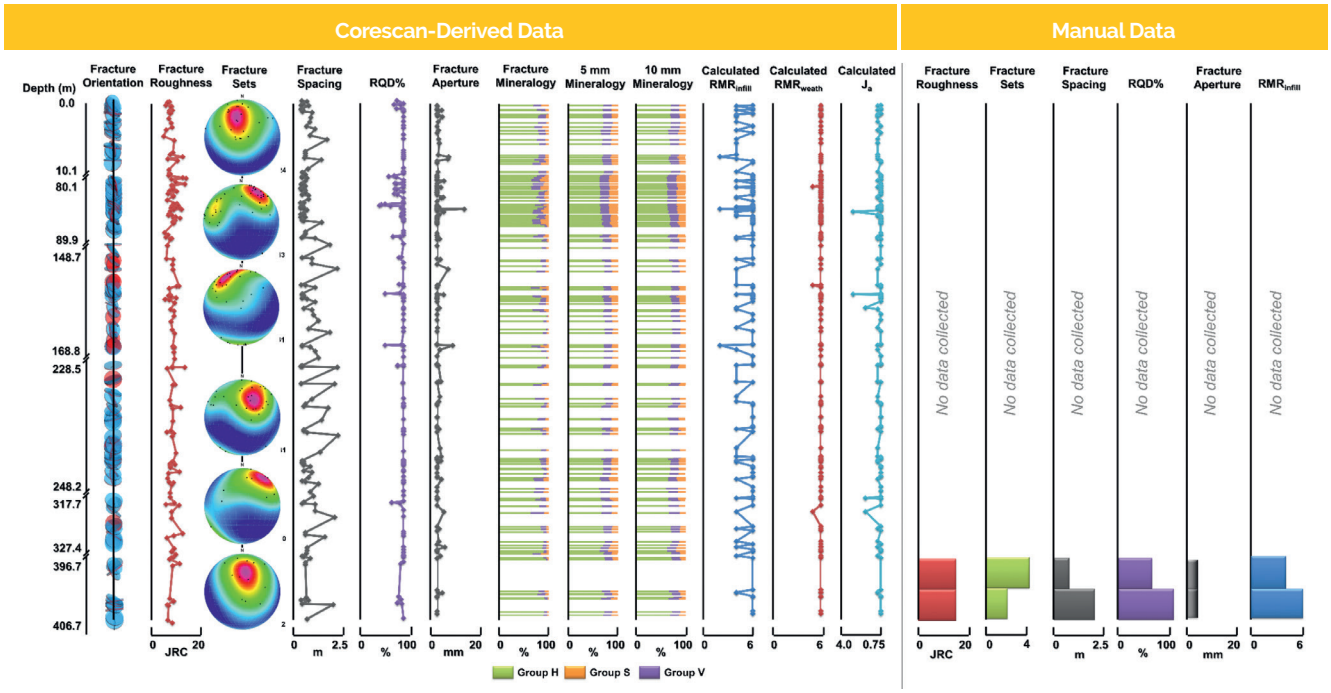

ABOVE: Comparison of geotechnical parameters derived from automated core logging data using the Corescan system with the data collected as part of routine site logging (Manual Data) within the same interval of drillcore (modified from Harraden et al., 2019).