

Your partner to step forward
in mining field



MINING ANALYSIS

From geochemical prospection to an effective exploitation



Technology, expertise and support to guarantee your success

Throughout the full mining process from exploration to extraction, enrichment and even site renovation, a significant number of analysis are performed :

ORE ANALYSIS IN THE EXPLORATION/GEOLOGICAL PHASE

Field analysis during this initial stage of the mining process is designed to identify future extraction sites.

ORE ANALYSIS IN THE EXTRACTION PHASE

Carried out in the lab, these tests identify the ore processing method used and provide information on the value of the finished product. Online analyses on the conveyor belt allow the slightest content variation to be tracked straightforward.

OIL AND FUEL ANALYSIS

To manage the maintenance and optimum performance of heavy vehicles involved in the operation.

Successful extraction requires operators that are able to carry out fast and accurate analysis throughout the extraction process. The testing procedure includes a number of critical stages: sampling, sample preparation (grinding, extraction, concentration, etc.), before dispensing the desired ores and interpreting the data analysis.

Our solutions allow you to optimize preparation and measurements to meet the most stringent quality and responsiveness requirements.

	Exploration/Geology		Ore Testing			Optimised fleet of vehicles
	Field	Lab	Crushing	Processing	Finished product	
AA FI		•		•	•	▾
ICP		•		•	•	•
ICP-MS		•			▾	▾
XRF portable	•		▾			
XRF		•	•	•	•	
XRD	•	•				
FTIR						•
Granulometer		•			•	
Titration		•		•	▾	▾
Laboratory balances		•	•	•	•	
Gamma-ray spectrometer	•	•				

• Perfectly suitable solution

▾ Suitable solution for specific applications

WHAT WOULD YOU NEED TODAY IN A MINING LAB ?

- Adequate analytical capacities for your analyses
- Appropriate solutions that cover all of your mining analysis lab's needs
- Warranties and readily available technical support

HTDS is a mining analysis lab specialist and brings you its expertise at every step of your testing facility's implementation : consultancy, installation, training, and maintenance

In order to provide our customers with the best equipment, HTDS choose wisely the finest performing solutions on the market

EXPLORATION / GEOLOGY

Before any exploitation or production on a site, the prospection's aim is to seek for minerals, ore, or more broadly useful materials, surface methods. HTDS provides a full range of solutions for fast and effective exploration campaigns.

FIELD ANALYSIS

The mining industry is demanding lightweight and mobile solutions that can be rapidly deployed to harsh environments, to run their analysis in situ

LIBS portable

Robust and reliable, our LIBS portable analyzer allows in-situ analysis Li, Be, B, C, Na, F - something no other portable analyzer can do

- Lithium inside rocks
- High sensitivity to other major elements Mg, Si, Al, Ca, K
- Basic distribution mapping using our application



XRF portable

With a measurement range from 100% to 0.1% and ultra-fast analysis speed, X-ray fluorescence spectrometers (XRF) are frequently used in the mining field for content control

- Analyzes all elements of Fluorine to Americium for contents from 100% to 0.1%
- Fast multi-elemental analysis (average of 80 samples in 8hrs and without need of gas)
- Solid sample analysis, pellet or glass disc (fusion)
- Energy dispersive systems (ED-XRF 10 / 15W) or wavelengths (WD-XRF 1-2.4-4kW)



Gamma spectrometer

With a full range of portable gamma-ray spectrometers, HTDS provides effective means to detect and analyses oil/ore radioactivity in the field

- Portable models (hand-held or belt) or embedded systems (land or air craft)
- Software adapted to the visualization of large areas, cartography, etc ...
- Large variety of detectors for different levels of accuracy and resolutions



PREPARATION OF SAMPLES ON THE FIELD

Grinder

With a design based on an electric grinder, our solution is the only one on the market that can be used directly to grind the rock to extract a uniform and dry powder with optimal granularity for in situ XRF analysis



Granulator

As a possible complement of the grinder, based on high-quality electrical casting and reliability, the tool can grind stones and blocks for accurate XRF analysis



Pelleting

For the preparation of pellets in the field in cases you might need to analyze the light elements <Ca (Si, Al, Mg, C, Li, B, Be,)



PRODUCTION LABORATORY SOLUTIONS

A mining analysis lab is requested at every stage of the mining cycle, from exploration to analysis of the finished product, including pre and post-processing analysis. The results are used to identify extraction areas, the suitable type of processing, and the mineral's added value.

CONTENT ANALYSIS

To identify the most suitable equipment to use, several parameters must be taken into account : the desired elements and contents, the numbers of tests per day, samples preparation, etc

Atomic Absorption Spectrometer

In the mining sector, most AAS are «flame mode» systems because they are cheaper and easier to use

- Analyzes all elements except C, halogen, and a few rare elements (samples in mineralised solutions)
- Content analysis from a few % to $\mu\text{g/L}$ (ppm) / $>\text{pph}$ with GC-MS
- Single-element analysis (30s to analyze an element in triplicate)
- Consumable: dedicated lamps, acetylene gas, and nitrogen protoxide



Optical ICP

For geological and ore analysis, this is the perfect tool for labs with a large number of samples, or elements to analyze per sample

- Analyzes all elements except C, and halogens (mineralized samples in solution)
- Analysis of mg / L (ppm) to $<\mu\text{g / L}$ (ppb)
- Fast or simultaneous sequential multi-elemental analysis (50 to 70 samples (20 or + elements) in 8h)
- Need of argon feed



XRF

With a measuring range from 100% to 0.1% and an ultra-fast analysis speed, X fluorescence spectrometers (XRF) are often used in the mining sector to analyze content

- Analyzes all elements of fluorine to americium for contents from 100% to 0.1%
- Fast multi-elemental analysis (average of 80 samples in 8hrs (16 elements / sample)) and with no need for gas
- Solid sample analysis, pellet or glass disc (fusion)
- Energy dispersive systems (ED-XRF 10 / 15W) or wavelengths (WD-XRF 1-2.4-4kW)



ICP MS

An essential tool for seeking very low (ultra-trace) content, in-depth sample testing (research), or for applications such as isotopic reports or rare-earth element (REE) analysis, etc

- Analysis of all elements for contents of $1 \mu\text{g/L}$ to $>\text{ng/L}$
- Fast multi-element analysis (40 samples in 8 hours)
- Requires high-purity argon
- Analyzes mineralized solution (with high purity acid)



Gamma Spectrometry High Resolution

The extraction of radioactive elements (uranium, phosphates, etc.), requires systems to detect traces, monitor content/thresholds, identify radioactive elements, etc
HTDS supplies complete systems for the sensitive analysis of radioactivity on site or in the lab



SAMPLES PREPARATION

Only appropriate and controlled sample analysis preparation can guarantee that your analyses will be representative of your initial samples. The technical sampling method chosen depends on both the analysis technology and the type of sample. HTDS has a large range of solutions for the sample preparation before AAS, ICP, ICPMS or XRF analysis.

Fusion

A commonly used technique before the XRF analysis to remove the matrix effects, simplify calibration and also improve the sensitivity and the detection accuracy. Before carrying out an AAS or ICP analysis, fusion allows an effective and complete mineralization

- Preparation before XRF (borated fusion) and ICP (borated fusion or peroxide)
- All elements except C, halogens and some rare elements
- Preparation from fine powders (<75µm)
- Duration about 15 minutes
- Multi-station (1, 2 to 6) with automation possible



Heating block (acid mineralisation)

The heater block is used to perform acid mineralisation by heating the sample in acid at a temperature below the acid's boiling point. The mineralisation may be time-consuming, but this is compensated by the capacity of some units

- Preparation for AAS, ICP
- The powder is the faster the digestion will be
- Duration: 1+ hours
- Multiple stations (12, 24, 48, 72), automation not available
- Biological samples, minerals, plastics, polymers, perfect for semi-volatile elements



Microwave mineraliser

As the mineralisation takes place within sealed containers, microwave mineralisation is faster than with a heater, and protects volatile elements such as Mercury

- Preparing tablets for XRF
- Preparation for AA, ICP, and ICPMS
- Fine, uniform powder. Test sample less than 1g
- Duration: 20-40 minutes
- Multiple stations possible (8 to 24), no automation possible
- Biological samples, polymers, plastics, minerals, and some alloys



Drying, grinding, spraying and splitting

Sampling and accurate preparation are essential for mining. We offer a complete set of sample preparation solutions that meet a wide range of needs, including :

- Crushers: jaws, cylinders and cones
- Sprayers: batch and batch semi-automated auto batch
- Rotating sample dividers and shaking or control sieves
- Drying ovens
- Extraction and dust collection systems, including ducts and workstations



A technology adapted to each step of your activity ...

OTHER CONVENTIONAL ANALYSIS

Granulometers

As an essential mining tool, granulometers have a range of applications from soil analysis to monitoring grinding and inspecting finished products (powders).

- Checking the grinding process
- Wide range from 0.01 to 3500µm
- Fast (< 1 min) and flexible measurements (measurement of suspensions or dry powders)

Titration systems

Essential during the exploration phase, titration remains in use throughout the mining process

- Determination of precious metals, ferrous and non-ferrous
- Auto-sampler
- Automated solvent dispensing and sample preparation

Precision scales

Essential stage prior to any analysis, weighing represents a key step to achieve reliable and repeatability results

- Range: from 52g to 64kg
- Details: from µg to g
- Protection of the weigh cell for weighing powder
- Weighing solutions with high efficiency possible (QUANTOS solution)



MINERALOGY SOLUTIONS

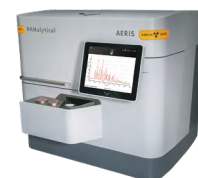
SAMPLE PREPARATION WORKSHOPS

Geological samples can be very diversified and integrate various mineralogical phases. The production of representative specimens is a multi-step process that requires high-performance equipment and technical knowledge.

X-RAY DIFFRACTION - XRD

Qualitative and quantitative analysis of phases, study of polymorphism, determination of crystallinity, structural analysis... all these quickly, simply and efficiently.

- Table and floor-mounted diffractometers with intuitive operation
- Incorporates the best known multi-dimensional detector, the PIXcel, guaranteeing speed of analysis and excellence in data quality
- Solid state detector that does not require gas or cooling, including a count rate linearity and extremely high dynamic range (> 1010)



RADIOACTIVITY ANALYSIS

Fixed radon detector

Directly implemented inside the shaft, fixed units enable radon levels in the working environment to be measured in real time.

Individual dosimeter

Essential tool to protect staff exposed to radiation, HTDS provides the mining sector with Gamma and X-ray dosimeters that are small, compact, and robust.

Vehicle control terminal

Radioactive elements can be hazardous to the mining operation and should be regularly monitored. HTDS supplies solutions (terminals and attachments) to check the cargo of trucks and containers.



OPTIMIZATION OF THE VEHICLE FLEET

Because a mine is bustling 24/7, the unforeseen breakdown of a vehicle (dumper, etc.) on site can lead to slowed operations and major financial losses. In addition, the high cost of maintenance requires an adjustment of the frequency. Thus, it is important to check the state of each vehicle and to master preventive maintenances. HTDS is at hand to support you in optimizing your vehicle fleet with approved instruments and provides appropriate advice

ENGINE OIL ANALYSIS

FTIR and OilExpress

IR spectrometry provides you with important information about the condition of the oil and its properties. Quick and easy to use, it is perfect for oil analysis labs that are often working under tight deadlines.

- Analysis of soot, nitration, sulphonation, oxidation, water content petrol content, and component wear, etc.
- Fast analysis (50-100 samples/hour depending on configuration)
- Low maintenance
- Manual or automatic with auto-sampler



Optical ICP

ICP provides swift analysis of all wear metals and additives present in the oil. With a sample feed configuration that is perfect for oils, up to 23 elements are measured simultaneously. Combined with FTIR, ICP is an effective tool for monitoring your vehicles.

- Measures 23 elements (Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, P, Pb, Si, Sn, Ti, V, Zn)
- Fast analysis, up to 20 samples/hour
- Low maintenance with nebulizer configuration / dedicated nebuliser / nebulisation chamber
- Automated, with auto-sampler



Titration

Because acidic engine oil becomes corrosive, it is important to monitor it regularly with titration

- TAN/TBN dispensing
- Automation-ready
- Integrated sample/solvent preparation
- Easy to use in a single click

FUEL ANALYSIS

XRF

XRF can measure the sulphur content of fuel, as well as other elements in line with the ASTM standards you wish to implement

Focus on



SECURE YOUR SITE

Security can be a major issue on sensitive sites or when extracting precious metals. Aware of the needs of mining operators, in addition to its range of lab products, HTDS also provides a full range of personal and container (bags, packets, barrels) inspection equipment. Our solutions range from simple magnetometer for metal detection, to X-ray tunnels and detection gateways.

OUR INTERNATIONAL NETWORK

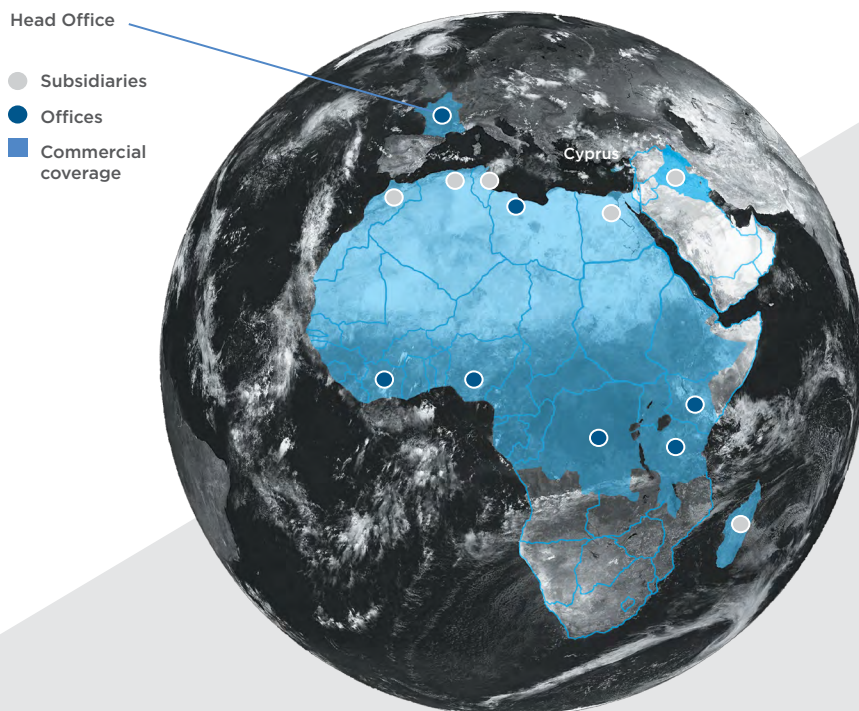
HTDS (Hi-Tech Detection Systems) is a company specialized in the distribution and maintenance of high-tech detection systems in France and abroad.

HTDS offers a full range of detection solutions dedicated to the following areas:

Security - Product Control - Analytical Sciences -

Nuclear and Radiation Protection - Signal Processing - Optoelectronics

HTDS's exclusive partners for mining analysis are recognized as world leaders in their field.



For a responsive service, tailored to your needs, HTDS has a network of subsidiaries, each with a team of specialized technicians and a complete stock of spare parts. A dedicated stock of equipment for your occasional rental needs is also available.

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