

Coal Quality Monitoring (Quality Checks & Testing)

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Date Feb 10, 2021



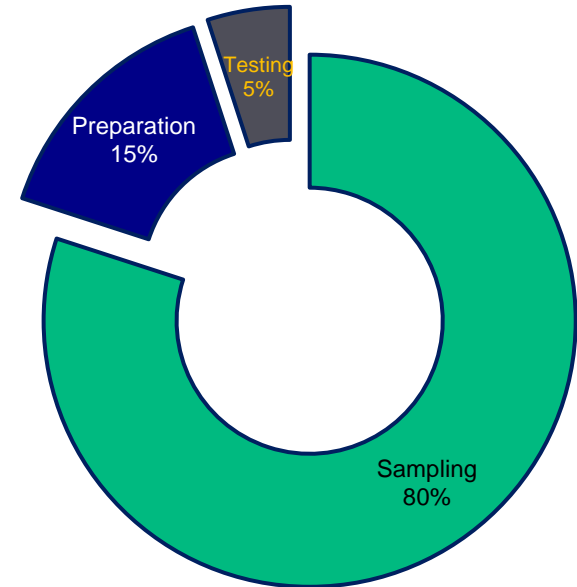
Quality Monitoring of Coal

- > Quality Monitoring is an essential requirement for process control, plant performance and for any commercial transaction between the consumer and producer.
- > Quality Monitoring requires proper implementation of standard sampling, preparation and testing procedures.
- > In coal mining and processing industry, the decision may involve **huge capital commitments** for **design of coal washing operations** and **producing the right specifications**.
- > Quality Monitoring may have **major impacts on cost and decision making**.

Quality Monitoring Scheme

> *Quality monitoring requires proper implementation of*

- Standard Sampling scheme
 - Correct Preparation techniques
 - Valid Testing procedures
-
- Coal is heterogeneous material. Sample should be representative.
 - Free from Bias and reduce the sampling variance.
 - Very difficult to achieve highest level of sampling precision
 - Overall precision is influenced primarily due to sampling
 - Utmost importance need to be given for sampling



Coal Quality Checks at Value Chain

Exploration

- Core Analysis
- Coal Geology
- Mineralogy
- Projects

Mining

- Seam Sampl
- Chip Samples
- Sampl & Anal
- Screen Anal
- On-Line Anal

Process

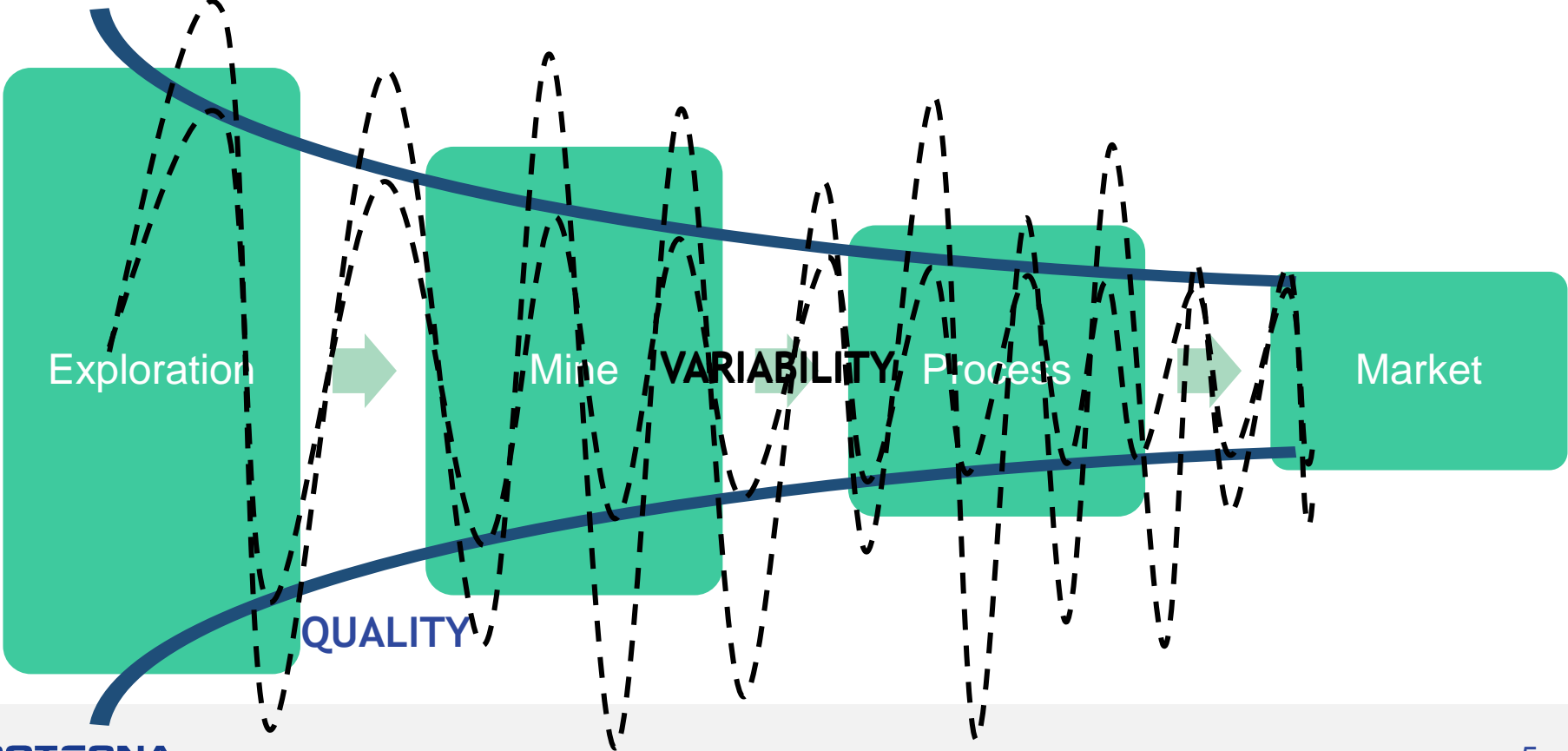
- Plant Efficiency
- Process Sampl & Anal
- Load out Sampl & Anal
- Certification
- Bias Testing
- Optimization Projects

Market

- Sampling
- Analysis
- Certification
- Projects
- Suppliers
- Research

- The Mining process consist of a chain, as can be seen from the point where it is still in the ground, Mining, Processing and then in the markets.
- Each activity has its own sub process as specified.
- Each quality aspect is indicated at the process and can be extended depending your scope of analysis

COAL QUALITY VALUE CHAIN - QUALITY VARIABILITY



Sampling scheme

> *Due to Technical, Cost and Time constraints, sampling procedures can be modified*

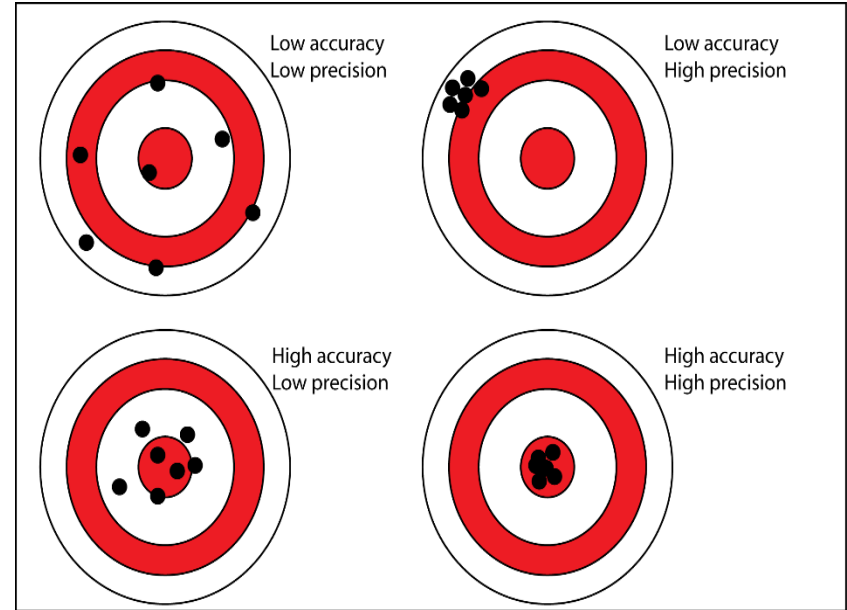
> **General procedure for establishing a sampling scheme**

- Purpose of the samples
- Increment collection method to be used – Mechanical or Manual
- Decide whether continuous or intermittent sampling is required
- Sampling from Moving belt or stationary lot
- Selection of appropriate sampling procedure
 - Define the number of lots and sub-lots
 - Number of increments
 - Mass of each increment and the gross sample
 - Distribution of increments
 - Dimensions & design of sampling device
- ***All the above conditions affect sampling precision & accuracy***

Sampling Precision and Accuracy

> Precision

- Measures the closeness of data in given condition
- Indicates the reproducibility of the results
- Smaller the random error, precise is the method



Sampling methods

Wagon top sampling



Stop Belt sampling



Cross Belt and Stream sampling

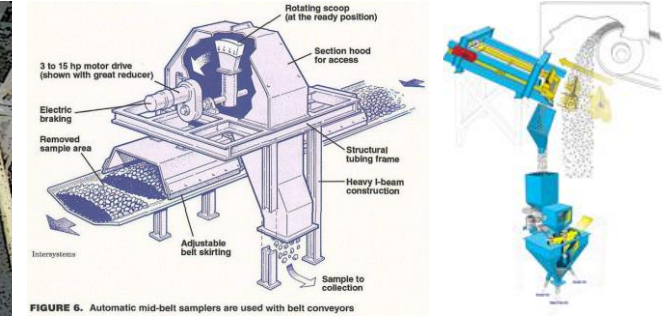


FIGURE 6. Automatic mid-belt samplers are used with belt conveyors

Auto Mechanical Auger



Auto Mechanical Auger



Coal Testing

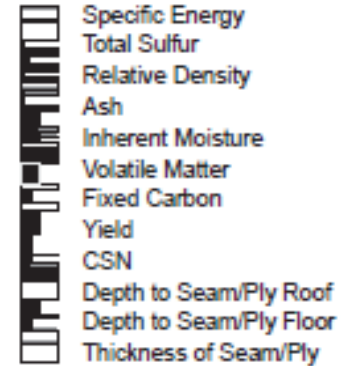
> The chemical composition of coal has a strong influence on its combustibility.

- Normally Proximate and Ultimate analysis along with Calorific Value
- Ash Chemistry, Ash Fusion (AFT), Highgrove Grindability Index (HGI), etc.
- Tendency to gain or lose moisture
- Undergoes oxidation when exposed to atmosphere
- Strict adherence to standard procedures to obtain repeatable and reproducible results

> Techniques used

- Several analytical techniques are available for coal testing and characterization
- Analysis needs to be sufficiently accurate to preclude any technical/economical consequences.
- Many new approaches available based on modern sophisticated instrumentation applicable for coal testing
- Instrumental analytical techniques enable coal testing where it is mined, processed, transported and utilized.
- On-line analyzers used at processing plants / washeries / power plants

Parameters Commonly Examined



Critical control points in supply chain of coal

> ***At Mine Head***

- Inpit drilling, sampling and data analysis
- Sizing of Coal
- Blending of Coal

> ***At Washing plant / Processing plant***

- Coal washing can influence quality, uniformity and quantity of fuel.
- Coal testing before and after washing unit for products and rejects is necessary
- Aim for quality product-oriented design than rejects oriented design

> ***At Power stations / Consumers***

- Homogenization – Minimize fluctuations in coal properties
- Mixing/Blending – Definite new coal qualities
- Periodic testing of all the quality parameters at each stage is recommended.

Losses and Measurements techniques

> Long term

- Auto mechanical sampling system at sampling points
- Auto mechanical augers from stationary lots

> Short term

- Design a practical procedure for routine implementation
- Perform periodic tests for checking

> Periodic tests in sampling & testing

- Overall precision
- Increment variance
- Sampling, preparation & testing variance
- Bias test



QUALITY CONTROL INTRODUCED BY GOVT OF INDIA THROUGH CIMFR/COTECNA

» **Project Objectives:**

- › *It is about establishing quality control in domestic coal supply from coal mines to Thermal Power Plants*
- › *Collaboration among 3 ministries*
- › *Quality control of 800 Million MT of coal per annum*
- › *To put whole production under quality control (currently +600MMT targeted 1BMT)*

» **Scope of current project**

- › *CIMFR & QCI are mandated to establish quality control system, including sampling, testing and reporting results on loading and unloading points*
- › *Cotecna gets the mandate from CIMFR for power sector includes;*
 - **Sampling**
 - **Sample preparation**
 - **Sample submission to CIMFR for analysis**
- › *Intervention at around +300 points in 9 coal subsidiaries (loading) and +70 power plants (unloading).*

“There are different flavors of coal, different tastes in boilers, and different reasons to select one recipe or technology instead of another. Coal is an economical source of energy and controlling coal quality is a way to do more with less”

THANK YOU

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