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Conveyor Sampling Best Practices

Building Confidence in Metallurgical Accounting Through Representative Sampling

Conveyor systems form the backbone of modern mineral processing operations.

From run-of-mine ore handling through to concentrate production, conveyors transport vast quantities of material every day. The information used to evaluate plant performance, recovery efficiency and metallurgical accounting often originates from samples collected directly from these conveyor systems.

For this reason, conveyor sampling is one of the most critical processes within any mineral processing operation.

When properly designed and maintained, conveyor sampling systems provide reliable, representative samples that support informed operational decision-making. When poorly designed or maintained, they can introduce bias that affects every downstream calculation.

Understanding conveyor sampling best practices is essential for achieving accurate and reliable metallurgical data.

Why Conveyor Sampling Matters

Every important metallurgical calculation begins with a sample.

Conveyor sampling supports:

- Metallurgical accounting
- Plant reconciliation
- Recovery calculations
- Product quality control
- Process optimisation
- Production reporting

The accuracy of these activities depends directly on the quality of the sample collected.



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If the sample is not representative of the material stream, the resulting data becomes unreliable regardless of laboratory accuracy.

Representative Sampling Is the Objective

The primary objective of any conveyor sampling system is simple:

To collect a sample that accurately represents the entire material stream.

This means the sampling system must:

- Intercept the complete cross-section of material
- Capture all particle sizes
- Minimise sampling bias
- Preserve sample integrity
- Operate consistently

Representative sampling ensures that operational decisions are based on reliable information rather than assumptions.

Best Practice 1: Full Stream Interception

A representative sample must be collected from the entire material stream.

Partial stream sampling introduces significant bias and should be avoided.

A properly designed cross-belt sampler should:

- Traverse the entire belt width
- Collect a complete cross-section of material
- Maintain consistent cutter movement
- Operate at predetermined intervals

Failure to fully intercept the material stream can result in systematic sampling errors.

Best Practice 2: Correct Cutter Design

The cutter is the most important component of any conveyor sampling system.



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Poor cutter design remains one of the most common causes of sampling bias.

Key considerations include:

Cutter Opening

The cutter aperture must be sufficient to collect all particle sizes without obstruction.

Cutter Geometry

The cutter should maintain a consistent cross-sectional profile throughout the sampling cycle.

Cutter Velocity

The cutter should move at a controlled speed that allows representative collection without disturbing the material stream.

Complete Stream Coverage

The cutter must fully traverse the conveyor stream during every sampling event.

Correct cutter design is fundamental to sampling accuracy.

Best Practice 3: Maintain Sample Integrity

Collecting a representative sample is only the first step.

The sample must remain representative throughout:

- Collection
- Transfer
- Discharge
- Storage
- Preparation

Common causes of sample degradation include:

- Material spillage
- Chute blockages
- Sample contamination
- Dust losses



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- Segregation

The entire sample path should be designed to minimise these risks.

Best Practice 4: Appropriate Sampling Frequency

Ore streams naturally vary over time.

Sampling frequency should be selected based on:

- Throughput
- Ore variability
- Production requirements
- Metallurgical accounting requirements

Infrequent sampling may fail to capture process variability, while excessive sampling can increase operational costs without improving data quality.

A balanced sampling strategy is essential.

Best Practice 5: Routine Inspection and Maintenance

Even the best-designed sampling system requires ongoing maintenance.

Routine inspections should focus on:

- Cutter condition
- Mechanical alignment
- Drive components
- Bearings
- Chute wear
- Electrical systems
- Control systems

Regular maintenance helps prevent gradual deterioration in sampling performance.

Sampling accuracy should never be assumed—it should be verified.



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Best Practice 6: Automate Where Possible

Automated sampling systems provide significant advantages over manual sampling methods.

Benefits include:

- Reduced operator bias
- Improved repeatability
- Consistent sampling intervals
- Increased safety
- Improved data reliability

Automation allows operations to collect representative samples consistently and objectively.

Best Practice 7: Conduct Regular Sampling Audits

Many operations audit laboratories regularly but rarely audit the sampling systems that generate the samples.

Sampling audits can identify:

- Design deficiencies
- Mechanical wear
- Operational issues
- Potential sources of bias

Periodic audits help ensure continued compliance with sampling best practices and maintain confidence in metallurgical accounting data.

Common Conveyor Sampling Mistakes

Common issues observed within the mining industry include:

- Grab sampling from conveyors
- Partial stream interception
- Worn cutter lips



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- Inadequate cutter openings
- Blocked sample chutes
- Poor maintenance practices
- Inconsistent sampling intervals

These issues can introduce significant bias and reduce confidence in operational reporting.

The Role of Go-Belt® Sampling Systems

For more than 35 years, Go-Belt® Sampling Systems have provided reliable conveyor sampling solutions across the mining industry.

Go-Belt® systems are designed to:

- Collect representative samples
- Minimise sampling bias
- Improve metallurgical accounting accuracy
- Support plant reconciliation
- Enhance operational confidence

With over 100 successful installations across gold, platinum, copper and coal operations, T.K.O Engineering continues to support mining companies through the design, manufacture, installation and maintenance of robust conveyor sampling systems.

Conclusion

Conveyor sampling is far more than a routine operational activity.

It is a critical engineering discipline that directly influences metallurgical accounting, process optimisation and operational decision-making.

By following proven conveyor sampling best practices, mining operations can improve data quality, increase confidence in reporting and make more informed business decisions.

Accurate metallurgical accounting begins with representative conveyor sampling.



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