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# **ACTIONABLE TIPS TO IMPROVE YOUR METAL ACCOUNTING **CHECK IN & CHECK OUT SYSTEM****

Based on material from the **Metal Accounting Professional Certificate**  
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THIS RESOURCE IS BASED ON MATERIAL  
FROM MODULE 3 OF THE

# Metal Accounting

PROFESSIONAL CERTIFICATE



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## TIP 1:

### Define Precision vs. Investment Costs

**Establish the required level of accuracy and precision for your mass flow measurement system based on business objectives.** However, keep in mind that higher precision often comes with increased equipment costs. Strike a balance between accuracy and cost-effectiveness to ensure optimal performance without unnecessary expenses.

When setting up a mass flow measurement system in a mining plant, it's crucial to determine the level of precision required for your specific application and strike a balance between precision and associated costs.

***Precision refers to the degree of exactness or consistency in measurement results. It's important to clearly define the level of precision needed for your mass flow measurements.***

Consider factors such as the criticality of the measurement to your metallurgical accounting process, regulatory requirements, and the impact of measurement errors on downstream processes.



## TIP 1:

### **Define Precision vs. Investment Costs** *Continued*

It's essential to consider both capital costs (initial investment) and operational costs (ongoing maintenance and calibration).

Balancing precision and costs requires a thoughtful approach:

- Conduct a cost-benefit analysis to evaluate the financial implications of different precision levels. Consider the potential gains from higher accuracy in terms of process optimisation, reduced waste, and improved decision-making.
- Engage with stakeholders, including process engineers, financial teams, and plant managers, to determine the acceptable trade-off between precision and costs. This collaboration ensures alignment with business goals and budget constraints.

## TIP 1:

# Define Precision vs. Investment Costs

## *Continued*

### **Short term vs long term gain**

Consider the long-term benefits of accurate measurements. While investing in higher precision might have an upfront cost, it can lead to substantial savings over time by avoiding process inefficiencies, product losses, and operational disruptions.

### **Evolving requirements**

It's also worth keeping in mind that precision requirements may evolve over time due to changes in business objectives, regulations, or process optimisations. Design your measurement system to be adaptable, allowing for adjustments in precision as needed without significant overhaul.

Regularly review the precision-cost balance as technology advances and operational requirements change. New measurement technologies or improvements in existing technologies might offer cost-effective ways to achieve higher precision.

Defining the required precision level for mass flow measurements and finding the right balance between precision and costs is a strategic decision that aligns measurement accuracy with operational and financial goals.

Careful consideration of these factors ensures that your investment in measurement technology is well-suited to your mining plant's needs and contributes to efficient metallurgical accounting processes.



## TIP 2:

### Select Appropriate Measurement Technology

Different materials and situations require specific measurement principles to accurately determine mass flow. Understand the nature of the material being measured and choose the appropriate measurement technology accordingly.

For instance, solids, slurries, and solutions may require distinct measurement principles such as load cells, ultrasonic Doppler flow meters, magnetic flow meters, and more.

Understanding the characteristics of the material being measured is essential for selecting the appropriate measurement technology.

## TIP 2:

# Select Appropriate Measurement Technology

## *Continued*

Here are some examples of measurement principles:



### **Magnetic Flow Meters**

These meters are suitable for measuring volumetric flow of conducting liquids with occasional entrained gas. They operate on the principle of electromagnetic induction and are sensitive to the properties of the materials being measured. Magnetic flow meters work well for conducting liquids but may be affected by variations in magnetic susceptibility, requiring consideration for material properties.



### **Ultrasonic Doppler Flow Meters**

These meters work well for measuring flow in air or suspended solids. They use ultrasonic waves to determine flow velocity. However, variations in temperature and liquid composition can affect the speed of sound, making compensation for these factors challenging. They might not work well for solutions with very high solid content due to their reliance on both reflection and transmission of sound waves.



### **Transit Time or Counter Propagation**

This measurement principle is suitable for clean solutions. It involves using an array of acoustic sensors to detect sound and pressure signatures from turbulent flow. Advanced signal processing is used to calculate velocity. The benefit of this method is its non-intrusive nature.



## TIP 2:

### **Select Appropriate Measurement Technology** *Continued*

Selecting the appropriate measurement principle is fundamental to accurate mass flow measurements. By understanding the nature of the material being measured and the principles behind different measurement technologies, you can make informed decisions on which technology aligns best with your mining plant's needs.

Consider factors such as material characteristics, measurement accuracy, potential sources of interference, and the adaptability of the chosen principle to varying flow conditions. This will help your measurement system operate effectively and provide reliable data for metallurgical accounting processes.





## TIP 3:

### **Consider Material Properties & Interference**

Be mindful of the material properties being measured. Corrosive or abrasive materials might require resistant linings or non-intrusive measurement methods to prevent damage.

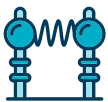
Also, consider potential sources of interference such as wind, rain, vibration, and electromagnetic interference that can impact measurement accuracy.

It's essential to take into account the specific properties of the materials being measured and potential sources of interference that could affect measurement accuracy.

## TIP 3:

# Consider Material Properties & Interference

## *Continued*



### Material Characteristics

Different materials have varying properties that can impact measurement accuracy. Consider factors such as material density, particle size, flow behaviour (e.g., free-flowing, cohesive), and potential for material buildup. These characteristics can affect how the material interacts with the measurement instrument and influence the overall accuracy of the measurement.



### Corrosive or Abrasive Materials

If the material being measured is corrosive or abrasive, it's important to select measurement equipment that can withstand these conditions. Consider using resistant linings or non-intrusive measurement methods to protect instruments from damage and reduce maintenance frequency.



### Material Build-up and Accumulation

Material build-up on measurement instruments can lead to inaccuracies. For instance, if a Belt scale accumulates spillage or debris, the added weight can result in over-reported measurements. Design the installation to minimise material buildup and consider using self-cleaning mechanisms or frequent inspections to mitigate this issue.

## TIP 3:

# Consider Material Properties & Interference

## *Continued*



### **Electromagnetic Interference (EMI)**

Some measurement principles, such as magnetic flow meters, can be sensitive to electromagnetic interference. Install instruments away from sources of EMI, such as electrical cables, transformers, or other equipment that generates electromagnetic fields. EMI can disrupt measurement accuracy and lead to inconsistent results.



### **Vibration and Mechanical Interference**

Vibrations from nearby equipment or machinery can impact measurement accuracy, especially for technologies that rely on sensitive components. Place instruments in locations where mechanical interference and vibrations are minimised. Consider isolating instruments or using vibration-resistant mounting solutions.



### **Temperature and Environmental Variations**

Changes in temperature can affect the accuracy of certain measurement principles. Ultrasonic flow meters, for example, are sensitive to variations in the speed of sound caused by temperature changes. Ensure that instruments are installed in environments where temperature fluctuations are controlled and minimised.

## TIP 3:

# Consider Material Properties & Interference

## *Continued*



### Moisture and Contaminants

Moisture levels in the material or surrounding environment can impact measurements. For instance, moisture in a conveyor belt can affect the accuracy of beltway scales. Install instruments in areas where moisture exposure is limited and consider moisture-proofing measures if necessary.



### Calibration and Compensation

Some measurement principles allow for compensation of certain material properties. For instance, ultrasonic flow meters can compensate for temperature changes. Understanding the compensation capabilities of the chosen principle and its limitations is essential for accurate measurements.

***For accurate mass flow measurements, it's crucial that you consider the material properties and potential sources of interference. Tailor the choice of measurement technology and instrument installation to accommodate the specific characteristics of the material being measured and the operational environment.***

By addressing these factors, you can mitigate potential sources of error and ensure that your measurement system provides reliable and consistent data for metallurgical accounting processes.



## TIP 4:

# Prioritise Ongoing Maintenance & Reliability

Regular maintenance is essential to maintain accuracy over time. Design measurement systems to facilitate easy inspection and maintenance, avoiding accumulation of dirt, material build-up, and physical damage.

Implement calibration processes as an integral part of the equipment design and ensure that calibration methods are well-suited to the specific measurement technology in use.

Here's a more comprehensive breakdown of this essential aspect:



### Regular Inspections

Implement a schedule for routine inspections of measurement instruments. Regular inspections, whether daily, weekly, or per shift, help identify any issues or anomalies early on. These inspections can include visual checks for damage, material build-up, and signs of wear.

## TIP 4:

# Prioritise Ongoing Maintenance & Reliability

## *Continued*



### Data Monitoring and Quality Checks

Establish a process for ongoing data monitoring and quality checks. Regularly compare measurements from different systems, cross-checking the accuracy and consistency of the data. This practice can identify discrepancies and help maintain measurement quality.



### Training and Documentation

Ensure that personnel responsible for maintenance are adequately trained on the instruments' upkeep procedures. Maintain clear documentation of maintenance schedules, procedures, and any issues encountered. This documentation aids in maintaining consistency and accountability.



### Environmental Factors

Be mindful of environmental factors that could impact instrument performance. Changes in temperature, humidity, dust levels, and other conditions can affect measurement accuracy. Regularly monitor and control these factors to ensure consistent measurements.

***Establishing a comprehensive maintenance plan, adhering to vendor guidelines, implementing redundancy, and using advanced maintenance techniques contribute to consistent and dependable measurement accuracy.***



## BONUS TIP

### **Plan for Expected Flow Rates & Grade Variability**

Size your measurement equipment based on the expected flow rates and variations. Different measurement principles have different effective measurement ranges.

Choose a principle that aligns with the flow rates in your operation, considering the upper and lower limits within which the measurement remains accurate. Understand the effective measurement range of the selected principle and ensure it covers your anticipated flow variations

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