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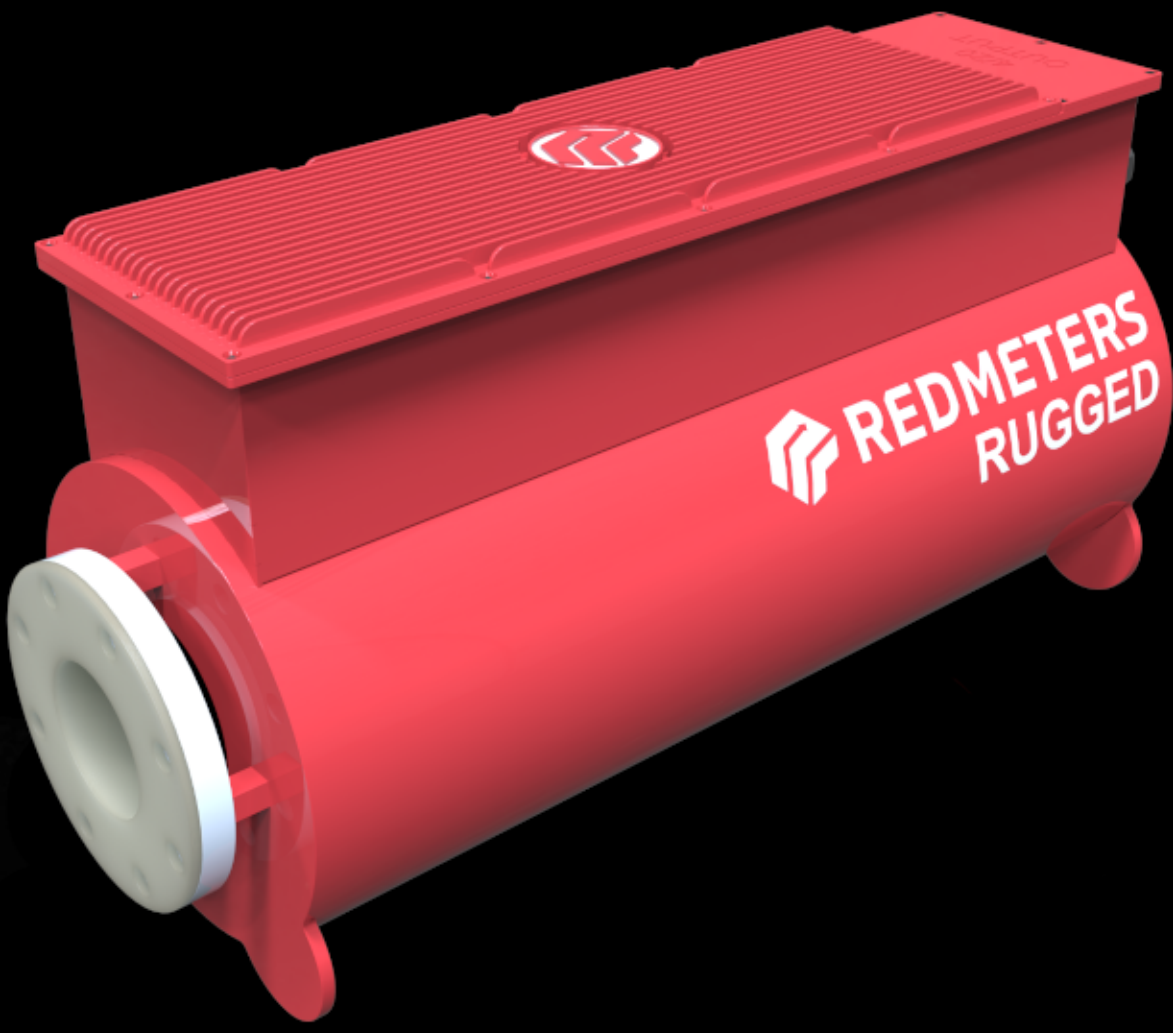
Measuring Mined Materials On-Site:

CENTRALIZING DATA SOURCES



REDMETERS

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Introduction

While density meters are necessary in a variety of industries to monitor slurries as well as being used for billing purposes, etc., most meters currently on the market either suffer from poor accuracy, potentially dangerous parts, or both. In most cases, slurries are pumped through a pipe, measured, and create an inferred reading from the sample. In the case of grab sampling, samples are taken out of the slurry and taken to a lab for measurement, which results in a long turnaround time. With the new real-time, non-nuclear density meter, the density of the entire sludge/slurry can be read with both high accuracy and repeatability without the use of dangerous materials.

Common Density Meters and Their Pitfalls

NUCLEAR	Traditional method of measuring slurry density. These suffer limited scope by only measuring what is in the gamma ray cross section and low accuracy. Combined with stringent safety regulations, these meters are costly and potentially extremely dangerous.
MICROWAVE	Can only measure a small cross section of the sample at a time. More importantly, the microwave signal is blocked after a few inches of material, and the carrier fluid itself is enough to disperse signals. These meters lose accuracy with increasing % solids and cannot work with large pipe diameters. Limited to only media with a consistent electrical permittivity constant.
ULTRASOUND	Problems are similar to microwave. Tend to be used in non-flowing solutions (i.e. sits in a tank and reads). Probe is directly exposed to the given media, therefore needing constant replacement in abrasive applications. Costly and inefficient.
AUTO-SAMPLING/ GRAB-SAMPLING	The method of taking a small sample and measuring the density in a lab environment. This has an exceedingly long turnaround time since the sample must be transported, leading to probable errors due to evaporation. Essentially, this method is a snapshot of the slurry at a specific moment in time and not representative of the entire system. These tests are time consuming; composite sampling takes even longer.

COMMON COMPLICATIONS

TEMPERATURE/ PRESSURE	Temperature has a creeping effect on the system. As the temperature changes, the meter system begins to behave differently, causing the displacement reading to drift. Instantaneous changes in pressure create a direct change on the total system, which causes sample-reading processes to be entirely inaccurate.

New Technology

Real-time Exact Density Meter (Red Meters)

Red Meters technology utilizes various components that leads to consistently higher repeatability, superior accuracy, and longer product life. One component is the abrasion resistant liner which allows the Red Meter to be compatible with varied carrier liquids and abrasive particulates. This durable liner extends the lifetime of the cartridge. Other components allow the cartridge to return to its original state with a high degree of precision and maintain its shape. This allows a high repeatability without sacrificing any accuracy.

Red Meters uses a flexible cartridge and a high precision displacement laser to measure the deflection. Deflection is then translated into weight. Since the volume of the cartridge is constant, the density of the media flowing through the cartridge is simply the weight divided by the volume. Since the laser is capable of recording thousands of measurements per second, a continuous measurement can be achieved. This lowers the wait time from hours, or even days, to milliseconds.

Quick Stats

The Red Meter boasts an accuracy of +/- 0.5% over a 6:1 density range, a significant difference from most other continuous measurement techniques. Superiority in response time should also be considered, where the RM density meter samples up to 50 times per second. In addition, the Red Meter is capable of being used on any pipe diameter and most specific gravity ranges.

Housing

An insulated housing is used to shield the cartridge and measurement devices from ambient temperature and weather. The casing is designed to have a sleek curved top to prevent buildup from snow, etc. This allows the effects of rain, snow and wind to be mostly negligible compared to the effects of the media temperature. This casing also eliminates damage caused by weather.

NEMA 4x

The NEMA 4x enclosure is used to prevent the detrimental effects of weather to interfere with the PLC and wiring of the measurement devices. Otherwise, water, dust, and heat can cause severe damage to the electronics.

Ease of Calibration

The Red Meter has a simple one button calibration that can calibrate any carrier liquid. The Red Meter can also handle bidirectional flow.

Monitoring

Red Meter also provides 24-hour coverage of the system. Real time monitoring can be accessed anywhere in the word through a wireless or Ethernet connection allowing an easy maintenance on the system.

Side By Side Comparison

	RM Series	Ultrasonic	Nuclear	Microwave
Accuracy	**±0.5%of Reading**	1.0% Full Scale	1.0% Span	2.0% Full Scale
Repeatability	**±0.4%of Reading**	1.0% Reading	0.1% Full Scale	0.1% Total Solids
Sample Size	**Entire Volume**	Volume Accessible by Source	Gamma Cross Section	Volume Assessible by Source
Response Time	**20 milliseconds**	1-60 Seconds	1-10 Minutes	1 Second

Conclusion

Current density meters lack the accuracy and totality necessary in measuring mined slurries. Throughout various stages of mining process exact density measurement devices are needed to determine solids being moved as well as ensuring that separation and dewatering stages are reaching maximum efficiency. Using a well-calibrated, totalized meter is the cornerstone to establishing optimal production and waste minimization.

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