

Case Study

Beni Amir Washing Plant OCP Group – Khouribga (Morocco)



INTRODUCTION

The phosphate ore at the Beni Amir washing plant goes through a wet treatment process to enrich the ore and increase its BPL (Boone Phosphate of Line) content. A density meter is needed to monitor the output of a cyclone, mixing tank and two thickeners to improve the efficiency and fully utilize the production capacity of these separation processes. The density measurement is combined with flow velocity measurement for mass flow calculations giving the total production output.

CHALLENGES

- Improve process control with real-time density data
- Fully utilize capacity of separation processes, such as a consistent thickener underflow (target density)
- Calculate the total production output of the plant
- Use a radiation-free and reliable density meter

INSTRUMENTS USED

Ultrasonic Slurry Density Meters (SDM) of Rhosonics. These were installed by wafer cells in 13 to 23 inch pipes. The instruments are IP68 classified and a metal cap (see picture) protects these against other external influences.

OUR SOLUTION

The Rhosonics SDM can measure the real-time density of outgoing flows in different separation processes for mineral processing. Measurements are reliable, stable and friendly to the human health and environment. Calibration is easy and RSO training for radiation safety is not needed thanks to the ultrasonic technology.

CUSTOMER



The OCP Group is one of the leading exporters of Phosphate in the world. OCP began operating the Beni Amir mine and washing plant in Morocco in 2015 to increase its production with a capacity of 12 million metric tons per year. The enriched phosphate ore is transported through a 187 km pipeline to Jorf Lasfar (OCP phosphate complex with port) for further processing and distribution.

“We confirm a successful test of the SDM from April 2018 until now. A single calibration is sufficient for operation over three months. The team at the BENI AMIR wash plant are satisfied with this technology.”

Mohammed el Moudden
Chief Instrumentation, OCP Beni Amir





MEASURING TASKS

Determination of slurry density in different applications at the OCP Beni Amir washing plant:

- 1. Cyclone outlet (in the washing unit)**
 Pipe diameters: 584 mm (23 inch)
 Pipe material: Carbon steel with rubber line
 Solids: 30 wt%
 Density: 1,150 – 1,350 grams per liter
 Temperature: 15°C – 30°C (59°F – 86°F)
 Flow velocity: 2.9 m/s
- 2. Cyclone feed (in the classification unit)**
 Pipe diameters: 584 mm (23 inch)
 Pipe material: Carbon steel with rubber line
 Solids: 15 wt%
 Density: 1,050 – 1,150 grams per liter
 Temperature: 15°C – 30°C (59°F – 86°F)
 Flow velocity: 2.6 m/s
- 3. Thickener underflow (after classification)**
 Pipe diameters: 335 mm (13 inch)
 Pipe material: Carbon steel with rubber line
 Solids: 62 wt%
 Density: 1,580 – 1,780 grams per liter
 Temperature: 15°C – 30°C (59°F – 86°F)
 Flow velocity: 3.0 m/s
- 4. Thickener underflow (after flotation units)**
 Pipe diameters: 335 mm (13 inch)
 Pipe material: Carbon steel with rubber line
 Solids: 62 wt%
 Density: 1,600 – 1,800 grams per liter
 Temperature: 15°C – 30°C (59°F – 86°F)
 Flow velocity: 2.5 m/s

APPLICATIONS

Washing Unit



Classification unit



Flotation unit



Thickeners





RESULTS

During a period of nine months (from April 2018) the ultrasonic density meters of Rhosonics were evaluated by the team at the OCP Beni Amir plant. The SDM met the requirements of OCP and the team was satisfied with the easy calibration and stable measuring results.

The SDM ultrasonic density meter contributes to:

- Real-time (non-nuclear) density monitoring
- Indication of the pump efficiency
- Avoiding pump obstructions
- Calculation of the production output (mass flow)
- Ability to directly detect changing process conditions
- Reaching the target density and production output
- No nuclear costs such as certification or disposal

MEASUREMENT ACCURACY

Local representative M2C has done the commissioning and calibration of all Rhosonics density meters at the Beni Amir plant. The measuring results of the ultrasonic density meters were validated with laboratory samples taken from the process during a period of nine months. The graphs in the right column show density values of the Rhosonics SDM compared with reference samples from the process in two of the four applications.

FURTHER INFORMATION

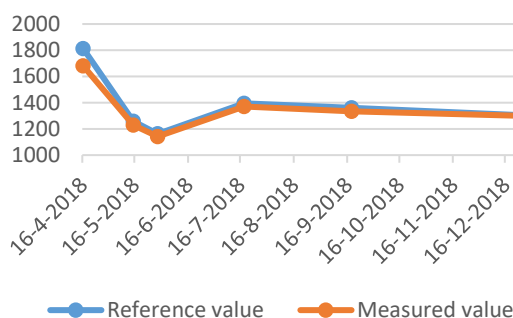
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MEASURING DATA

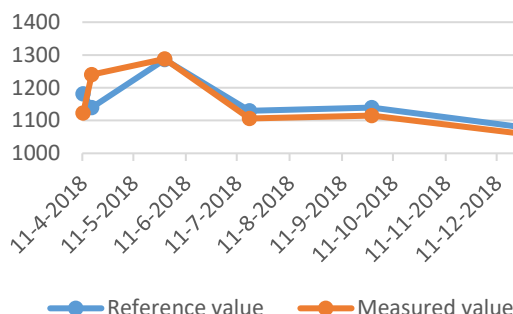
Washing Unit

Density measurement (cyclone outlet, washing unit) with an average deviation of 2% from laboratory values in 9 months



Classification unit

Density measurement (cyclone feed, classification unit) with an average deviation of 1% from laboratory values in 9 months



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