

*Reasons for density measurement  
in the process of dry tailings*



**REASONS WHY DRY TAILINGS IS IMPORTANT  
WHITEPAPER**

## INTRODUCTION

In this whitepaper we will share more information about the important reasons for density measurement in the process of dry stack tailings, and how important it is to maximize the water recovery in the process.

According to [CRC Care 2013](#), every year more than 10 billion tons of tailings are produced by mining activity. Globally, many mining sites struggle due to insufficient amounts of fresh water intake available in their regions; the dewatering process can capture as much as 90 percent of the water for reuse.



Figure 1: Thickeners at a mineral processing plant

## RISKS OF WET TAILINGS

In order to extract valuable minerals, mining companies have to move large amounts of earth. The waste resulted from this process is usually stored in a large pond, as a semi-liquid known as wet tailings. It is expected that these ponds are stable enough to withstand the pressure of the stored material, however, unfortunately history shows that this is not always the case. Some dam failures in the past years resulted in the loss of many lives and an environmental destruction on a large scale.

## WHY DRY STACKING?

Current generation engineering have shown that an alternate process known as dry stacking is a practical solution to semi-liquid tailings. In addition to achieving the dry tailing benefits, it is possible to recover valuable process water while dewatering the tailings slurry utilizing modern separation technology.

With environmental sustainability being seen as a key factor in modern mining, the method of dry stacking tailings is becoming increasingly popular. Dry stacking can eliminate concerns related to potential dam failures among other benefits, like:

- Optimized footprint of tailings storage and minimized fresh water intake
- Reduced dam construction with decreased operational costs
- Lower tailings risks and insurance rates
- Easier permitting and socio-political acceptance
- Low environmental impact and savings at the rehabilitation
- Resistance to high seismic activities



Figure 2 Brumadinho tailings dam failure in Brazil

## HOW IT IS DONE

Dry tailings are typically achieved through a multi-step process. The slurry is thickened or concentrated through gravity settling in a [thickener](#). The concentrated slurry is withdrawn from the bottom and clarified water exits through the overflow of the thickener. The thickened slurry is then processed through one of several types of mechanical dewatering equipment to achieve dry tailings for stacking.

Three devices proven to have various degrees of success with dewatering the thickened slurry are: belt presses; plate and frame chamber filter presses and decanter centrifuges. One example is given in the image below, showing the process scheme of the dewatering process by a tailings thickener and filter press.

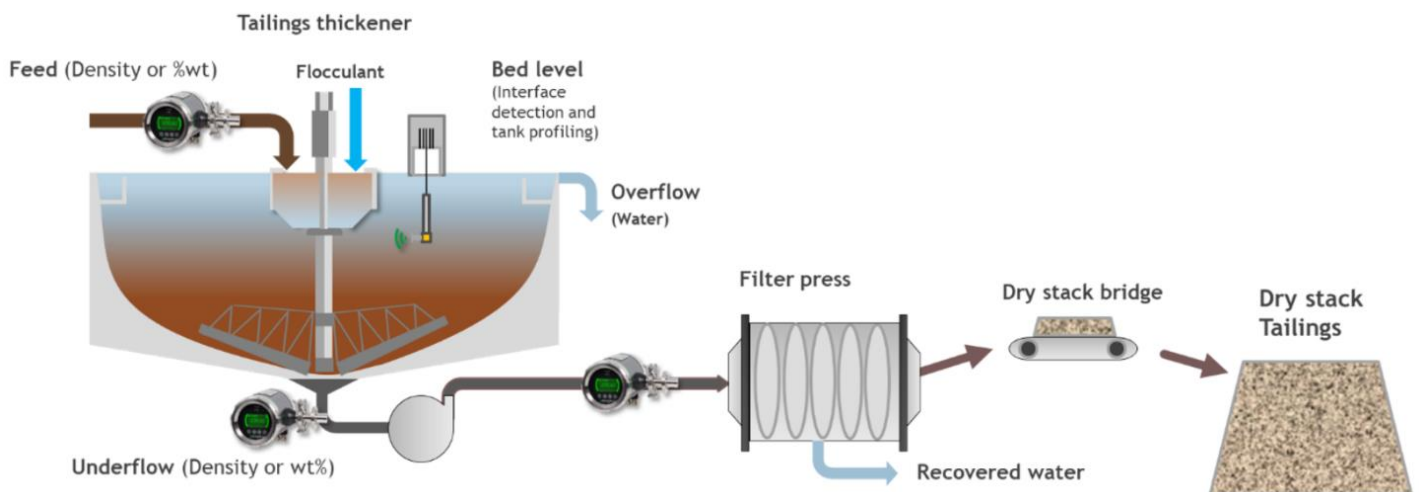


Figure 3: Tailings thickener and filter press to create dry-stack tailings

## DEWATERING PROCESS

### WHY DENSITY CONTROL IS IMPORTANT

In the process of dry tailings, which is basically just one step after the thickening process, the density value can be used to monitor and improve the dewatering process efficiency.

In a dewatering plant using a filtering station, a density meter in the inlet of the filter allows a control over the %solids being fed to the dewatering process, which must be within a certain range as established by the supplier of the filtering station based on the type of ore and tailings.

Keeping density stable means a more efficient dewatering process, resulting also in a better water recovery. By measuring density and flow in the inlet of the filtering station and calculating the mass flow, it is possible to then calculate the efficiency of the dewatering process based on the amount of dry solids from the outlet. In theory, the amount of solids being fed to the station should not differ much from the amount of solids in the outlet.

## BENEFITS OF DENSITY CONTROL

It was mentioned before that there are different modern dewatering technologies, and Rhosonics density meters have also been used in Decanter centrifuges. This type of equipment requires the use of flocculant in the separation process, therefore, a density control on its inlet allows for a precise dosage of such polymer, which will result in a highly efficient dewatering process.

Processing plants ideally want to have steady operating conditions, with an efficient and sustainable process. However, process conditions are subject to changes over time. When changes occur, real-time instrumentation and automation can help operators to keep control over the processes.

Main benefits of density measurement in dewatering processes:

- Maintain steady operations
- Efficient polymer dosing
- Improve water recovery
- Mass calculation

## CONCLUSION

As discussed in this whitepaper, density measurement is important, for monitoring and improving efficiency in the dewatering process. The density value can be a performance metric which is used to control and optimize the operation of separation equipment such as thickeners and decanters.

## MORE INFORMATION?

Rhosonics has more than ten years of experience in using ultrasonic technology for non-nuclear density measurements. Our density meters are used in different applications in mineral processing plants, such as, hydro cyclone feed, flotation feed, and in the thickening process.

Please contact us if you want to learn more about density measurement in a non-nuclear way. Our team is ready to help.

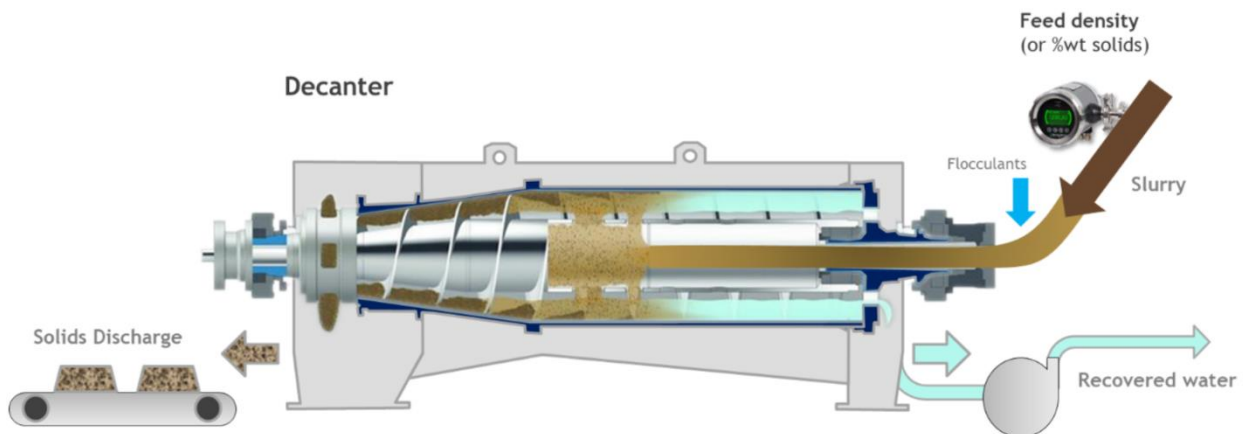


Figure 4: Decanter to create dry-stack tailings



## ABOUT US

Rhosonics helps the mineral processing industry to replace nuclear density gauges by non-nuclear ultrasonic density meters, through which a process optimization can be achieved, allowing a safer, more reliable, sustainable and cost effective operation. This is how Rhosonics contributes to a reduction of radiation devices. Reliability and excellence in measurements for a greener and smarter industry.



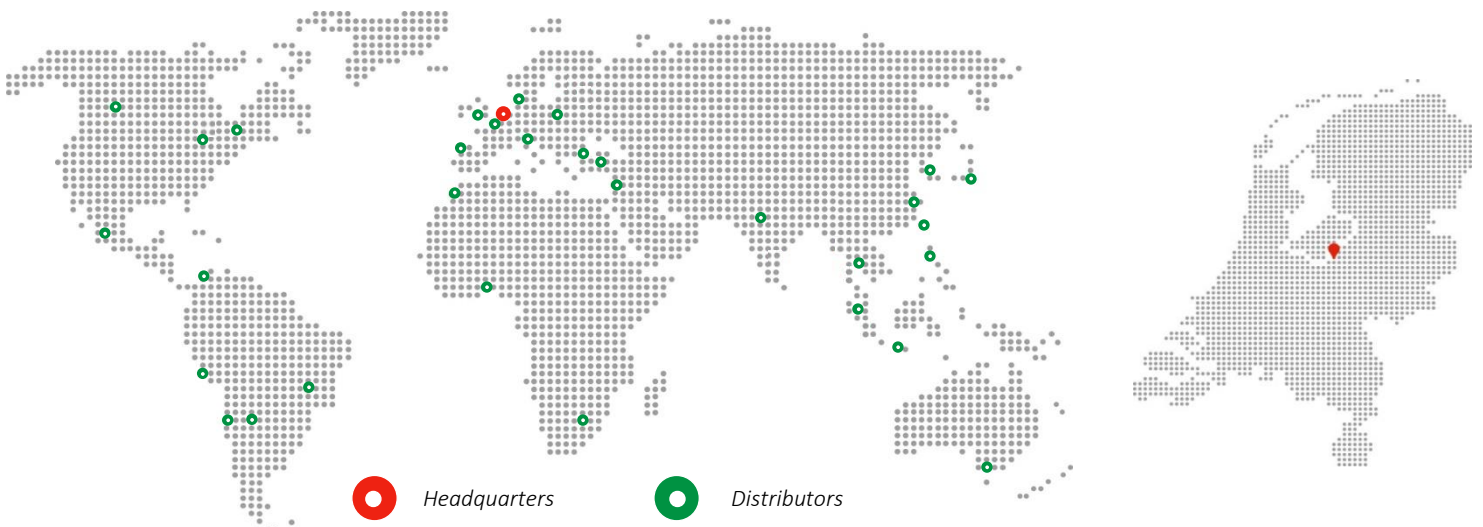
We proudly meet the requirements for the ISO9001 standard since 2010.

## CONTACT US

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