
NEWS

Automated Sorting at Mt Todd: improving processing efficiency

The application of automated sorting technologies is not new to the mining industry. In fact, these technologies are used all across the mineral sector from diamond production to coal. What makes Vista Gold automated sorting effective is the combined use of two widely applicable technologies, x-ray transmission (XRT) and laser sorting. By using a combination of XRT and laser sorting technologies, Vista Gold is able to lower their grinding circuit costs and improve overall process plant efficiency.

What is XRT?

At Mt Todd, gold is associated with sulfide and quartz mineralization. The first step of the sorting process at Mt Todd begins with XRT by measuring the density of the particles. The XRT technology x-rays the rocks while on a moving belt and the sensors measure the density differences in the ore, reflecting the results in real-time.

When the crushed rock moves through the XRT, the particles containing sulfides are easily identified by the sensors because they are more dense. This is similar to the use of x-ray technology in the medical field, where technicians are able to see the difference in tissue and bone because soft tissue appear gray and bones appear white. Once the sensors identify particles with potential value, a computer controlled air blast is used to capture these particles at the end of the belt.

What is Laser Sorting?

Once the ore has been sorted in the XRT process, the rejected pile of material is then taken to the second stage of sorting using the automated laser system. The laser works by scanning the particles. The sedimentary rock, appearing gray/black, will absorb the laser. The quartz, however, will appear to light up as it is penetrated by the laser. This allows the sensors to distinguish each particle of rock during the process.

NEWS

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This second stage of sorting helps Vista Gold collect more material worth value before it is discarded as waste.

What Timing is Associated with the Sorting Process?

Vista Gold's CEO, Fred Earnest put it best, "The key to the sorting technology is being able to identify, in a short amount of time, which rocks potentially have value, and which rocks have no minerals or value."

In order for the sorting process to be efficient, the ore must be processed at an incredibly fast rate. Testing completed in Germany showed that a production scale sorter with a 60 cm wide belt was able to sort between 800-1000 rocks per second on a belt moving 2.7 m/set. In order for this quick timing to be possible the system must be seamless.

What is the Gold Loss in Sorting?

Some of the material rejected does contain small amounts of gold. It is estimated that on average, approximately 1.3% of the gold delivered to the plant will be lost, but the grade of the material rejected is between .06 g/t and .23 g/t. It would cost more to process this material than the value of the gold that could be recovered.

How does the Sorting Process Reduce Operating Costs?

The last round of testing was completed as a bulk test in Germany. 20 tonnes of ore from the Mt Todd project were crushed and screened at 16 mm before the sorting process began. From there, about 18-20% of the sample was then sent for automated sorting test. About 4 tonnes from the original 20 was sorted first by XRT then by the laser technology. It was concluded that 10% of the run-of-mine feed to the process plant could be eliminated.

NEWS

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By eliminating that 10% it also ensures that grinding, leaching, and tailings handling costs are reduced by 10%. This cost is directly proportional to the amount of rock processed. By eliminating unnecessary grinding, Vista Gold saves time and money.

Vista Gold demonstrated the value of automated sorting and is incorporating it into the Mt Todd infrastructure. The return on investment is huge and the technology has proven itself, resulting in an 8% improvement in grinding circuit feed grade and reducing production costs by 10%. This technology has allowed Vista Gold to set the stage for a redesign of the grinding circuit, further improving process plant operations and efficiency.

About Mt Todd Project

The Mt Todd Gold project is located in the Northern Territory, Australia. Mt Todd contains approximately 5.9 million ounces of proven and probable gold reserves and is considered a “brownfield development” project with substantial existing infrastructure with operational access to all vital mining amenities including:

- Paved roads to the mine site
- Natural gas pipeline
- Power lines for present power needs
- Fresh water reservoir
- Tailings impoundment facility
- Trained and knowledgeable team of labor and technical personnel

Currently, automated sorting equipment is being designed specifically for the Mt Todd project.