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# Output

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## **Sustainability – through modernisation and optimisation**

Author: Richard Jenner

Every mining operation has budgets, production targets, business goals and a sustainability plan. Each of these operations aims to minimise capex, reduce opex and downtime, and increase profit and productivity. On top of this, there is growing pressure to be better corporate citizens, reduce our carbon footprint, and improve water management. Challenges we cannot control add further to the mix, such as metal prices and global economic performance. Achieving budgets and business goals requires the efficient use of all internal resources, such as; people, plant, raw materials, maintenance, reagents, and procedures.



### **How do you achieve these goals with current resources?**

Globally, mining operations are faced with the same general challenges. Ask any plant manager if they are operating efficiently, and within original design specifications, and the response will resoundingly be "no". This is due to many reasons - capital constraints, increased throughput, ore composition changes, aging plant - these are just some of the challenging variables.

Other factors could include manually operated equipment, high staff turnover, resulting in loss of local knowledge, limited personnel numbers who are focused on operation with no time for projects.

Without responding to these factors, the sustainability of an operation is threatened, and the consequences are obvious; plants run at low efficiency, with high operating costs, lower than desired grade and recovery, high maintenance costs, and so on. To achieve sustainability, plants must optimise and modernise.

Most sites have a good idea where their operational bottlenecks are, or which part of the plant is causing the most problems, but where should you start?

Process audits are an excellent way to benchmark current performance, review current operating and production targets. They are also extremely useful in identifying projects to meet or exceed budget targets and business goals. A process audit will answer the tough questions that threaten your sustainability.

- How do I get that extra 3% yield?
- How can I reduce water consumption?
- How can I reduce my power usage without reducing productivity?
- What gains can be achieved without capex?
- Where can I spend my limited capex for maximum returns?

The scope of a process audit will depend on your needs, and can range from basic to detailed, with either a narrow single process stage focus or broader site wide perspective. Depending entirely on the scope, a process audit may include:

- Site-wide mass, energy and water balance
- Overall and unit efficiency of existing plant (grinding, thickeners and flotation)
- Mechanical condition of existing plant (grinding, thickeners and flotation)
- Identification of bottlenecks and root cause analysis of performance issues
- Corrective actions and improvement opportunities identification
- Budgets, scoping, engineering, contracts, implementation, gains!



A skilled process audit team will approach your operation from a number of perspectives to determine your needs, including: metallurgical, process, mechanical, operation, maintenance, and personnel training. Looking at a minerals processing plant, the following are just some of the potential benefits from a process audit:

### Grinding

Particle size distribution and electricity consumption are the two main concerns for any grinding circuit. A process audit in the grinding circuit will:

- Determine optimum particle size distribution for maximum recovery
- Outline a process for efficient mill control
- Determine any potential for reduced power consumption

## Flotation

Flotation has come a long way since its inception over 100 years ago. The rate of technology development continues to increase rapidly. As a result of this, most new technology is designed to be retrofitted to existing flotation machines. The flotation circuit is where the quality and quantity of your final product is determined. Minor changes in the operation or design of the float circuit can have an impact on your bottom line worth \$millions. A process audit can result in benefits such as:

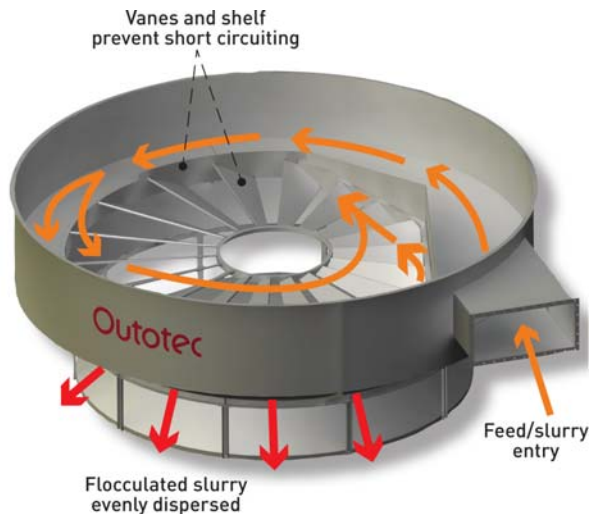
- Increased throughput of existing circuit
- Metallurgical performance improvements
- Step change power draw reduction
- Safer, quicker maintenance turnaround
- Reduced wear of consumable spares

For example, following a collaborative process audit at a gold mine in New Zealand between the site's metallurgical team and Outotec, it was determined the flotation circuit had inadequate flotation capacity, sub optimal recoveries, with high operation and maintenance costs. Following Outotec's installation of three TankCell® - 300s and automation technology, gold recovery increased by 3%, and the circuit was easier to maintain and operate.

## Thickening

Only minor deficiencies in thickener control can have a significant impact on downstream processes – dirty process water, high moisture filter plant feed, poor water recovery, high flocculant usage, and so on. The fact is, achieving effective thickener control is simple and economical.

- Am I achieving optimal underflow density?
- What benefits would I get from improved thickener control?
- Is my feedwell suitable for the current duty?
- Can I fix the froth problem?



*Outotec's new Vane Feedwell, a significant performance enhancer in the industry.*

### Potential audit benefits:

- Increased throughput of existing thickener
- Reduced flocculant usage
- Optimised underflow density control and moisture reduction
- Steady, reliable thickener control
- Improved water recovery and clarity
- Elimination of menacing froth problems
- Simple, cost-effective thickener retrofit, thereby minimising capex

For example, a process audit was performed on a mineral sands thickener. Following the audit, a new feedwell design was installed. This resulted in flocculant reduction of 10-20%, throughput increased by 10%, with less variability in underflow density.

## Automation

This is another area which can quickly yield results if the correct process and technology are in place. Typical questions to ask before determining the need for a process audit are:

- What does better level control mean for my circuit?
- What is the best way to automate my reagents?
- Am I getting the most out of my on stream analyser?

## Spares, service, maintenance and training.....

- Am I carrying enough critical spares to stay online?
- Do I know the lead times for critical spares that I don't carry?
- Is my preventative maintenance program suitable?
- Do my operators have the skills to run my plant optimally?
- Do we know how to effectively troubleshoot process upsets?

Answering no to any of these questions represents a risk to the sustainability of your operation. Not only will a process audit answer these questions, but will outline the corrective actions necessary to achieve sustainability. So it pays to ensure you are talking to the right people. Whether it is auditing your on-site technology such as the grinding or flotation circuit, making sure your operational staff are operating at absolute maximum efficiency through customised training packages or ensuring you have competent spare parts and maintenance programmes, the right people can make all the difference. And in today's market, with all the challenges facing mining operations, staying ahead is particularly critical.

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