

## Tramp Iron Systems

The presence of tramp iron, i.e. unwanted metal objects in process streams, can have a significant impact on the performance of almost any mineral processing plant. When considering the potential disruption to conveying systems, crushing equipment, separation equipment, the effects of unscheduled downtime, and risk to personnel safety, it can be argued that the optimisation of tramp iron removal may be one of the foremost priorities, even though the application is often not as visible as those unit operations in the main flow line.

The presence of tramp iron affects plants negatively in multiple ways:

- **Damaging equipment:** Conveyor belts, crushers, transfer stations. Separators (cyclones in particular), are all exposed to increased wear by tramp iron. Direct costs result from replacement of equipment, and indirect cost result from reduced availability through unscheduled shut downs.
- **Reducing effectiveness of equipment:** Tramp metal tends to build up in separators such as dense medium cyclones. Due to their shape, items do not get released easily and remain locked up in the separating vessel. Inside the vessel, the tramp metal acts like an agitator and causes mixing of sink and float fractions.
- **Safety risks:** In particular unscheduled maintenance events, such as emergency repairs on conveyors and crushers caused by steel, can lead to injuries and loss of life when unscheduled repairs have to be made during night time, bad weather or by inexperienced staff.

### Large potential for optimisation

Tramp Iron magnets in new and existing application often perform sub-optimally for a number of reasons.

Equipment selection and specification may have been inadequate at the design phase, possibly due to capital constraints, or lack of application-specific expertise. Newer design plants often need to cope with more demanding process conditions, for example high conveyor speeds, which are not always well understood by plant designers or equipment vendors. Process conditions may have changed; equipment may have been allowed to deteriorate over years. Often this goes unnoticed, leading to an unnecessary and ever-increasing failure rate in the plant, which may over time be accepted as 'normal'.

These deficiencies can be remedied through the analysis and evaluation of the overall system consisting of magnetic equipment, conveyors, pulleys and their relative location, in combination with the understanding of tramp metal sources and the type of process equipment most susceptible to damage by tramp metal.