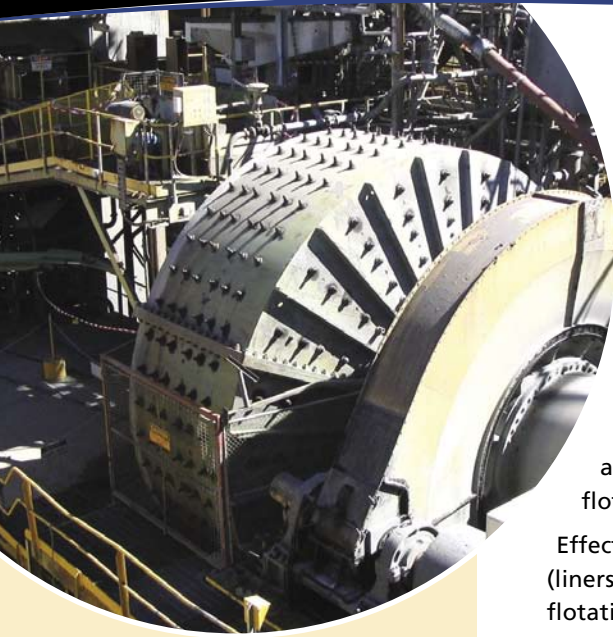


SAG Mill Control



Semi-Autogenous Grinding (SAG) is arguably the most commonly used method of comminution in mineral processing. In spite of this, many SAG mills do not run at their full potential.

Primary grinding consumes a significant percentage of plant operating costs and has a significant impact on the performance of downstream process, such as flotation.

Effective SAG mill control will maximise throughput, minimise damage to mill internals (liners and lifters) and contribute significantly to achieving maximum recovery in flotation.

Well designed and implemented SAG control will payback in weeks not years.

SAG mill control is essentially the stabilisation of mill load (and/or power) and density which can be implemented successfully and very cost-effectively on most modern PLC or DCS platforms.

The application of advanced regulatory control is a MIPAC speciality which we have applied productively in SAG milling and other mineral beneficiation processes.

Optimum performance, minimal capital expense *advanced control in your PLC or DCS*

Modern plant control systems, whether Programmable Logic Controllers (PLC) or Distributed Control Systems (DCS), are extremely powerful process control and automation engines.

In the mining industry these systems are used extensively for basic control functions, yet their use for more advanced process control is surprisingly less common.

By implementing advanced regulatory control in your existing DCS or PLC you can stabilise SAG mill load and density by manipulating variables such as feed-rate, mill speed and feed water. You thereby improve efficiency without purchasing new control software or hardware.

The MIPAC Approach:

MIPAC has successfully optimised SAG Mill control on both fixed and variable speed mills in both closed and open-circuit applications. Our approach is:

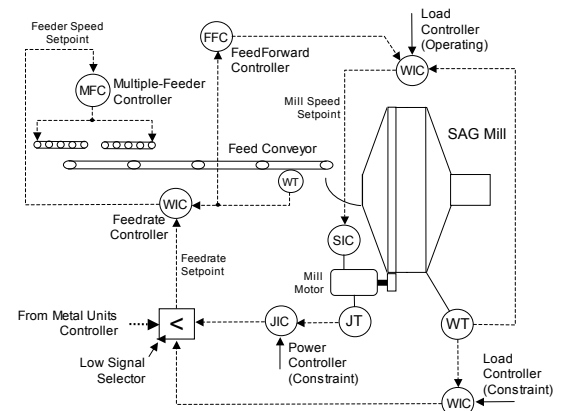
Cost-Effective – existing control infrastructure is used.

Robust – no need for extra computer hardware, software or network connections.

Maintainable – local plant personnel can provide day to day maintenance and support.

Appropriate – directly meets the client's real control requirements.

Flexible – can address other control issues not just SAG Mills.



Typical DCS Based Control Strategy



Example: Century Mine, Australia

MIPAC's recent experiences at MMG's Century Zinc operation in Australia (world's second largest open pit zinc mine) prove that automatic control of the SAG mill is very achievable using a PLC or DCS. Together with operating knowledge and appropriate techniques, high-quality control is achievable. At Century Mine, model-based, constraint, and multiple-output control were employed. The control was implemented using standard blocks in the plant DCS.

The resulting overall control strategy fulfils the operating objectives and controls the mill with minimal operator involvement over 95% of the time.

SAG Mill Control: FAQs & Myths

Why can SAG Mill control be difficult? The main reasons are often poor lower level control loops (particularly feedrate control); inappropriate tuning (particularly slow integrating loops); lack of and/or underperforming instrumentation; lack of metallurgical input.

Can my PLC or DCS be used for SAG Mill control? Yes without doubt. Most modern PLCs and DCSs have a sufficiently rich library of control blocks to build effective SAG Mill control strategies. We have experience with a number of suitable PLC/DCS systems which can be used.

Is a DCS/PLC more cost effective than an expert system? Yes, provided your control objectives are primarily concerned with mill load and density stabilisation, however if process optimisation is included (e.g. operating at the optimal load) then a rule-based expert system should be considered.

Can a SAG Mill be Controlled 100% on Automatic? No the operator is still required. Operator input should always be encouraged.

How long will it take to implement a typical system? With good instrumentation, 5 – 10 days on site.

Can a typical plant instrumentation person keep the system going? Yes if they are correctly trained. MIPAC can supply this training.

Can the system be monitored remotely? Yes we can discuss your requirements.

What should I do prior to installation of a MIPAC SAG Mill control system? The most important thing is to have a clear set of control objectives (e.g. stabilise mill load to a setpoint with an upper constraint power). Next ensure all instrumentation is well maintained and calibrated. Finally appoint a metallurgical champion who will act as the plant representative (this is very important).

Is a Process Control Audit required prior to Implementation of SAG Mill Control? Yes. An audit identifies control objectives, substandard instrumentation, and poorly performing control loops.

MIPAC Process Advantage™

MIPAC Process Advantage™ is the application of process knowledge and appropriate automatic techniques to stabilise and optimise industrial process. At MIPAC, we combine our experience with your process knowledge to collaboratively reduce variability and inefficiency, whilst improving consistency and increasing yield. **MIPAC Process Advantage™** can be applied at any level in a control hierarchy from basic regulatory control to plant wide economic optimisation strategies. Business success in a processing or production operation is directly related to how well assets are deployed and used to generate profits. **MIPAC Process Advantage™** ensures we have a good understanding of your plant operations and that we deliver the most appropriate strategies and tools to operate your plant assets as efficiently and profitably as possible.

MIPAC is a respected provider of process control, instrumentation and electrical engineering solutions to major, complex process and production facilities. MIPAC specialises in industries such as minerals and metals processing, pulp and paper, and food and beverage. MIPAC employees are some of the industry's most talented process control engineers and we have worked on more than 100 projects in over a dozen countries.

Learn more at
www.mipac.com.au

Postal:
PO Box 3129
Hendra Q 4011
Australia

Tel: +61 7 3212 5600
Fax: +61 7 3212 5699

Email: email@mipac.com.au
Web: www.mipac.com.au

ACN 097 111 772 • ABN 66 097 111 772
Effective: April 2010