



mipac

Project Overview Series '23

Australia Mining



## The hidden treasure down under: Australia's mining impact

Mining plays a vital role in the Australian economy, contributing significantly to its growth and prosperity.

Australia is rich in mineral resources, including coal, iron ore, gold, copper, and many others, making it one of the world's leading mineral producers. The revenue generated from mining exports substantially bolsters the country's economy, providing jobs, infrastructure development, and essential government revenues.

Moreover, the mining sector fosters technological advancements and innovation, enhancing Australia's global competitiveness. As a major contributor to the nation's Gross Domestic Product (GDP), mining ensures a robust economic foundation and underpins various related industries, including manufacturing and logistics.

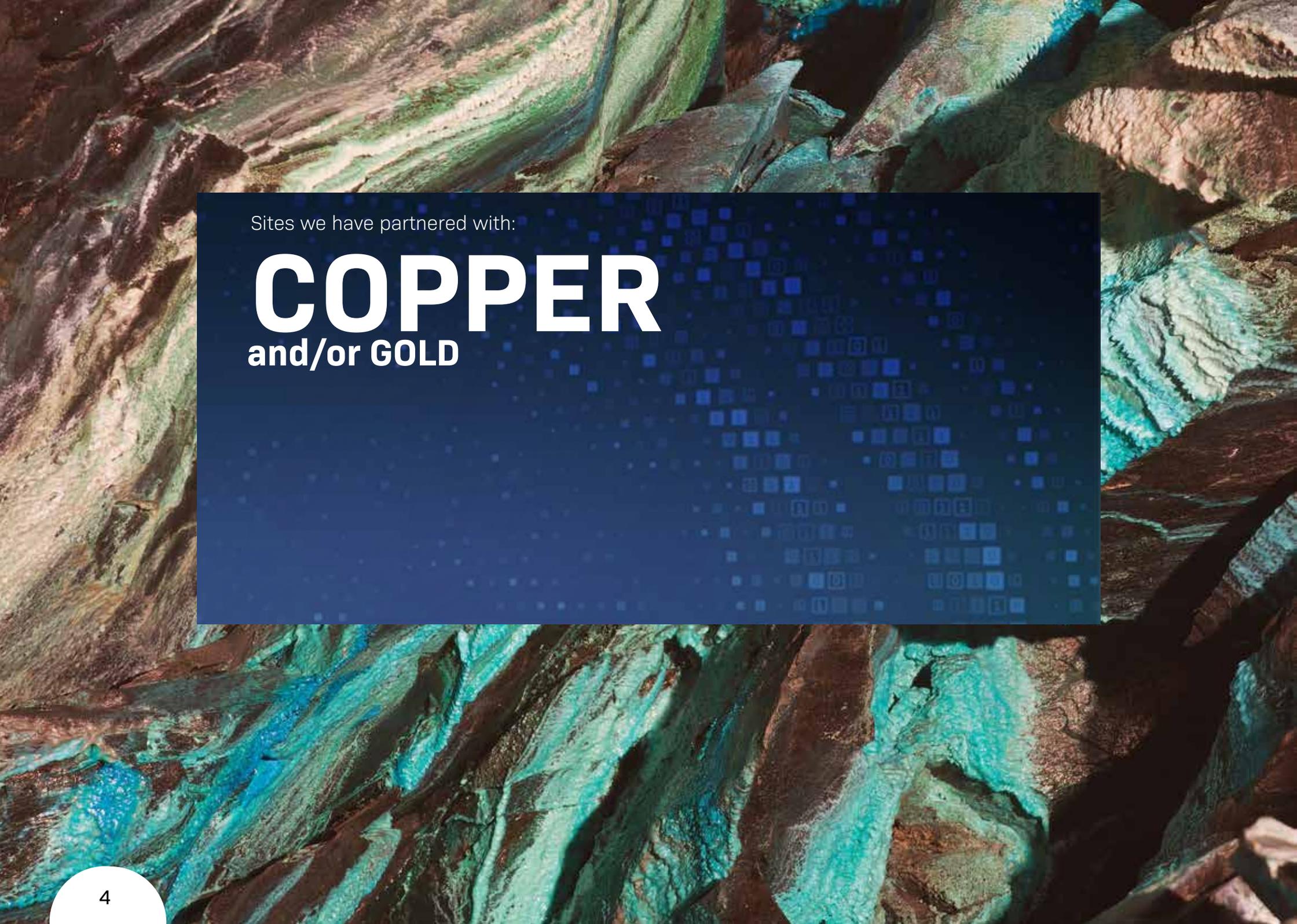
It's safe to say that the mining industry remains an economic cornerstone, solidifying Australia's position as a resource-rich and economically resilient nation.

# Australian Mining

## PROJECT OVERVIEW

Sites we have partnered with:





Sites we have partnered with:

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and/or GOLD

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## West Musgrave Project Profile

### Project Overview

Located in the Musgrave province of Western Australia, 1300km north east of Perth and 1400 northwest of Adelaide, BHP's West Musgrave project includes the Nebo and Babel nickel-copper deposits and the Succoth copper deposit.

Pre-feasibility studies presented the project as a low-carbon, low cost, long-life mine producing high-demand copper and nickel for renewables and electrification industries.

Once commissioned it will be a 13.5 Mt/y operations with average production over its 24 year operating life yielding circa 28,000 t/y of nickel and 35,000 t/y of copper.

Project:  
**Plantwide Control System**  
Greenfield Accelerated Startup

Sector:  
Mining

Client:  
Oz Minerals  
then BHP

Location:  
Musgrave, WA

Control System:  
Rockwell PlantPAX with  
fully integrated Rockwell  
drives

I/O COUNT:  
10,000+



## Vision Stage

December 2020 - February 2021

As part of the pre-feasibility stage, OZ Minerals identified an opportunity within the West Musgrave Project to take a further step forward in the maturity of the convergence of data and computer actions.

This opportunity gave OZ Minerals the ability to develop principles and operational philosophy, from the ground up, to leverage a fully integrated 'digital' mine.

OZ Minerals created a vision of the merging of digital technologies - Information (IT) and Operational (OT / PCS) - on which to build the digital mine and looked for assistance in turning their vision into action.

Mipac has been involved in developing highly integrated OT systems for complex operations all around the world and were engaged by OZ Minerals to help turn their vision into action.

Using the vision, Mipac created a high-level control system architecture design and an OT/control network design criteria, creating a robust design for the project to move forward with as the West Musgrave development progressed.

## Vendor Selection Stage

February 2021 - May 2021

Armed with a control system design criteria and network architecture, OZ Minerals wanted to know what the most optimal control system was to help fulfil their vision.

Mipac has experience in implementing most, if not all, control systems and were engaged by OZ Minerals to evaluate and recommend the control system to be used on the West Musgrave Project.

Using the vision, design criteria and architecture, Mipac engaged and evaluated a comprehensive number of control system vendors, producing a final recommendation.

## Early Works Stage

June 2021 - November 2021

Following the control vendor selection, Mipac was engaged to develop the specifications to provide a basis of design for the West Musgrave Processing Plant Process Control System (PCS).

In this early works phase, Mipac developed:

1. Plant control system basis of design
2. PLC/controller specification
3. SCADA/HMI specification
4. Alarm strategy specification
5. System architecture drawings
6. Network specifications

Mipac also provided budget estimates for the West Musgrave Control System as part of the feasibility studies.

## Early Detail Stage

December 2021 - December 2022

Following the basis of design and specifications for the West Musgrave PCS, Mipac were engaged to complete early detail design. In this early detail phase, Mipac developed:

1. Control network architecture for the minerals processing plant
2. Rockwell PlantPAX standards - These standards were issued and used by vendors providing a control solution, providing a standardised and integrated PCS for West Musgrave.
3. Fieldbus I/O Design - with EPC contractor
4. PCS panel design
5. Communications panel design

## MAC Stage

April 2023 - current

Following the early detail design phase, Mipac was engaged to provide Main Automation Contracting (MAC) for the West Musgrave Project (now owned by BHP).

As the MAC, Mipac is responsible for delivering a complete and operating integrated process control system (PCS) for the West Musgrave Project, which will monitor, control, ensure plant and asset safety, manage plant operations and achieve business objectives.

Once completed, the site will have fully integrated operational processes and systems, enabling more efficient and dynamic energy management as well as integrated operations, reducing its green footprint as well as the requirement for personnel to be on site.

This work is expected to take two years and engage up to 16 staff.

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## Mount Isa Mines Project Profile

### Project Overview

Mount Isa Mines Copper operates two 525 tonne per day oxygen plants to supply gaseous O<sub>2</sub> to copper and lead smelting operations. A steady and reliable supply of oxygen is critical to maintain current production levels within the copper and zinc/lead streams.

Since 1991 both plants have been controlled using a Yokogawa uXL distributed control system, which is no longer supported by Yokogawa. This project involved the replacement of the uXL system with the current Yokogawa CS3000 DCS.

Project:

**Oxygen Plant DCS Control System Upgrade**

Sector:  
Mining

Control System:  
Yokogawa

Client:  
Glencore

Location:  
Mount Isa, QLD  
Australia

### Mipac Scope

- Reconfigure all plant controls to the CS3000 DCS
- Install and commission new DCS
- Perform FAT and live plant testing
- Provide operator support during plant startup
- Enhance graphics and control strategies

### Project Highlights

- Seamless replication of uXL configuration in CS3000
- Software developed to automate conversion
- Improvements to control strategies and operator HMI
- Reliable DCS platform for critical plant operation
- More maintainable DCS platform
- No loss in oxygen to critical plant operations

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## Mount Isa Mines Project Profile

### Project Overview

Mount Isa Mines (MIM) selected Mipac to help replace aging distributed control systems for its Mount Isa copper smelter. The previous system was a Yokogawa MicroXL which the supplier no longer supports.

Mipac worked with MIM in the lead-up to and during a planned full shutdown to re-brick the smelting surface of its copper ISASMELT™. This only happens once every three years and the timing is tight, with the cost of downtime running into millions per day if delayed.

Mipac configured the new control system (Yokogawa CS3000 hardware and software) with very little change to operations and it now controls process areas of the feed preparation system, copper ISASMELT™ and rotary holding furnaces.

Project:

**Copper Smelter: Control System Conversion**

Sector:  
Mining

Control System:  
Yokogawa

Client:  
Glencore

Location:  
Mount Isa, QLD  
Australia

### Mipac Scope

- Mipac replaced the existing Yokogawa MicroXL control system with the then current CS3000; configured, tested and commissioned the control system and supervised the installation changeover
- Mipac also provided additional value to MIM, assisting in areas such as test documentation preparation

### Project Highlights

- Mipac's familiarity with MIM's plant, knowledge of the Yokogawa control system and excellent working relationship with MIM, resulted in a DCS changeover that was completed ahead of schedule and under budget, creating no disruption to the scheduled shutdown

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## Mount Isa Mines Project Profile

### Project Overview

This \$100M brownfield project covered the design, installation and commissioning of off-gas handling, acid neutralisation and copper recovery circuits associated with Copper Smelter off-gas feed to a new Sulphuric Acid plant.

Mipac was engaged to deliver the conversion and upgrade of the plant's Yokogawa control system

#### Project:

**Acid Plant Gas Handling – Control System Conversion and Upgrade**

**Sector:**  
Mining

**Control System:**  
Yokogawa

**Client:**  
Glencore

**Location:**  
Mount Isa, QLD  
Australia

### Mipac Scope

- Design, installation supervision and commissioning of instrumentation and control system
- Re-design, installation and commissioning of control system for existing Pierce Smith Copper Converters
- Training of site personnel on new control system

### Project Highlights

- Conversion of existing controls from Yokogawa  $\mu$ xl to CS3000
- Interfaces required to other party's Centum CS controlled Acid Plant
- Cutovers and conversions required amongst operating plant
- Project completed successfully in arduous, brownfield environment without lost production or safety incidents

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## Mount Isa Mines Project Profile

### Project Overview

Mount Isa Mines copper operations embarked on a four year project to improve environmental standards and in particular, to reduce emissions of Sulphur Dioxide (SO<sub>2</sub>).

Mipac played a key role early in the project to make improvements to process control. Mipac's work has resulted in a significant reduction in emissions (40%), as well as less wastage of SO<sub>2</sub> from their secondary copper smelter in Mount Isa.

By applying our process control experience in an operating environment.

**Project:**

**Copper Smelter Emissions Reduction**

**Sector:**  
Mining

**Control System:**  
Yokogawa

**Client:**  
Glencore

**Location:**  
Mount Isa, QLD  
Australia

### Mipac Scope

- Design, configuration and installation of control improvements, including:
  - Modify and improve DCS configuration
  - Upgrade and replace control field equipment
- Install optical flow-meter at secondary smelter for constant monitoring of SO<sub>2</sub> concentration in emissions

### Project Highlights

- Physical configuration now replicates the existing PLC I/O slot layout and I/O assignment. This ensured that the physical change-over of hardware and connection of existing wiring to the new cards was as simple as possible
- Left minimal footprint and very little disruption to operation

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## Mount Isa Mines Project Profile

### Project Overview

Mipac was selected by Mount Isa Mines to manage the replacement of aging Programmable Logic Controllers (PLCs) for three chilled water pump stations at the underground copper mine.

In the underground mines, oxygen is depleted and good ventilation along with the ability to efficiently cool the air is paramount for the safety of mine workers.

The existing PLCs were about twenty years old and becoming increasingly difficult to maintain.

Upgrading and improving automation of the control of the chilled water pump stations was essential to maintaining safe and efficient operations.

#### Project:

**Mine Ventilation: Underground Chilled Water Pumping PLC Replacement**

#### Sector:

Mining

#### Control System:

Allen Bradley,  
Compact Logix

#### Client:

Glencore

#### Location:

Mount Isa, QLD  
Australia

### Mipac Scope

- Replace existing Toshiba EX100 PLCs with Allen-Bradley PLCs. Mipac was responsible for the design, specification, supply, installation and configuration of these PLCs
- Program the same logic from the existing PLCs into the four new PLCs
- Provide training and documentation in the system to Mount Isa Mines U/G refrigeration maintenance personnel so they can independently carry out trouble-shooting and make changes to the programmed logic

### Project Highlights

- Physical configuration now replicates the existing PLC I/O slot layout and I/O assignment. This ensured that the physical change-over of hardware and connection of existing wiring to the new cards was as simple as possible
- Left minimal footprint and very little disruption to operations

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## Mount Isa Mines Project Profile

### Project Overview

Glencore Mount Isa Mines refurbished their existing flotation cells and associated equipment within the Copper Concentrator during 2015 and 2016.

The plant was more than 40+ years old and the refurbishment was targeted to allow the concentrator to operate at a high levels of reliability and availability for the remaining life of the mine.

A new concentrate cleaning circuit consisting of three (3) new Jameson cells was installed in 2015 to provide improved recoveries. The existing cleaning circuit was re-tasked to provide an additional 3rd flotation line.

Project:

**Copper Concentrator Flotation Refurbishment Upgrade**

Sector:

Mining

Control System:

Yokogawa

Client:

Glencore

Location:

Mount Isa, QLD  
Australia

### Mipac Scope

- Develop new functional description.
- DCS Configuration including:
  - Advanced control sequences using SEBOL programming code and sequence function charts for startup/shutdown, feed and recycle modes
  - Removal of redundant logic and re-tasking of logic for existing services
- FAT testing
- Develop commissioning check sheets for instrumentation and motor control
- Commissioning activities including:
  - Calibration, set-up and commissioning of level transmitters (hydrostatic and radar); associated with froth level and feed sumps
    - Calibration, setup and commission of valves and flowmeters
  - for VSDs and DOL drives. Pre-commissioning and commission motor controls
- Functional testing and SAT of Jameson Cells
- As-built documentation and drawings

### Project Highlights

- Jameson Cells are performing at higher than expected results

# PROCESS OPTIMISATION

## Case Study

A major copper producer was experiencing low gold and copper recoveries due to plant instability.

The operations team would revert to manual control of equipment rather than rely on the automated controls.



### Client's challenges:

- Limited visibility of underperforming root causes
- Restricted capability to safely deliver on Life of Mine production

### Custom solution:

Co-designed and co-delivered a multi-pronged stage gated automation roadmap



### Key work fronts:

Production intelligence

- ✓ improved decision making

Capability development

- ✓ sustained value creation

Process control optimisation

- ✓ increased process stability

### Results:

**15%**  
improvement in gold recovery

**6%**  
improvement in copper recovery



### Returns:

**+19%**  
EBITDA (est)

**~\$USD 164M**  
per annum

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## Mount Isa Mines Project Profile

### Project Overview

Operational staff at both plants including plant operators, metallurgists, reliability engineers, maintenance engineers and plant management relied on the [AVEVA] OSIsoft PI data for operational reporting as well as operational performance evaluation.

MIM personnel had relied upon various excel based reports, generated manually, in order to fulfil their monitoring and evaluation tasks and wanted a more reliable and less time consuming method using their existing OSIsoft PI system.

#### Project:

**PI-AF design and configuration,  
operational data visualisation and  
report automation**

#### Sector:

Mining

#### Client:

Glencore

#### Location:

Mount Isa, QLD  
Australia

#### PI-AF scope:

+700 PI-AF elements, data  
update every 5 seconds,  
segregated in to +100 AF  
element templates

+178,000 event frames (part of  
control loop analysis)

+500 roll-up analyses (results  
stored as PI points)



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## Mount Isa Mines Project Profile

### Project Overview

In 1996, Mount Isa Mines (MIM) operations went through a >AU\$300M Copper Smelter upgrade to increase plant throughput. The upgrade included the installation of new Oxygen Plant, Converter, Stack Fan, Feed Preparation System, Storage Facility, and a Natural Gas Distribution and Burner control to the new and existing plant. Mipac worked in conjunction with Fluor Daniel to deliver electrical, instrumentation and control scope of works for the project.

A Krupp Circular Stacker/Reclaimer was installed at the new Storage Facility and utilized a Chevron Stacking Method to blend the ore from Isa Mine and Ernest Henry Mine.

**Project:**  
**Copper Smelter Upgrade**

**Sector:**  
Mining

**Control System:**  
Yokogawa

**Client:**  
Glencore

**Location:**  
Mount Isa, QLD  
Australia

### Mipac Scope

- Detailed design for instrumentation and controls
- Engineering design calculations
- Preparation of drawings associated with cabling design, equipment layout, GAs and SLDs
- Develop functional description, instrument list, instrument datasheets
- DCS Configuration - High level logic including:
  - Positioning control, luff and
  - slew (stacker) and rotation (reclaimer)
  - Stockpile blending for Chevron length, height and indexing
  - Reclaim rate calculated on requirements from Smelter Feed
  - FAT testing.
  - Design of UPS Systems, DCSs, Communication Equipment, Field Devices, Ca-bling, and CCTV packages
  - Develop and prepare installation scope of work packages and provided installation supervision
- Commissioning activities including:
  - Calibration and commissioning of the belt weighers and instrumentation
  - Functional testing and SAT of anti-collision system
  - As-builts drawings and documentation
  - Vendor liaison with Krupp

### Project Highlights

- Mipac was involved in further control system upgrades and plant modifications for the stacker/reclaimer

## Mipac Scope

- PI-AF based plant hierarchy design and development including calculations and roll-up analyses
- Implementation of MIPAC Process Advantage™ (MPA) as the seamless visualisation tool that interfaces with the plant OSIssoft PI system and presents plant information in pre-configured templates.
- Combined design process along with client to capture PI-AF tree structure
- Migration of previous MS Excel reports to standard report templates implement-ed via MPA
- Ongoing support and system

## Project Highlights

- Use of custom developed (.NET environment) analyses back-fill tool. This minimised time and costs involved in updating the PI data archive
- Aggregate data from multiple plant sources using standard PI interfaces
- Designed from the start, a PI-AF tree was created in conjunction with key users, plant management and project sponsors to ensure it meets the requirement for various departments and tasks
- The PI-AF tree contains +700 elements with input data update every 5 seconds. Elements were

classified in to +20 templates

- +500 roll-up analyses are utilized for various KPI calculations and aggregation
- Seamless integration of MPA with PI which requires configuration of the tree at only one source (PI-AF)
- Minimising project costs by remote engineering from Mipac's Brisbane

## PROJECT RtDUET Delay Accounting

SECTOR:  
Mining

Client:  
Glencore

Location:  
Mount Isa, QLD  
Australia

Machine Centres: 34

## Mipac Scope

- Evaluate existing MS Excel based delay accounting system for strengths, errors and opportunities for improvement
- Replace existing MS Excel based delay accounting system with RtDUET for both the Copper Concentrator and the Copper Smelter
- Configure RtDUET with Glencore's global standard time usage model (TUM). Apply automated and advance triggers and customised reporting to compliment RtDUET's out-of-the-box reporting capability
- Train operators, reliability engineers and metallurgists the operation and administration of RtDUET
- Provide MIM ongoing OSIssoft PI, RtTech RtDUET and Mipac MPA support and deliver small projects to optimise and further automate the reporting as user sophistication increases.

## Project Challenges

This was one of Mipac's first RtDuet implementations and has gone through many upgrades in the time since.

Standardising the configuration between separate assets has enabled better integration and comparison across the enterprise.

## Project Highlights

- Reliable and automated delay accounting system meaning Reliability Engineers and Metallurgists could spend less time compiling data and more time optimising the operation
- Greater data capture, accuracy and visibility of delay events providing greater confidence that the correct priorities were being addressed
- Advanced automated delay triggers applied to minimise manual operator input.

# COPPER + GOLD



## Ernest Henry Mine Project Profile

### Project Overview

The Ernest Henry Mine, situated near the town of Cloncurry in Queensland, Australia, is a prominent and renowned copper and gold mining operation.

This mine, which began production in 1998, is operated by Glencore and has established itself as a key player in the region's mining industry. With its rich deposits of copper and gold, the Ernest Henry Mine has contributed significantly to the local economy and the broader Australian mining sector.

Our involvement in this \$310M greenfield design and construction of copper/gold mine and concentrator included the design, configuration and commissioning of the plantwide Yokogawa control system.

#### Project:

**Plantwide control system design and commissioning**

**Sector:**  
Mining

**Control System:**  
Yokogawa

**Client:**  
Glencore

**Location:**  
Cloncurry, QLD  
Australia

### Mipac Scope

- Client representative for instrumentation and control systems
- Control system engineering and configuration
- Commissioning
- Post-commissioning operations support

### Project Highlights

- Rapid start-up to nameplate capacity
- Very stable process control
- Fast and effective transfer of technology to maintenance and operations

# COPPER + GOLD



## Ernest Henry Mine Project Profile

### Project Overview

Glencore's Ernest Henry Mining transitioned its copper / gold mine near Cloncurry from an open pit to an underground operation, significantly increasing plant production and adding at least 14 years of life to the site.

Mipac commenced work on the \$589 million (AUD) brownfield project as the lead control system designer.

#### Project:

**Transition from Open-Pit to Underground Mine | E, I & C Design**

#### Sector:

Mining

#### Client:

Glencore

#### Control System:

PLC SCADA

Wonderware Information Server

### Mipac Scope

- The scope included E,I&C, design, PLC standards definition, software configuration, installation, commissioning and support
- Worked on the underground mine infrastructure, dewatering, and crushing, handling and conveying works
- Defined, developed and implemented control system standards and specification documents that were adopted across the site
- Advised on enhancements to site automation and functionality, conducted operator training and formulated PLC and SCADA specifications and standards that were adopted across the site
- Managed the transition of the project from 'projects phase' to 'operations and maintenance phase' by liaising with various client teams, developing procedures and practices as well as upskilling staff through training programs

### Project Highlights

- Recommended the implementation of the Wonderware Information Server solution for aggregating and presenting plant production and performance data via the web to smart devices.
- Executed a 24/7 remote application support contract to support operations and maintenance teams. This support contract has been continued into 2015-2016
- Maintained high levels of compliance to client safety management systems and had no incidents.
- Met stringent project cost and schedule constraints.

# COPPER + GOLD



## North Parkes Mine Project Profile

### Project Overview

Northparkes is a copper and gold mine located 27 kilometres north-west of Parkes, in the Central West of New South Wales, Australia.

The operation is made up of an underground block cave mine, a sub-level cave and an ore processing plant which produces copper concentrate for export.

In the project Mipac improved plant performance through:

- **Increased plant throughput**
- **Improved circuit stability**
- **Increased SAG Mill liner life**

### Project:

**Grinding Mill and Flotation Control**  
Brownfields Grinding and Flotation Optimisation

### SECTOR:

Mining

### Client:

CMOC

### Location:

Parkes, NSW,  
Australia

### Control System:

Citect HMI  
Schneider PLC

### Mipac Scope

Mipac was asked to improve the stability of the

- grinding (SAG/Ball) mills and
- flotation plant (conventional and Jameson cells),

through improved instrumentation and control strategies.

### Mipac Solution

- Design, install and commission control loop in grinding and flotation plants
- Specify novel instrumentation solutions (Flash flotation density control)
- Training site personnel on practical loop-tuning techniques

### Outcomes

- Design and commissioning of stable SAG mill power / load control
- Averaging-level control on all sumps
- Accurate hydrocyclone pressure control
- Flotation level control (including feedforward control)
- Successful transfer of process control skills to site personnel

# PROCESS OPTIMISATION Case Study

A copper operation was looking to **increase throughput** as part of an **expansion** study

The tailings thickener was identified as a bottleneck to successfully achieve the required **increased throughput rates**

## Approach

- ✓ Review control philosophy
- ✓ On-site audit of instrumentation
- ✓ Revised control strategy development

## Key Opportunities

debottleneck  
the thickener

increase density  
to tailings

improve  
water recovery

## PROCESS CONTROL IMPROVEMENTS

✓  
Implement feed  
forward control to  
floculant dosage

✓  
Upgrade faulty  
thickener  
instrumentation for  
utilisation in more  
advanced controls

Delivering:

**23%**

reduction in  
floculant dosage  
rates

Increased  
throughput with  
minimal CAPEX  
investment

**OPEX**  
saving

**~\$USD 140K**  
per annum



Sites we have partnered with:

**ZINC**

# ZINC



## Dugald River Mine Project Profile

### Project Overview

Dugald River Mine is a greenfield mine and concentrator located 65km north-west of Cloncurry in Queensland.

Dugald River Mine is a global top 10 zinc mine processing on average 1.7Mtpa to produce 170Ttpa of zinc concentrate.

With production commencing in 2018, the Dugald River Mine has quickly become one of the world's top producers of these essential base metals. Operated by MMG Limited, a global resources company, the mine is renowned for its high-grade ore deposits and modern, environmentally responsible mining practices.

#### Project:

**Greenfield fast-tracked Configuration  
HMI Design Commissioning**

**Sector**  
Mining

**Control System:**  
Schneider M580 PLC,  
Wonderware

**Client:**  
MMG

**Location:**  
Cloncurry QLD,  
Australia

### Mipac Scope

- Plantwide control system, full concentrator, crushers to thickeners/filters
- Develop standards and functional descriptions
- Control system engineering, HMI design and configuration
- FAT (factory acceptance testing) and architecture optimisation
- Plant control system commissioning

### Project Highlights

- Fast-tracked project, first production achieved ahead of schedule
- Working seamlessly with Dugald River Mine stakeholders to achieve plant commissioning project milestones across multiple organisations
- Advised and developed control standards for MMG
- Smooth transition from project commissioning to operational support

### Results

- Optimisation of control system architecture to achieve plant control performance
  - Plant commissioning and first production delivered ahead of schedule
  - Coherent transition from project to 24/7 remote support of operations
- Seamless evolution from project design/commissioning into operational process and production optimisation

# ZINC + LEAD



## Century Mine Project Profile

### Project Overview

New Century Resources' Century Mine, located in the Gulf of Carpentaria in Queensland, Australia, is a significant operation specializing in the extraction of zinc. This mine, which officially commenced production in 2018, stands as a key player in the global zinc market.

The Century Zinc SAG mill has been the subject of two major advanced control projects since its commissioning in 1999. Over time, both systems failed to meet the mill's needs and operating staff lost confidence, preferring to operate the mill semi-automatically.

The first system used expert system technology and failed because of a lack of site-based experience and expertise. The second system, although DCS-based, was unnecessarily complicated, failed to deliver performance and did not meet operating objectives.

### Project:

**Zinc and Lead operation: SAG Mill  
Stabilising Control**

### Sector:

Mining

### Control System:

Foxboro

### Client:

New Century

### Location:

Lawnhill QLD,  
Australia

### Mipac Scope

Mipac provided a practical solution for SAG mill control using four key strategies:

- determining Century personnel's real requirements
- making the best use of the plant DCS (e.g. model-based control)

- loop-tuning and commissioning skills
- supporting operators to understand and use the system

### Project Highlights

- Mipac developed a robust control strategy which stabilised the SAG mill and met operating objectives.
- Operators saw the control strategy as a valuable tool in the day-to-day operation of the primary grinding circuit

# ZINC



## Mount Isa Mines Project Profile

### Project Overview

Mipac was engaged by Mount Isa Mines to automate and optimise key processes in its zinc concentrator with the provision of an advanced control solution that integrated with existing systems and lead to a significant improvement in throughput and recovery of precious metal.

The project applied advanced control strategies to stabilise control and manage (optimise) throughput for grinding (Rod & Ball Mills, SAG Mill & ISAMILL™ Fine Grind) and flotation.

Project:

**Advanced Control Strategies to optimise Zinc Concentrator operations**

Sector:

Mining

Control System:

Csense® rapid process

Client:

Glencore

Location:

Mt Isa QLD,  
Australia

### Mipac Scope

Mipac provided a practical solution for automating and optimising core processes using these three key strategies:

- Analyse the plant to gain insight into operational strategies
- Shape control systems to address plant wide issues
- Tailor the CSense® control system to address plant demands

### Project Highlights

These advanced control strategies improved operations by stabilising production, allowing the plant to operate consistently at optimum capacity, leading to a higher quantity of high grade recovered precious metal.

[Glencore] operational staff have access to early, relevant analysis with real-time provision of data that highlighted plantwide production and operational information.

# ZINC



## McArthur River Mine Project Profile

### Project Overview

Mipac was appointed to develop the DCS interface for the \$360 million expansion of the Glencore-owned McArthur River Mine (MRM), located about 1000 kilometers south-east of Darwin in Australia's Northern Territory. The Phase 3 development of the mine is expected to more than double zinc and lead production — raising production from 3 million tonnes to 5.5 million tonnes a year by 2014 — making MRM the largest zinc resource in the world and extending the life of the mine to 2038.

Mipac had previously been involved with design, programming and commissioning of the plant DCS (Yokogawa) for original startup (1995) and for the heavy medium plant (2011). The Phase 3 project scope was to interface the new plant areas and extend the plant wide control system (PWCS) using the latest Yokogawa DCS and VNET/IP (gigabit network).

### Project:

**Plantwide Control System (Phase 3)  
expansion for Zinc Concentrator**

### Sector:

Mining

### Control System:

Yokogawa Centum VP

### Client:

Glencore

### Location:

Northern Territory  
Australia

### Mipac Scope

- Control system design, software configuration, integration, testing, commissioning of the extended PWCS to incorporate the following new plant areas:
  - a new power station
  - a primary crushing plant
  - a secondary/tertiary crushing plant
  - a 11.5 Megawatt ball mill
  - an upgrade to the IsaMill™ regrind circuit (the site has eight IsaMills™)
  - nine new rougher flotation cells
  - a new concentrate dewatering filter
- Development of PWCS software standards
- FAT, site commissioning and operator training

### Project Highlights

- Development of suitable control strategies to maximize mineral recovery
- 3rd party package plant interfacing, including integration of Smart MCC's
- Mipac has since developed an eLearning training course for the site that enables online learning on plant specific control system application and trouble-shooting
- Mipac are currently engaged on a 24/7 remote support contract that enables phone, email as well as remote application configuration support on DCS & other plant PLCs as well as the plant PI system

# ZINC



## New Century Mine Project Profile

### Project Overview

The Century mine operated for 16 years producing Zinc concentrate until the original ore reserve was depleted and the plant mothballed. New Century Resources restarted operations and are reprocessing the tailings through the concentrator to extract the remaining zinc.

New Century did not have extensive systems in place when the plant was restarted and wanted to implement a strategy to improve the operation. Mipac had already been involved by providing support for New Century's AVEVA (OSIsoft) PI system and was asked to scope and execute an automated delay accounting project. Mipac was engaged to implement RtDUET to capture and track delays in the concentrator to improve operation.

**Project:**  
**RtDuet Delay Accounting**

**Sector:**  
Mining

**Machine Count:**  
10

**Client:**  
New Century  
Resources

**Location:**  
North West Queensland,  
Australia

### Mipac Scope

Facilitate a full-day workshop to establish delay accounting requirements.

Develop scope of work, detailed execution plan and design specification.

Procure, supply and install RtDUET on a dedicated server.

Remotely configure RtDUET delay accounting system with 10 machine centres, automated triggers and out-of-the-box reporting.

Develop tailored digital training materials and remotely deliver RtDUET training to the operators and engineers at New Century Resources.

### Project Challenges

The initial workshop was completed in-person in Brisbane, with all subsequent configuration and training completed remotely.

### Project Highlights

Robust, accurate and reliable delay accounting system implemented to automatically capture, track and report delay events.

Improved identification of process bottlenecks ensuring maintenance activities were focused on the highest priorities.

Greater collaboration across the organisation to optimise operations across the concentrator.

Sites we have partnered with:

# IRON ORE

# IRON ORE



## TAKRAF Semi-Mobile Crushers Project Profile

### Project Overview

Tenova's TAKRAF is recognised as the world's leading technology brand when it comes to handling high capacity run-of-mine and bulk material handling including crushers. A considerable number of mines around the world, including Roy Hill in WA, opt for a semi-mobile crushing plant as these are in many ways an ideal compromise between flexibility in the pit and the required improvement of carbon footprint by reducing truck haulage following pit advance. These plants are designed in such a manner that they can be relocated through the use of transport crawlers and/or multi-wheelers.

Mipac was appointed by to design and configure the control system for three semi-mobile crushers at a major project in Western Australia's Pilbara region.

### Project:

**Crusher Control for 3 Semi-Mobile Crusher Stations**

### Sector:

Mining

### Client:

Tenova

### Control System:

PLC – Rockwell  
Control Logix

SCADA – Rockwell  
FactoryTalk® View

### Location:

Port Headland,  
Western Australia

### Mipac Scope

- Develop the functional specification for the control philosophy in conjunction with Tenova
- Control system design and configuration
- Design of field cabling and remote I/O panels
- Highlighting areas where safety could be improved and incorporating this into the design

### Project Highlights

- Mipac's design plans for one semi-mobile crusher was duplicated for the other two crushers, significantly reducing engineering costs – AVEVA design software was used to achieve this
- Working seamlessly with the many stakeholders involved in the project

Sites we have partnered with:

# NICKEL

# NICKEL



## Nickel West Smelter Project Profile

### Project Overview

Nickel West is a fully integrated mine-to-market business operating in various locations across Australia. All nickel operations including their open-cut and underground mines, concentrators, smelter and refinery are located in Western Australia.

Mipac was appointed to upgrade the nickel smelter's control system. The project consisted of obsolete MicroXL units replaced and existing CS3000 systems upgraded to Centum VP5. Identified safety instrumented functions (SIFs) from the hazard and operability studies (HAZOP) assessments were removed from existing software code and implemented in an independent safety instrumented system (SIS).

Project:

**NKS MicroXL / CS3000 Upgrade**

SECTOR:

Mining

Control System:

Yokogawa Centum VP

Client:

BHP

Location:

Kalgoorlie,  
West Australia

### Mipac Scope

- HAZOPs assessments
- DCS coding and design
- Development of functional specifications
- DCS/SIS software implementation
- Design of the network and hardware architecture
- Development of factory acceptance testing procedures
- Development of hardware/software migration for dynamic shutdown planning

### Project Highlights

- Implementation of logic using the latest Centum VP function block libraries
- Conversion of 5 Yokogawa CS 3000 FCS's to Centum VP
- Conversion of 14 Yokogawa MicroXL units to Centum VPB

# NICKEL + COBALT



## Murrin Murrin Refinery Project Profile

### Project Overview

Murrin Murrin is a remote, fully integrated nickel and cobalt producer located in the north-eastern Goldfields region of Western Australia.

They use conventional open pit mining methods to extract the nickel and cobalt ore, before processing and refining this laterite ore at a complex hydrometallurgical facility. The high-grade nickel and cobalt products are sold to customers in both the domestic and export markets.

Mipac was asked to explore optimisation potential at the dry laterite Nickel-Cobalt Pressure Acid Leach Plant & Refinery. The plant's design rate was for 45,000 tonnes per annum (tpa) Nickel and 3,000 tpa Cobalt

Project:

**Brownfield Process Control Optimisation**

SECTOR:

Mining

Control System:

Yokogawa

Client:

Minara

Resources

Location:

Murrin Murrin,  
West Australia

### Mipac Scope

- Maintain and support DCS / PLC / instrument systems
- Development and trouble-shooting across plant areas
- Implementation of sequencing, batch and auto control strategies
- Operator and engineer training
- Process optimisation

### Project Highlights

- Implementation of process improvement recommendations
- Implementation of advanced sequencing, batch & auto-control strategies

# About Mipac

Global leaders in operational technology, control systems and engineering services, Mipac is the perfect partner in driving your operational performance.

- ✓ Advanced Process Control
- ✓ Industrial Automation
- ✓ Industrial Software Solutions
- ✓ Data Analytics and Visualisation
- ✓ Electrical and Instrumentation
- ✓ Process Optimisation
- ✓ Cybersecurity
- ✓ Operations Support and Procurement
- ✓ Industry 4.0 Consulting

From control systems with robust software and engineering foundations to the latest innovative advancements in digital technology, Mipac delivers high-quality, intelligent solutions to drive performance.

We understand the complex challenges operations face through our depth of onsite experience and have developed a reputation for solving complex problems.

Operating globally, we provide an extensive range of services to realise the total value of your mining operation and have developed a suite of solutions that will help you increase productivity, reduce costs and optimise operational performance.

Transforming mining operations with solid automation, engineering expertise and cutting-edge digital technology - count on the Mipac team as your trusted advisors.

## Our solutions

We work across various industries to realise the total value of your operation and recommend solutions and services that produce optimal outcomes and increased performance.



Building new operations



Operating and optimising existing operations



Modernising existing operations



Main Automation Contractor



With more than

**650**

projects delivered  
worldwide

over the past

**3**

decades, we've  
worked in

more than

**50**

countries around  
the globe

for more than

**100**

clients across  
the globe

with a team of

**120**

experts dedicated to  
projects like yours.

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