



MOMENTUM

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**PARTS AND SERVICE ARE GOLD IN
THE PNG HIGHLANDS**

**CONTROL SYSTEM UPGRADED TO
MEET CHANGES IN PRODUCTION
TECHNIQUES**

KEEPING THE WHEELS TURNING

**SPECIALISED SERVICE FOR CRITICAL
VALVES**

**WIRELESS VIBRATION MONITORING
EXPANDS CRITICAL EQUIPMENT
ASSESSMENT PROGRAMS**

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CRAM operates in highly specialised fields of fluid power, electro-hydraulic engineering & design, undercarriages and specialised maintenance and engineering services.

CRAM also acts as a full service provider to facilitate maintenance, refurbishment, repairs and overhauls throughout the entire life cycle of industry equipment and machinery.

Our team is compelled to keep machinery moving reliably into the future, fuelled by innovation, dedication and passion for individualised engineering solutions that are driven by customer needs in an ever-changing market.

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PARTS AND SERVICE ARE GOLD IN THE PNG HIGHLANDS



Issues around less than optimal service life for some components and long lead times for replacement parts caused a PNG gold miner to find an alternative and reliable supplier. Motion Australia solved the problems.

Gold mining and processing requires some of the world's most robust equipment. Grinding mills and processing pumps and a myriad of associated specialist equipment are subject to coarse ore and acidic process water – elements which combine to damage and erode components, so much so that some of the check valves in the autoclave feed pumps were only giving a service life of 12 weeks.

Timely access to replacement parts was vital but when some of those parts were taking more than nine months to arrive from the manufacturer (OEM) productivity could be impacted. This was the scenario faced by one of the largest gold miners in Papua New Guinea.

Previous experience with Motion Australia prompted the site's maintenance superintendent to get one of our Brisbane-based engineers to the mine to see what the issues were with the pumps and what could be done to fix the parts supply problems.



Our involvement in many aspects of production

The result, following conversations with the site's production and maintenance teams and some clever reverse engineering, was a solution that would eliminate the supply problems and extend the service life of the wear parts.

By changing the chemical composition and structure of the steel used by the OEM to a highly abrasion- and corrosion-resistant material, the service life of the wear parts has been extended out to six months.

Additionally, although supplying castings - which are more expensive to produce - rather than the friction-weld components provided by the OEM we have ultimately provided a direct cost-saving to the mine by ensuring a reliable product that doubles the service life.

The pump wear parts supply program sits alongside a long-standing bearing and power transmission service and maintenance contract the Brisbane office has with the mine and compliments a comprehensive on-site product training program.

The bearing component of the contract includes the supply of stock and speciality bearings and seals appropriate to the extensive range of plant on site and includes bearings for pumps, conveyors, ball mills; essentially any type of rotating machinery.

Likewise the power transmission component, especially the products required – including gear drives, belt drives and the like - to maintain mechanical power fixed plant equipment. When required stock and custom-made driveline shafts and axles are also provided as part of this contract.

Supported and endorsed by mine management the training program covers all the products - including bearings, gaskets and fasteners - Motion Australia supplies to the site. Having the site workforce properly trained in the correct installation and fitting processes for the range of products used by the mine improves the reliability and service life of the particular equipment and also adds to the overall cost saving by substantially reducing the necessity for replacement.

Feedback from the mine has highlighted the competence of the Motion Australia staff and the confidence they bring to the operation. The overall goal is about the total cost of ownership. It's not just about buying the products it's also about increased reliability, on-time delivery, relevant training and the accurate identification of the tools and equipment the site needs to perform the maintenance correctly. 



Solving parts supply problems kept them working.

CONTROL SYSTEM UPGRADED TO MEET CHANGES IN PRODUCTION TECHNIQUES



As mining production methods and techniques change so too do the control systems that monitor and control plant output and productivity.

In 2019, in response to a request from one of Australia's leading iron ore mining companies, CMA Engineers, the specialised electro-hydraulic engineering division of Motion Australia, designed, manufactured and installed a bespoke hydraulic and control system to precisely control the flow of iron ore onto a process conveyor at the company's Pilbara mine. Three years later, that system has been upgraded to take account of increases in demand and production complexities.

A 1500mm x 1500mm x 2700mm purpose built stainless steel cabinet, designed by CMA, houses the control system which includes a 690 litre oil reservoir, a 37kW electric motor to drive a 100-litre-per-minute, 220 bar hydraulic pump mounted inside the reservoir. A bespoke manifold (to direct the hydraulic oil) and components of the system's hydraulic circuit sit on top of the reservoir. A separate enclosure inside the cabinet includes the electronic control technology and hardware.

The cabinet also houses a nitrogen-charged accumulator – essentially a hydraulic capacitor that stores hydraulic energy to provide instantaneous hydraulic start-up power while waiting for the pump to come online.



The upgrade was done on site in the Pilbara

When commissioned in 2019, the system controlled a purpose-designed and built hydraulic actuator which, by precisely activating a diverter gate, directed and regulated the flow of iron ore onto a downstream process conveyor.

Three years on and changes to production methods at the mine necessitated changes to the control system. Instead of operating one ore control gate, the system was to be upgraded to operate two gates – at essentially the same location on the same conveyor.

A range of design influences soon became apparent: one large gate would be replaced by two smaller gates; the gate cylinder would be smaller; they would occasionally be operating at different speeds and the ore feed rate to the gates would vary.


The solution was to redesign the manifold so it catered for the additional functions. A new manifold brought about minor changes to some of the associated hydraulic equipment but it retained its original footprint.

Thanks to some clever design and engineering by CMA it wasn't necessary to supply a new system. The original oil tank, electric motor and pump were retained. Apart from a minor change to the electronics there were no changes to power requirements for the motor or the pump.

Time to have the control cabinet off line while the upgrade was completed would be critical so, instead of having the cabinet returned to CMA Perth workshop the job was completed on site in the Pilbara. A workshop was made available and the mine's tradespeople removed the cabinet from its installed location.

CMA technicians then went to work. The cabinet was stripped down and all components tested, ready for reassembly. The 'old' manifold was removed, the 'new' unit was bolted on, upgraded hydraulic equipment fitted and the complete system was commissioned on site, ready for re-installation by the mine staff.

Five days from go to whoa!

A combination of good engineering, the right people and cooperation from the client delivered a smooth job. The mechanical changes are contained in the manifold and the valves that control the oil to the cylinder. The change to the electronic controller was to remove one piece of equipment that takes feedback from the system and install a different one. 



CMA Engineers designed, manufactured and installed the complete system

KEEPING THE WHEELS TURNING



Used extensively in the Australian mining industry, bucket wheel reclaimers have become part of the mining industry landscape and an integral part of train and ship loading systems. Keeping the wheels turning is vital to the performance, reliability and profitability of miners.

Some of the world's biggest mining companies are mining iron ore in the Pilbara and exporting to markets around the globe. One of those companies operates some 30 bucket wheel reclaimers in its mining and export operations – and it's the job of Motion Australia's Perth office to keep these bucket wheels operational.

A comprehensive service and maintenance agreement between the Perth office and the mining company covers 24 bucket wheel reclaimers spread across thirteen sites – including two shipping terminals – in the Pilbara. The agreement calls for a service team to inspect and service every reclaimer at least once over a 12-month period.

The emphasis for the service teams is on the bearings in the bucket wheel assembly because if a bearing goes down and the wheel stops turning, export performance can be impacted. Generally, on sites with multiple reclaimers alternative load programs can be initiated however disruptions will compromise a planned loading schedule.

The scope of work for the service includes more than 30 individual steps to cover the drive end and non-drive

end bearings. All bearings are inspected and a report prepared outlining bearing wear, grease condition, environmental factors, damage to housings and the like. Radial internal clearance measurements are taken on the inside of the bearing to assess any wear. Experience has allowed us to develop a 'signal flag' system which shows that a bearing is right on the edge of a catastrophic failure and a change-out should be done inside the next six months.

The service teams also have a historical detailed health matrix to refer to from which to determine operational changes and identify which bearings need to be changed out or complementary equipment repaired or replaced.


The agreement, which has been in place for almost ten years - and the experience it has meant for service crews - has seen Motion Australia develop an enviable reputation as a regional specialist in service and maintenance of bucket wheel reclaimer bearings. So much so that other reclaimer designer and constructors with equipment in the Pilbara regularly call in the Motion Australia service teams for bearing service and maintenance.

Some unique engineering by the Motion Australia specialists is increasing the efficiency, enhancing the site safety and increasing the service life of these reclaimers. First, the bearing housings.

A normal bearing housing has a horizontal split on a straight line through the centre of the shaft; a design that makes it extremely difficult to change-out that housing in-situ. Even by lifting the shaft well out of position the housing cannot be removed from underneath the shaft because the edges of the housing are at the same height as the centre of the shaft. This identified difficulty was the starting point for a housing re-design by Motion Australia.

The bespoke housing design has a 45-degree split which means one side of the housing is much lower than the other. Both sides now slide apart and by lifting the shaft by just 5mm, the housing can be taken off the base it was sitting on.

As this work was progressing opportunities for sealing and re-sealing the bearings and the housing were identified. This has resulted in the design of matching dual seal cover fittings to stop the ore from getting in – which will reduce wear and increase service life.

Through a combination of knowledge, engineering, service support and efficient and effective maintenance Motion Australia has built a niche capability in bucket wheel reclaimers, especially the shaft bearings – to keep the wheel turning. 



Motion Australia has built a niche capability in service support and maintenance for bucket wheel reclaimers.



SPECIALISED SERVICE FOR CRITICAL VALVES



Western Australia's leading liquefied natural gas (LNG) producers depend on the specialised gas turbine valve overhaul and repair service by Motion Australia to keep their plants productive.

When it comes out of the ground, natural gas is a cocktail of methane, ethane, carbon dioxide, hydrogen sulphide and mercury along with a host of impurities including water and other fluids. Removing the impurities – some of which could cause corrosion in pipelines used in the purification procedure – is the first stage in the LNG liquefaction process. With the impurities and any residual hydrocarbons extracted, the remaining (purified) gas is ready for liquefaction.

LNG is produced by cooling the pre-treated natural gas to -162°C . At this temperature it becomes liquid and its volume decreases by some 600 times, making it both stable and economical to transport. The liquefaction process means passing the gas through a series of compressors and heat exchangers to reduce the ambient temperature. At the start of the process, a small amount of gas is fed into gas turbines via the gas turbine control valves, which powers the compressors and heat exchangers downstream along the production line. And if the valves stop working, so does the process.



Young and Franklin valves are the benchmark for gas turbine control valves. Our LNG gas control valve program is designed to complete any repairs with minimum delay.

It's our job to keep those valves working.


The Young and Franklin 9500 Valve is the benchmark standard in gas turbine control valves and is installed throughout the LNG manufacturing industry and power generation. Designed to meet the demands of LNG production, they regulate the flow of gas into the turbine. As such, internal components are constantly oscillating and as a consequence they will, in common with all mechanical equipment, wear. In operation they are also subject to sulphur deposition from the gas feed. Either, or both, of these conditions can cause the valve to perform below standard or ultimately fail.

As the only authorised repairer of Young and Franklin valves in Australia – and with a factory-trained technician on staff - Motion Australia has developed a comprehensive overhaul and repair program to maintain the performance and operation of the valves at OEM standard.

In common with the many equipment repair programs Motion Australia offers, the LNG gas control valve program is designed to complete any repairs with minimum delay by trained technicians who understand the products.

Any item received for repair is subject to a receiving test to determine the extent of repairs required to return the valve to its original design and operation specifications. In the case of gas turbine control valves this test also looks at the hydraulic side – which operates the valve – and the gas side. The gas side is checked predominately for leakage and to ensure of a 100% seal on the plugs and seats inside the valves. The workshop also utilises a unique electronics test package that drives the valves when they are on the repair bench. These tests simulate operating conditions during service.

Based on the data from the receiving test, a repair and overhaul program is initiated. When any repairs are completed the valves are rebuilt with OEM parts, re-certified back to zero hours and returned to site – generally within a four-day turnaround.

Motion Australia is the first-choice service provider for the vital gas turbine valves – whether Young and Franklin, Voith, Meggitt or Moog – used throughout the LNG sector in WA. Irrespective of the brand of valve the service criteria and program remain the same – with the target of completing the repairs and returning the valves to site within the turnaround time to avoid any disruptions in production. 



The feed to the turbine is regulated by the valves. If the valves stop working so does the turbine – and the whole production process.



WIRELESS VIBRATION MONITORING EXPANDS CRITICAL EQUIPMENT ASSESSMENT PROGRAMS



MANUFACTURING

Site trial by Adelaide office proves worth it for local manufacturer. Critical plant equipment could mean high costs to the business should it catastrophically fail. As such equipment becomes more diverse – technologically and geographically – the right monitoring system, could save expensive repair or replacement costs.

US-based Symphony Industrial AI is one of the world's leaders in vibration monitoring systems – and a supplier of such equipment to Motion Australia for more than 15 years. To test the abilities of the new Symphony wireless vibration monitoring system the Motion Australia office in Adelaide decided to put it to the test with a site trial.

The Symphony high-resolution wireless vibration system is designed for 24/7 monitoring and provides hourly summaries and daily diagnostic analysis checked against baselines and component definitions initially establish. It identifies and flags emerging faults and prioritises repair action recommendations for all assets and plant being monitored.

The wireless operability of the system makes it ideal for hazardous or remote locations.

In areas where it might not be safe to collect data with hand-held vibration detection equipment – for example near machinery that is running or in a potential explosive environment – the sensors could be installed during a

planned shutdown and the equipment monitored from a safe distance. The system also improves monitoring of equipment in remote sites and has the potential to eliminate the costs typically associated with fly-in fly-out data collection.

Communication between the sensors and the gateway is through a mesh network with potentially a limitless number of sensors connected to a single gateway. Maximum range for a sensor is 100 metres line-of-site to the gateway and that transmission distance will be compromised by obstacles such as machinery, walls, building and the like.

One of the biggest advantages with the Symphony system is that, because it's a mesh network a sensor doesn't necessarily have to communicate directly with the gateway. It can communicate with another sensor that is in range of the gateway. In practice, this means sensors can be up to 200 metres from the gateway. The data will hop to the gateway where normal internet-based data transmission takes over.



For the trial, the dust collector fan was monitored.


The system is exclusive to Motion Australia.

For the trial, the system's unique sensors were attached to a dust collector fan which has to run whenever the site is operating - and a failure would cause extreme disruption to production. The fan unit itself, because of its physical position relative to the production line, was the ideal site for a trial of the wireless system.

Straight away an out-of-race bearing defect was detected on one of the fan bearings. This defect was tracked in real time and displayed consistent characteristics which, along with other problems with mechanical looseness – often a precursor to a worn bearing – were advised to the site's maintenance team.

To confirm the data received from the sensors an intrusive inspection on the fan bearings was done during one of the site's maintenance shutdown days. The bearing grease was removed and samples sent for analysis. The internal clearance of the bearing was measured and it was found that the clearance was greater than the unfitted clearance – a good indication of a higher wear rate. The bearings and cavities of the housing were packed with fresh grease and the fan unit reassembled.

The grease analyse revealed moisture and indications of iron, supporting the advice to the client of wear in the bearings. Traces of dirt and site-generated dust were also found in the grease sample. The inspection revealed that the housing seals were in a very poor condition which was allowing water, dirt and dust to get in.

Recommendations included upgrading the standard of the housing to incorporate better sealing that was split so that, in the future, when the seal faces wear they can be replaced in-situ without having to remove the bearings and the housings. Also included in the recommendations was the suggestion that the site ensure they have the appropriate parts in stock for a future bearing changeout. 

OUR SATISFIED CUSTOMERS

Over the last 25 years, CRAM have serviced hundreds of customers in various capacities across a wide range of industries. in-house.

- Mining
- Industrial
- Manufacturing
- Agriculture
- Energy
- Minerals
- Transport
- Construction
- Waste Management
- Materials
- Production
- Infrastructure



ACCREDITATIONS

CRAM's management systems are certified to ISO 9001 Quality Management Systems, ISO 45001-2018 Occupational Health and Safety Management Systems and accreditation to AS/ NZS ISO/ IEC 17020 general criteria for the operation of various types of bodies performing inspections.

The aim is to provide a comprehensive set of concepts and tools for the leadership and operation of a continuously improving organisation with a major focus on customer needs and the expectations of all stakeholder

- Certification to ISO 9001 & AS/NZS 4801
- Accreditation to ISO/IEC 17020
- Compliance to ISO 14001 Environmental Management
- Zero Harm to the environment



OUR SUPPLIERS

CRAM has business partnerships with an extensive range of world class suppliers and quality products.

CONDITION MONITORING					
CONSUMABLES AND ADHESIVES					
CYLINDERS AND JACKS					
DRIVES AND ACTUATORS					
ELECTRONICS AND CONTROLLERS					
FASTENERS					
FILTERS AND ACCUMULATORS					
HOSES, FLANGES AND FITTINGS					
LUBRICANTS					
MOTORS					
OIL					
PNEUMATICS					
PUMPS					
RIGGING					
SEALS AND O-RINGS					
SWITCHES AND SENSORS					
TESTING AND GAUGES					
VALVES					



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