



Switching on to automation

A decision made more 18 months ago to expand its presence in the growing mine machine control technology market via a dedicated automation research and development, and product support arm is paying early dividends for Perth-based Remote Control Technologies.

The company, which has grown strongly in the past five years on the back of a successful response to the industry's call for more advanced remote control solutions, has added many additional personnel in automation R&D and product support, including mechatronics, software and design engineers, and an automation engineer.

It is now working closely with some of the world's major mining houses on mine automation projects, including being the enabling designer and supplier for the development of a world class automated surface drill.

"Going back about two years ago there was a fair bit of industry talk, and indications from mining leaders, about a bigger role for automation technology in improving mine safety and production efficiency," said RCT's managing director Bob Muirhead.

"That is something that we, given our recognised competency in remote control and Teleremote control of most types of mining machines, established over many years, couldn't ignore particularly when a lot of the noise was coming from our own backyard.

"The decision was made last year to add to and expand RCT's capability in the mobile equipment automation field, including machine automation control and guidance systems.

"We decided we didn't want to be a sub-supplier into the developing market for mine automation systems, we wanted to be a turnkey supplier and system integrator. We are not manufacturing all of the automation system components. Advanced, purpose-built control systems remain the core of our product offering. What we can provide is an integrated delivery capability that draws on our considerable experience in the field of mine machine control and automation, and our history of supporting the technology in the field through maintenance, training and other services, plus the specialised automated system competency we've built up over the past 18 months.

"We are the first company to come from this background of becoming a leader in mine remote and Teleremote control technology, in Australia and other world mining markets, to now providing a full mine automation system integration and delivery capability."

Muirhead said in the same way mine operators had recognised the need to switch people from hazardous underground and surface mine environments, to safe and more productive work locations, and operate machinery using Teleremote control systems, there was increasing realisation of the benefits of automating equipment engaged in repetitive tasks or in conditions that created OH&S issues.

"You're already seeing, for example, where production drills, dozers, continuous miners and other equipment that typically produces whole-of-body vibration for operators, and/or the work cycles are extremely repetitive, transferring an operator to a better environment not only produces better OH&S outcomes but productivity gains," Muirhead said.

He said machine automation in industries such as manufacturing. This had produced significant benefits in different areas. One was reduced variability, and therefore greater consistency, in production outcomes. Lower maintenance costs will result from consistently running machines at manufacturer-specified performance levels, again without variation.

"You are going to get variability in drilling, dozing or loading performance, even with the best operators," Muirhead said.

"In production drilling, for example, hole depths might vary by up to 1m, which can have a huge impact on product quality and/or production consistency. Miners want to complete a drill pattern with minimal or no variation. To get your hole depths consistently accurate to within 100mm instead of 300-400mm, the process would have to be automated.

"Some operators might be heavier on the drill bit, others lighter on the bit. Eliminating this sort of unevenness in machine use, and utilising it for longer periods of time at optimum performance settings, is obviously going to produce superior maintenance results and, in time, more predictability in this area.

"Listening to what the industry is saying, these are the types of outcomes that seem to be at the top of peoples' wish lists at the moment."



Mines were increasingly establishing modern communication networks to facilitate better control, monitoring and guidance of equipment, and RCT had a proven track record of integrating an array of control systems with the emerging networks.

"There is a clear move now to use technology to reduce mining costs," Muirhead said. "Some tasks will be automated; some will continue to be done using remote control machinery.

"At the end of the day the really critical thing is that the systems are reliable and fit for purpose, and that not only means good technology and integration, but also technical and field support, training and maintenance.

"We're in a position to fully support the industry. RCT can provide turnkey systems, integrate remote control solutions with existing local and remote networks, or provide the critical hardware or software components that enable projects of varying size and complexity to function."

RCT is in the final stages of completing a semi automated system for articulated LHD machines, this has been fitted to a machine in Perth for initial trials with great success, product release approximately 3rd quarter of 2009. This system incorporates vision utilising cameras and guidance, IP rated scanning lasers, an articulation sensor and control group CPU.

The information is transferred to and from the machine with RCT's current Teleremote communication technology and machine operation is performed via a control room (this can be a fixed or portable control room).

This system has the ability to be used for surface applications.

Some key features of the RCT **Control Master**® product:

- ▶ Increases productivity - potential to increase tramming speed and size of machine operating in the mine.
- ▶ Reduces machine damage - keeps the machine off the wall.
- ▶ System can be adapted to suit all types of machines – not brand specific.
- ▶ Uses existing Teleremote communication system - no additional infrastructure required.
- ▶ No Mine Map required - cost savings.
- ▶ Connects to existing remote control equipment.
- ▶ Incorporates speed control - allows machine to travel at the correct speed to suit the conditions.
- ▶ Guidance is Real Time responsive.
- ▶ Fully Supported by RCT service team nationally & internationally.
- ▶ This is a relatively low cost high quality Automated system.



BHP switches to dozer remote control at Escondida

BHP Billiton has declared it is serious about addressing safety issues related to the operation of bulldozers at its mine sites, and in particular around stockpiles and conveyors.

The company says poor visibility, unstable ground and material falling from conveyors have led to numerous injuries and fatalities among bulldozer operators. "Across the globe, bulldozers working on ore stockpiles within the mining industry expose their operators to major safety challenges," it says on its website.

BHPB says the global mining industry has experienced a number of fatal accidents involving bulldozers operating on stockpiles. Between 2001 and 2006, there were several incidents involving bulldozers at Escondida. "In an incident in March 2006, where the operator eventually escaped with minor injuries, one of our bulldozers was buried for five hours," the company says.

In an unrelated incident at the end of December an employee of an earthworks contractor was killed while operating a bulldozer at Canadian company Anatolia Minerals' Çöpler gold project in Turkey. An investigation into the incident is continuing. BHPB says its challenge was to develop an approach that allowed it to continue to gain the economic benefits of operating bulldozers in stockpile areas while reducing safety risks to operators.

"Analysis showed that the only sure way of addressing such risk was to remove the bulldozer operators from their cabs," the company says. "We would need to have them operate their machines from a safe, remote, location."

BHPB engaged Australian company Remote Control Technologies to develop a remote control solution for the Escondida copper mine in northern Chile's Atacama Desert. The big miner has 57.5% of Escondida in joint venture with Rio Tinto. Annually, the mine moves about 400 million tonnes of material to ensure a continuous flow of ore to concentrators at Laguna Seca and Los Colorados – oxide and sulphide leaching facilities. Three stockpiles support ore feed to the plants with bulldozers used to move material within the stockpiles to ensure a continuous supply of feedstock to the plants.

BHPB says using bulldozers within stockpiles has "strong positive impacts on plant performance" through elimination of prolonged interruption to feedstock supply, which maximises the volume of ore processed and economic benefits from processing.

Switching to remote control operation of dozers at Escondida involved adapting state-of-the-art technology used in other mining processes and applying it to the stockpile bulldozers. "Challenges included sourcing the best equipment for our needs, ensuring it was appropriate to our conditions and operation and that it could be adapted effectively, and then training our operators in a new way of working," BHPB says. "We undertook our first site test and completed equipment installation in early 2007 and, after operator training, began full operation in mid 2007. The remote control bulldozers have performed well, assisting us in maintaining operational continuity and improving safety."

"We believe the technology we have selected represents leading practice, is sustainable and can be supported globally. There is potential to apply this technology in other operations where operating a bulldozer involves a safety risk to the operator. Potential situations where the technology could be used include operations on unstable or soggy ground, or on drilling platforms with limited access."



Remote Control Technologies senior business development manager Phil Goode said up to a dozen mines in the Australasian region – including Papua New Guinea and Irian Jaya – were using the company's remote control systems for dozer operation.

There was "some indication" remote dozing might be taken up across the BHPB group.

Goode said the efficiency of remote control dozer operations was "very comparable with manual [and] significantly safer as men are not in dozers and at risk of falling into crushing feeders with the conveyor running overhead".

"It is a much more productive way of operating as they do not have to shut down conveyors and feeders to do all the clean-up work," he said.

RCT has supplied and fitted five full dozer remote systems (for D11R and D10R machines) at Escondida and provided training for mine personnel. Service is provided via RCT's Chile agent, Power Train Technologies.

Mali on the map for RCT

Randgold Resources' "introduction of first-world technology to Mali" at its expanding Loulo gold mine in the country's west has provided Remote Control Technologies with another entry point into the increasingly significant African market.

RCT was engaged via the Caterpillar dealer Delmas to supply and install line-of-sight remote control systems for two Caterpillar underground loaders in use at Loulo. Mine equipment operators and mechanics also received product training so they can use RCT remote test and service kits to undertake preventative maintenance. Local Caterpillar equipment dealer Delmas is contracted to provide after sales service at the mine, with RCT also providing OEM support through the dealer.

"It's the first project we've done for Randgold and the first underground project we've done in Mali," said RCT senior business development manager Phil Goode.

"We have been active for some time in other African countries and certainly see good scope to continue the transfer of state-of-the-art remote and Teleremote technologies being widely used in places like Australia to Africa as operators switch to more mechanised mining practices."



Commando rearmed to fight mine danger

A customised remote control solution developed for the giant Deep Ore Zone (DOZ) underground block cave operation in Papua, Indonesia, is expected to solve safety and productivity issues that have long been associated with rock blockages in cave draw points.

Remote Control Technologies has worked closely with DOZ mine operator PT Freeport Indonesia to overcome technical obstacles and produce a reliable remote controlled version of the Sandvik DC300 Commando drill. The hydraulic, self-propelled unit is also configured to deliver explosives into rock crevices, with the blasting process aimed at dislodging large boulders that can get caught in cave draw points and impede ore flow.

DOZ, one of the world's biggest block cave mines, produces more than 50,000 tonnes of ore a day.

A DC300 Commando was sent to RCT's factory in Perth, Western Australia, for re-engineering and to enable Freeport personnel to liaise with RCT technicians on the optimal placement of cameras which become the eyes of an operator remote controlling the machine from a safe location. All functions of the Commando are now totally remote controlled, previously not achieved with this type of machine.

RCT area sales manager Nic Stone described the project as a "world first".

"It's a very important piece of gear because it does a high risk job – the machine goes into a large draw bell full of loose rock and places explosives – and takes a person out of that high-risk area," he said.

"There is no machine made to do that specifically, so we've modified and remote controlled a machine developed to do the job. No-one has done it before, but we've done similar projects successfully. This is a world first for this type of machine."

Stone said the hybrid drill/explosive delivery unit was not designed to be remote controlled and "we had to modify a lot of hydraulics".



"We re-engineered the hydraulics and modified a lot of the pilot systems ... to suit our remote control system and enable the machine to achieve the degree of movement the customer requires, under remote control," he said.

"The second main challenge was camera placement for operators so they can place explosives properly. We brought two Freeport personnel over [to Perth] for about a week and they helped us set up the cameras to their satisfaction."

Freeport has more than 10 Commando units operating in DOZ, with the other machines equipped for drilling only.

The company, owned by Freeport-McMoRan Copper & Gold and the Indonesian government, plans to increase DOZ production to 80,000tpd.

"Our success in developing the DOZ mine, one of the world's largest underground mines, has given us additional confidence in the future development of PT Freeport Indonesia's large-scale undeveloped ore bodies," Freeport said last year. The underground Grasberg, Kucing Liar, Mill Level Zone/Deep Mill Level Zone and Big Gossan ore bodies are all at various stages of development.

Highwall act not so hair-raising

Remote Control Technologies has completed its first Caterpillar D10T dozer conversion – enabling the machine to work under remote control at the top of a steep openpit highwall – for the Savage River magnetite iron ore mine in western Tasmania.

Operator Australian Bulk Minerals mines three contiguous pits at Savage River, 100km south-west of Burnie. They average 100-150m in depth but a significant cut back and extensions will deepen them by up to a further 250m.

ABM, which has production drill rigs working at the base of the highwall being operated by remote control, determined that operating a manned dozer on the cut back was too dangerous. The company approached RCT to supply a line of sight remote dozer solution.

RCT senior business development manager Phil Goode said the remote dozer would also be used to clear slips on pit walls and for dozing in unstable areas of the mine. The company manufactured and installed the dozer remote system and provided onsite product skills training.

"It's the first D10 dozer on remote that RCT has done," Goode said. "That's the very latest model Cat dozer and control system. So we have demonstrated we are on top of that as far as technical systems go.

"For Savage River the result is that they are able to work on the highwall in a safer manner than with an operator in the machine."

The current pit cut back at Savage River is expected to be completed this year. Implementation of ABM's new 16-year mine life expansion project has commenced, under which the company plans to maintain production of about 2.5 million tonnes per annum of iron ore pellets from the Savage River concentrator.



Remote dozers making mining in dangerous areas safer:

- ▶ Improves operator safety in high risk working conditions
- ▶ Minimises operator fatigue
- ▶ Prevents repetitive stress injuries
- ▶ Maximises dozer utilisation
- ▶ Greater overall operator vision
- ▶ Improved ergonomic working environment for the operator
- ▶ Less idle time between production cycles
- ▶ Easy to operate and maintain



Gradco puts another iron in the fire



The US-made Gradall excavator about to start cleaning out manganese smelting furnaces at Tasmanian Electro Metallurgical Company's (TEMCO's) Bell Bay plant typifies its owner in the sense that its appearance suggests not much has changed in 50-odd years. And that, underneath the name badge and shape, a significant transformation has in fact taken place.

An unusual machine with its telescopic boom, in place of a standard excavator knuckle-boom, and extensive range of movement and rotation, the Gradall TRAC 360 has been a versatile performer for Launceston-based company Gradco. The diversified contractor, established by "Dak" Diprose in 1955 and now run by his son Robert and grandsons Oliver and Tom, was among the first to bring Gradall machines into Australia and it has found a range of applications for them and built part of its business around them.

Robert Diprose believes a technological step change will help the company delve deeper into the furnace clean-out market niche pursued with the Gradall unit.

With the help of an AusIndustry grant and the specialised expertise and technical skills of Western Australian company Remote Control Technologies (RCT), Gradco has converted the Gradall TRAC 360 for Teleremote control operation, which is expected to improve furnace clean-out safety and productivity. The company has completed furnace clean-out work previously in Tasmania, South Australia and WA.

Instead of an operator inside a caged-cabin driving the track-mounted excavator in and around the furnace, the unit will be controlled either with line-of-sight remote (outside a furnace) or with Teleremote systems, including RCT's unique Vision Assist tool, inside the furnace. This eliminates any exposure to heat, volatile slag and fumes.

"Remote controlling the machine and taking the man out of the machine became the next obvious step for us," Robert Diprose said.

"The machine [Gradall TRAC 360] has the ability to work in height restricted areas. The boom can extend and rotate 360 degrees. We have developed a range of our own attachments and modifications for Gradalls, including a hydraulic quick-hitch mechanism which was an exercise in itself because of the design of the telescopic boom. That means we can drop an attachment and pick it up remotely, and lock it on and off remotely. We can also run bigger breaking hammers on it, which is useful for production on furnace work."

Gradco can easily remove the excavator's cabin when working in areas with restricted access heights. All of the machine cabin controls, lights and other indicators, brakes, throttle, and boom function mechanisms were modified by RCT for remote operation. The technology company also fitted additional hydraulic and electric controls to interface with Gradall systems and make the machine compliant with the AS 4240 remote equipment standard. RCT provided training for Gradco operators.

"We're expecting that there will be other applications for the remote control Gradall," Robert Diprose said. "In underground [mines] in dangerous areas, or for handling hazardous waste, where an operator can just control the machine from a distance.

"Every time we send the machine out to do a job it attracts attention and interest."

Gradco has grown steadily on the back of its core business activities of government construction and maintenance work, civil contracting, contract mining, tailings dam and foreshore dredging, and the furnace clean-out contracts. The company now has about 90 major items of plant and equipment, and some 85 employees.

Robert Diprose said Gradco had been willing to source specialist machinery and skills to service an expanding client base that included state and local governments, underground and opencut mine operators, agri-business owners, and civil construction firms.

"We've maintained a fairly steady growth rate over the years," he said. "We're still a family-owned company ... and we're reasonably conservative. I have three of my sons in the business with me.

"We believe we've got to have a fairly broad client base in this economic climate, and we certainly have. If mining is down, something else is up. Things have quietened off this year and we're devoting more effort to our core business right now.

"We're feeling our way a bit with the [remote control] technology, but as I said we've got more furnace cleanout work coming up during February and May this year and the machine seems to get attention wherever we take it.

"We've had these Gradalls since the 1950s in one form or another. It's an expensive machine because it has a lot of moving parts in the telescopic boom. We have a lot of other equipment – the Gradalls represent a relatively small part, but I take a particular interest in it because there were a lot of them around in my time. I started working with my father in the late 1960s and we have used them for everything – everyday earthmoving jobs to the more specialised work.

"The first job we did outside Tasmania was at Whyalla about five years ago, with the Gradall. It was a furnace cleanout job.

"If someone wants a machine for that type of application they're usually prepared to pay to get it there, so that's an area where we'll continue to work outside Tasmania.

"We have a bit of an edge there now."

For more information about RCT's range of products please visit:

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