

QUEENSLAND MINING INDUSTRY

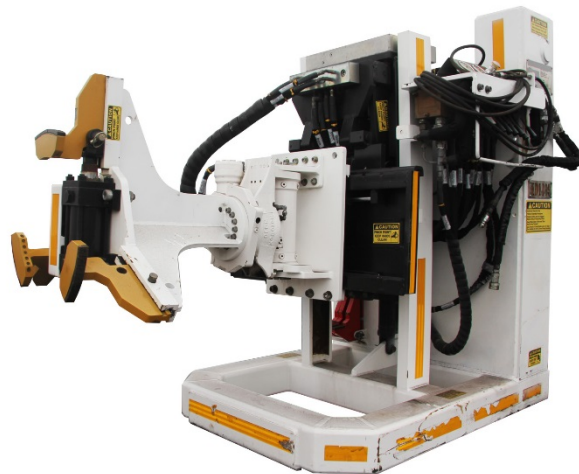
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Quick Detachment System Tyre Handler

Glencore – Oaky North Underground



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The Problem

- Tyre change in underground mines manual handling hazard
- Various solutions/multiple versions of tyre handlers trialled over many years
- Challenges and safety issues with moving LHD while operator lines up wheel with hub
- Challenges increased with solid-filled tyres
 - Tyre/Rim increased from 400 – 750 kg



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The Solution

- Oaky North designed, developed, implemented removal and installation system, QD900



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Solution

- QD900 reduces
 - amount of manual handling for a tyre change out
 - number of workers to carry out the task
 - risks associated with procedure.
- QD900 allows removal and installation of shuttle car and LHD wheel assemblies with limited manual handling
- Task safely done by two workers instead of four
- Saves labour and time
- Eliminates potential “crush zone” during tyre change



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QD900

- Combination of proprietary/custom components
- Components work together to provide 6 ranges of motion
 - raise/lower, reach, tilt, side shift, horizontal slew and rotation
- Ranges of motion are power behind QD900
- Motions allow wheel removal and reinstallation while LHD stationary
- No need to move LHD to line wheel up with the hub



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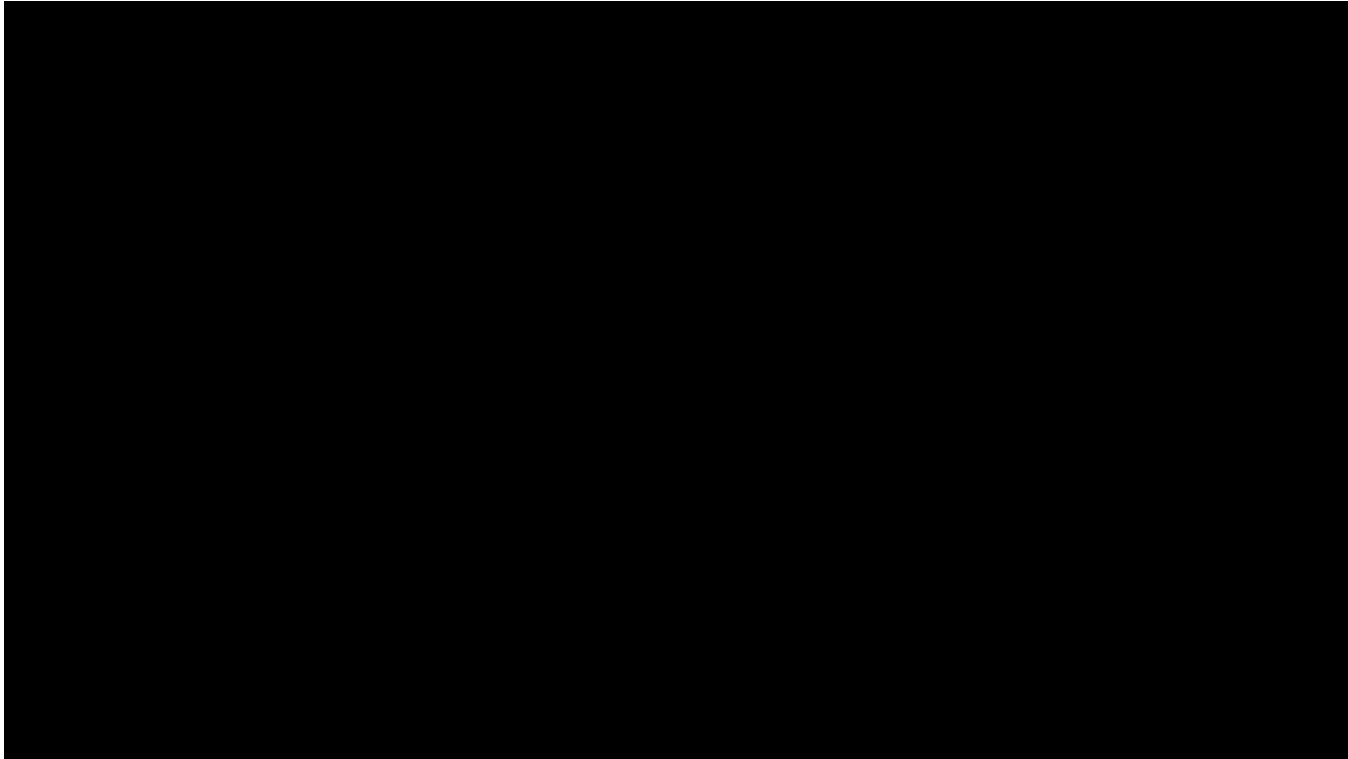
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The QD900 evolution

- QD900 first trialled at Newlands Underground
- Original project initiated with Jet Engineering, Mackay
- Project manager Michael Medway, Newlands
- Project inherited by Oaky North
- Modifications made based on user feedback
- Management of change process/ risk assessment conducted pre-implementation



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Benefits/Effects

- Reduced manual handling by tyre fitters
- Decrease in delay when changing tyres
- The QD900 grips wheel inside the rim instead of outside the tyre, providing two major benefits
 - suitable for use on machines with limited clearance between tyre and wheel arch (shuttle cars)
 - suitable for solid filled tyres and pneumatic tyres



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Special Features

- Controlled by Danfoss proportional valve bank
- Operator maintains precise control
- Speeds up aligning wheel with hub
- Reduces damaged wheel studs
- Valve bank operated remotely
- "Deadman" ensures two-handed control
- Operators kept clear of hazards



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Special features (cont)

- Hydraulic circuit includes priority flow control valve
- Valve guarantees functions operate at consistent speeds, regardless of the hydraulic performance of LHD providing power.
- Load holding valves on all critical circuits, preventing unplanned movement in event of hose failure
- Clamping circuit includes accumulator guaranteeing clamping force maintained until intentionally released
- Clamping force can be monitored via clamp pressure gauge



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Special features (cont)

- Coloured band in gauge allows operator to determine correct clamp pressure
- Unique self-centring gripping system
- Zero radial movement rotating the wheel
- Tyre cannot impact wheel arch during rotation
- 360° endless rotation in either direction
 - faster/ easier to align wheel and the hub
 - eliminates requirement to re-grip wheel



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Special features (cont)

- RPEQ certification for a WLL of 900kg
- Accommodates all solid-filled tyres common in underground coal mines
- Hydraulic hosing manufactured/tested to MDG41
- Emergency stop allows remote shut down of LHD in event of emergency fault



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Transferability

- QD900 tyre handler applicable to all underground tyre changing as well as surface workshops
- Unit currently in operation at Oaky North Underground



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Innovation

- QD900- highly innovative, simple to use
- Improves safety by reducing risks to workers
- Reduces number of operators for the task
- Robust to withstand underground environment
- Overcomes shortcomings and safety issues associated with existing QDS tyre handlers



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Specifications/ Features

- Tare Mass: 1600kg
- WLL: 900kg
- Ranges of Motion
 - Raise / Lower - 610mm
 - Reach - 600mm
 - Tilt - Up 3.2°, Tilt Down 4.2° (from horizontal)
 - Sideshift - 200mm (100mm either side of centre)
 - Slew- 30° total (15° either side of centre)
 - Rotation - 360° endless rotation in either direction



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Options

- Modification for use with rig throttle on LHD (bolting mode)
- Interchangeable jaws to suit different wheels
 - (Joy and Warracar Shuttle Cars, Various LHDs, IT28, etc)
- Adapter for installing wheel units



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Approximate Costs

- Cost to design/manufacture first unit
\$150,000
- Units now available commercially
through Jet Engineering



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