

PLASTIC FINAL DRIVE COVER REDUCING HANDLING RISK

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BACKGROUND

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Large reduction gearboxes (final drives) of Caterpillar haul trucks are regularly rebuilt by Thiess' Component Rebuild Centres (CRC) in Brisbane (QLD) and Hazelmere (WA).

Approximately four final drives are rebuilt each week. During transportation and storage, a cover over the spindle is required to prevent the formation of rust.





Final Drive

PROBLEM

Issues with existing covers

- >> Made from heavy steel plate 53kg
- >> No existing suitable lifting equipment manual lift performed by physically capable fitters
- >> Heavy and awkward to lift placed strain on a worker's back, shoulders, arms and hands
- >> No lifting points
- >> Assistance required from a second person to lift and secure cover
- >> Silicon required to seal the cover:
 - >> Silicon smudged resulting in an ineffective seal
 - Installation and removal of the cover takes approximately 40mins at each end





HAZARDS

- >> Musculoskeletal Disorders (MSDs)
- >>> Crush injuries
- >> Cuts and abrasions
- >> Hand pinches

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>> One fitter trying to do job alone

Minor – Serious Injury

Minor – Serious Injury

Minor – Serious Injury

Minor Injury

Minor – Serious Injury



Understanding and leading in times of true adversity

In 2014-15, over 40,000 musculoskeletal injury claims were lodged across all industry sectors with an average cost of \$7,059 per claim. (WHS Queensland).

DESIGN PROCESS

Three prototypes made from HDPE:

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>> Designs included handles on the front face of the cover

- Initial designs included fixed or fold-away handles that broke during transportation
- >> Final prototype handles replaced with an in-built box
- Final HDPE design weight 16kg (70% lighter than original steel cover)





SOLUTION

Re-design existing final drive covers for Caterpillar 789s and 793s to:

- >> Swap the fabrication material from a heavy steel plate to a lighter high-density polyethylene (HDPE)
- >> Achieve a more ergonomic lift

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- In-built lift point moves the cover's center of gravity closer to the fitter's body reducing strain on back, shoulders, arms and hands
- >> Create an effective seal by using the components installation O-ring with recessed cover edge
- >> Eliminate the need for a second person to assist by adding spigots to aid cover alignment with mounting flange
- >> Generate a flexible design that can be adapted for other components and uses.



BENEFITS

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- >> 70% lighter than original steel cover
- >> Improves manual handling, significantly lowering the risk of MSDs
- >> Reduces common pinching, crushing and abrasions associated with steel plates
- >> Spigots enhance cover alignment with mounting flange
- >> Reduces number of people required to fit and remove cover
- >> **75% faster** to install and remove than original steel cover
- >> O-ring on mounting flange provides effective seal
- >> Reduces rust and damage to rebuilt components during transportation

REDUCED HAZARDS

>>> Musculoskeletal Disorders (MSDs)

>>> Crush injuries

>> Hand pinches

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Reduced

Reduced

Reduced

>> Cuts and abrasions

Reduced

COST BENEFITS

Steel Cover

>> \$465 per unit

- >> Replacement required when plate is bent or damaged due to overtorquing securing bolts and during transportation
- >> Replaced every six months

HDPE Cover

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- >> \$1165 per unit
- >> Longer lifespan as a result of flat and durable material
- >> No covers have been replaced since final design inception

TRANSFERABILITY

The HDPE cover design is transferable to any off-highway truck model and can be upsized for ultra-class mining machinery.

Covers designed for:

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- >> Excavator hydraulic cylinder barrels
- >> Sandblasting off-highway truck front wheel hubs
- >> Cylinder bearing areas during painting
- >> Excavator gearbox protection during transport







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