



Safe Work and Return to Work Awards

Shane Webcke, Queensland Safety Ambassador

Safe Work and Return to Work Awards example entry Category six – Best demonstrated healthy and safe work design

1. Describe how your design change has improved the work to achieve safer and healthier outcomes.

Servicing of heavy vehicles, such as buses, trucks, mining equipment and other heavy vehicles, requires frequent removal of the wheels for tyre replacement and/or brake maintenance. A high level of manual handling is involved including removal and replacement of the wheels (90kg each), the calliper (35kg), the rotor and hub (80kg) or drum (70kg), depending on the type of braking system. On occasions the stub axle (70kg) needs to be replaced. In addition, for brake maintenance separation of the rotor and hub is required which is often done by belting the rotor with a large hammer or physically lifting the rotor/hub assembly into a 100-tonne press often resulting in the 20 kg rotor falling towards the floor of the workshop.

Much of this work is carried out by the operator at ground level while on their knees, bent over or lying on their back. The removed wheels are generally rested away from the immediate work area leant against the vehicle, against a wall close by or even flat on the floor close by for ease of retrieval. This can pose a worker trip hazard.

There are multiple tasks involved in manual wheel removal and brake maintenance, most carrying high risk of musculoskeletal skeletal injury and resultant pain to workers especially spinal columns and upper limbs. Musculoskeletal injuries can be either acute (caused by a specific event or cumulative events) or chronic (caused by long term degeneration) in nature with acute on chronic injuries also occurring. The load on the back, neck and upper limbs with manoeuvring heavy tyres can result in acute back, neck and upper limb joint sprains and muscle and tendon strains and tears and tendon in addition to disc prolapses in the back and neck. The risk to the back and neck is increased by the need to twist and bend further increasing the pressures to the spinal cord. The requirement to be in a prolonged bending position for some tasks further exacerbates the risk of back injury. The risk of shoulder injuries is increased if the task requires the arms to be above head height or the load cannot be positioned close to the body. Both acute and chronic injuries in the upper limb caused by sudden forceful and repetitive movements such as banging a hammer to remove rotors from hubs would also be reduced in likelihood and severity.

For these reasons of unsafe work practices Martin James has been working in the area of automating heavy vehicle wheel end maintenance for 10 years. Over the past 2 years he has developed, built, trialed and demonstrated the current Wheelaway™ range as described:

- The Wheelaway™ Lite removes and replaces single, dual and super single wheels in one operation.
- The Wheelaway™ Caliper Lifter removes the caliper from any position around the rotor with ease and total control. It lowers the caliper onto the ground or workbench depending on the service requirements.
- The Wheelaway™ Heavy collects the hub or drum from the axle assembly then rotates up for ergonomic inspection or rotates down to place on the ground. For a disc brake assembly, the rotor and hub can be separated easily through an automated action with no need for operator intervention or involvement.

The Wheelaway™ range is particularly sophisticated because:

- It uses linear actuator power that enables multi-directional load handling in excess of 500kg. This means that no force is required for any of the operations.

- Covers the entire range of steps with the heavy vehicle wheel end maintenance process
- It provides high level accuracy of the linear motions with a built-in laser sighting system. This means that all operations can be achieved with finger sensitive joystick control.

The WMS Wheelaway™ units will result in significant improvements in health and safety outcomes as discussed above and below. In addition, the ease of their usability will lead to significant operational efficiency enhancements and so provide attractive OH&S and economic returns on investment.

Martin James has been liaising with Mick Reynolds, Training Manager of the Dyson Bus and Coach Group, about addressing the OH&S issues associated with the wheel and brake servicing of their bus fleet. In addition, Martin has spoken to many heavy vehicle maintenance operators over the years to confirm their issues and needs.

WMS had a booth at the recent 2021 Brisbane Truck Show. This proved to be most successful in receiving positive feedback from:

- Potential distributor partners who are actively involved in heavy vehicle maintenance both in Australia and overseas
- More than 15 potential end users being truck maintenance organisations including truck vendors and local councils. Indeed 1 request for quotation has been received from a major truck servicing company
- St Edmund's College in Ipswich. Rob Roy, the teacher responsible for the Certificate II in Automotive Vocational Preparation AUR20716 has indicated the school's intention to purchase 2 Wheelaway™ Light units for this course to provide a safe mechanism for students to remove vehicle wheels. This will assist all students and in particular a small cohort of students with physical limitations who always require assistance to engage in any weight bearing activity. In addition, Rob is so impressed that he has offered to run a trade night to demonstrate the Wheelaway™ units to other vehicle service organisations. A reference letter is attached
- Amberley RAAF base contractors who saw the Wheelaway™ Light unit as making their workplace safe and more efficient in the removal of aircraft wheels.

The visit to the Brisbane Truck Show by Martin James and 2 of his colleagues indicated his strong commitment to sharing his knowledge and experience through the demonstration of 2 of the Wheelaway™ units on the booth that was rented. This involved a 2 day drive each way from Melbourne to Brisbane towing the units. Martin has indicated his willingness to drive to Sydney to demonstrate to 2 companies that are interested in this OH&S and productivity enhancement solution for the heavy vehicle maintenance sector.

The outcome to date is that the 3 Wheelaway™ units: Lite, Caliper Lifter and Heavy have all been repeatedly tried and tested in the WMS workshop on actual truck wheels and brake assemblies using different operators across an age and strength range to an 85-year-old man who all operated the units with ease. This demonstrates the ease of use and the reliance upon the units for all the load bearing lifting and moving operations.

WMS has also been in close discussions with Ross George, Managing Director of Austeng Engineering, a boutique engineering firm that specialises in the design, engineering, development and building of customised electromechanical machinery and systems. They are ideally suited to productions and manufacture the WMS Wheelaway™ unit. Their contacts in the vehicle industry will further enhance the early stage of the Wheelaway's™ business development and commercialisation.

Martin James is committed to continuous improvement and consultation as he seeks to improve and refine the Wheelaway™ range. For example, feedback from a potential and very interested export distributor in the US is that servicing of drum brakes is a key significant market. To this end, Martin has designed an adaptor for the Wheelaway™ Lite that will remove and replace drums thus enabling all handling of drum brake components to be catered for by the Wheelaway™ Lite unit.

Martin James showed exceptional leadership and foresight to develop this innovative solution to workplace health and safety in the injury prone area of heavy vehicle wheel end maintenance.

The Wheelaway video and brochure are both attached to this submission.

2. Describe how your business has benefited from the design solution and the impact of industry.

The design of the WMS Wheelaway™ units will lead to significantly improved OH&S and efficiencies in the maintenance of heavy vehicle wheel ends. WMS is partnering with manufacturers and distributors to take the Wheelaway™ products to market. By building the market presence WMS will build the cash reserves to invest in the development of further equipment that will automate the handling of automotive servicing and procedures and so improve the health and safety and efficiencies in not only wheel end but overall heavy vehicle maintenance. In addition, significant interest in sales opportunities to the US will lead to job creation in Australia and exports from Australia.