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Axle Replacement Inline (ARI) Unit

★ **Winner of the 2016 WA Engineering Excellence Award for Innovation**

Project Location

Pilbara Region, WA

Scope

The scope involved designing, supplying and installing a system for quick change out of the wheel axles on iron ore wagons - without having to split the train consist into individual wagon pairs.

The system had to be robust, cost effective, be able to deliver improved operational performance and improved health and safety associated with axle replacement.

It was essential the system was capable of handling full and empty wagons, as well as heavy locomotives passing over it.

Business Objective

There were three main business objectives associated with the Axle Replacement Inline (ARI) Unit

1. To eliminate the need for wagons requiring wheelset replacement, identified by RailBAM, from entering the heavy haul rail workshop. Potentially meaning the consist misses its allocated slot on the mainline.
2. To reduce the backlog of BAM wagons and possible hot bearing failures by significantly reducing the time to change a wheelset.
3. To repair the wagons up-track, where wagons are left due to hot bearings. The existing repairs on full wagons were problematic, as well as the safety issues associated with jacking a full wagon up 500mm while working on ballast.

Challenges to Overcome

There were five key challenges that had to be overcome:

1. Installation was taking place in a remote area with no power or communication, and therefore needed minimal infrastructure requirements for

installation. The ARI System uses a self-contained solar charged battery powered sump pump and Hydraulic Power Unit (HPU).

2. High and low pressure hydraulic circuits had to be integrated into one hydraulic power unit.
3. Track rail had to be restrained to minimise the joint gap between the ARI System and the rail interface over seasonal temperature variations.
4. The ARI System needed to be installed in live signalled rail areas under train control to maintain rail continuity.
5. The construction, fabrication and commissioning of the axle replacement inlet unit was to be done offsite and installed at a desired location in under one week.

Smarts

The ARI System is an Engenium patented product, specifically designed and manufactured to overcome operational issues outlined above.

Other patented products required to be designed included a Bogie Jack Lock System, which locks the hydraulic jack without putting the maintainer in the line-of-fire of a suspended load. There is no lifting heavy chocks and it only takes 2.5 seconds to activate.

Engenium also designed a shoeing and brake adjustment bar.

Project Outcome

Two ARI Units were successfully installed and delivered. Immediate benefits for the client, included:

- Improved safety through the elimination of hoisting wagons. The ARI Unit hydraulic jack only takes the weight of the wagon with a 10mm lift.
- A single wheelset (axle) change-out occurs in 10 minutes, including shunt.
- The ARI Unit does not require brake testing when removing the wheelset as air lines don't get removed.
- Training for the product is easy to deliver (approximately 30 minutes) and the equipment is well liked by operators and maintainers.
- The ARI Unit and its operation is intuitive, easy to use and highly successful with crews.

Delivering Value. Delivering Results.