

WORKSHOPS Equipment

WHEELSETS

Robot automates bearing overhauls

Last month, a robotic machine that automatically selects and mounts roller bearings for freight wagon wheelsets was commissioned by one of the US Class I railroads as part of a programme to update a wagon overhaul workshop.

Supplied by Simmons Machine Tool Corp, the Automated Bearing Mount Machine Cell can undertake the entire process to select and fit two bearings, before measuring the completed wheelset. This will speed the throughput of the wheel shop while minimising the number of operators required. According to Simmons, the new line should also improve safety, with various functions that were previously done manually being undertaken automatically behind safety gates.

Automated wheel maintenance

Simmons has supplied a range of automated wheel maintenance machines to different railway operators in recent years, including the fully-automated wheel shop for Fortescue Metals Group in Port Hedland which was commissioned in 2013 (RG 8.15 p60).

According to Simmons' President & COO David Davis, the automation of wheelset maintenance offers significant

benefits in improving capacity and throughput for heavy haul, freight and passenger railways. As well as reducing the time needed for maintenance, it can contribute to an extended vehicle life and support the introduction of heavier axleloads.

A variety of automation technology is used in the workshops, including robotic handling units and escapements as well as cranes and turntables to move the wheelsets and components between the workstations, which are grouped into 'cells' and protected by fences with locked gates. Special purpose measuring machines evaluate, qualify, and route wheelsets through the facility without human intervention. CNC-controlled lathes with integrated measuring systems are used to reprofile wheelsets, while other workstations can press off worn wheels, reclaim the axles, and fit new wheels as required.

Robotic manipulator

The newly-developed Bearing Mount Cell is the first to use a five-axis ABB robot, similar to those deployed in the automotive sector. It also makes use of two separate vision systems as part of the process.

An incoming wheelset is positioned using hydraulic escapements, allowing the operator to select the appropriate bearing type and enter this in the control system. Four types of bearing are used in this shop, but more could be handled with changes to the programming.

The wheelset is then advanced into



The multi-axis robotic head selects the appropriate bearings for each wheelset and positions them in the press ready for mounting.

Once the bearings have been installed, a measurement station checks the radial and axial run-out of the wheelset before it is released for use.

an automatic journal lubrication station, where a suitable lubricant is applied to the bearing journal and rust inhibitor to the dust guard. During this process, the wheelset diameter is measured and the vertical positioning of the mounting press is adjusted so that the roller bearing cassette can be cleanly mounted in relation to the axle centreline.

The new bearings are grouped by type on pallets and located under an overhead gantry. A vision system locates the correct bearing, enabling the robotic arm to pick it up with a purpose designed gripper head attachment and lift it into the mounting press. The wheelsets is then moved into the press and the bearings pressed onto the journals.

After mounting, the wheelset is ejected to the end cap assembly station. Here an operator fits the two end caps to protect the bearing and axle end, and bends over the washer tabs to secure the caps in position. A lift and rotate function allows the operator to install both end caps from the same side.

The final wheelset measurement station inspects the radial and axial run-out of the mounted wheels, while the second vision system verifies that the end cap washer tabs have been correctly secured. The completed wheelset can then be transferred to a holding area awaiting fitting to an overhauled vehicle. ■

