Driving Operating Profits with Consistent, Accurate Loadout Systems

Loading Efficiency
Transport costs are a significant and growing share of the delivered price of coal and other bulk materials. The average costs of transporting coal by railroad to power plants increased by almost 50 percent during last decade.

The loading operation offers substantial opportunities to improve the efficiency of this supply chain while safeguarding the plant, personnel and environment. Overloading which increases wear on the wagons, and underloading which risks derailments and penalties, significantly undermine operational efficiency. Consistent, accurate loading means quicker load times, higher productivity, less spillage and a more competitive business.

Honeywell has been automating train loading systems since 1999 for some of the world’s most successful businesses, including BHP Billiton, Rio Tinto, Xstrata, Anglo Coal and Vale.

With years of project experience for loading coal, iron ore and other materials, we’ve developed in-depth understanding of the complexities of these operations and proven techniques that result in more efficient systems.

Honeywell Train Loadout (TLO) systems require minimal intervention by the operator, who only has to initiate loading from the SCADA screen (below).

The sequence runs automatically, with operator intervention only in the event of an abnormal situation. In such cases, all devices have a manual mode to allow the operator to start, stop, open or close devices and systems from command buttons on the SCADA screen or from a joystick on the operator console. Emergency stops are hardwired, independent of the SCADA system. Honeywell can supply the entire TLO control system, from design, programming and installation to commissioning and ongoing operational support.

Flexible Options
The five main types of loading options include:

A. Fully Automated Batch Loading
B. Inline Bin Weighing Loading Control
C. Track Weighing Loading Control
D. Volumetric Loading Control
E. Fully Manual Operator Loading Control

Loadout systems for greenfield and brownfield sites can include basic and optional functionality. Base system functionality includes the following:

- Train speed detection
- Wagon type detection
- Spill detection
- Rail Signals
- Hydraulic pack interface
- HMI terminal
The range of optional functions expands on this:

- **In-loading and/or out-loading weighing**
- **Train manifest management**
- **RFID tag reading**
- **MCC for power distribution and bin instrumentation**

Optional engineering support can include SIL assessment of design requirements and up to three months of 24/7 post-commissioning on-call support.

**System Operation**

The solution includes several tightly integrated systems to ensure accurate, consistent loading across the wagons:

- **Wagon Position Detection** – The TLO system detects the leading and trailing edges of wagons and automatically controls the loading chute and gates. Integration with the SCADA and Production Manager application, powered by Matrikon, for train scheduling and reporting allows the system to distinguish between rolling stock and ensure each wagon is loaded to the correct mass or volume.

- **Train System Interface (TSI) System** – The speed indicator automatically signals the train driver via a telemetry receiver in the locomotive cabin. It indicates when the train should stop, drive forward, reverse, and has finished. The train details are displayed. The train speed is shown by the bar target with a moving bar speed can be either an array (PE) cells or by track mounted switches.

- **High Object Detection** – To prevent collisions the TLO detects high objects such as locomotives, raised pantographs or track maintenance vehicles that enter the train loadout.

- **Spillage Detection System** – This warns of material from spillages that, if left over the rails, can lead to a derailment. The system can be linked with the TSI system to automatically signal the train to stop in the event of a spill.

- **Derailment Detection System** – Derailments may occur following material spillages. In these cases the automated derailment detection system can be linked with the TSI system to signal the train to stop.

- **Door Open Detection** – Coal wagons typically use bottom doors. Confirming these are closed as the wagon enters the loadout avoids spillages and possible derailments.

- **Wagon Underfill Detection** – A 3D camera measures the height of coal in wagons — a highly cost-effective method to detect underfilled wagons before they leave the TLO.

- **In-Motion Weighing Integration** – An in-motion weighbridge can help optimize loading chute gate control so wagons are not under or overloaded. A weighbridge at the loading facility also provides real time weight information for reporting.

- **Video Monitoring for Remote Loading** – A CCTV system, typically with two PTZ (pan tilt zoom) cameras and monitors mounted in the remote control room enable visual monitoring of operations from remote locations. Cameras are fully integrated into the SCADA system.

**Truck Loadout Systems**

Similar functions and options are available for truck loadout systems. Honeywell offers design, programming, installation, commissioning and ongoing operational support.

Base functions including batch loading, truck detection, traffic signals, hydraulic pack interface and the HMI terminal. Optional functionality includes RFID tag reading and MCC. The same TLO engineering support options apply.

**Production Manager (Train Manager)**

Information from the TLO system can be integrated into Production Manager, Honeywell’s manufacturing execution system software for integrating plant automation control and corporate business systems.

**Manifest Management**

Train manifest management is fully integrated between rail companies and the automated TLO control system using Production Manager. Train details can be entered into the PLC automatically from the rail company website or manually, specifying the type and number of each wagon. The train details page on the SCADA display shows each wagon. Information such as wagon type, target and tare weights is automatically loaded into the PLC when the manifest is submitted while the other values are calculated as each wagon is loaded.

**Video Monitoring Facilitates Loading in Remote Locations**
Reporting and Quality Control
Production Manager integrates all available loading and train data into a single user interface. A variety of hard and soft copy reports maximize the effectiveness of the TLO system

- Train Schedule
- Train Loading
- Train Manifest
- Wagon Loading Variance
- Loading Times
- Materials Quality
- Overloading/Underloading

Additional Support Services

Instrumentation and Weightometers
Honeywell also specializes in instrumentation and weightometers:

- Weightometer calibration and alignment
- Process Plant instrumentation service and calibration
- Licensed servicing of “nuclide sourced” instruments

Lifecycle Support
Honeywell offers extensive services and support to ensure you get maximum value over the lifecycle from your investment in automated loading systems.

We offer 24/7 support including Holidays, site familiar Engineers, problem resolution protocols, agreed maximum response times, preventative maintenance, including backup and disaster recovery, and PC and network health checks.

Other services include procurement, general automation engineering, and communications network configuration commissioning and troubleshooting. Honeywell offers in-depth experience across a wide range of protocols including Ethernet IP, ControlNet, DeviceNet, Modbus, Profibus, Ethernet and Serial. Honeywell has also been active as a systems integrator for over 30 years for Schneider Electric, Rockwell, Siemens, and GE.

For More Information
To learn more about how Honeywell’s train loading solutions can boost consistency and accuracy across the loading operation, visit our website www.honeywellprocess.com or contact your Honeywell account manager.

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