

MAGNETEK ENGINEERED SYSTEMS

Peterbilt, Denton, Texas Automated Axle Set Monorail System,
Automated Cab Set Monorail System, Fifth Wheel Monorail Systems



Project — Peterbilt Automated Axle Set Monorail System, Automated Cab Set Monorail System, Fifth Wheel Monorail System

Application — Automated Axle Set Monorail System, Automated Cab Set Monorail System, Fifth Wheel Monorail System

Products Used

- IMPULSE®•VG+ Series 3 drives
- IMPULSE®•G+ Series 3 drives
- Off-board console for Human Machine Interface
- Supervisory Programmable Logic Controller
- Ethernet connection to plant network
- Wireless I/O
- PulseStar Radio Remote Control System
- SBP2 Pendant

CHALLENGE

- Increase production output through increased automation
- Replace outdated manually operated axle, cab and fifth wheel delivery systems with monorail systems
- Integrate line processes to increase production efficiency
- Increase accuracy of production process

SOLUTION

- Magnetek engineered three custom automated monorail systems for cab, axle and fifth wheel assembly processes
- Provided application expertise and the products to meet the customer's specific needs
- Designed monorail systems that synchronized production lines for greater efficiency
- Installed a barcode reader system for accurate product tracking

Peterbilt's reputation is built on providing innovative design and superior-quality features in custom-engineered trucks. Each truck is custom manufactured to user specifications. Whether the order calls for a fully-appointed owner/operator truck or a unit spec'd to fleet requirements, each is manufactured to the same critical quality standards. Magnetek's Engineered Systems Group is helping Peterbilt continue this legacy through the design of automated systems for the line of vehicles produced at the customer's Denton, Texas, facility.

To achieve both increased production efficiency and output, every line in the factory was updated. Magnetek provided the engineering expertise and state-of-the-art control systems to create custom automated monorail systems resulting in tangible benefits to Peterbilt's end customers. The highly automated systems result in superior quality and increased production.

THE SYSTEMS

Cab Set Monorail System

The 10 carrier cab set monorail system begins with three lanes where cabs are picked and queued. As each cab is loaded, the operator uses a barcode scanner to read the cab production data. This scan associates the cab with the carrier, which is important later in the production process. Truck chassis move under a larger section of the monorail and are also read by a barcode scanner. When this is done, the cab that is required for that chassis automatically moves into place and the cab-to-chassis assembly process begins. During assembly, the carrier automatically matches the line speed of the chassis conveyor, making it easier for the operator to attach the cab to the chassis.

Magnetek SBP2 pendant stations are used to control the carrier over the lanes where the cabs are picked providing optimal control and performance in a compact design. Magnetek's PulseStar radios are used for setting the cabs on the chassis during the assembly process, and a maintenance transmitter is also available to manually operate a carrier around the entire monorail loop. Magnetek IMPULSE•G+ Series 3 adjustable frequency drives control the travel and hoist motions on each carrier, and reversing contactors control the grab.

Red and amber beacons illuminate on the carrier as a clear indication to personnel in the area that the carrier is moving automatically or if a fault has occurred. Blue and yellow beacons notify the operators of which radio transmitter is in control during the assembly process.

Axle Set Monorail System

A second 10 carrier monorail system was installed for delivering and assembling axles to the truck chassis. On this monorail loop, carriers move from the load station and travel onto and off of two interlocking bridge cranes that are positioned above the on-ground chassis conveyor. Empty carriers are dispatched automatically back to the load area where the cycle repeats itself. This system contains both a clockwise and counterclockwise sequence of operation, with only one direction operational at a time.

SBP2 pendant stations are used to control the carriers and PulseStar radios are used to control the bridge cranes. IMPULSE•G+ Series 3 drives control the trolley and bridge motions.

Once again, a series of red, amber and blue beacons are used to inform personnel when the carrier is moving automatically, if faulted conditions arise, and whether the bridge interlocks are functioning properly.

Fifth Wheel Monorail System

The fifth wheel monorail system consists of three carriers that synchronize in speed with the on-ground chassis conveyor. After moving a loaded carrier to the assembly line, the operator activates the line synchronization feature that synchronizes the speed of the carrier to that of the chassis conveyor, allowing for an easier assembly process and more flexibility for the operator. Empty carriers are then dispatched automatically back to the load station queue area.

Manual control of the carriers are provided through SBP2 pushbutton pendant stations suspended from the carriers. Two speed reversing contactors control the hoist motions, and IMPULSE•G+ Series 3 drives control the travel motions. All of the controls are mounted in NEMA 4 enclosures on the carriers.

Each fifth wheel carrier is equipped with a red motion beacon that is energized when the carrier is moving. The amber beacon on each carrier turns on steady when the system detects a problem with the carrier and flashes fast when the dispatch button is pressed.

General System Information

Each of the three independent operating monorail systems are controlled by a floor mounted ControlLogix PLC. Touch screen operator interfaces display system information and allow the operators to control track switches, call carriers, and establish which carriers are active on line. In addition, each carrier contains I/O that talks with the on-ground PLC over 802.11 a wireless communication.

To further increase production efficiency, the carriers are positioned at various stages along the monorail loops using a barcode-type positioning system. This positioning system not only provides for accurate positioning of the carriers, but it also allows the main system PLC to track the carriers and perform collision avoidance between carriers as they traverse around the system. Ultrasonic sensors are also employed on the carriers as a collision avoidance back-up.

Magnetek's Engineered Systems Group contributed to improving the production efficiency and throughput at Peterbilt's Denton, Texas, facility by providing a complete turnkey controls solution. The automated monorail control systems were designed by Magnetek engineers, using IMPULSE adjustable frequency drives, PulseStar remote radio controls and SBP2 pushbutton pendants. The system further incorporates programmable logic controllers, touch screen operator interfaces and RF data communication, all programmed by Magnetek. And to ensure that the system operated per the end user's requirements, Magnetek's system engineers performed on-site start-up services, along with maintenance and operator training.



ADVANTAGES OF USING MAGNETEK'S ENGINEERED SYSTEMS GROUP

- Expertise in crane, hoist and monorail control systems
- Experience in automated carrier and bridge monorail systems
- 100 years of combined experience in the Engineered Systems Group designing and implementing automated crane, hoist and monorail systems