

All-weather pneumatic solutions

Martin Sanders Business Development Manager-Transportation, for Parker Hannifin's Pneumatics Division, highlights how the latest generation of pneumatics technology is helping rail operators to optimise the reliability of their trains even in extreme conditions.

Both passenger and freight trains are expected to operate reliably in some of the most challenging conditions imaginable. Extreme temperatures, aggressive contamination, and shock and vibration all do their best to bring vehicles to a standstill, requiring engineering technology that is robust, dependable and long lasting. However, with rail operators also looking to make their fleets as energy efficient and cost effective as possible, these systems and components also need to be compact, lightweight and simple to install and maintain.

Combining all of these features is no easy task, but the latest pneumatics technology has been developed to do just that. Pneumatics has been used throughout the rail industry for many years, and is today used to control everything from braking systems and pantograph mechanisms to doors and toilets. One of the reasons for this widespread use of compressed air systems is their ability to provide a simple and affordable yet also precise and reliable method of motion control both onboard and at the trackside. With the need to keep trains running in some of the lesser developed and habitable regions of the world, pneumatics often plays a vital role. In this article, I'll highlight just a few examples of pneumatic systems helping



rail operators overcome the elements to optimise their productivity and profitability.

Robust unloading systems

Pneumatics form a key element of an automation system developed for one of Europe's biggest manufacturers of Falns self-discharging freight wagons. These vehicles are designed for transporting coal. They are loaded mechanically at the upper part of the box and feature four trapdoors, two on each side of the box, for subsequent unloading by free-fall beside the track. For these trapdoors to be controlled easily and reliably, pneumatics technology is used. There are two large bore actuators mounted under the vehicle, which open and close the hopper doors at the side of the wagon. These are operated by heavy duty manual push buttons via

brass body valves that are built into the control panel. As the wagons are used in applications where contamination from coal dust and other particles is rife, these components need to be extremely robust and damage resistant. Additionally, the pneumatic system is also responsible for locking the doors, so the reliability of the setup also has direct implications on safety.

In this instance, the pneumatic control system was developed as part of a complete automation solution, incorporating everything from the pneumatic valves and cylinders to piping and connectors. This consolidation of supply, helped the wagon manufacturer keep costs to a minimum, while using a single supplier also helped ensure the final design was fully integrated and simple to install.

Extreme valves

The latest pneumatic components designed for extreme conditions have been essential in helping operators maintain the reliability of their fleet whatever the climate. For example, Parker's Viking Xtreme valves are able to withstand temperatures of between -40° and +60° for maximum reliability and significantly reduced downtime. These specially developed valves use moulded spool technology, which is proven to provide dependable service in the harshest environmental conditions. Combining this durable construction with compact dimensions and lightweight materials makes these kinds of valves ideal for a wide range of rail applications.

For instance, a major Korean train manufacturer, required a 3/2 valve for use on a coupling system for its rail rolling stock. The valves had to be able to operate at extremely low temperatures as cold as -30°, and offer a wide voltage tolerance and a flow rate capable of operating the cylinder in the coupling system.

The Viking Xtreme valve was chosen for the application as it had already been proven to work successfully in other applications on rail rolling stock. This solution proved so successful that it was adopted not only for the initial 24V DC application but for other applications with varying voltages as well.

Sub-zero solutions

This extreme technology has also provided the solution for an electrical isolator switch gear used on US subway rolling stock. The manufacturer of the switch gear needed pneumatic components that could tolerate -40° temperatures. Until coming across the Viking Xtreme valve, the company had been unable to find a pneumatic solenoid valve that met the technical requirements and was suitable for the application.

The valves were provided to the manufacturer affixed to a sub plate complete with all the required electrical wiring and pneumatic connections. This made the system extremely simple to install and helped keep down costs. By sourcing the pneumatic technology from a supplier with multi-platform capabilities, the manufacturer could specify a fully tested and pre-assembled solution.



Pantograph control

New generation pneumatics technology has also proved considerably useful for controlling train tilting, pantograph and sanding systems, helping to make rail vehicles more energy efficient and therefore cost effective.

For example, the latest Pendolino tilting trains use proven electro-pneumatic systems to control the movement of each car as it enters a camber, ensuring the cars remain level and independent from the bogies. Two electro-pneumatic proportional regulators are used per cylinder, with one controlling the air feeding the cylinder, while the other controls the air draining from it. Once again, the cylinders and regulators can be supplied as one complete pre-assembled system, making this another instance of a complete design solution featuring pneumatics technology.

The same components are used in a modular pneumatic 'circuit board' system that can balance a train's pantograph

system effectively in one fully-integrated lightweight assembly. These kinds of pantograph control panels are used throughout the UK to enable connection to the overhead lines when they are in use. As with all pneumatic systems for railway applications, this technology has to operate reliably and safely in accordance with the exacting industry standards.

In summary

Optimising the performance and reliability of rail applications can be particularly challenging when the operating conditions are stacked against you. Extreme weather, aggressive contamination and demanding schedules require engineering knowledge and products of the highest standard.

Where pneumatics are concerned, it is vital that components and systems are specified that are capable of meeting these tough demands. This technology is now available and is helping rail operators around the world increase their productivity and profitability. By working with a leader in pneumatics that can also offer a complete multi-platform solution, ensuring vehicle reliability is simpler, faster and more affordable than ever.



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