



## **Braking from Tradition: How Bosch Rexroth Future-Proofed the VIS-Check Vehicle Inspection Machine**

**Vehicle Inspection Systems (VIS) is a long-established, leading manufacturer and distributor of safety inspection equipment, primarily used by law enforcement, transit facilities, fleet maintenance, service shops and owner/operators. VIS' products enable accurate inspections of the brakes, steering and suspension of heavy trucks, transit buses, school buses, motor homes and other vehicles.**

The VIS-Check is a diagnostic machine that automates the vehicle inspection process, providing precise testing of brakes, steering and suspension through a unique design that realistically simulates road conditions. The unit can fit into a conventional repair shop service bay, but is also available in a transportable version that allows tests to be conducted on location.



Vehicles drive on top of the VIS-Check, with the machine applying force to each wheel, which the vehicle must counter by applying the brakes. At the end of a test, the VIS-Check produces a final report on the health of a vehicle's brakes, providing a pass/fail grade. In addition to making sure the brakes comply with DOT specifications and CVSA guidelines, the unit is able to find otherwise undetectable issues in need of repair, enhancing vehicles' overall safety on the road.

Since being introduced in the late 1990s, the VIS-Check had only received minor updates to its original design, which utilized a customer real-time data collection PC with a wired hand controller to run test operations, such as turning on rollers and gathering sensor data. This data was then sent to a standard desktop PC, from where reports could be printed using a dot-matrix printer. The standalone PC also housed a database to temporarily store records of previous tests.

As time went on, wear and tear on the system's ancillary equipment, such as the hand controller and the cables that connected it, led to regular breakdowns that often required a lengthy repair process. The original machine's

custom-built boards contained chip sets, circuits and other components for which it became increasingly difficult to source replacement parts. Another factor tying the machine to outdated technology was its firmware, which was only compatible with antiquated software that itself was only compatible with a very old version of Windows.

Vehicle Inspection Systems wanted to completely reimagine and update the VIS-Check interface using modern hardware and software, making it a flagship product for the company as well as an example of technological innovation for its parent company, Nepean Transport. Among the changes VIS requested were to replace the machine's push-button operator panel with a web-based, graphical interface that would allow the visualization of data by any internet-capable touchscreen device, such as a tablet or phone. VIS also wanted the design to incorporate wireless local area network (WLAN) technology for printing and OPC unified architecture for data transfer. Adding to the complexity of the job, VIS also requested that the machine's hardware fit into an enclosure of a similar size as the original machine — not just the i/o and machine drivers, but any technology replacing the external PC as well.

VIS chose Bosch Rexroth and AOTSource not only because they were able to lead the entire process of machine development, testing and deployment, but also because Rexroth offered an elegantly simple technological solution through its high-performance, ultra-compact and powerful control platform ctrlX CORE. Built on a real-time, Linux-based operating system, ctrlX CORE offers open, flexible architecture that's compatible with any kind of hardware, offering maximum versatility for a wide range of applications. Its advanced capabilities not only make it suitable for today's needs, but as a practical solution over the long term as well.



"The ctrlX AUTOMATION toolkit is really a step ahead of anybody else," said Greg Phelps of AotSource.com, which made the initial connection between VIS and Bosch Rexroth

and provided integration services for the project. “In essence, it’s a Linux PC that can run third-party software. It’s hard to explain how revolutionary or disruptive an idea that is in our market, because every manufacturer wants you to play in their sandbox if you use their brand.”

The VIS-Check’s three main components – its control unit (a programmable logic controller, or PLC), its visual display (a human machine interface, or HMI) and its database – all used different programming languages, which traditionally required separate units. But the ctrlX CORE, “The Smartphone of Automation,” boasts open design and computing power that allowed Bosch Rexroth to consolidate all the old machine’s hardware, features and functions into a single unit using ctrlX Store apps such as the PLC app, Web HMI app and database app. Not only did this dramatically cut down the physical footprint of the machine, it simplified the process of setup and installation.



“The PLC functionality, the HMI functionality and the database functionality, it’s all happening in one place. The true technology aspect of this is what Rexroth has brought to the table with the ctrlX CORE,” said Rocky Hafen of Vehicle Inspection Systems.

Updating the machine’s software presented a different challenge, however. The VIS-Check’s software had been

originally written by a third-party company and VIS had been licensing it ever since, so they didn’t have access to the original code. As a result, the machine’s entire operation would need to be reverse-engineered. Additionally, VIS wanted the new machine to use the original VIS-Check’s mechanical components – including load cells, transducers and proximity sensors – to prevent any operability problems being introduced by new variables in the machine.

The engineers in Bosch Rexroth’s Automation & Electrification division worked with AoTSource.com and VIS to review all the machine’s functions and capabilities, and from there, generated a completely new set of panel layout drawings, machine wiring schematics and a bill of materials, making sure that the final design would meet UL508 certifications.

In just over a year, the new VIS-Check was completely redesigned, re-engineered, programmed using only the old machine’s operation as guidance, and tested. Today, Bosch Rexroth- and AOTsource-designed VIS-Check units are available in both electric and portable diesel-powered versions, with several currently deployed in Australia and in the U.S. and more to come by the end of 2023. The new VIS-Check runs entirely off the ctrlX CORE, which connects wirelessly to a tablet or other internet-capable device. The user is able to do everything wirelessly – from operating the testing mechanism to visualizing test results to printing reports. If the user’s handheld device malfunctions, all it takes to get up and running again is to connect another device.

“They’re not dead in the water because one piece of hardware is broken, which out in the field happens a lot. It’s not a controlled environment by any means,” said Rocky Hafen. Because of the ctrlX CORE’s hardware-independent architecture and ability to process large amounts of data, the VIS-Check isn’t locked into its current setup, as it was before. Instead, it can continue evolving long into the future.

“If we decide to go down an upgrade path and also implement new technology as it comes out, the ctrlX CORE is going to allow for that. With a lot of platforms, new technology often means new design. This is going to allow for scalability that a lot of control systems don’t even come close to,” said Rocky Hafen. “You’re going from a custom-built solution to one where you guarantee components for a minimum of 20 years with the Rexroth product. It’s giving peace of mind,” adds Greg Phelps.

Through the power and versatility of its products and its hands-on support, Bosch Rexroth is putting control back in the hands of the customer.

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