THE BENEFITS OF TERMINAL AUTOMATION USING THE DTN GUARDIAN3™
Operating today’s bulk terminal without a modern terminal automation system has become increasingly difficult. Current requirements from state and federal agencies for safely operating a bulk terminal and tracking product movement present a significant challenge for terminal operators. Combined with sophisticated data exchange requirements to corporate headquarters or third-party host systems; a modern terminal simply cannot operate without some type of automation.

The DTN Guardian3 (DTN G3) terminal automation system provides industry-leading tools that allow terminal operators to manage terminals in the safest, simplest manner, while providing data exchange capabilities that meet or exceed the sophisticated requirements of modern back-office systems. Using the DTN G3 as a standard, this paper will review system architecture, industry trends and examine must-have features required in a valuable terminal automation system.

REVIEW OF SYSTEM ARCHITECTURE

When choosing a terminal automation system, a terminal operator should begin by looking at the platform used to create the system. The system platform is often overlooked by the terminal operator, but is a critical component for any modern terminal automation system.

Due to the instability of early versions of Microsoft Windows, combined with the lack of processing power from early PCs, often early terminal automation systems were delivered on non-Microsoft platforms. However, today Microsoft operating systems dominate the PC platform and have become the business standard for most companies. When combined with the speed available from current PCs, it is clear that a current Microsoft Windows operating system is the correct platform for a terminal automation system. Terminal operators have PCs in their offices or at home, and will likely be familiar with a Microsoft Windows user-interface. In addition, the DTN G3 terminal automation system is always delivered on a current Microsoft platform and can be easily integrated into corporate network environments.

A second factor in terminal automation system architecture is the database used to store terminal information. A modern automation system is a combination of real-time control and data storage. Using a Microsoft platform-compatible relational database is the optimal approach for a terminal automation system. Certainly one of the most popular relational databases for Microsoft platforms is Oracle. This product offers fast and reliable data storage, and can be found in back-office products like SAP. The DTN G3 is available on an Oracle database.

INTEROPERABILITY THROUGH INDUSTRY STANDARDS

Another important factor to consider when choosing a terminal automation system is how well it supports industry standards. The number of intelligent devices found at a terminal greatly increased throughout the 1990’s. A modern terminal is likely to have dozens of devices ranging from PLCs to electronic presets to additive injectors—all of which require interfaces from the terminal automation system. Keeping track of and writing device drivers for all of this equipment is a difficult task for all automation vendors.

Working to increase the interoperability of these devices like those found at terminals, one open standard which will play an important role in the coming years is called OLE for Process Control, or OPC. While not required to successfully automate a facility, systems which support the OPC standard are likely to provide interoperability with future products for many years to come. A further examination of the OPC standard will explain its importance to current and future terminal automation systems.

The concept behind OPC is relatively simple. Instead of a software vendor creating individual drivers for each device they need to communicate with, the vendor simply accesses device information from an OPC Server. In return, the manufacturer of the intelligent device creates an OPC Client which provides a conduit of information to and from the OPC Server. Using the OPC approach, a terminal automation vendor needs only to write the principal logic behind the system. Traditionally, an automation vendor had to become intimately familiar with the mundane details of device interfaces.

The DTN G3 supports OPC connectivity to field devices. There are a number of DTN G3 installations utilizing OPC to communicate with PLCs manufactured by vendors such as: Allen-Bradley, General Electric, and Automation Direct. DTN is also working to incorporate OPC into communicating...
with terminal automation-specific devices, such as electronic presets and additive injectors. The goal is to deliver a terminal automation system in which all field device communication will be handled via OPC.

A second feature which is required by a modern terminal automation system is user-friendly data management. Data entry screens should not be overly complicated and the most used screens, such as those for bills-of-lading and allocations, should be simple to access and navigate. The screens should provide configured drop-down menu choices whenever possible to prevent erroneous data entry. Further, business logic should prevent operators from performing data deletes and modifications, which can affect the terminal balance and billing for customers. Simply prompting operators to confirm data deletes and certain modifications can eliminate common operator errors. The DTN G3 provides a non-cluttered, Microsoft Windows interface, which provides configured drop-down choices wherever possible and validates data on important fields. The DTN G3 displays error messages to the user if invalid data is entered, or required data is not entered.

A third capability desired in a modern terminal automation system is support for extensive diagnostic troubleshooting. As explained earlier, a modern terminal often has a large number of intelligent devices requiring continuous communication. When a terminal is struck by lightning or experiences intermittent power outages, communication with field devices can be severely hindered. It is imperative that the terminal automation system at the facility be able to quickly show which devices are in fault. Tools such as graphical overviews of the facility which provide visual fault indications and the ability to disable and enable equipment are needed. Further, detailed logs of system activity and the ability to view communication logs with field devices enhance the ability to quickly diagnose problems. The DTN G3 contains a graphical terminal overview which allows authorized personnel to enable and disable operations for the entire site, a single loading bay, or even single load arms. In addition, the DTN G3 gives terminal operators the ability to view all field device communications, an invaluable tool which has saved many hours of troubleshooting over the years.

The final capability needed in a modern terminal automation system is the ability to balance terminal inventories. In concept it’s simple, just take the difference in volumes between two sets of tank levels, account for any trucks loaded and bulk movements into or out of the tanks in anticipation of everything balancing. In reality, it is much more difficult. A single tank gauge entered incorrectly could make a difference of thousands of gallons of product. In addition, most terminals have multiple product owners, and there can even be many product owners in a single tank of product. Those product owners often require daily book balances of their inventory positions. This can make the overall inventory reporting very complicated.

A second feature which is required by a modern terminal automation system is user-friendly data management. Data entry screens should not be overly complicated and the most used screens, such as those for bills-of-lading and allocations, should be simple to access and navigate. The screens should provide configured drop-down menu choices whenever possible to prevent erroneous data entry. Further, business logic should prevent operators from performing data deletes and modifications, which can affect the terminal balance and billing for customers. Simply prompting operators to confirm data deletes and certain modifications can eliminate common operator errors. The DTN G3 provides a non-cluttered, Microsoft Windows interface, which provides configured drop-down choices wherever possible and validates data on important fields. The DTN G3 displays error messages to the user if invalid data is entered, or required data is not entered.

A third capability desired in a modern terminal automation system is support for extensive diagnostic troubleshooting. As explained earlier, a modern terminal often has a large number of intelligent devices requiring continuous communication. When a terminal is struck by lightning or experiences intermittent power outages, communication with field devices can be severely hindered. It is imperative that the terminal automation system at the facility be able to quickly show which devices are in fault. Tools such as graphical overviews of the facility which provide visual fault indications and the ability to disable and enable equipment are needed. Further, detailed logs of system activity and the ability to view communication logs with field devices enhance the ability to quickly diagnose problems. The DTN G3 contains a graphical terminal overview which allows authorized personnel to enable and disable operations for the entire site, a single loading bay, or even single load arms. In addition, the DTN G3 gives terminal operators the ability to view all field device communications, an invaluable tool which has saved many hours of troubleshooting over the years.

The final capability needed in a modern terminal automation system is the ability to balance terminal inventories. In concept it’s simple, just take the difference in volumes between two sets of tank levels, account for any trucks loaded and bulk movements into or out of the tanks in anticipation of everything balancing. In reality, it is much more difficult. A single tank gauge entered incorrectly could make a difference of thousands of gallons of product. In addition, most terminals have multiple product owners, and there can even be many product owners in a single tank of product. Those product owners often require daily book balances of their inventory positions. This can make the overall inventory reporting very complicated.
The DTN G3 has extensive support for both physical and book inventory reconciliation. On a single screen, terminal operators can easily view physical, physical month to date (MTD), book, and book MTD inventories by tank or by shipper. All that is needed to perform a balance or close is a set of tank gauges when product is not moving in or out of the tanks. After that, the close can be performed at any time. The ability to recalculate a close, if data which affects the close has been modified, is also supported.

A unique feature to the DTN G3 inventory reporting is the ability to keep a terminal balanced in real-time. The DTN G3 will automatically calculate terminal inventory positions after any product movement. This is very valuable to operators of terminal with multiple product owners as those product owners often need accurate and up-to-date information regarding their positions.

In conclusion, there are many factors to consider when choosing a terminal automation system. Make sure to choose a system that will support tomorrow’s requirements. While no one can predict the future, choosing widely-used components will help ensure better chance of success. Secondly, choose a system that supports safe loading, is easy to use and troubleshoot, and can properly perform terminal inventory balancing and reporting functions. The DTN G3 is all of this and much more. For information on how the DTN G3 and other DTN products can help operate your terminal or terminals, please contact DTN.