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Improving traceability at Tilbury



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by Arvin Donley

The Forth Ports plc grain terminal at the Port of Tilbury dock, London, U. K., recently completed the commissioning of an advanced management and traceability system.

In a business environment fraught with legislation and stringent, trade-assurance schemes, Forth Ports was looking for a way to significantly reduce the potential for human error and vastly improve its management information system.

Forth Ports chose Doncaster, England-based DB Information Systems (DBIS) and its real-time CommTrac bulk commodity management and traceability system as the solution.

Forth Ports realized that increasing demands for accreditation, regulatory compliance and traceability would be made by their users. From a due diligence and reduced-business-risk standpoint, it was clear that a single, facility-wide system was needed to deliver the handling quality that would be expected in this increasingly demanding business environment.

The Tilbury grain terminal had the inherent capacity, throughput and location to attract business. What it needed was proof that the facility was run in accordance with accreditation schemes and that a traceability audit trail was readily available for all handled commodities.

The project included two phases: an automation upgrade, followed by the installation of the management system.

AUTOMATION UPGRADE

Prior to the upgrade, manual push buttons were used to control all the electrical devices in the facility. Routing for transfer of commodities had to be determined manually and deployed through a laborious planning process in which devices had to be set to achieve the required path.

The automation phase was completed using modern logic controllers and intelligent motor starters. DBIS decided to take all signals from the existing large mimic display that covered a complete wall in the control room to ensure that the terminal could stay in operation during the automation upgrade.

One of the more interesting upgrade features involved the use of a radio

frequency link from the silo building to the marine towers located at the end of the riverside jetty. This feature allows the passing of text-strings representing weigh scale information from the towers as ships are unloaded.

The operational processes, which are the business processes of the facility, had to be understood to provide the specification for the programming of the logic controllers. This information was also the key to the specification of the operational control that was to be obtained under the management system.

TRANSFERRING KNOWLEDGE

In CommTrac, the equipment and operations are executed under a complex set of rules. These rules are established according to the physical layout of all equipment in a facility and how they are used to meet the business that the facility undertakes. The transfer of this knowledge from time-served facility controllers to the system engineers was one of the key achievements of the project.

At Tilbury, the bins used for export accumulation are linked to the input truck scale, laboratory testing and the truck discharge pits. The various conveyors used to transport commodity through this part of the silo are identified and their routes verified. Accumulation blending operations are executed through the management system, retaining full traceability through a "parent-child" structure.

A similar process is used for the import side, with a de facto IP regime being applied to all shipments. There are about 1,000 possible routes through

the facility, taking all valid permutations. The "mapping" of the facility and equipment usage is vital to the correct running of the terminal. Once it has been established and tested, the quality of grain handling is assured.

The four on-site milling facilities represent more than 75% of the terminal's import capacity, with the remainder being shipped from the automatic truck-loading bay at the land side of the terminal. Both export and import transactions are handled by CommTrac, as is any rummaging required for grain quality preservation.

HACCP compliance is readily and inherently achieved. Plant equipment that requires cleaning cannot be selected by an operator, as the system tracks past and current usage.

Each bin has a Radio Frequency Identification (RFID) tag to identify it, with the tripper conveyor carriage having a sensor that reads and confirms that it is located correctly prior to discharging to the bin.

Since this system has been installed at Tilbury, contamination of commodities by others has been avoided. As a result, the facility has benefited by avoiding cross-contamination, implementing automatic cleaning schedules and achieving Trade Assurance Scheme for Combinable Crops (TASCC) approval. Compliance with E.U. 178-2002 is also inherent to the design and implementation of the system.

IMMEDIATE, ACCURATE INFORMATION

The management system works by using accurate, real-time data from

the automation system to which it is linked. This real-time data ensures that its built-in interlocks operate correctly and at the same time provide controllers and managers with accurate information about any aspect of the terminal's operation.

Full automation is not required for CommTrac to be deployed. Input can also be taken from mobile devices, keyboards and scanners, which allows automation to be considered separately.

All of Tilbury's data is archived electronically to provide a record of "what actually happened" to any commodity that was handled at the facility. The data is structured and handled according to the Food and Drug Administration's (FDA) CFR21 Part 11 guidelines that ensure data integrity and access security. This greatly reduces business risk both for Tilbury and its customers.

The most important aspects of Tilbury's business operations are its storage, the effective use of that storage and quality commodity handling. The investment in CommTrac makes accurate information immediately available to the terminal manager. The system automatically populates the company's accounting system with financial information while the bookkeeping functions of receipt, handling and discharge fees are automatically invoiced.

Another benefit has been the elimination of paper-based tasks that were a particular burden on control room and ledger operations. After just three weeks, all paper systems were abandoned at the Tilbury facility.

The availability of accurate, real-time information has had some unexpected benefits for Tilbury. During the automation phase, it was determined that level probes were needed to monitor out-loading bin content. These devices are now governed by ATEX (explosive environment rules) and are expensive. However, the availability of real-time data means that bins can be filled without the need for level sensors. This produced significant equipment savings and also provided a tangible acceptance of the quality of CommTrac data.

SATISFIED CUSTOMER

Peter Ward, Tilbury's grain terminal and bulk assets manager, said the system has improved operations at the facility.

"We simply have to be ahead of the game," Ward said. "Our customers are increasingly expecting traceability and hygiene in our operations. Having CommTrac allows us to show any customer how we undertake our operations and that they can have confidence in correct handling."

He added, "It is not my experience that a system can be seen to be effective merely three weeks after commissioning. This reflects well on DBIS and the Tilbury IT and operational staff. CommTrac has worked better and faster than we initially expected and I am certain that, as we get more experienced in its use, we will get more information out of CommTrac that will allow us to offer value-added business benefits to our customers."

He said Tilbury's customers are now experiencing advantages in operating at the terminal. For example, load-out bins are accurately filled in readiness for truck arrival, previous delays are eliminated and turnaround is much faster, which is important given new working time

directives.

By looking at his desktop PC, Ward can now see all information and activities that are taking place in real time, such as stock figures and vehicle movements. He said this has allowed him to operate the facility in a more efficient manner and offer a far more flexible and information rich service to his customers.

Ward said the investment in enhanced management and traceability has placed Tilbury in a very strong position to attract new business from new and demanding markets. WG