schenck process

APPLICATION REPORT

LOGiQ®
The new generation of loading and shipping automation

Introduction

Problem-free and efficient production processes are key to a well-organised flow of goods. The material needed must be available at the right time, at the right place and in just the right quantity. LOGiQ® from Schenck Process GmbH is a logistics solution for the bulk materials and cargo industry. It automates all procedures from ordering through to shipment. LOGiQ® controls the flow of goods to and from production processes. It also ensures that data is exchanged between the process and commercial systems in a fully automated manner.

LOGiQ® is able to respond flexibly to the customer's needs through its use of numerous coordinated hardware and software modules. The solution is used in the chemicals, steel and cement industries as well as for waste and paper management.

Figure 1: LEGIC Identcard

Figure 2: Multilingual interface for drivers

Customer's requirements

In 2005, one of the biggest cement manufacturer in Germany launched a project to automate cement dispatching and shipping up to a level of full 24x7 self-service.
Previously the plant had handled around 80-120 trucks of cement a day, a figure which has now increased to 150 trucks.
In January 2006, the customer tasked Schenck Process with turning this project into reality.

Site conditions

In terms of plant layout, the following stations had to be automated:

- Plant access with entrance and exit gates. The new installation had to consider appropriate automated plant access. The exit will be opened by ultrasonic detectors, regardless of the type of vehicle.
- The two existing 3rd party gate weighbridges had to be equipped with self-service terminals to provide 24x7 operation, without the need for support from a plant operator. It should be possible to register without an Identcard or the like; hence the installation should issue the media required where necessary.
- The weighbridge office had two operator workplaces that also had to be upgraded to latest PC technology and LOGiQ® DispatchManager for order maintenance.
- The former loading stations were also to be fully automated using new terminals with touch screen technology.
- Furthermore the customer also had 13 unloading stations for e.g. fly ash, REA gypsum, fluff, photo water, raw meal, animal meal and lump coal that were to be considered for automated loading and unloading procedures.
- Video surveillance was required for all stations, including surveillance of the entrance and exit truck weighbridges.
- The installation had to be completed by a server system comprising two equal rack servers for back-up. ORACLE was required as company standard for the database system.

LOGiQ® from Schenck Process GmbH

LOGiQ® matches perfectly with the requirements of the customer. The multi-layer architecture and the use of LEGIC Identcards opens up a wide range of options for the customer, while also leaving scope for future quantitative and functional extensions.
Even high workloads do not limit individual terminals because the installed stations only handle dedicated tasks. Every station provides information on the present status via TCP communication. The central data collector is the ORACLE database. Since the transmitted data is only a few bytes in size, the system is also suited for a large extension in the future. The local terminals are designed to undertake work autonomously as a result of which the server does not have to reserve CPU power for these machines.

RFID card system

One of the key components of this installation is the RFID system (LEGIC) that is widely used in LOGiQ®. Using these Identcards eliminates all avoidable paperwork, optimises the registration and identification process and thus makes the whole procedure more secure and reliable.
Identcards allow truck drivers to operate the system as self-service, 24 hours a day, 7 days a week.

Forms of business

The plant basically has two types of customer:

- Customers who collect their own materials. These customers have their own truck or authorise transport companies to pick up their material.
- Customers who have material delivered to their required destination. In this case transport also forms part of the sales order. The truck fleet from the plant or an authorised transport company usually handles this.

Installation also covers suppliers for commodities, based on purchase orders.

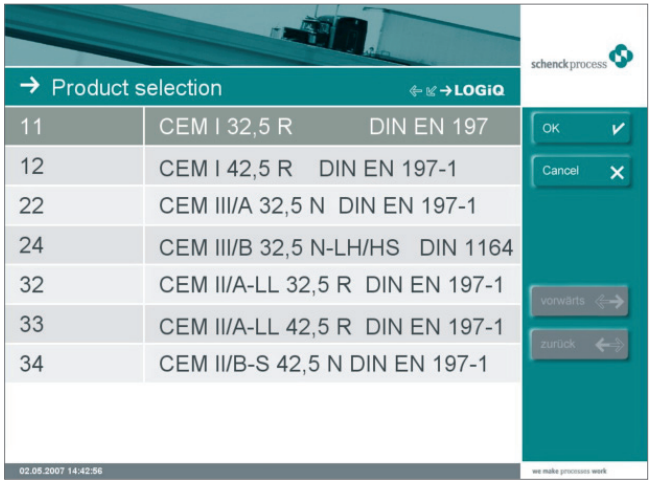

Figure 3: Product selection

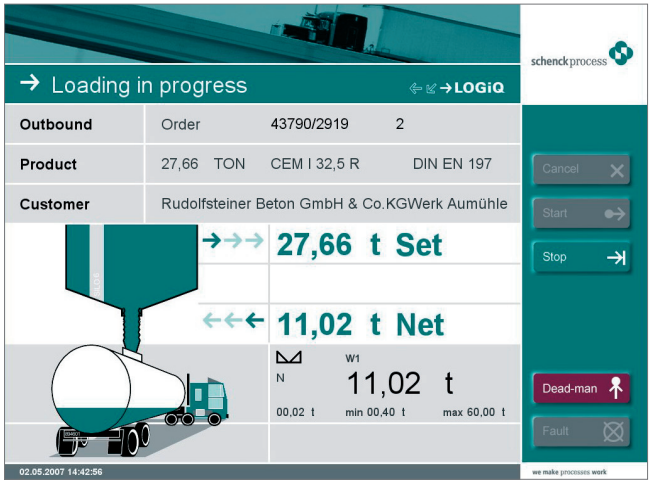

Figure 4: Loading station screen

Business work flows

At the plant entrance, the drivers have various options for registering with the system on the self-service terminals.
If the driver arrives without an Identcard, he may identify himself in several ways:

- TAN (transaction number)
  This is only valid if the plant operators have maintained such a TAN. This TAN clearly identifies one transport order.
- Contract number
- Carrier name

Alternatively, the driver has a permanent Identcard. This card can be linked in LOGiQ® to a direct transport order, contract or transport company.
The link to a contract is mainly used for customers collecting their own material who are registered with a single contract. However, this contract may contain different materials that will be available and released for pick up.
Certain transport companies may be registered for multiple end customers. Additional steps of identification are therefore required to properly identify a transaction. Internally this transport company is linked with customers, ship-to locations and materials.

Loading stations

All loading stations should be equipped with touch screen technology and new weighing electronics.
Communication has been established to the existing PLC systems with parallel I/O contacts and a 4-20mA analogue output for the actual truck weight. It is understood that these terminals also had to be incorporated into the plant Ethernet network for communication.
For financial reasons, the scales at the loading stations are not legal for trade.
The user interface on the loading stations is designed in the same way as the self-service registration terminals at the entrance to achieve optimal recognition.

Security features

With the introduction of LOGiQ®, the plant operators and the drivers had to learn one important key message:

"Big brother is watching you"

LOGiQ® maintains logging information for every transaction throughout the plant. This includes registration, loading and of course interfaces to the host and truck dispatching systems. Over the years, drivers have learnt that they cannot cheat LOGiQ®. LOGiQ® provides information about each time a user presses a key and provides evidence of system malfunctions as well as misuse. The installation has therefore also helped to greatly reduce complaints about anomalies as users caused more than 90% of them, not LOGiQ®. In fact, the remaining incidents where caused by "human error". Over the years we have experienced fewer than 10 issues which were traced back to the software (out of more than 50 000 transactions).

In the rare cases of technical issues, these logging features were a great help in identifying problems quickly and reduced the repair time. Most of these issues could be rectified without having to fully shut down the system .

Video surveillance

The web cameras at the legal for trade entrance and exit scales had to take snapshots from the trucks automatically and to store these on the file server with reference to the transport order. This has to be done because the cement plant tended to remove the driver's signature in favour of the photos of the truck and driver. The pictures are stored in a secure area accessed only by authorised administrators.

Interface to ERP system

The customer maintains the existing ERP system that is based on ORACLE. The interface is a directly coupled link.

Usually, these kinds of interfaces are designed to be asynchronous and decoupled. In this particular case we developed a fully linked system, based on direct external database access.
For security reasons, the external database comprises (read-only) views that can be accessed securely. A set of new tables was created for returning processed information. The external system permanently screens these tables for new or modified data and reads the information as necessary.
One additional special feature is the way the external master tables interact. The information is split into several different views, which must be evaluated and stored in the internal system.
For example: One view comprises information about the customer, the ship-to address (construction site) and materials. Additional views provide information about trucks and the linked transport companies and furthermore information about the contracted client. Therefore, if a truck driver arrives at the plant, registers for a defined client and enters an authorised construction site, he is entitled to load the released material.
Our system permanently scans the external views for modifications and first creates a 1:1 copy in the internal database.
When the connection is active, this happens every 5 minutes.
It is important that the copy is created first and the data then processed because the link to the external system may fail.
Since only the modifications are considered (based on change date and time stamps), traffic is minimal.
If a connection is lost, the system will automatically re-establish the link and continue screening the external views. This interface remedies itself without the administrator having to intervene.
Beside the direct database connection, LOGiQ® can of course interact with external systems in other ways, for instance:

- File sharing access on ASCII flat files (e.g. IDOCS)
- Direct TCP access to external services
- XML file exchange based on XSD validation (file sharing or TCP->SOAP)

The customer is highly satisfied with the installation and greatly appreciates the flexibility of LOGiQ®. Over the years many enhancements have been implemented to optimise business procedures.
The customer very quickly came to understand the huge potential of LOGiQ® and planned many optimisations that could not have been undertaken before.
Ultimately LOGiQ® not only fulfilled expectations but opened up vast new possibilities for the customer.

System summary

Key figures:
1 LOGiQ® installation for a major cement manufacturer in Germany comprising

- 2 gate control terminals (entry/exit)
- 2 entrance/exit scale with weighing terminals, traffic lights, and barriers
- 2 self-service dispatch terminals with touch-screen PC, card dispenser, printers
- 2 dispatch operator workplaces (modernised with 2 PCs, laser printer, table top card reader systems.)
- 5 cement loading stations with touch screen PC and DISOMAT weighing terminal
- 13 unloading stations for materials with DISOMAT release terminals
- 13 web-cameras for plant surveillance
- 2 Dell servers with ORACLE database
- 1 fully automated interface to ERP system

History of installation

Date	Item
2006/01	Main installation
2007/10	Dead-man switch
2008/01	Additional release terminals
2008/02	Extension LOGiQ® BARCODE
2008/04	Extension LOGiQ® OTIFIC
2008/07	Extension LOGiQ® Camera systems
2008/11	Modification of fly-ash silos >> cement silos
2008/12	Extension LOGiQ® Touch panel signature
2009/04	Extension LOGiQ® Interface to truck tracking
2010/04	Extension LOGiQ® ParkManager

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