

Traceability in bulk handling

when software can provide the answer

The increasing demand for traceability of product has thrown special demands on bulk handling, writes David Trueman, sales director of DB Information Systems. The apparently impossible task of tracking products through the whole of the bulk handling process can only be solved by taking an innovative approach to the problem.

This approach involves tracking the data that represents a 'lot', and in this way providing full traceability to an apparently amorphous mass of material. Traceability does come at a cost. However, the process of applying a software solution to the problem can yield business benefits. An organization that has invested in traceability solutions can become better managed and more profitable.

When first viewed, the problem of the tracking and subsequent tracing of a bulk commodity product seems impossible. There is no tangible start or end, there is nothing to hang a label on, and one 'lot', or product batch, can merge into another. The business pressure exists to provide IP and commodity separation as well as avoiding Admix and handling GMO (genetically modified organism) material in isolation from non-GMO material. Compounding this is the large variability in the degree of automation found in differing facilities and the existence of experience-driven local working practices.

When trying to provide answers to many problems, one of the best techniques is to divide a large problem into several smaller ones. The accumulation of the various smaller solutions can provide an answer to the whole.

Applying software to the bulk commodity traceability problem is a situation that responds well to this breaking down of the various steps that need to be taken. If one considers the unloading of a large grain ship at a dock-side elevator, local storage and distribution and perhaps dispatch by road freight then the process can be seen to be in discrete steps. A large batch of material is actually divided into smaller individual 'lots' for handling. It does not really matter that many of the 'lots' will actually be the same; they come from a known place and they are delivered to a known place.

"...what, where, when?"

In this example, the ship is moored by a tower elevator, the commodity is mechanically extracted, and amount is weighed and then placed into a silo bin. The software to track this will be connected to the weigh scales and the chosen conveyor and will therefore have data relating to 'what' (from the unloading information), the 'when' (the data is 'real-time' stamped), the 'where' (which path the scale is in) and also its planned

Keeping track of bulk product throughout the handling process can be complicated. (photo: David Brearley)



destination (the silo). This is a very simple example to show the basic principle. Many such 'data-extraction points' exist in the facility that can be seen as places where the large volume of material being handled is actually being handled as a succession of traceable 'lots'.

Software traceability thus uses these basic handling checkpoints as markers in the data. Tracking and tracing this data is far more convenient than trying to cope with the physical item directly. If tracking is understood to be the processes by which the commodity is handled, then traceability is the historical record of the tracking, as it happens, that is, in real time.

The management of a bulk facility can essentially be

Where do I start?

It is at this stage that the business benefits of traceability become obvious. If the facility manager can comprehend the need to do something, then the first question he will ask is "where do I start?"

This can initially look daunting. Often the facility is large and has been developed over many years, with no real automation in some parts and high levels of automation in others. The facility manager may know that the paper-based system has worked well over the years, but that the customers are increasingly demanding and it is becoming harder to provide all the information required in a cost-effective manner.

One of the best ways is to take an approach similar to the disciplines of achieving the ISO9000 quality standard, which is to examine how you do things. For example:

- ❖ how do we schedule a job?
- ❖ how do we set a 'path'?
- ❖ how do we lock GMO paths?
- ❖ when do we trigger a clean out?

You can begin by simply writing this down, a better tool is business process flow maps. These give a pictorial representation of the particular activity, from an input through to an output, e.g. from a ship to a truck. They can be developed into a specification of how you operate. They can be shared with people with particular operating expertise in the process of refinement.

This is the key.

By sharing flow maps and developing this visual map of how things are done, you reveal opportunities to do them better, more efficiently, or they may even reveal bottlenecks that can now be seen in a clearer light. This generates an environment in which improvements can be identified.

seen to be that of managing the material, equipment usage, asset usage and labour.

All of these can be part of the tracking process. The work practices that are used on a day-to-day basis are a tracking function.

Tracking can be broken down in simple terms to:

- ❖ what do we have to do?
- ❖ what do we do it to?
- ❖ how do we do it?
- ❖ what do we do it with? and
- ❖ when do we do it?

If all this is automatically recorded, then you have traceability.



Keeping track of a batch of a bulk commodity can provide tangible business advantages.

However, you still have to deal with the manual and fully automated parts of the facility; surely these cannot be solved with the same technique?

In system terms there is no real difference. The difference is actually in speed and the 'deterministic' nature of what the system does. It can be argued that fewer errors (remembering that 'Admix' is high on the problem list) occur with fully automated rather than purely manual handling. In reality, most facilities are a hybrid of these definitions. In some cases, justification for automation investment will be difficult to make, and in some it will be overdue. A computerized system can deal with both the types and the hybrids.

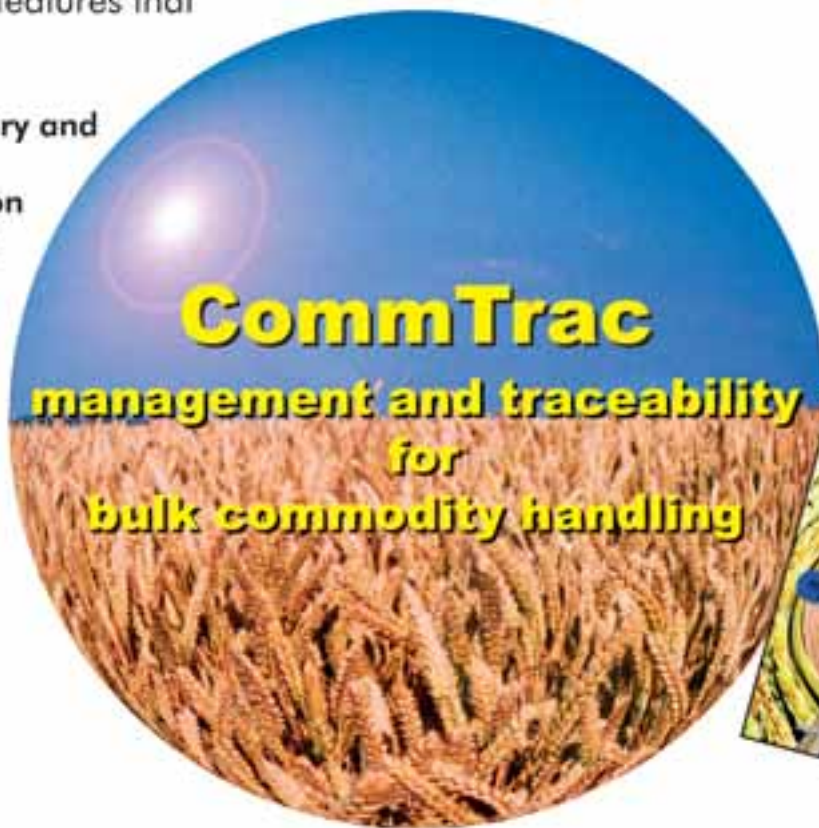
In an automated facility, the system will look at sensors, at controllers, at weigh scales to obtain data and will also send signals to automatically set paths (or routes).

In a manual facility the system will issue job instructions and path setting lists, and receive confirmation feedback before issuing the next instruction. This will involve devices such as barcode readers, card swipe terminals, operator displays and keyboards.

The hybrid facility will have all of these.

CommTrac is a facility manager's database, having features that include:

- Real Time Inventory and Stock Control
- Space Optimisation for Silos and Flat Stores
- Customer Transaction Administration
- Traceability and Quality Management
- Management of HACCP Procedures
- Product Quality Reports (intake and storage temperature for example)



dbis

DB Information Systems Ltd
9 Station Road
Adwick-le-Street
Doncaster DN6 7DB
United Kingdom

Tel: +44(0)1302 330888
Fax: +44(0)1302 724731
sales@dbis.biz
www.dbis.biz

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DB Information Systems' CommTrac software solution

DB Information System offers its CommTrac software as a solution to the tracking and tracing problem. It handles both the management (the tracking) and the regulatory (the traceability) issues together, as well as providing other business benefits on an ongoing basis. This product is based around a standard database Microsoft SQL and allows connectivity to facility devices such as weigh scales, weighbridges, automation controllers, barcode readers and printers and other similar peripherals.

The choice of MS SQL is a good one for users, as it is a standard for database access for other applications that may need to interface with the data, and it also allows IT professionals within the user's business to support the system.

The connectivity with the above-mentioned devices and other sensors allows automatic HACCP schemes to be implemented, the system keeping a continuous and automatic watch on critical parts of the process, and issuing alarms ahead of an actual problem.

The CommTrac difference is the modularity of its construction. This has been developed from many years' experience in commodity handling. The 'know-how' is built-in.

Thus many of the predictable requirements of a particular facility will have already been considered. This greatly facilitates the creation of an agreed specification and a detailed functional specification; this is again made easier by the company's long experience in this field. Thus CommTrac is a facility manager's database, having features that include:

- ❖ realtime inventory and stock control;
- ❖ current status of delivery orders;
- ❖ status of completed fixings;
- ❖ operational details;
- ❖ product quality data (intake and storage temperature for example); and
- ❖ optimization of space for bins and flat stores.

This is in no way a complete list, but it does characterize the capability; DB Information Systems has designed this product to provide improved operation of all types of bulk handling facility, and mills. Silo and flat stores are equally manageable, including non-segregated flat stores where product specific, angle of repose algorithms are used to prevent cross contamination while maximizing storage space. A particularly effective feature is the support of wireless communication with flat store payloaders, through an on-board display showing the vehicle registration, haulier name, product and storage bay for each job, ensuring correct delivery to the customer.

The business process flow maps that allowed you to determine where operational improvements could be made now deliver extra benefits as they can be the bedrock of your user requirements specification. Put simply, if you cannot model how a task is done, it probably cannot be done without ambiguity.

These flow maps greatly facilitate the specification of CommTrac adaptation for your facility. Flow maps are also generally acceptable to ISO 9000 auditors as proof of process.

The initial CommTrac specification, content and design was discussed with several trade organizations. This included UKASTA's Feed Material Assurance Scheme, FEMAS and The American Institute of Baking.

Implementation of CommTrac has already produced the following business benefits:

- ❖ easier, more accurate and flexible scheduling;
- ❖ improved quality dispatch orders;
- ❖ confident routing;
- ❖ improved stock control;
- ❖ improved space management;
- ❖ faster inventory flow; and
- ❖ allowed realtime progress chasing.

CommTrac allows both operators and managers a clearer and more 'transparent' view of the facility, allowing instantaneous assessment of what is going on and how well the facility is working. Admix can be almost totally eradicated. The most critical business benefit is that of risk reduction.

Remembering that such systems have a database at their core, the system is automatically logging all steps, sequences and transactions. This data is retained in the system and can be reported upon for traceability purposes. In addition, the actual 'lot' traceability information is added to the initial IP (Identity Preserved) information to allow a complete record of its handling through the facility. This applies equally to 'IP' and 'commodity' cereals, allowing both to be run in the same facility at the same time.

Questions naturally arise as to the security of information in software-based systems. This is a multi-faceted issue that refers to access control, hardware reliability and redundancy. Standard IT security, reliability and backup techniques are used in the design of all the components of CommTrac, including the recommendations of FDA 21 CFR part 11.

This combination of tracking for management of the facility and traceability for compliance with regulations allows software to take centre stage in the new regulated commodity handling environment. The benefits that are obtained through detailed examination of business processes at the specification stage, plus the enhanced operational information that appears in when in use, can make traceability investments pay back well for facility owners.

A newer aspect of technology that can provide increased customer service is to provide access to the Tracking database for customers directly by utilizing a web portal. This is a logical extension to the system to allow customers to place delivery orders directly and to monitor their commodities in the system using internet technology.

This is achieved with standard web browsers augmented by password access and firewalls, the customer seeing only his information, and that information is real-time. CommTrac can provide this access to customers directly or through a third-party web portal such as First 4 Farming.

Software traceability is not only viable, but in many ways it can be argued to be the only realistic solution to traceability in bulk commodity handling.