



## Bulk Commodity Traceability...the business benefits

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### *Abstract*

Since the introduction of legislation and regulations affecting the food industry it is clear that investment is needed to meet with these requirements. In this paper it is argued that this investment can deliver advantageous business benefits to bulk commodity handlers through automatic inventory management, real-time information display, protection against cross contamination and mixing, and vastly improved management of work flow. Experience has shown that the cost of traceability can be recovered through better management information and realtime automated control of a facility. For example, HACCP can be integrated to systems with automatic alarming when errors are detected. Deployment of such systems can be made incrementally from totally manual through to fully automated systems, utilising industry standard technologies. It is necessary to gain an understanding of business processes, IT skills and industrial automation knowledge to undertake such a project. The resulting facility meets with increased customer confidence, and therefore competitive advantage. Additionally, the information in the system provides a valuable opportunity to further expand the scope of the business through hosting customer web-portals. Here customers can efficiently transact business managed by such a system utilising e-commerce through simple web browsers. A case study will be used to illustrate these points.

## Bulk Commodity Traceability...the business benefits

The requirement to meet with legislative and regulatory standards within an industry can initially be seen as a non-recoverable cost. The effort to meet with the traceability regulations that come into effect on January 1<sup>st</sup> 2005 will no doubt be seen as yet another task that the facility manager has to deal with. The underlying need to be competitive, retain existing business and attract new business, to maximise facility availability and throughput, and to grapple with e-commerce would seem to be enough!

However, given that fact that traceability will not go away and “is not an option”, it is worthwhile considering the necessary processes by which it can be achieved in the light of business improvements. These improvements should positively affect the business and may allow the entire cost to be regained through process improvements.

Traceability definitions and requirements within EU 178-2002 are very broad and all-encompassing. At initial viewing they can appear to be impossible to



apply to an ill-defined quantity such as a full ship load of grain. The container is the hold, the identity is the ship's manifest, and the shipment will be off-loaded to various silos, or sent directly to a port-side bulk facility, or transferred to a smaller coaster or barge, or even dispatched through road or rail haulage. So there you have it, it looks as impossible as "nailing a jelly to a wall", and then the whole market blows up in your face with issues of GMO!

We are to provide traceability at all stages of production, processing and distribution, therefore bulk commodity handling is affected, but there is still the problem of how to deal with a large, loose, non-contained volume. The regulation can be seen to pivot around the concept of IP (Identity Preserved), this code should firstly define some of the characteristics of the grain (or other bulk commodity), perhaps to agricultural information of the seed (or perhaps this can be extrapolated from the code). As the bulk handling is executed the generalised idea is for the IP to acquire extra information as it passes through the facility (such as "path", ownership etc), the "output" IP is therefore the original IP plus extra information – simple! As the "IP" is passed through the food processing stage and onto retail then a significant amount of data is available by which the path of the raw material through to finished goods can be traced. Equally it is possible to trace back from finished goods through the raw material, all done and no problem.

Well... the problem would be the enormous amount of data (and cost) that would be available to (and bourn by) the end user. This data would be by the main useless. So the notion of cascaded traceability comes into play. This can be roughly described as working on the basis that there is no need for the end-user to have all the traceability data, as long as someone at each stage of production and handling does. So, albeit somewhat disjointed, traceability can be engineered in a bi-directional fashion from field to fork. This is all that is needed; now this is particularly useful as the investment in traceability is now between the input and output of a particular operation (your operation). Any operating advantages are therefore made available to your operation.

But we are still faced with the problem of how to trace bulk commodities – there is simply nothing "physical" to which a "label" can be attached.

It is here that one has to stand back from the initial impossibility of the problem and take a look at what "data" can do for you. If is possible to detect when something happens to some part of the load described in the ship's manifest, and record that moment, then we have the start of a record of what happened to it. Nothing new here, when a ship arrives in the dock, instructions are produced as to what is to be unloaded, who owns it, what has to be done to it, and "when". Most systems utilise weigh scales and some method of setting a path from the grain elevator to the immediate destination, so the basics exist already.

Paper-based systems can manage this, although the usual reservations apply about accuracy and clarity. When traceability is considered, then you start to get



a problem, the paper system produces reports that are filed and archived – then someone or some organisation, maybe your customer, wants to trace something back through your facility – it's going to be a long night and maybe even impossible!

...and penalties will probably apply when you cannot come up with the answers.

....and in the case of a food product recall, the buck will stop somewhere.

Essentially the paper system is a form of database, you add records (things that are to be done and then things that have been done), but that's about it. They are satisfactory for "the immediate", but little use in generating historical reports or for "querying" after an event.

Information Technology solutions have therefore to be considered.

The basic database for tracking (that is the immediate "doing"), and even some level of scheduling (what can we plan from known information?), can be readily envisioned. How does this help with traceability?

Well, first of all the tracking data can be reported in a flexible manner, allowing what happened to be examined when required. But, to what level of detail? The regulations affecting GMO handling require the route (or path) to be known and operational procedures to avoid cross-contamination (the .5% "argument"). It can perhaps be seen that the database needs to stretch its "fingers" into the facility itself. This means that that data from the plant equipment itself needs to be recorded.

*Remembering that the various conveyors, weigh scales and trip mechanisms provide us with a way of looking at the "progress" of a "lot" through the facility...*

These can be linked to the database in real-time (that is, when they do something the event is recorded there and then). The ideal structure is where this can be done electronically with integrated weigh scales and other sensors. However, the information that is given to operators to manually "transact" a lot through the facility can also be "captured".

Such a database has therefore the information to deliver traceability solutions. Some reports need to be generated to keep an eye on day-to-day running and queries can be made on the data to extract traceability information on a flexible and on-demand basis.

These are then the bare-bones of the traceability solution for bulk commodity handling such as a grain terminal and store.



### **Getting started and the business benefit bonus...**

The similar sounding descriptions of “tracking” and “tracing” are in fact different when applied to bulk grain business (and to all stages of field to fork).

Traceability is now not an option, but Tracking has business management benefits that could offset the cost of traceability compliance. The two are in fact available through the same investment.

The existence of a database that has both method and a record of events is at the core of the combined solution.

Consider, when a ship arrives at the grain terminal the ship’s manifest has to be entered into the unloading system to determine what goes where and for whom, at the same time the skill of unloading a floating vessel has also to be factored in. Thus an initial entry is made to the database. It is clear by now that the basic description of the “lot” will be its IP (Identity Preserved). The lot will have to be routed through the appropriate “path” through the facility to arrive at its flat store location, or silo, or direct conveying to an adjacent dockside facility, and other destination. Thus the Path is required to be set, a paper based routing slip can be completed, or the database can issue routing instructions. If the plant is automated (in that it has sensors and controllers), then the routing can be both set and monitored automatically. The settings in all cases are recorded.

GMO handling requirements can conveniently be considered here as the database will have a record of “path usage” for GM and non-GM lots, avoiding – that is *demonstrably* avoiding – inadvertent mixing through residual product in the path. If no path can be found then path cleaning can be advised, and recorded!

The identification or traceability of the lot is achieved by the accurate logging of data that represents the lot’s journey through the facility. Clearly, the lot will be subdivided and may end up in many final destinations. The creation of “way markers” through routing controllers, weigh scales and weigh bridges can all be seen as monitoring points that can be automatically read as the work is done.

A full data record is obtained, thereby producing traceability, but, by the very exercise a tracking system has been established that controls path selection, work lists and schedules. The storage inventory is automatically updated in real time improving the decision making process. Through the very process of computerisation the whole facility can be re-appraised and new or improved business processes considered. It is in fact “key” to the design of the database system that business process charts are created to arrive at a mutually understood sequence of how the plant works.



### **Extended Business Benefits...**

The database has data from the facility that we turn into many forms of information. The immediate need is for traceability, such reports can be created as the work is being done, and at the completion of a Lot.

Further business benefit is obtained by producing reports concerning plant performance and utilisation, about grain condition (tagged to traceability) and as a method of determining and monitoring KPI (Key Performance Indicators).

A report can be on-screen, on paper or connected to web and GSM phone systems. A special “report” can be a real-time, on-screen graphic visualisation of the facility as it is working, allowing clear confirmation of current tasks and machine status. Alarms can be generated for equipment failure and used as preventative maintenance schedule inputs, together with run-time counting.

The all-pervasive e-commerce aspect can now be addressed. The data in the database becomes information by the software “tools” that are applied to it. This is in fact how all the “reports” referred to above are made. The implementation of a web “portal” alongside the database can allow further business benefit to be gained.

The web portal takes the *data*, selectively makes it into the required *information* and converts this into a format that is suitable for the web. This format is the one used typically by a standard web-browser and is supplied with most corporate desktop PC’s. Thus a remote PC can be used to interact with the information in the facility’s system to create delivery orders and other instructions by customers. Real time stock and job progress reports can be made available online. Needless to say, normal internet security and “firewalls” have to be deployed to protect the database and the commercial transactions. Customers see only their “information” not plant-wide information.

It is proposed that the installation of a web-portal for such transactions would add greatly to the facility’s competitive position.

Thus, legislation that initially seems like another cost to be covered and therefore probably reducing profit can result in an enhanced business. Bulk Commodity Handling is long established and a review of business processes and working practises can only show better methods and ways of doing things. Traceability and Tracking produce better business.

**Thus key business benefits can be obtained from the investment in traceability.**



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**dbis**

*about the speaker...*

*David Trueman is a director of DB Information Systems UK and has many years experience in bulk handling. DBIS concentrates on providing systems that deliver management and traceability in bulk commodity applications from dockside to store to output in all combinations and permutations.*

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