MXT October 2001

Traceability

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Traceability is becoming a hot topic. It was thrust into the public conscience over the Ford Explorer - Firestone Tire rollover debacle, which has cost both companies billions of dollars in legal and recall costs and has done untold damage to their public image.

Despite ISO 9000, TQM, six sigma and other quality enhancing programs, things can and do go wrong in the manufacturing process. Machines go wrong, people make mistakes, vendors ship defective materials, and testing fails to identify problems until it is too late. The question is not whether defective goods will be shipped. The real question is how you will respond when this happens.

It is the call you dread. A customer calls up and says that your product failed in their application. You could deny that the defect occurred and blame the customer. Some companies have tried this approach but it usually results in a rapid loss of customers and the onset of expensive legal proceedings (witness Ford and Firestone). Instead, the wise thing to do is to rapidly gather the facts and then try to figure out what happened.

To do this you need to know the lot number or preferably serial number of the unit that was defective. This implies that you must have serialized the units (preferable) or clearly identified the lot and placed this identification on each unit so it is easy to read. Without this, traceability is impossible to achieve.

The next step is to have a knowledgeable engineer trace back the defective unit or lot to determine and examine, for each step of its manufacturing operation:

- Who worked on it (may be multiple people).
- What materials were used (these also need to be serialized or lot number controlled).
- What equipment was used and what were the process parameters.
- What test measurements or other data was recorded

If WIP or intermediate inventory is used in the step, then the item or lot itself needs to be traced through its manufacturing processes. You start with the defective item and trace back down the tree of all possible contributors to the problem.

The purpose of this is to try to determine the cause of the defect, such as:

- Inadequate operator training
- Defective machine
- Wrong process parameters
- Defective vendor materials
- Inadequate testing

Once the cause has been determined, you then need to be able to trace all lots or finished goods items that have been affected by the problem. This may be quite extensive. For example a defect in a vendor supplied material may result in a defect in several WIP items. These WIP items may be used in hundreds of other products.

The objective here is to be able to trace precisely those lots that may have a defect as a result of the problem. You want to minimize the size of the recall to minimize costs but also to minimize disruption of our customers, who may have used our defective products in their products.

It is essential to be able to respond quickly to avoid escalating problems. BSC has clients who produce various types of cable. The cost of a defective cable escalates dramatically after the cable is laid in the ground. Hence it is critically important to identify and recall defective cables as soon as possible.

Almost all customers recognize that there will be a defect in manufactured goods once in a while. The difference between a happy customer and an unhappy customer depends on how you respond. If you quickly identify the problem and respond by quickly replacing all the defective units, most customers will be satisfied. If you delay in fixing the problem until the customer's problem has escalated dramatically in cost and scope, then you may well find yourself confronted with an expensive lawsuit. Even worse, your reputation as a vendor will be ruined. These days customers can easily communicate with each other using the Internet and you can quickly lose many customers.

To be able to trace defects back and forward you need to do the following:

1. Put a barcode on every item or container of material so that its movement can be traced from when it is received or made to when it is consumed or shipped.

2. Save all incoming QC test data and associate it with the barcode on each incoming item or lot.

3. Record any non-conforming material that is accepted for use and the disposition of that material which is rejected.

4. Use a barcoded traveler for each job so that the barcode of the material consumed can be associated with the job step.

5. Associate the barcodes put on all items or containers of material with the barcode on the traveler of the job that produced them.

6. Scan the badges of everyone who worked on each step of each job along with the step and job barcodes from the traveler.

7. Save all test data and associate it with the material lot or job step so that it can be examined easily.

8. Record which machine was used for each job step by scanning a barcode for the machine and scanning the job and step barcodes on the job traveler.

9. Record who did the machine setup and what parameters they used.

10. Save all process parameters and their variation over time, preferably in a data historian, so these can be examined to determine what went wrong.

11. Record whenever a machine goes down, the reason code, and for how long.

12. Record when each item or lot is shipped, who it was shipped by, and to whom it was shipped.

If this is done conscientiously and thoroughly you will find that you have excellent traceability records that can be quickly interrogated when the need arises.

Some companies have filing cabinets full of paper records and claim that they have traceability. This is no longer adequate. It takes way too long to search these paper records to identify the problem and to trace the necessary recall. A well organized computer-based traceability system, such as that offered by BellHawk can enable problems to be identified quickly and the resultant recall quickly put into place. The system can also be used to rapidly trace problems identified by internal testing before products are shipped thereby facilitating rapid corrective action.