



Avoid Package Coding Errors and
Minimize Their Impact on Your Business

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Abstract

- Coding errors affect product quality and drive unacceptable costs throughout the enterprise due to scrap, rework, regulatory fines, damage to the brand reputation and more.
- The majority of miscoded products are caused by operator error.
- Code Assurance is an approach to proactively preventing errors by designing message creation and job selection processes to be as foolproof as possible.
- Videojet is pioneering the concept and implementation of Code Assurance through our CLARiTY™ interface, CLARiSOFT™ PC-based message design and rule creation software, and CLARiNET™ database connectivity and network control solution for managing multiple coding and labeling technologies.

The True Cost of Coding Errors

Correct product coding is important to manufacturers of fast-moving consumer goods (FMCG), helping improve supply chain efficiency and visibility while providing customers with important information about the products they buy. Today, getting codes right isn't just important – it's crucial.

Coding errors are costly, not only to plant operations but to the entire enterprise. There is the cost of rework – assuming that the product can actually be reworked and the plant has the capacity to do so. In a 24/7 production environment, rework may not be possible. Or, once the product has been coded, it may be impossible to recode or repackage it. The need to scrap miscoded product can be even more costly than rework – but it may be the only option.

And that's nothing compared to the trouble and cost of miscoded products that end up on the retail shelf or in the homes of consumers. Beyond the risk of regulatory penalties and fines, the brand itself can suffer costly damage to its reputation. The product may be unavailable while restocking takes place, forcing customers to switch to competing brands in the meantime. And in high-profile cases, media reports can lead to depressed sales even when the product is back on store shelves.

Most organizations struggle to quantify the actual cost of lost product and lost production capacity as a result of coding errors – let alone lost reputation. Most evidence is anecdotal. In many cases, management is simply unaware of the scope of coding problems.

Another factor that complicates accurate cost accounting is that many companies tend not to highlight coding errors within their plant efficiency reporting. Often, there's an assumption that coding errors are detected by regular inspection and then rectified. The specific costs associated with rework remain entangled with general measurements of line inefficiency, so that there is often no knowledge of the cumulative effect of these mistakes.

Why Correct Coding Matters

Manufacturers are looking for ways to:

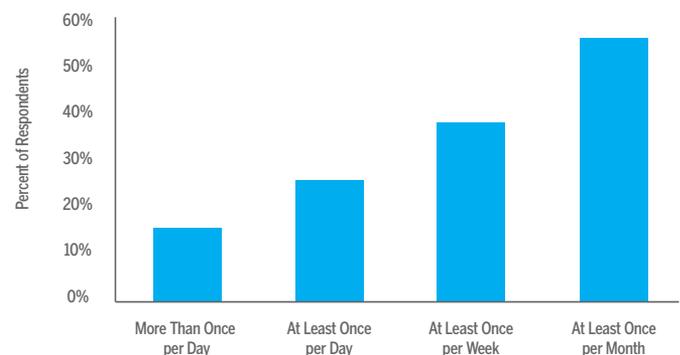
- Remove operator error from message setup and job selection processes
- Minimize the cost of scrap due to coding errors
- Reduce resupply costs for replacing recalled or withdrawn products
- Reduce potential for lost business from incorrect products being shipped
- Minimize brand damage by narrowing the scope of any recalls
- Meet the requirements of retail partners and regulatory overseers for product quality and traceability

With reliably correct coding, all these issues are addressed up front, before they can become problems.

The True Frequency of Coding Errors

Coding errors do happen. In fact, they're common. Videojet recently surveyed a variety of FMCG manufacturers and found that all had experienced coding errors – many of them on a frequent basis. In fact, nearly half the companies surveyed were having trouble with coding errors at least once per week, with one-quarter reporting coding errors at least once per day.

Survey: Frequency of Coding Errors



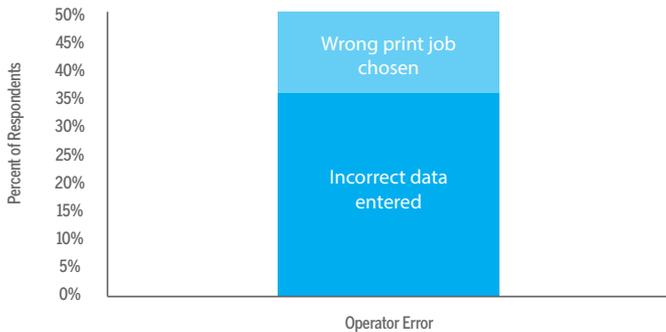
Videojet found an unacceptable rate of coding errors across all FMCG manufacturers surveyed.

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It's Better To Prevent Errors than To Calculate the Damage

More than half of coding errors are caused by operator error – our surveys suggest a range of 50 to 70 percent. The most common mistakes are incorrect data entry and incorrect job selection. In our survey, we found that those two mistakes accounted for 45 percent of all coding errors.

Survey: Cause of Coding Errors



Up to 70 percent of coding errors are caused by operator error, with almost half caused by mistakes in code entry and job selection.

Even where the problem is recognized, many companies respond by simply introducing more checks during the packaging operation. However, this does not address root causes such as the wrong codes being entered in the first place, nor does it tackle the problems and costs associated with product rework or the resulting decrease in plant efficiency.

It's in the manufacturer's own self-interest to understand the scope and cost of coding mistakes and take countermeasures to eliminate them. Moreover, many retail partners are now requiring compliance with coding standards that include implementation and documentation of methods to eliminate such errors.

Preventing Errors by Design: Mistake-Proofing Coding Processes

Manufacturers need proactive solutions to address all these issues – from unaccounted costs, to ineffective countermeasures, to partner mandates – instead of reacting to coding problems after they occur and their costs accrue.

There are two ways to deal with coding problems at the source – the production line:

- Proactively reduce the likelihood of errors.
- Try to catch errors when they happen to minimize waste, correct the error and get back to production as soon as possible.

It's not a question of either/or. Even if you're effectively preventing coding errors, you still need the ability to quickly respond if something goes wrong in order to limit the damage. But clearly, resources invested in prevention can pay back many times over when compared to the expense of remediation.

Common Operator Mistakes Responsible for Coding Problems

PROBLEM	EXAMPLE	VIDEOJET SOLUTION
Incorrect Data	Operator selected the wrong country of origin or picked incorrect product description	Scrollable job selection with preview option before final run is selected
Invalid Data	Operator chose a past or future date not aligned with the customer's intentions/ product life	Calendar display limited to previously defined acceptable dates
Transposed Data	Operator entered incorrect date: 1/9/13 instead of 9/1/13	Calendar selection option available so date does not have to be keyed in
Unauthorized Access	Unauthorized operator entered 'unacceptable' codes and/or messages on the product	Operator lock-out features to prevent code data from being changed on the line

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In recent decades, manufacturers have increasingly turned from quality assurance based on statistical sampling of products bound for market to a more proactive philosophy of prevention. Often referred to as “poka-yoke,” this approach focuses on up-front process design. Lean manufacturing processes are created with fail-safe features that allow operators to immediately detect a mistake and correct it – or, preferably, prevent mistakes from occurring at all despite the operator’s actions.

Code Assurance: A Comprehensive Approach to Coding Quality

Code Assurance is Videojet’s comprehensive approach to preventing or eliminating errors in the coding and marking process.

We believe that human-machine interfaces – including both hardware and software components – can and should be designed to simplify data entry and help prevent operator errors, both at code entry and job selection. And we believe the structural flow of coding processes can be redesigned to minimize operator interactions to reduce the risk of errors, even to the point of distributing correct codes to the correct printers for the correct jobs automatically.

Videojet’s complete Code Assurance methodology relies on four basic principles:

1. **Simplify message selection**, so the operator selects the right message for the right job.
2. **Restrict operator input** to the absolutely essential points of contact only.
3. **Automate messages** as much as possible, with pre-defined rules that help prevent incorrect entries.
4. **Use authoritative data sources** – such as MES, SCADA, ERP or other enterprise IT systems – so that the appropriate information is pulled to the printer automatically when the operator selects a job.

Videojet incorporates poka-yoke concepts into its execution of these principles to help reduce operator mistakes and coding errors.

Poka-Yoke: Mistake-Proof by Design

The term “poka-yoke” was coined by Shigeo Shingo, a leading expert on the Toyota Production System. Pronounced PO-kah YO-kay, it might be translated literally as “prevent-mistake.” The idea is to incorporate error-proofing into the design of processes, so that mistakes are difficult (ideally, impossible) to make, and easy to identify and correct should they occur.

The concept of poka-yoke began in 1961 with a simple change in the way workers were assembling switches. Instead of grabbing parts from the parts bin as they worked, employees were taught to place the necessary parts in a tray before beginning assembly. This simple change in process design completely eliminated a common problem with missing parts in many of the switches that had been shipping to customers. If a part remained in the tray, the worker knew he had to go back and install it before moving on to the next switch.

The poka-yoke principle has since been applied to countless, more sophisticated processes, but the essential features of the first poka-yoke solution still apply more than 50 years later: The solution must be cost-effective, easy to implement, and must ensure correct operation without depending on constant attention or infallible input from the operator. Ideally, it should work without depending on the operator at all.

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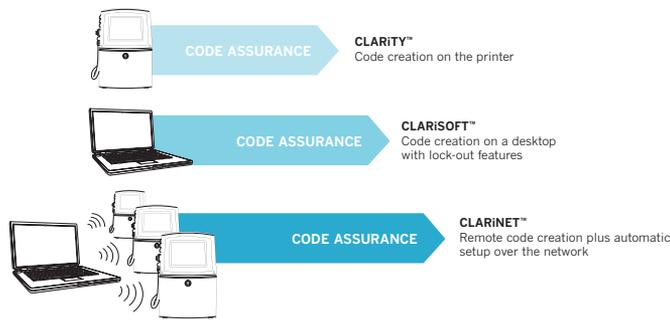
Videojet's solution starts with poka-yoke design features built into the operator interface. Customers can build on this foundation by adding powerful poka-yoke capabilities through PC-based and network-based message creation and management:

The CLARiTY™ operator interface implements principles 1-3. It's an integral part of our new-generation ink jet coders as well as our thermal transfer overprinter, large character marking and thermal ink jet product lines.

CLARiSOFT™ Windows-based software provides additional support for principles 2 and 3. Our Windows-based software isolates code design from the production floor and eliminates the need to load individual messages onto each printer interface.

CLARiNET™ eliminates the need for principle 1, further strengthens principles 2 and 3, and fully implements principle 4. Our network setup and control solution pulls from authoritative data sources to distribute the right codes to the right printers for the right jobs. CLARiNET™ can distribute coding messages to multiple coding and labeling equipment technologies across the plant – and even across multiple plants – to simplify management and practically eliminate coding errors due to incorrect operator input.

The elements of CLARiSUITE™ build on each other by adding additional safeguards and minimizing human interaction



CLARiSUITE™ enables you to build a Code Assurance model to best suit your operational requirements.

Let's take a closer look at what Code Assurance means, and how these Videojet solutions help manufacturers achieve it.

From Individual Operator Interactions to Facility-Wide Automation

A central goal of Code Assurance is to simplify the process of message selection and constrain incorrect entries, so that operators reliably enter the right coding message and apply the message to the right job. Predefined coding rules automate as much of the message creation process as possible, minimizing day-to-day operator input while ensuring that any necessary input complies with policies and logic that pertain to the specific job.

Although it's impossible to eliminate operator input completely, the intelligent CLARiTY™ interface can restrict input to the few key points where the process requires it – and even then it can restrict the input to policy-defined formats and content choices to substantially reduce the opportunity for operator error.

The risk of errors can be further reduced through CLARiSUITE™ Code Assurance technologies, including CLARiSOFT™ and CLARiNET™. These PC- and network-based technologies remove the need to create codes at individual printers, provide a centralized source for the right code, and connect printers with authoritative data sources, quality control solutions and product tracking systems across your enterprise.

The deeper the organization dives into Code Assurance, the less risk for operator error and costly coding mistakes. Code Assurance isn't a single technique, but a progression of possibilities stretching from the individual operator to the entire operation. Code Assurance allows any organization to find the optimum balance of costs and benefits.

Implementing an Intelligent User Interface

When evaluating and implementing Code Assurance solutions, many companies begin with the user interface. The goal here is to manage and enforce acceptable parameters for the coded message and to eliminate operator error from the job selection process. The printer's user interface can be designed with several features to help advance these goals, including:

- Requiring separate user authorizations for code creation and job selection.
- Restricting the types of coding parameters the operator can enter, or allowing job selection only from a list of valid jobs that have been created and stored in advance.
- Providing stored jobs with a meaningful name that describes the actual product being coded.
- Using calendar selection for dates to eliminate errors arising from date formats that vary from region to region or product to product.
- Assigning date offsets so that, for example, a Use By date can only be selected from the range of valid dates allowed for the product.
- Linking Use By dates to Sell By dates, so that once the Sell By date is selected the correct Use By date is generated automatically.
- Setting calendar rules that prevent operators from selecting specified dates, such as weekends or holidays, and also prevent the system from using these dates in automatic date calculations
- Restricting selection of data to a drop-down list to eliminate the possibility of wrong key-presses.

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- Prompting for required fields and confirmation of correct entries before allowing the operator to begin the print job.
- Confirming data prior to every job change to ensure the correct job has been selected.

These goals must be achieved while still making it simple and efficient for the operator to perform their job. In designing the Videojet CLARiTY™ interface, for example, we specified a large 264 mm (10.4") touchscreen and designed the display for easy operation – with fonts that are easy to read, colors that are easy to interpret and buttons that are easy to press.



CLARiTY™ presents Code Assurance features in formats that are easy to read and interact with.

Along with the calendar selection, drop-down menus, field prompts and other Code Assurance features listed above, the physical design of the CLARiTY™ interface makes it almost impossible for a reasonably careful operator to get code creation and job selection wrong.

Removing Message Creation and Management from the Production Floor

With an intelligent user interface, separate authorizations are required for code creation and job selection. This separation of duties ensures that a shift foreman, for example, can't make coding changes that should only be made at a product management level. At the next level of Code Assurance, these processes are separated even further by completely removing message creation and management from the production floor.

By moving these processes to a central location, coding messages can be built by a dedicated individual with proper training and authorization, in an environment free from the distractions and pressures of the production environment. Videojet's CLARiSOFT™ software provides a Windows-based solution for isolating and protecting code creation and management processes by moving them away from the printer interface and onto a locally networked PC.

Designed to be printer-independent, CLARiSOFT™ provides a single, simple solution for creating, editing and visually verifying messages and then distributing them to any CLARiTY™ enabled coding or labeling equipment in the facility. In addition to helping ensure code accuracy, centralized message management saves labor by simplifying printer setups and streamlining the changeover process. Code Assurance benefits include:

- Reduced overhead, with no need to create different code designs for different printer types, and no need to learn and work with different printer-specific software.
- Increased control and efficiency, since a single message can be created away from the production line and run on any printer.
- Better coding quality with reduced errors, thanks to features such as wizard-based creation of complex or merged fields such as GS1-128 bar codes, seamless connectivity to a wide range of databases, print preview for confirmation of the finished design, and many other advanced features.

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Implementing Network-Based, Database-Connected Message Control

For customers who want to move to the highest level Code Assurance system, it's as simple as adding CLARiNET™ to CLARISOFT™ to provide networking capability for full line coding control across the plant or even across multiple plants. CLARiNET™ can be thought of as a Supervisory Control And Data Acquisition (SCADA) solution for coding and labeling.

Working with your existing serial, Ethernet or wireless network, CLARiNET™ can be used as a self-contained coding network control system – or can be integrated with SCADA, factory networks, MES and ERP systems to form part of a broader enterprise quality assurance solution. Open database connectivity (ODBC) allows messages created in CLARISOFT™ to be stored in SQL, Access, Excel and generic databases for connectivity to enterprise IT systems.

Upon job selection, this connectivity enables the job information to be pulled from any CLARiTY™ enabled coding or labeling system, and the correct message for that job to be pushed back to the printer or labeler. Jobs can be selected using the CLARiTY™ interface – or they can be scanned in from a worksheet using wired or wireless bar code scanners to provide even greater assurance against operator error. Industry-standard Open Process Control (OPC) functionality offers an alternative mechanism for downloading and starting jobs, as well as viewing real-time status information.

CLARiNET™ eliminates the effort of programming multiple printers separately, reducing setup and changeover time. And with a dynamic, centralized message database, it's easy to rapidly adjust the messages being printed by coding equipment. Each message change is made once and automatically made available to all printers, supporting automation goals for a more productive operation.

Even more important, this create-once/use-anywhere message creation and distribution system greatly reduces the risk of coding errors. And for even greater Code Assurance, scanners can be placed throughout the packaging line to check codes for accuracy in real time. If an error is detected, the alarm beacon can be activated and the line can be stopped or the product rejected automatically. And with all data stored in a secure, centralized data management system, the solution also helps assure reliable product traceability.

With flexible configuration to suit each plant's physical setup, information architecture and coding needs, CLARiNET™ provides powerful Code Assurance – and labor savings – through centralized message creation and automatic code distribution to printers and labelers across your enterprise. Benefits include:

- Accurate and consistent on-pack coding from line to line and plant to plant, with centralized message creation and automatic distribution to printers, labelers and scanners across the network.
- Minimized operator input to increase production efficiency and prevent errors from being introduced on the production floor.
- Reduced costs, with centralized control to protect against waste, rework and recalls.
- Optional wired or wireless SCANPOINT integration, providing bar code-driven setup to eliminate operator input and ensure the correct product and packaging are used.

- Optional integrated fixed-position bar code validation to confirm correct packaging.
- Optional intranet view of live, enterprise-wide performance information.
- Dashboard performance feedback and production counts in audit logs to help ensure traceability and provide support for continuous efficiency improvements.

Getting Started with Code Assurance

To build Code Assurance into your organization, you can start with initiatives as simple as retraining operators, improving ergonomics at data-entry points and performing cross-checks before committing to a print job. These and other operator-centered Code Assurance methods can measurably reduce errors. But they're not foolproof.

When you're ready to move beyond behavioral methods to solutions that minimize the human element, Videojet is ready to help – all the way to the design and integration of a full line control system. Whatever your final Code Assurance destination, the best place to start is with the Videojet CLARiTY™ interface.

It's the only user interface on the market designed to implement Videojet's Code Assurance model through poka-yoke principles. And we're rolling it out across an extensive range of Videojet coding equipment, including the Dataflex® Plus thermal transfer over printer, the 2300 series of high-resolution case printers, the 8510 thermal ink jet printer and more. Now it's also featured on our new Videojet 1550 and 1650 small character continuous ink jet printers, designed to deliver industry-leading runtimes and availability.

With a touchscreen built for easy entry of approved and accurate data, CLARiTY™ can help eliminate errors printer-by-printer across your enterprise. Building on that foundation, CLARISOFT™ software and the CLARiNET™ network control solution make it easy to take central control over all your coding and marking processes, helping to eliminate nearly all possible error points.

As you add layers to your Code Assurance solution, you gain centralized, single-point message creation and the ability to push policy-compliant, quality-checked codes out to all your printers. You gain the ability to ensure the right codes are going on the right products, reducing risk, rework and recalls while protecting the brand reputation. And you streamline data management and simplify changeover to drive productivity gains and support your automation goals.

It's a natural progression, it's good for your business, and Videojet is ready to help you all the way.

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