9 Steps to Accurate Traceability in Manufacturing

Traceability means being able to provide evidence that your manufacturing process was followed and that all products were built according to specification, utilizing proper components. You want to be able to execute and prove that you're making the right parts the right way at the right time.

Traceability is also about making sure that the product flows through the assembly process according to specification and that the measurements taken along the way are within the engineered tolerances that are allowable for that product.

This is important for several reasons – the most important of which being product quality. Ultimately, the goal of a manufacturer is to deliver to an order on time with a good product, right?

In this eBook, you'll find the 9 key steps that are essential to building an accurate traceability process on which your clients can rely. We break each of these steps down in detail so you'll know exactly what needs to get done.

Happy learning!

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1. Identify Your Materials and Processes

First things first – it's hard to collect evidence if you haven't identified what that is, right? This can typically be done using a standards based naming mechanism or even an internally defined naming mechanism.

What you really want to do is make sure that the materials that flow through the process, and the process steps themselves (like work cells and machines) are clearly identified so that as you're collecting evidence, you can make sense of the information that's collected.

2. Formulate Your Lot Definitions

There used to be this concept that a production lot was a kind of long run, multi-day build of a particular product. You would set up the plant once you'd have all the material you need for the next several days and you would run a large batch of production and assign a lot identification to that production lot. This spanned multiple days, shifts, operators, and inbound lots of raw materials throughout the process.

However, over time we got more sophisticated in how these runs were done and the lot size got smaller and smaller. Therefore, the definition of the lot had to change and be associated more to significant events that happened along the way, either a part change over or a shift change. Now, even more granular lot definitions are being used, depending on component changes, machine adjustments, or even production pitches.

This all basically comes down to understanding what your lot sizes are so that you can determine the level of traceability that you need. Once you've done that, make sure your lot definition is well understood and then well disseminated so that all systems match it.

3. Marking

So, you now have identified the materials coming in the door, your stations, your processes, and the people on the floor. Now in order to actually track things as they flow through the facility, you need to mark them.

This could be a barcode or RFID tag, which are both fairly common. Or, it could be something in the firmware of a station, machine, or test stand. It's a continuous process because you have a steady stream of raw materials coming on the receiving side and a continuous flow of product coming off as finished goods. By marking them according to the identification standards that you defined earlier, you're able to then perform accurate traceability throughout the process.

4. Start Collecting Evidence

The easiest way to start collecting evidence for traceability is to focus on the materials themselves. Now that you have raw materials coming in that are marked, you should record their arrival at the workstation, their introduction into the process, and associate that introduction into the process with the product that's flowing through at the tech.

When you're done, you'll end up with finished goods that are clearly marked. Whether the product is individually serialized or associated with a production lot in batch, you have a record of the component materials that went into making them, and information about how that product flowed through the process.

5. Manage Inbound Material

The next step is to validate your inbound material against the prescribed recipe or bill. At this point, you've done the work in getting your traceability to a certain level and you can now start validating that you're actually doing the right thing along the way.

Say your end product has multiple internal lots associated with it – whether those are individual serialized pieces or internal lot numbers. This all creates this genealogy tree of content. What you want to do is not only collect and store that genealogy information, but also use it in the process to make sure that you're building the right thing at the right time.

For example, let's say somewhere through the process you found one of the constituent lots of a sub assembly turned out to be failing in the test lab. You need to be able to use that information to stop utilizing that same constituent lot in production, right? So you want to quarantine those sets of assemblies, as well as the rejected component lot.

In addition, you can use traceability to improve the efficiency of material flow in the manufacturing process. For example, you can signal for material replenishment as current machine-side quantities get low, implement an e-kanban process, or fully automate kitting procedures with validation. Since you know exactly what is being made, exactly what is being used, and exactly where materials are needed, you can use this information in-process to eliminate starved machines and excess WIP materials.

Similarly, orders are changing along the way based on your production plan. So what you knew you wanted to build seven days ago has shifted a little bit. Traceability gives you the ability to adjust products that are in process to meet the new production plan accordingly by changing it on the fly and having more of a flexible production setup.

And the best part is, the more you do it, your capabilities don't grow incrementally – it's exponential!
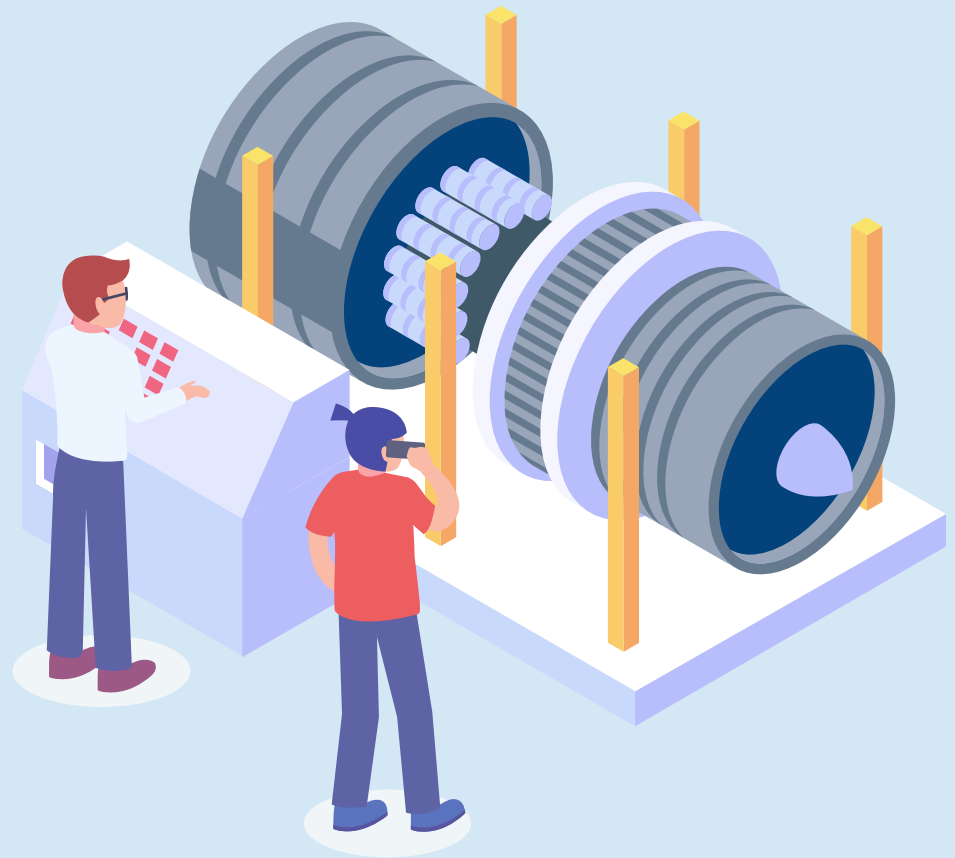
6. Validate Process Information

This step is a combination of validating that the product is flowing through the line at the appropriate time and in the appropriate order. In repetitive manufacturing plants, you would have what's called routing, which outlines the plan to say these parts are going to go from step A to step B, step C to step D. They can't go from B to D, right? They have to go through C. That's a high-level view of how you'd validate process routing.

But then there's also more intricate validation where we would be reaching down into the machine controls and validating that the set points are right on the machine and that any kind of measurements that occur in the process are within spec.

We're basically gathering all kinds of information on torque, welding, dimensional and electrical measurements, as well as a variety of sensor readings as the product is being made and we're comparing it against what was called for by the engineers.

The simplest way to do it without the machine tie-ins is just to make sure you're going through the right steps. But then as you're going through the right steps, you can get deeper and deeper into validating that that step was performed properly.
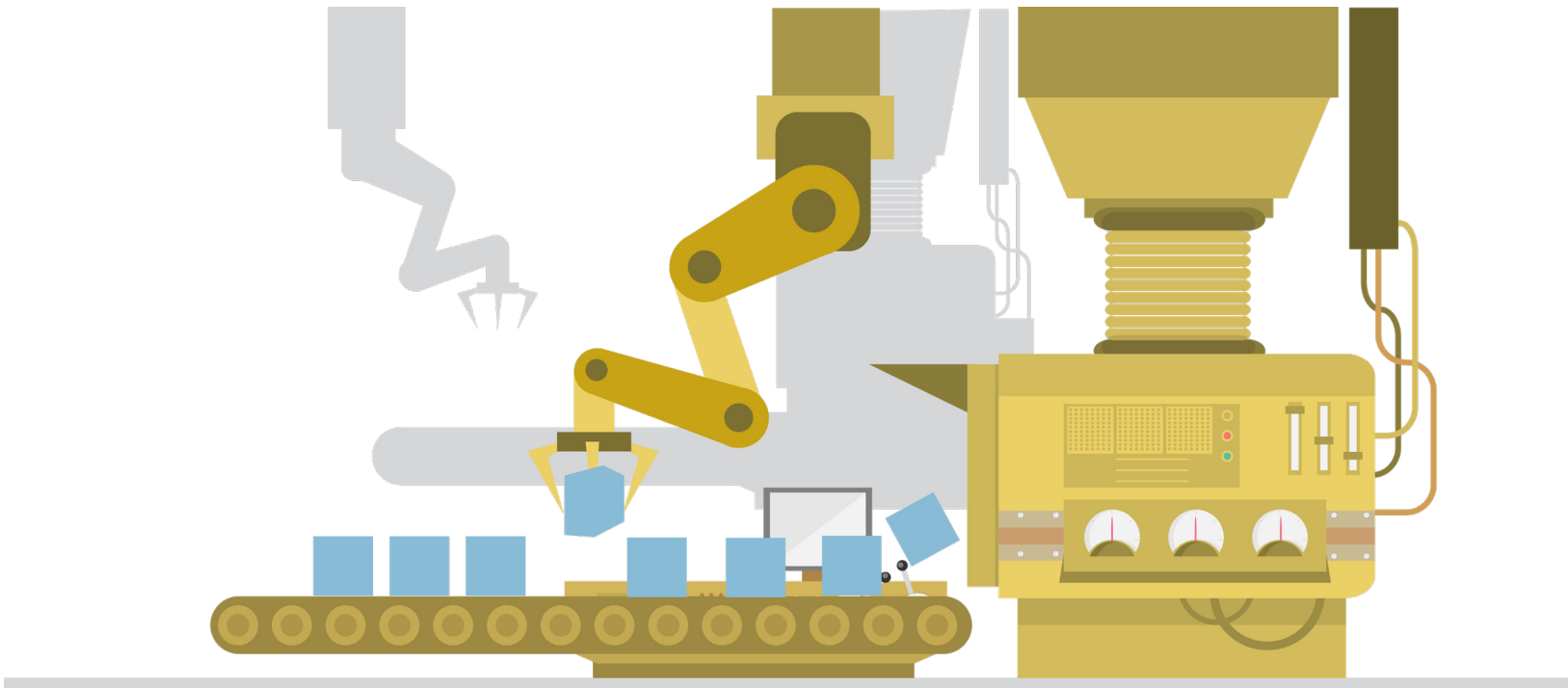
7. Label

You want to make sure that not only are the products or the end units themselves labeled properly, but the containers that hold them. It seems like one of those obvious things, but also one of the biggest problems manufacturers face. The number one cause of customer returns is having the wrong labels on their packages. So either the label on the box is inaccurate, it doesn't have the right quantity, or it doesn't have the right part number on it. That's why there are so many issues around container labeling when the product doesn't match what's inside the container.

From a consumer standpoint, there are few things more frustrating than being excited for a product you ordered online only to find that the wrong product was inside.

For repetitive manufacturers, the same disappointments can be avoided. Say an autoworker on the final assembly line goes to take a steering wheel out of a box that's labeled for a base sedan, and they find highly optioned, leather wrapped steering wheels in there. The line stops and they have to figure out what happened. It's obviously going to slow down their production and hurt the profitability of that plant. Proper labeling leads to uninterrupted production.
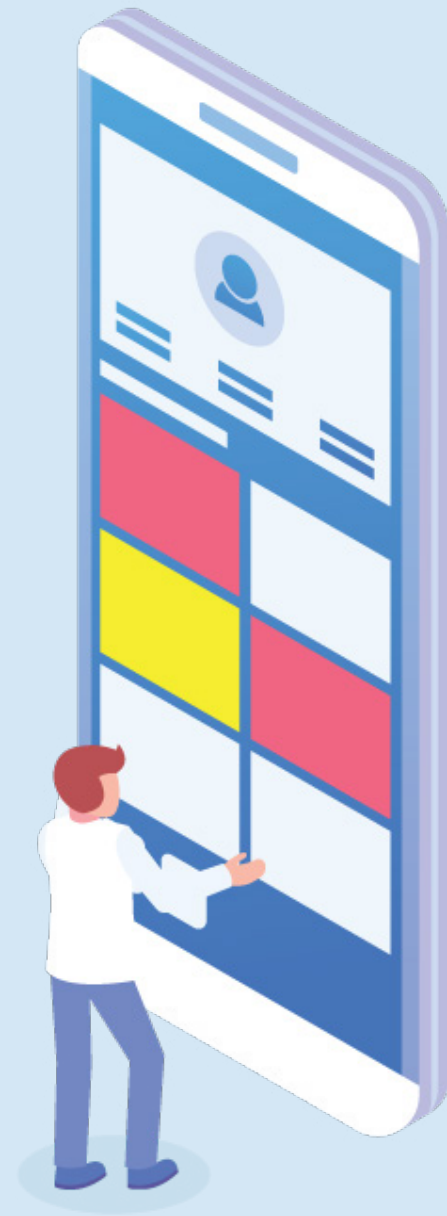
8. Lot Acceptance Testing

At this point, you know that you have all this information about each piece, what went into it, who touched it, which machines it flowed through, the readings off the machines, etc. You can take samples in process and pull them off to a quality lab and make sure that they're at the right parts per million, pass depth stress testing, dimensional testing, and any other key measurement.

If certain components fail one of the tests, you'll know what went into that specific product and identify quickly what population of products might have been affected.

Years ago, before modern technology existed, you might have had to shut down an entire plant if your components failed testing and sort back through weeks of production prior to when the issue was found.
Today, you can conduct lot acceptance testing with a high degree of traceability so that you can essentially push a button within the quality lab and quarantine everything from this very tightly controlled lot until you get your arms around it.

This would then prevent containers at the shipping dock from actually being shipped if they contained any of the products that were part of that quarantine lot. Once reworked and passed, the quarantined lots can then be approved, and shipment released.

9. Just in Time / Just in Sequence Production

Once you've got all of the basics locked down, you can get into the next level of production that's driven by traceability and will elevate your efficiency. We call that "supply chain synchronization".

Let's go back to the steering wheel example. For demonstration purposes, assume your manufacturing plant makes steering wheels.

Say that the final assembly line at your customer has 25 combinations of steering wheels from which to choose: starting with the basic level, then the next level up has cruise and radio controls, next level up has that same thing but leather-wrapped, the next level up has a wood insert, and the premium wheel has a heating element. And each of those comes in five colors.

So now you have all kinds of combinations of steering wheels and the final assembler needs to order them in bulk. At the assembly plant, they've got a system setup where they plan in advance which vehicle models will go down the line, in a certain order each with a certain style, option level, and color.

They can look at the order sheet and say, "The next one gets gray, then a black leather with cruise control, then tan with a built-in heater, then gray with cruise control..." and so on down the line.

Rather than sift through the boxes manually, they can signal to their supplier what's needed ahead of time so that they're getting the right inbound products in order. It allows the supplier to take the request and pack the steering wheels in a synchronized way that keeps the assembly line moving quickly and efficiently, so that the next piece out of the box matches the next vehicle down the line.

You really can't achieve that without traceability. Traceability provides the confidence that you know exactly what the content of each piece is when you put it in the box, because you've identified, validated, and recorded all of the process and content information about it as it was built. Now you can match that sequenced order that came in from the final assembly plant dead nuts.

So, What's Next?

Hopefully these steps have you excited about traceability and everything that it can do for your business.

If you have more questions or you're ready to take traceability to the next level, let's talk! I'd love to chat with you and walk through how VIA Information Tools can help solve your problem.

Book a Time with Me

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