

PROCESS CONTROL, STAT!



Statistical process control is an increasingly widespread method of improving manufacturing visibility, and to provide a beginner's guide to the technique, **Tom Stewart**, President of the North American subsidiary of Q-DAS, recorded a podcast interview. **Accelerate!** catches up with the conversation in this HxGN Radio Recap.

Could you give us an overview of what statistical process control (SPC) is?

Statistical process control is the matter of collecting data during the manufacturing process and determining whether the process is stable, in control, and trying to determine the probability that parts will be in spec or out of spec.

What challenges do manufacturers face in applying statistical processes to manufacturing systems?

Well, in many cases the traditional methods of statistical process control, which were originally derived in the 50s, 60s and 70s are simply not applicable today. So in a given plant, while they're making production parts they have to be concerned about tool wear, and tool life, and targeting a process, and so many process parameters.

Why are those 50s, 60s and 70s processes not applicable today?

In those days the production process was more or less linear. For example, in the automotive industry, it's transfer line based, where a piece part would be processed in one operation and then sequentially go to the next and the next. So in those days, they were taking the piece parts off of the production line in the order they were manufactured and measuring them in the order they were manufactured. And in that case they could develop a subgrouping of the data and something called the Western Electric Rules: runs, trends, middle thirds, were more applicable than they are today.

How does today's environment change how we look at SPC then?

In today's environment the manufacturing systems tend to be more agile in nature. The materials and the tooling; technology has greatly improved. So these days we're measuring perhaps one piece from one machine a shift, and you need enhanced statistical methods.

How does this tie in with industrial metrology?

It really ties in nicely as the technology [of SPC], also of the metrology systems, has improved over the years. Their ability to include traceability; not only serial numbers but machines, fixtures, tools, feature groups. This information is now coming from the metrology systems and can be correlated in the Q-DAS product to make sense of the data that we're receiving.

But there are also other places you might be gathering process data, aren't there?

That's correct. If you look at the typical manufacturing plant, they have a lot of suppliers. Suppliers are producing the same kind of part, shipping it to the plant. When those parts arrive they have variability in them, so it's important to understand which supplier the components are coming from and record it as well.

What else should you think about in applying SPC techniques and incorporating them into the supply chain?

Well, it always depends upon the knowledge of the process. In our case we partner with the customers and suppliers because they're the people that understand their processes, how they're producing their parts. And then we adapt the systems to suit:



a) how the data's coming, b) how it's been recorded, and c) the reason it was recorded. For example, I would look at data differently if it recorded as a station check or tool change check, as if it was recorded for the standard production.

Is this approach only for the biggest manufacturers?

We're seeing it as a coming trend. It certainly started with the larger producers but it's becoming more and more important for the middle production kinds of facilities and also job shops.

How does a company that's new to SPC get into this?

Well, if they have the desire to support continuous improvement, then they have to record the measured values of the process. If they are working with a solution provider like Q-DAS, we're instructing them, training them, teaching them about what we do. We're experts in using their process knowledge to come up with the products and support services that make it beneficial to them.

So there's a lot of consulting as well as software?

Consulting is very important. We have process experts. We have software experts. But it also needs the customers' input, the customers' understanding of their processes, because they're all different. We use a standardised but adaptable set of software tools, then work with the customer to apply them.

What industries could benefit from this kind of approach to managing quality processes?

A large portion of our business is in the automotive industry, but we're also very active inside the aircraft, heavy duty, energy markets. Aircraft is a lot more similar to automotive than a lot of people would think, because of the exotic materials and tools.

In manufacturing, do you tend to get normal or non-normal data?

We tend to get non-normal data. Inside a Q-DAS product is a statistical engine that has the ability to determine the correct data model for any given set of data and because we normalise it at

that point we're able to compare non-normal data and normal data together in the same setting. That buys us clarity into the process, which eliminates the confusion about somebody transforming the data and making an interpretation on the data. We let the data speak for itself.

Why is that a benefit going forward?

If you're trying to manually determine the normality of the data, I might do it differently to how someone else would do it. And then six months later, somebody else has to figure out how it was done. With our system we're using a configuration of evaluation which equates to a set of business rules for analysing the data that is customer specific.

How do you see SPC developing over the next few years?

With the advent of big data and Industry 4.0, there's more demand to collect more data, and the need for the correct kinds of analysis will only increase. But also we're taking it a step earlier in the process, determining the capability of the metrology systems and the manufacturing systems ahead of time to determine what kinds of data need to be collected.

What are some of the most important things to think about in deploying SPC?

It does depend on the industry, but step one is understanding the capability of the metrology systems and the manufacturing systems, then using process knowledge to define what kind of data should be collected, how frequently, and then what you do about problems.

What's the ultimate benefit then?

Productivity and quality! ■



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