Don't Shoot the Messenger: Make Your Quality Meetings Fun!

by Gray McQuarrie

SUMMARY

Quality meetings are about hiding, fear and survival. Who wants to be the messenger that dares speak the truth, only to be shot? The truth is, in some way we all contribute to the problems in our company. Our work lives will improve dramatically when we accept this fact and stop shooting the messenger.

I don't know of a single person who enjoys quality meetings. Why? Because nobody wants to be shot! Quality meetings are about hiding, fear and survival. Want to be shot? Then be the messenger that dares speak the truth. Quality meetings are a witch-hunt to find bad people. Eliminate them, set the example and voilà, no more problems! But, where are they? Hiding behind their story. Who wants to stand up, just to then get shot? If you want to wipe out all problems, blow up the planet. No people, no problems.

One choice only!		Problems Good or Bad?	
		Bad	Good
Your search?	The Truth	#2	#1
	Your Answer	#4	#3

Table 1.

The truth is, in some way we all contribute to the problems in our company. Our work lives will improve dramatically when we accept this truth and stop shooting the messenger. We need a new mindset. Wait; let me state this in a stronger way. We need a new culture in our industry in this country.

Louis Gerstner said, "I came to see, in my time at IBM, that culture isn't just one aspect of the game—it is the game." Table 1 shows the choices we have. Which box are you operating in? If it is Box 4, then you will have a culture where problems are bad and you want immediate answers. In this culture, fear will dominate and the truth is buried. Your company will be under a high degree of competitive pressure. You will lose customers.

Consider Box 1, where problems are good and people are on a quest to find the truth. In this culture, people will work together, learn and grow. People will find and deal with the truth with a high degree of emotional intelligence. Your customers will be happy because they will be the beneficiaries of your discovery and growth. Your business will thrive. Box 1 needs to be the goal for our industry in this country. In fact, at the end of the day, our quality meetings should be about success, not punishment. They should be (dare I say) fun!

Where do we start? Start with how we present data in our quality meetings. For example, average yield data is meaningless because averaging hides the truth! Let me explain. Consider Figure 1.

Figure 1 shows the average lot yield for Jobs A through O. You can pretty much tell any story you like with this data. If asked about Job E, just say, "it was a bad operator this month. We fired him." Or, "A press went down. We fixed it." Or, "There was a power outage. It was beyond our control." Just throw out the usual suspects. In other words, the story is important, not the truth. Since we want to change our culture and find the truth, then we need a better way to present our data. I have highlighted with red diamonds four jobs for us to consider. By focusing on these four jobs, we will discover that less is more.

Let's get started by developing a relative metric so we can compare the relative complexity of the different jobs. What's happened in our decades of being exposed to quality training like TQM and Six Sigma is that the emphasis on absolute precise metrics has

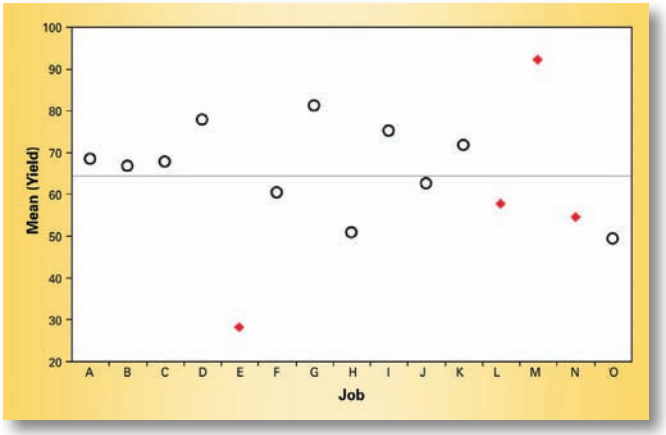

Figure 1.

robbed us of our most important innate skill: making relative comparisons and developing relative metrics. Our ability to detect slight differences in shades of color is an excellent example. Does it matter if we are accurate? No. Not only that, this ability to detect relative differences has been key to our survival. An example of an important relative metric is the Reynolds number in fluid mechanics. It is unitless. Accuracy and precision aren't important. It is all about comparisons. It is used to comparing how different solutions will flow through a given conduit design. What we need for our yield data is a similar unitless relative metric to compare the complexity of Jobs A through O.

Lets' start with board design. Suppose the range of lines we accept in the shop is from 1.5 mil to 5 mil. Let's assign the number 10 for the 1.5-mil line and the number 1 for the 5-mil line. Here, 10 is hard and 1 and easy. We can then interpolate to get a rating for different line widths. Consider the diameter of the hole. Let's say our smallest hole is a 2.5-mil diameter and our biggest hole is a 6-mil diameter. Anything above this is considered very easy to accomplish. So the range we choose for the scale has to be a within a range where we begin to have difficulty, all the way to where we are severely challenged, but still a part of normal production.

So again, a 2.5-mil diameter hole would be 10- and a 6-mil diameter or above would be 1. Let's say we have a board with a 1.5-mil line and 4.25-mil diameter hole. What would be the relative rating for the design complexity of this board? The 1.5-mil line would be a rating of 10 and the 4.25-mil diameter hole would be 5. Taking the average, we come up with 7.5. We can continue in this way for the other design parameters that include aspect ratios, total number of drilled holes, total number of blind vias, cavities, etc.

We can do the same thing with process parameters. Let's say our board can have as many as four sequential laminations, to having zero laminations. In this case, four laminations would be 10 and the zero lamination would be 1. In the same way with design you can include a number of process parameters, such as number of times the board needs to be imaged, the number of times it is routed through the drill room, whether special handling is involved through the etcher, etc.

The way you would combine the design with the process would be to multiply them. For example, if you had a relative rating of 7.5 for the design and a relative rating of 5 for the process, the overall combined rating, or the complexity rating design x process, would be 37.5.

Now for the fun part. Let's plot the data in Figure 1, not as an average of all of the lots, but use each of the individual lot yields and plot this data as a function of relative complexity. What do you think you will see? Figure 2 shows the plot.

In this figure, we have the jobs as before—E, L, M, N—which are shown by red diamonds. Often, a plant manager, operating

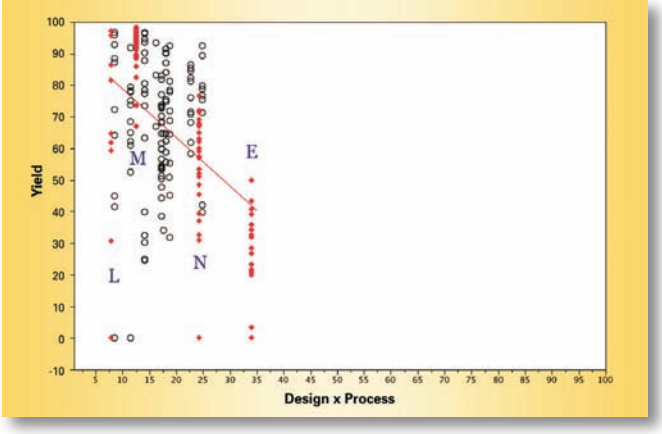

Figure 2.

in a fear-based culture, will not like a chart like this at all. The degrees of freedom she has with which to make up a story is very small. A chart like this forces the truth to be exposed. The manager has few options to protect herself. One option is to shoot the messenger and this chart, claiming, "I don't understand this chart, it is a lie," or my favorite, "You can make data say anything. This data is meaningless." This, by the way, is very true about Figure 1, but not so true about Figure 2. This reaction isn't the plant manager's fault. This behavior is a result of the company's fear-based culture perpetuated by the owner or CEO.

Since this chart is likely new to you, let me explain its most important feature, the slope of the regression (shown as a red line). Remember our relative metric? Well, it was based on what we would accept into the shop. That means jobs with a complexity rating of 100 would be quoted, and we would take the order. Should we? The answer is no. If we extrapolate the red line it would intersect the X-axis at about 70. Typically, when a chart like this is prepared for a client they are shocked about what they can't do and they are shocked that their hardest jobs have such a low complexity rating. Then the truth sets in. They aren't as good as they thought. However, now they have a target to shoot for and a means to measure their performance. The target? Change the slope of the line! Then go out and find more profitable work with higher complexity levels. Progress measured as the rate of change of this line becomes more horizontal. It takes substantial change in the factory and a big change in how the most challenging jobs are run through the factory to change this slope. Is this different from a TQM or SPC way of looking at yield? You bet. Is it powerful? Yes. By finding the jobs that need the most help instantly, it forces questions that get at the truth fast. A chart like this shows you exactly where you need to focus.

So often in our shops we think collecting more data will be better than looking at less data. The problem with looking at too much data is we can lose focus trying to do too much, which results in no improvement. In fact, more data provides us with a way to hide the truth if we live in a fear-based culture.

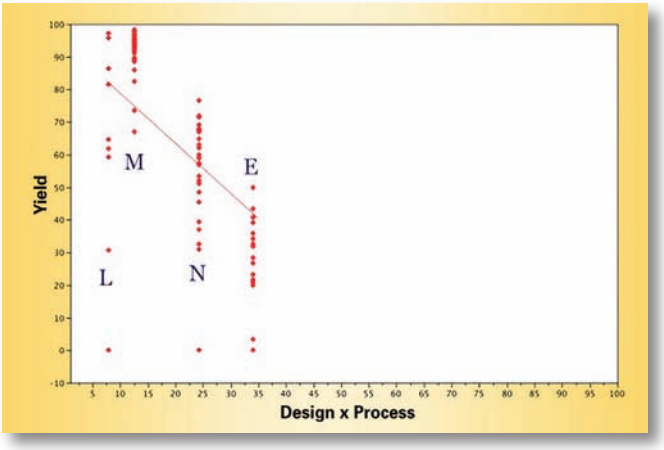

Figure 3.

Figure 3 shows the simplified graph where we focus on jobs L, M, N and E. The line still represents the fit of all of the data.

Each job is significantly different, which mean that not all jobs run through the shop in the same way. There are specific issues surrounding each job and when we address these issues we will make the shop better and become more profitable. To get at the truth it all starts with questions. For example:

1. What accounts for the 0% lots?
2. What accounts for the large variation and erratic yield in Lot L?
3. What accounts for the high average yield for Job M?
4. What accounts for the low yielding lots for Job M?
5. Why didn't Job M have a 0% yielding lot?
6. Why is the standard deviation on Lot M so much tighter than the standard deviation on Lot N?
7. What parameters specifically for Lot N, be it the design or in the process, accounts for the drop in yield?
8. The variation in lots N and E are very similar. Does this point to something similar about these two jobs that needs to be improved?

What I have found about working with similar data is the this: When I see something erratic like Job L, there is usually a process step or two that requires a high level of operator

skill. In the case of Job L it turned out to be an imaging operation. When presented with this, you can proceed in two ways. The first way is to make sure only highly skilled operators work on Job L at the step that counts. The second is to buy technology such that a high level of operator skill is no longer required. Variations found in lots N and E usually have to do with tight line and space jobs that require precision etching. If this is not done doing panel plate, and you have a high level of plating variation, then the yield problem will be compounded because the variation from both processes will add together. A job like M, which doesn't have these problems, will likely have variation that is half or a third of that of Job N or E.

There is something very important about Job M. It was the only job over the period where there wasn't a total yield loss. In fact, no lot came close to a low yield loss. Jobs that have total yield loss are usually caused by poor handling and operator mistakes. Job N is dialed in. Job N likely doesn't have critical handling steps. This means there are very specific areas within the shop that are contributing to 100% yield loss. Fix these and the economics of your plant will soar. However, you need to be willing to find the real causes (i.e., the truth). Job N shows what is possible for the plant. The 100% yield loss and the wide variation has nothing to do with job complexity. It has to do with how the shop is managed. And if you have a culture of fear, a chart like this will never see the light of day, because you will want to shoot the plant manager. In this case only the manager can deliver this message, so don't shoot the messenger. You must work with the manager so that operators care, are better trained, and help each other.

What about Job E? Despite all of the good reasons you can come up with, such as Job E is for a really important customer, you shouldn't be doing it. Job E is killing the economics of the plant and we described this in last month's article, "Are We Nothing More Than a Pair of Socks at Walmart?" The more jobs like Job E that you do, the less your plant will be able to produce per bag of money. Guess what? That means the cost of every single panel will go up, because cost is a function of overall plant throughput. Your production flow defines your plant economics. Until you invest in the technology to do Job E right (assuming the job is doable) and the customer allows you to do the job right, then you need to get it out of your factory immediately. Anything else is just wrong. It will sap your profitability and drive you out of business. If you continue to produce jobs like this then you choose to live in a fantasy world. Supporting this fantasy will drive a fear-based culture. You will reject the truth and look for the answer you want: Job E is good business. Anyone that tells you the truth and says, "Job E is bad business," will be shot.

The goal in our industry should be to develop a culture where quality meetings are fun. Our quality meetings need to be a time to celebrate our success, share our learnings, expose our weaknesses and mastermind new ideas in a culture of openness and trust. When the messenger comes to us, we should listen to his message, not shoot him. And in our quest to find the truth we need to work hard at collecting and displaying our data where problems are completely exposed, instead of abbreviating the data with conventional averaging that simply hides the truth. Edward Tufte wrote a series of famous books, one of which, Visual Explanations, said it best: "We shouldn't abbreviate the truth, but rather get a new method of presentation." Well said! **PCB**

Gray McQuarrie is the President of Grayrock & Associates, a team of experts dedicated to building collaborative team environments that make companies maximally effective. McQuarrie is the primary inventor of the patent Compensation Model and Registration Simulation Apparatus for Manufacturing Printed Circuit Boards. He has worked for AlliedSignal, Shipley, Photocircuits, Monsanto and many other companies and clients. For more information, visit www.grayrock.net, or email McQuarrie at gray@grayrock.net.