

INSTITUTE OF CURRENT WORLD AFFAIRS

RJB-24  
Quality Control

846 Broadway - Lot #49  
Saugus, Mass. 01905  
August 5, 1974

Mr. Richard H. Nolte  
Institute of Current World Affairs  
535 Fifth Avenue  
New York, New York 10017

Dear Mr. Nolte:

Western Electric takes a great deal of pride in the high quality of its products. At Merrimack Valley there is an elaborate and complicated system of quality control, beginning with the process checkers who check the work done by the bench hands. Defects not caught by the process checkers are picked up by shop inspection, the second stage quality control people. The company would like all defects to be picked up either at the first or second stage. There is, however, one more check before the product leaves the plant. This check is made by company employees who act as representatives of the customer. They are part of a company Headquarters organization called "Quality Assurance". They operate in areas called the "cage", and a defect which is picked up in the cage is considered quite serious.

During my orientation the need to produce something well was repeatedly mentioned. Again and again we were told it was our responsibility to make a good product. One of the men running the orientation said, "We have a top notch quality control system. You can't inspect quality into a product... you must build it in."

Our supervisor made a point of telling new workers that it was better to build something right and build it slowly than to build it fast and build it wrong. For the first few days he would drop by the work area of a new worker and assure him that speed would come eventually, and that his concern was that whatever we built, we built correctly.

Although I was aware of the importance of quality, I didn't really think about quality control for more than a week. My first week was pre-occupied with learning my jobs. Occasionally the process checker came by and checked one of the boards I was building. If I had made a mistake the process checker would return my board, I'd correct the mistake, and resubmit the board. I thought that that was all there was to the system.

Even though Jack, our supervisor, had stressed that speed was unimportant, at first I was trying to do the various jobs I was assigned as quickly as possible. I was, I knew, working slower than other people, but I was sure each time I built a board that I had built it correctly. Yet, to my surprise, I was being told that I was building things incorrectly. I was reversing polarities, inserting wrong parts, and on two occasions I simply forgot to insert required parts.

---

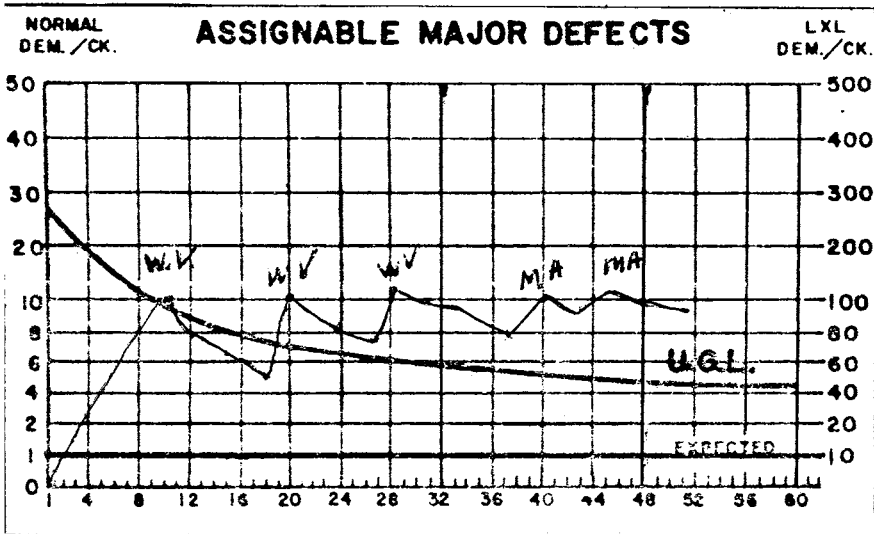
Richard Balzer is an Institute fellow exploring the effects of social and economic change on lower and middle class America.

Near the end of the second week I noticed that there was a sheet, displaying a graph, in front of my working position. I looked around and noticed that there were similar graphs in front of everyone's position. I took a closer look at the graph and noticed a normal curve and then another curve which I assumed represented my productivity. Out of curiosity I plucked my graph from its stand, turned to the woman who worked behind me, and asked what these graphs were all about.

Jill told me it was a quality control chart. She said the big steady line represented the number of mistakes you are "allowed" to make in a month. "A good worker," she said, "is supposed to stay under the curve." The other line, which on my chart looked like a roller coaster represented my mistakes. She said that each time I made a major defect that the process checker picked up, it would be marked on my chart as a hundred demerits (50's are marked as well) and my chart would reflect those defects.

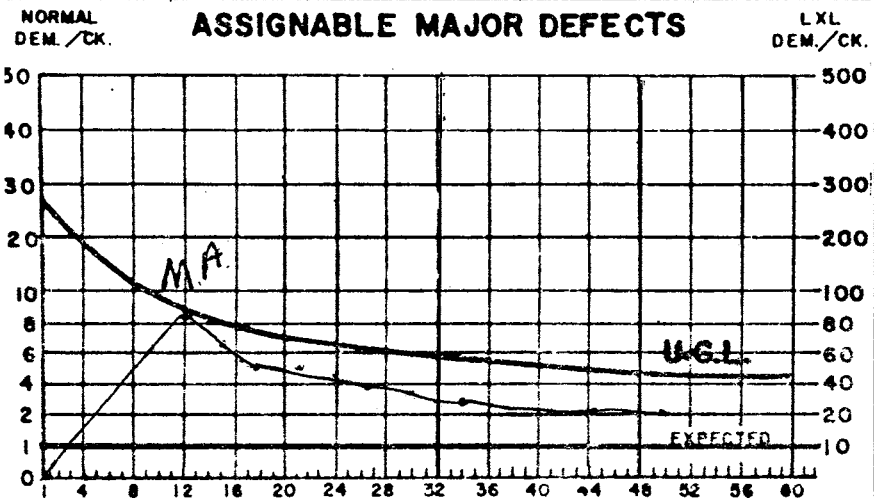
Jill could see I was getting a little alarmed because my chart already showed I was having trouble. My curve had passed the normal curve early in the month and hadn't gone under it since.

Jill said, "Don't let it bother you. We all have trouble to start with. When you get to know the job, your quality will improve. Even when you've been here a while you'll still have bad days. Last month I got 600 demerits in one day." The last thing Jill said before we both returned to our work was, "Try not to pay any attention to it."



PRODUCT QUALITY  
Position Charts

MY CHART



ANOTHER WORKER'S CHART

M.A.= Missing Apparatus  
W.V.= Wrong valve  
U.C.L.=Under Control Limits

I began working again, but I found I was taking an occasional peek at my chart. Now that I knew what the chart represented I was embarrassed. Somehow it seemed to me that it was like showing off a low grade for everyone else to see. I couldn't understand how I could not be bothered by it.

The next morning when Arlene, the process checker, came over to make a check, I asked her about the system and her feelings about it. "Theoretically, it's a good idea. Obviously they need to try and control quality, but I think the thing has gotten out of hand. You see, what happened is some guy had a bright idea of having a quality control unit years back. The trouble is it has grown until it is too big, and it's as destructive as it is helpful.

"The trouble," Arlene continued, "is with the charts. People get nervous when they see they've made a lot of mistakes. I don't blame them. I don't think most people mind being told they make mistakes, but they don't like those mistakes staring them in the face on a chart which anyone can see. I know myself I don't put down all the mistakes I catch. Some of the girls chart them all, but I don't. Instead, I bring the boards back and let the bench people know the problem.

"Look at your chart--you're upset because it looks so bad. If I plotted all the mistakes you made you would be off the chart. But how is that going to help you do better work? It isn't. My trying to explain a mistake or how you should work may help.

"If you're a nervous person the chart will make you even more nervous. When I used to work upstairs there was a 60 year old woman who was very nervous. At first she made mistakes all the time. She told me she would never learn how to do the job. I didn't put down most of the mistakes she made, I'd just bring the boards back to her. Finally the woman got the hang of the job and now she's one of the best workers in the group. If I had charted her mistakes, she would have never gained any confidence in herself.

"I'll tell you something else, I can tell when one of the girls is having personal problems. I don't mean a little argument, but if there's something wrong with her children, or if she had a fight with her husband, it always shows up in the quality of the work. Their minds just aren't on the work. I try to be sensitive to it and I end up being a mother confessor.

"We're having a problem with quality because we do so many different jobs. If you have the kind of shop where you're doing a repetitive task then you keep good quality and high production. I worked in an area where we did the same thing week in and week out. We put out 10,000 parts in a week. The girls got so they could do them blindfolded. When you're doing a lot of different pieces, switching around like we do, there tend to be more mistakes unless you give up on high production.

"Really, if you ask me, if the company were smart they would get rid of those darn charts. They just make people feel bad. Most people in here want to do their job correctly, and the company should work under that premise . "

As the months passed I heard more and more people complain about the charts. The complaints seemed to intensify with news of our poor bonus. People would say, "Sure we can't make a good bonus, we're always building boards short; you can't get a routine going. We have to do work over, fix mistakes, and they don't pay you for the second time you do a job."

The complaints about quality control and the process checkers mushroomed into real hostility when the group learned that it had gone "out of control". A group is considered out of control when the number of demeritable items exceeds a predetermined statistical limit based on production levels. This is a very serious situation, so serious that Western Electric's New York headquarters is notified of the problem. The situation is rare and an embarrassment for the supervisors responsible for the area. A group which is out of control is, I discovered, slated for meetings and other procedures to locate the group's problems.

The first tangible result of our going out of control was the disappearance of the courtesy check. Customarily, at least in our shop, when a worker began on a new board, he was given one courtesy check by the process checker. If a defect was picked up it wasn't charted. Instead he was simply told of his mistake. In this way he could become acquainted with a new job and not worry so much about defects.

I discovered that we were losing the courtesy check when one of the women started complaining about it during lunch. "Do you know," she said, "Arlene gave Tina 300 demerits on a new board. Arlene told her, 'No more courtesy checks because our group is out of control!'"

Janet, Tina's friend, was really upset. "They've always given us a courtesy check on a new job," she said. "This new stupid idea will just make everyone more nervous."

I learned later that afternoon that more than just the courtesy check had disappeared. Arlene brought back one of my boards with three defects, which meant 300 demerits. Usually in a situation like that she would only chart me for one defect. I felt somehow abused.

I asked her in a half-joking, half-serious way, how come she had charted me for all three mistakes. For the first time since I'd known her she spoke to me with an edge in her voice. "Look," she said, "my boss keeps coming down on us (the process checkers). He tells us we aren't charting everything, and it makes it look like we're not doing our job. So from now on he wants us to put down every mistake we catch. They want to know what the work coming out of here is really like. I don't like doing that, none of us do, but that's what they want."

Tempers grew very short very quickly. Boards which had once been returned by a process checker with instructions to fix it but without a demerit being charted were now returned with each and every defect charted. People started reacting negatively to the process checkers, making snide remarks to them and behind their backs. The process checkers retaliated by starting to give the boards with mistakes to Jack, our supervisor, rather than directly to us. It cut down on personal contact, and it made Jack even more aware of our mistakes. It was a very uncomfortable situation for everyone.

Jack finally said something when two operators, with more than seventeen years of service between them, had received a total of 700 demerits on new boards. Both complained bitterly to Jack about the absence of the courtesy check and one was nearly in tears. Jack called the process checker over and asked her to give them a courtesy check. Her face turned red, and she said, "You just told us there were no more courtesy checks."

Jack, as always, kept his composure and said, "Well, I've changed my mind, let's have one."

"No," the process checker said, "I can't."

So Jack went to her supervisor and told him he wanted courtesy checks reinstated. They discussed the matter, and then Harold agreed and assured Jack that he would take care of it. Later that day the courtesy check was reinstated.

This made the people on the bench somewhat happier but infuriated the three process checkers. One of them, Vivian, told me, "Here they take one stand and then you do what they tell you and they want to change it. Now that we've begun to chart everything they're embarrassed because there are so many mistakes being made. Either you say there can be courtesy checks or you don't."

"You know what they're doing, they're turning the girls on the bench against us. They don't get mad at the supervisors, they get mad at us, and for what--doing our job. You think I like charting all the mistakes? I don't; none of us do. We try to catch the mistakes and get them corrected. I don't care whether none of the mistakes are charted. I think it's a dumb system anyway. But we don't make the rules, the bosses do. If I have to chart everything I will. And I'll tell you this, if the girls start giving me a tough time because I'm doing my job, I'll just give all the boards with mistakes to Jack. We'll see how they like that."

Relations between the process checkers and the people on the bench continued to deteriorate. Everyone was concerned that the bonus was low, so people were pushing to get more work out. But the more we seemed to push the more defects we seemed to make. Tempers grew quite short. One fellow who had worked for the company for less than six months refused to let a process checker take a sample board he was working on. He told her he wasn't ready and they got in a huge argument, which ended in both of them trying to grab the board.

At the end of what had been a particularly tense week Jack told us we were going to have a meeting with the quality control people to try to figure out the troubles we were having with production and quality. Jill waited for Jack to leave and said, "Big deal, we're going to have a meeting. What do you think a meeting will help to do? All that will happen, if we say anything, is we'll get in trouble."

Another person said, "You're wrong, they really want to know."

Jill interrupted, "Want to know what? Do you think they're going to admit they're doing anything wrong upstairs? Not a chance. I'm telling you if we say something we'll only hang ourselves. I know what happens at these meetings. They won't do anything about our complaints. They just want us to see things their way. There's no way I'm going to say anything."

The meeting was held the next morning in an upstairs conference room. At 8:30 everybody put down their tools and walked slowly upstairs. The engineers and time study men were already in the room. Our supervisor and our department chief also attended the meeting. The quality control engineer for our department, a person few of us had ever met, chaired the meeting. Ralph began by wishing everybody good morning. "I want to talk to you about why quality is so important. I'd like to be bold enough to make some suggestions on how we can help you people improve the quality of your work."

"Quality is important because it's important to our customers." Seizing a pamphlet he continued, "See this, it's a quality bulletin. It is used by all our major customers. If the quality isn't good the customer doesn't want the product. Western Electric has always provided the Bell System with what it needed, but the Telephone companies aren't obligated to buy from us. I'll be honest with you, five years ago we weren't in such a competitive position. But today there is unbelievable competition from other companies in this country and from the Japanese. Now if we can't build something well and build it inexpensively the Bell System companies will buy elsewhere."

"Building something well means good quality. We have constructed an elaborate structure to insure continuing high quality. Good work from you people on the benches is important. After the work leaves your hands we have a system for checking the work. The process checker is the first level of that system. We keep making checks all along and the final check is made by the people in the "cage". They are supposed to be the customer's advisors. So we don't like mistakes to get that far. If a mistake is made in here and it isn't caught until the product is installed in the field that mistake can cost the company millions and millions of dollars."

"I don't know how many of you ever heard of Pareto, the philosopher, but he once said 20% of the people own 80% of the land. Well, in here we have our own Pareto principle of defects. We say 20% of the people make about 80% of the mistakes. We use the quality control charts to isolate the cause of the mistakes. By using the charts we can pinpoint where mistakes are coming from and correct them. I know that some of you don't like these charts, but you shouldn't take them personally. We only use them to help us in isolating mistakes."

"Well, I've talked for a long time. I guess that's pretty much of what I want to say. Now I wonder if any of you have any questions?"

There was silence for a moment and then Jane, a person who had worked in our shop for less than two months, spoke up. She said, "Well, yes. I find the quality charts to be very discouraging and humiliating."

Even before Ralph got the chance to get the why out of his mouth, Jane continued, her voice picking up a little more emotion. "If I see the chart one more time, I think I'm going to scream. I've worked for several

companies and I've worked a long time for this company and this is the first time I've been in this situation. I keep on making mistakes in this new job. Every day I make a mistake and I see my chart and I'm afraid I'm going to do worse and I get so nervous I do worse. I hate that chart staring me in the face. I don't mind my supervisor seeing it, but I don't think it should be up for everyone to see."

Ralph tried to mollify her. He said he could understand her being upset, but believed the charts needed to be up. Ralph said, "Those charts are up there not to embarrass you, but so the supervisor can see them. We're afraid if they were just given to the supervisor they might get buried in his desk."

I waited for someone to say something. I was sure someone would point out that our supervisor rarely if ever went around checking the sheets so that couldn't be the reason to have the charts up. No one said anything so I finally pointed this out.

Ralph smiled and repeated what he had just said, when Jane started complaining again about the humiliation she felt, he looked at her and in a lowered voice said, "Maybe there's nothing to say except that you aren't working well."

The room was silent again and then Grace, a woman with 11 years of service, said, "You know, as long as I've worked here I've never understood the need for those personalized charts. I remember when I began working here I was always embarrassed by them. If you ask me they aren't helpful; they just make you feel uncomfortable. I don't know why the company uses them."

Larry McNeil, our department chief, spoke for the first time. "Why do we need them? Of course we need them. How are you going to tell the bad apple in the bunch unless you have the quality charts?"

Ralph said, "I feel you people are taking this all too personally. Those charts are posted to help you, to help you improve your work. Look, if you know what you're doing wrong you can improve on it. If you make work with fewer mistakes your bonus will go up..."

I said, "If the quality control sheets are so helpful, why aren't the ratings of the supervisors posted to help them?" People laughed and Ralph, instead of answering my question, asked if there were any other questions. When none were put forth he closed the meeting.

We walked back to work, and for the rest of the day people were talking about the meeting. Jill, the woman who had warned me to be quiet, said, "See, what did I tell you? They didn't want to hear what we had to say. They had an answer for everything, didn't they? They're not going to change anything. That's why I didn't say anything. I felt sorry for Jane, but she should have known better. She's been here long enough to know not to speak up at one of these meetings. You'll see, they're going to make it even harder on her."

To my surprise, a number of people were critical of Jane. Like Jill, a number of people thought Jane should have known better than to speak up. One

woman said, "If my work was as bad as Jane's, I'd be upset. But the charts don't bother me; in fact, I like them. I don't make hardly any mistakes and I like to see that my chart is better than most of the other people. I'll tell you," she said, "I like it just like I like the bogey. I do good work, and I like some credit for that."

A few people thought Jane had been courageous to speak up. One fellow told me, "I didn't say nothing because I don't speak English so good, but I feel just like Jane. But now I'm glad I didn't say nothing because all they do is bullshit with you when you tell them how you feel."

I asked Grace why she had spoken up. She said, "I know it won't do me any good, but it just got me mad the way they were picking on that poor girl. I just got madder and madder till I had to say something. I've been here long enough so they can't do anything to me, but Jane could get hurt speaking up like that."

Things didn't change very much in the next month. There were several more meetings, but not with the entire group. There were meetings with the layout operators, and the process checkers. Our supervisor went to meetings, and quality control people came down to the shop. We were checked more frequently. The process checkers began checking work three times a day instead of twice as they used to. A couple of women told me, "Even if you slow down, check your work before one of the process checkers takes a look at it." During the month we were told that another process checker was going to be coming into the shop.

Our bonus didn't pick up and relations between the process checkers and the people on the bench continued to be strained. Our courtesy check had disappeared again. The process checkers used Jack as an intermediary to pass back our defects until the people on the bench stopped complaining.

I asked Arlene how long she thought the tensions would last. She said, "I'm afraid it will just get worse and worse until the bonus begins going up. Some of this is just mass hysteria. Once people start making mistakes, they begin getting a little hysterical. Not consciously, but it happens. I know, I've seen it before. In a group I used to work in I noticed a woman will make a mistake and that quality chart in front of her will start getting to her. It just reminds her constantly of those mistakes. Inadvertently, at lunch, she'll say something to other women in the group and that afternoon all their quality will go down.

"When I told my supervisor what was happening he told me I was crazy, so I showed him. I waited till the end of the week, and showed him a woman who had made several mistakes in a single morning. I showed him the charts of the woman who worked next to her and how their work fell off later in the day. I can't explain it to you, but mistakes seem to be compounded.

"And when a group is out of control like this one is, things seem to get worse for a while. Feelings are strained and then, I don't know why, they'll start slowly to get better again."



There was no big event that I could see that began to change things, but by the time I left some of the tension was undeniably gone. The fairly good relationships that had existed between the bench people and the process checkers seemed to return. I couldn't tell for sure, but it seemed as though the old practice of not charting all defects had returned.

At a time when there is increasing national concern about the deteriorating quality of much of our manufactured products, Western Electric can take great pride in the continuing high quality of what it produces. Much of the credit must go to the complicated and elaborate quality control system. Theoretically the system makes a great deal of sense.

The quality control charts are an important part of the system in that they are used to pinpoint defects. Most people, in my experience, were willing to admit their mistakes, but few people wanted their defects constantly staring them in the face, open for everyone else to see. Many people mentioned that the charts made them nervous. The public display of the charts is degrading and, I believe, an unnecessarily inhumane way of trying to improve quality.

The existence of these public charts, and the reaction of the people on the bench to them, creates a dilemma for the process checkers. They receive conflicting pressures from management and the people on the bench. Management instructs them to chart each and every defect. However, in their daily contacts with the people on the bench, the checkers see the high human costs involved in charting all defects.

It is interesting to note how the process checkers in our department resolved this dilemma. Basically, the three of them evolved a system which varied with their respective personalities, but which boiled down to not charting all defects.

They were intent on catching defects, and seeing that they were corrected, but they were not intent on charting all the defects. None of them seemed particularly to like the charts, and they seemed very sensitive to what the public display of the charts did to the people. Repeatedly they mentioned that they saw their job as catching mistakes, and not charting people. As one of them said, "If you've ever worked on the bench and had to stare at one of those damn charts you know how nervous they can make you."

It was only when our department went "out of control" that the process checkers were forced back into the position of charting each and every defect. None of them believed this would help cut down on defects. In fact, they expressed the opposite view, saying it would only make people more nervous. However, if that was what the bosses wanted, that was what they'd do. When they began charting everything they felt the increased displeasure of the bench people who had gotten used to the more informal system.

Their reaction to this hostility, a very human reaction, was to retreat to an even more formalized procedure, giving boards with defects to the supervisor and not to the bench people. This reduced personal contact and let the bench hands know that if they didn't cooperate the process checker could make things worse. There is no doubt that it is within the power of

the process checker to make a bench worker look better or worse.

But the process checkers were as unhappy with the more formal structure as the bench workers. As soon as complaints lessened charting began returning to the old pattern.

The stated purpose of the charts is to pinpoint defects and help improve quality. The hanging of charts bothers many workers and places process checkers in an uncomfortable position. One would think that when the deleterious aspects of such a small feature as hanging the charts, had been brought to management's attention, it would have been corrected, but that isn't what happened.

I was sure before we went to the quality meeting that Jill was wrong, and that if the problem was aired, there would be some positive response. However, instead of trying to understand why people were so upset by the charts, the management's representatives reacted by telling people they were taking the charts too personally. There seemed to be no attempt to understand.

Of course a person would take that sort of chart personally. Imagine if your public school report cards were posted in front of your desk for the entire year, so you could improve your work. Certainly a few people with excellent report cards wouldn't mind. However, we can imagine what the posting would do to other people.

One doesn't even have to look as far as the public school. Imagine if the practice on the shop floor was extended to cover the ratings of supervisory personnel, or engineers. All these people are rated, each of them may know his rating, but how would they respond to a public display of those ratings?

It is regrettable that the lower management which dealt directly with this problem was so unresponsive to the feelings of the bench hands. I was repeatedly told by people in upper management at Merrimack Valley that they were interested in the feelings of the people working in the shop, but the meetings I attended seemed to reinforce the general workers' view that management wasn't genuinely interested in their complaints. The norm, at least in my group, was not to speak up because, as one woman said, "You'll see, they won't do anything about what we say." The meetings I attended just reinforced this idea.

This is a very dangerous situation for a company, particularly one which professes an interest in understanding the problems of the shop floor. At Merrimack Valley workers are told during orientation that you can't process check quality into a product. This is true. For the company to function the quality really has to be a constant concern of the people on the bench as well as the engineers and professionals. The company must act on the belief that the people who work on the bench care about what they build, and they should be more sensitive to the human problems which their quality control has created.

*Richard J. Boyle*

Received in New York August 19, 1974