Stalking the elusive maintenance quality beast.

Quality control is hard to define in maintenance. Everyone knows when it's missing but it's hard to tell when it's there. The usual definition in production is quality is to consistently produce parts with low variation. Maintenance quality usually deals with the consequences of the repair not the repair itself. The emotional context of the response is also tied up in maintenance quality (a surly, dirty maintenance technician is low quality even if their work is superb) .

In some circumstances maintenance quality might = Reduced downtime

In others: maintenance quality = Reduced scrap

Maintenance quality = Faster start-up

Maintenance quality = Quicker response

Maintenance quality = No repeat repairs

Maintenance quality = Keep unit in spec

Maintenance quality = No interruptions

Maintenance quality = Satisfied user

Every maintenance operation should define quality in a way to be useful to their operating environment. The late W.E Demming was considered the quality guru for the last generation of Japanese quality experts. In fact, the quality award in Japan today is the Demming award. He had much to say about quality in manufacturing. The surprise is that Deming's points apply to maintenance also. We just have to see what quality is in our plant, site or division.

W.E. Deming's Fourteen Points: First discussed in 1950! See 20 Steps to World Class Maintenance section in first chapter for additional discussion.

1. Create constancy of purpose toward improvement of product and services with the aim to stay competitive, stay in business and provide stable employment. Maintenance deterioration usually takes a long time. Any effective maintenance strategy must also have a long horizon. Resources must be allocated for good maintenance practice and not taken away with every bump in the quarterly results.

2. Adopt the new philosophy. Awaken to the challenge. Take responsibility for and leadership in change. Our maintenance departments often are the last areas of the organization to realize the need for change. The department is dragged kicking and screaming into the new corporate

culture. Looking toward the future I see a maintenance department providing leadership for the rest of the organization. Nowhere else is high quality so closely related to safety, high self-esteem? Quality is intertwined with the very history and culture of the crafts.

3. Cease dependence on inspection to achieve quality. Build quality in. Quality comes from skilled and knowledgeable mechanics given good tools, adequate materials and enough time to do the job. Quality comes from choosing well designed equipment that doesn't need much maintenance. What maintenance the equipment does need is easy to perform and get to. Quality comes from pride in a job well done. Lead by example with ceaseless training, coaching and systems analysis. When defects occur concentrate on the system that delivered the defect rather than having a preoccupation with finger pointing.

4. End the practice of awarding business on the basis of price alone. Instead, minimize total cost. Move toward a single source for each item and on a long term relationship of loyalty and trust. A revolution in purchasing is at hand. More and more organizations are looking at the total costs of a part or the life cycle cost of a machine. Some economies are false and hurt the overall goals of the organization. A low cost bearing might be the most expensive bearing you ever buy.

5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly reduce costs. In today's market the way it used to be done is never going to be good enough for the future. All improvements and growth flow from dissatisfaction with the status quo. Build measurement into the maintenance information system. Continually strive to improve both the visible and the invisible performance.

6. Institute training on the job. Training should be mandatory for mechanics the way it is for doctors or teachers. Our factories and facilities have today's levels of technology and our maintenance people have yesterday's skill sets. To maintain effectiveness we must train to bridge to gap. Special effort should be given to the people on your staff who deliver the on the job training. These informal trainers need instruction in how to teach adults. They also need back-up materials to deliver the best possible training.

7. Institute leadership. The aim of supervision should be to help people and machines do a better job. The supervisor should serve their subordinates by removing the impediments from production. The supervisor should insure that the mechanic, the tools, the parts and the unit to be serviced converge at the same time. The supervisor should also be the lightning rod for disruptions from management and production (unless there is an emergency the mechanic will not be disturbed because interruptions reduce quality and worker satisfaction).

8. Drive out fear, so everyone may work effectively for the company. Fear of the lose of a job interferes with the mechanic's ability to concentrate. Fear gets in the way of the pride a mechanic feels in a job well done. A flexible and highly productive department where people can shift from trade to trade, maintenance to construction to production is the safest one.

9. Breakdown the barriers between departments. Everyone's expertise is needed for constant improvement. With scarce resources we must include knowledge from other departments and groups to come up with the best overall solution for the organization. Maintenance problems can get complex quickly with financial, marketing, purchasing, quality and engineering ramifications. The best solution to a problem might not be the best maintenance solution (like run until destruction to fill an important order). Information for the best solution might come from another department and another expertise.

10. Eliminate slogans, exhortations and targets for the work force asking for zero defects, new levels of production. Such exhortations create adversary relationships. A bulk of the problems for quality and production belong to the system not the people. Stable processes create quality. Create stable processes producing quality outputs and the people will feel the way the slogan without cohersion and alienation.

11. Eliminate work standards, quotas, and management by objectives (MBO). Work standards and quotas are associated with management styles that treat the maintenance worker as someone needing to be told exactly what to do and how long to take. Standards are useful for scheduling and to communicate management's expectations. It is difficult to not use them as a production whip. That is a disaster in maintenance situations because we want the mechanic to take the time needed to fix everything they see (within reason!), not just the original job. We must trust the mechanic to look out for our interests particularly when we are not there. The problem with MBO is that it focuses on visible, measurable aspects of maintenance. Many of the real issues of maintenance concern aspects of the environment that are hard to measure.

12. Remove the barriers that rob the worker, engineer of his/her right of pride of workmanship. The responsibility of supervisors must be shifted from numbers to quality and improvement. Tradespeople must be allowed to feel pride in their jobs that are well done. Maintenance managers and supervisors must not allow anything to stand in the way of that pride.

13. Institute a vigorous program of education and self-improvement World class maintenance departments make a commitment to invest 1-3% of their hours in training for all maintenance workers. Technologies are changing skills must change too. A world class auto manufacturer mandates 96 hours of training per year for everyone. A high tech manufacturer requires 110 hours.

14. Put everyone in the organization to work to accomplish the transformation. This transformation is everyone's job. This transformation requires the talents of all the employees. It requires all of the talents of each person. When a hotel chain had the housekeepers meet with the architects (for a new hotel) the result was concrete suggestions to improve the designs that reduced maintenance costs and improved the rooms for the customers.

Deadly diseases and obstacles to success

1. Lack of constancy of purpose to plan product and service that will have a market and keep a company in business and provide jobs. Maintenance issues (like the wearing out and failure of a compressor or boiler) take a long term to develop. Only an equally long term view will be effective. A moving agenda for the goals of maintenance work against the department.

2. The supposition that solving problems, automation, gadgets and new machinery will transform industry. Maintenance problems are people problems. The systems, attitudes and approaches are at issue. The paradigm of maintenance as a necessary evil, or of maintenance workers as grease monkey slobs must be transformed. The transformation starts in the minds and hearts of the maintenance department and then flows to the rest of the organization..

3. Emphasis on short term profit, short term thinking feed by fear of unfriendly takeover, and by a push from bankers and owners for dividends. Top management will squeeze maintenance to reduce costs below the level that is necessary to avoid deterioration. The cost reduction is temporary, the asset will deteriorate and long term integrity of the process will be compromised. Maintenance requires long term planning and commitment.

4. Evaluation of performance, merit rating, or annual review. The question about annual reviews, performance rating is what useful outcome flows from these procedures. In most cases the production of a mechanic is more related by how much management gets in their way rather than by their actual qualities. Annual reviews rarely change behavior.

5. Mobility of managers and job hopping. In one beverage bottler the average tenure of the maintenance manager was 22 months. Some lasted as few as 9 months. Everyone came with bright ideas and wanted to prove themselves. The result was a complete lack of focus on long term goals and plans. As each manager tried to cut costs the negative results impact fell to the next player. This job hopping in management without a master plan dramatically exacerbates the short term view.

6. Management by use of only visible figures, with little or no consideration of figures that are unknown or unknowable. For example, when you invest in training for your maintenance crew where does the increased asset show up? When, after spending $100's of thousands in a long expensive trial and error development process a firm finally develops expertise in a new process. This expertise, this new asset is nowhere on the balance sheet. It is important to measure and also to realize that much of what goes on in maintenance is unknowable.

7. Hope for instant pudding. Change of fundamental processes take time. In the current US culture it is hard to imagine instituting a change in processes that could take 5 or 6 years. In actuality if you start with a typical reactive maintenance department it could take you 5 years or more to create a proactive TPM type partnership in maintenance and production.

8. Search for examples. We think that if something worked in another machine shop or foundry it will work in ours. Since maintenance in factories has no strict rules examples from our industry may not be useful or even relevant.

9. "Our problems are different." Actually many people's problems are the same. In the PM area while no two plants will have the same exact schedule the problems will be the same. In our public sessions maintenance managers in widely different industries, sizes, and sophistication marvel at the similarity of the problems.

10. Poor teaching of statistical methods in industry. Industry is just waking up to the value of statistical methods of explaining what happens in the shop. Application of simple statistics to PM or PCR intervals would improve effectiveness. Simple relationships such as failures to PM's would show the effectiveness of the frequency you have chosen. Statistics replaces seat of pants reasoning, panic logic, historical prejudices with testable and verifiable conclusions.

11. "Our trouble lies entirely within the work force." Your production system is a stable system to produce a certain number of defects. Changes in the work force are irrelevant to the output. Only changes to the system can have an impact.

12. False starts with inadequate planning, top level support and lack of follow through kill quality improvement transformation in most places. Serious thought and planning are needed before starting. Commitment must start in the highest levels is the organization. Buy-in at each level must be earned, worked and appreciated before proceeding to the next level.

13. "We installed quality control." The quality control is a way of life. It is a daily diet. You don't install it you become it.

14. The unmanned computer is one of the dangers of wholesale computerization of maintenance. The computer is a great tool that like any great tool is frequently misapplied. Allow the people to have their say and make sure the computer answers to someone (a real person) and they can overrule the machine.

15. The supposition that it is only necessary to meet specifications. Many of the important aspects of a component are not included in the specifications. You never know which attributes are important until you try changing vendors and find out that your entire process depends on qualities of a particular vendor's products that are not covered by the specifications.

16. The fallacy of zero defects. Every system produces defects. Ultra high quality requires enormous sample universes to establish the defect rate.

17. Inadequate testing of prototypes. By starting manufacturing on inadequately tested prototypes we strain the system of improvements. There will be so much ground to cover before everything stabilizes that the product will be half baked for a long time. To leapfrog this phase exhaustive testing should be built in.

18. "Anyone that comes to try to help us must understand all about our business." The sad truth is that if the solution to your problem was commonly known in your industry you would probably know what to do.

Executive Summary

Quality control is difficult to define in maintenance. The customary definition in production is quality is to consistently produce parts with minimal variation. Maintenance quality generally handles the consequences of the repair not the repair itself. Maintenance quality might be reduced downtime, reduced scrap, quicker start-up, faster response, no repeat repairs, no interruptions and satisfied user. Ensure there is consistent improvement of the product and services in an attempt to remain competitive, remember that quality comes from skilled person with good tools and adequate material as well as sufficient time to complete the task. A few obstacles might be emphasis on short term profit, thinking only about near future, etc.

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