Low Cost Approach to Manufacturing Problem Solving

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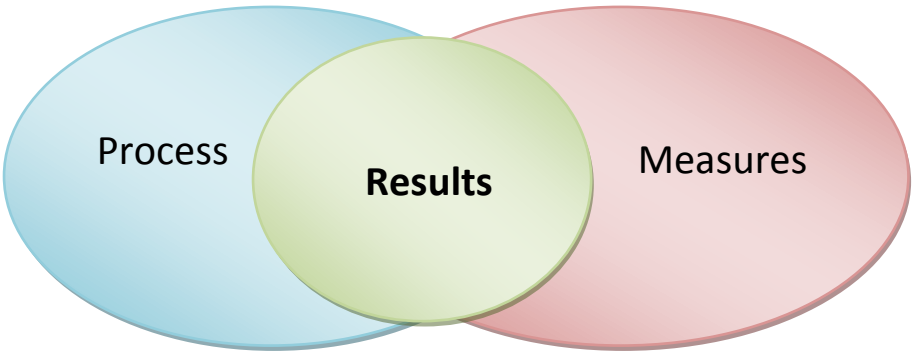
Abstract

For today's organization, much like the past, successful problem solving translates into enhanced productivity and increased profit. The more efficiently, effectively, and quickly problems get resolved the greater the propensity for improved product quality, enhanced production capabilities, and realization of fewer dollars lost or wasted.
Achieving successful problem resolution has remained an important endeavour in manufacturing for decades. In production inline fluctuations, uncertain defects of mechanical failure, etc. were the common disruptive issues solved with deliberate functions but on working problems like Product Defect and Process Defect is the case of quality inspection which were rapidly involving more investment as the complexity of manufacturing process get increases. But this inspection can be carried out in more precise way primarily except investing and utilising the highly equipped technology for minor requirements. This strategic cycle helps to procure the cause and depth problem temporarily on countermeasures with a low cost approach. The use of highly equipped technology is the part of dominant need of further investigation and inspection of defect but at most primarily the low cost approach for solving the manufacturing defect is the best methodology of working. This cycle is centred to the skills and phase of accuracy of the worker, which is certainly the best possible criteria of approach and thus only cost calibre, is the skilled and well trained worker, who also called as problem solver.

Manufacturing Problem Solver

Successful problem solvers recognize the value of structurally controlled problem-solving methods to promote discipline of processes and increase the productivity. Problems must first be defined before an investigation of the causes can begin. Calibrating and implementing the solutions are the next phases of the process. Naturally, self describing the problem accurately and communicating the problem clearly to the defined measures is critical in successful problem solving methodology but practice and skill of accuracy emphasis it perfectly. The key to efficient and successful problem resolution is approaching the process with a systematic and logical methodology and accomplishing this through positive interpersonal interaction. This paper proposed a results-oriented approach to problem solving a straightforward and impactful model as follows:



The Application of Tri-Pin, Process-Measures-Results

- Detect the problems in Manufacturing
- Maintain the quality Assurance of Product
- Reduce the unnecessary cost of highly equipped inspection

Process is accordingly sustain through the defined measures of appropriate and efficient working strategies and the desire output as increased productivity results through it. So adhering to the standardized measures the improved results can be obtain from the sophisticated and well deliberate process. As this tri-pin is applicable to bring out desired results it also used as an inspection tool. The spruce contact of processes with the measures and standards always helps to inspect the functions and working of the processes, and thus the probable disruptions and defects easily detected. Likewise; continues accordance of Measures and Standards to the manufacturing process on account of every newly produced product enormously increases the quality assurance and reduce future large investment in highly advanced inspection technocrat. In so far Process and Measures plays a vital role in manufacturing problem solving, results that obtain also contribute a important factor as feedback at every level of process check, product check, quality check, flow check, etc. and hence the cycle cannot regulate properly without considering the outputs or results at large. Thus this tri-pin conducts the three major purpose (as mentioned in application) of Productive Maintenance in manufacturing industries and adds value on test bench.

Next is the customer

In every Mechanical Industry mainly in Manufacturing and Processing Industry the final product gone through the various sub workplaces or a process counters, where the final product is manifested in various parts and continued to the finalization and perfection over the production line. All work is a series of processes, and each process has its supplier as well as its customer. A material or piece of information provided by a process A (Supplier) is worked on and improved in process B and then sent on to process C. The next process should always be regarded as a customer. This Axiom-the next process is the customer-refers to two types of Customers: internal (within the company) and External (Out in the Market).

Most people working in an organization deal with internal customer. This realization should lead to commitment never to pass on defective parts or inaccurate pieces of information to those in the next process. This axiom regulates the trend within a workshop to obtain precise products at each level of sub workings or sub part manufacturing, and thus the accuracy and preciseness regulated through the production line from planning of product to the actual product in inventory which bounded to the perfection. When everybody in the organization practices this axiom, the external customer the market receives a high quality product or a service as result. While concentrating on a process series functions within the company or industry the external customer i.e. the receiver out in the market automatically move toward the satisfaction and quality assurance of the product. A real quality assurance systems means that everybody in the organization subscribes to and practices this axiom.

Process Check Analyse Act (PCAA)

When in the organization internal customer axiom recruits; the ***Process Check Analyse Act*** subsequently must be practiced. It's a four step cycle, primarily based on the temporary countermeasures.

Process

Process must be in flow and small disruption must be calculated and resolve by the worker himself. Process must be well regulated and rapidity of checking the process must do after the one forth regulation of 1 cycle. If in a batch there are 100 products, process must be checked after 25 products. This ratio apparently depends on several aspects like inline fluctuations, waste formation, take timing of product. According to the bulge of process the ratio must be checked and this can be decided virtually looking to the need of Man and Machine. For example: while working on a particular machine if the waste is saturating on a conveyer or on the belt of engine then the speed of machine-working get disrupted and productivity reduces, thus this disruption must easily get noticed by the worker and waste must be removed by simple leg-shake or any kind of stroke to that belt i.e. this quite simple problem must get solved by fine *Process Check* rather than certainly facing the machine stop and high technical problem solving decisions like production line stop.

Check

As the process is well regulated and most perfect in one batch after regular *Process Check*; every product must go under the '*Improve by Comparing*' strategy. Which on certain compares the produced product to the previously produced product by simply holding it in your hand, touching it, feeling the subsequently generated properties of material like heated surface, texture etc, closely examining it, looking to the appearance. This inspection can be taken through different measures like Texture of produced product, heat generated on machining surface, colour of the product after production, etc. These measures also called as '*On Day Standards*'. These standards may be change batch-wise or working day-wise or worker-wise, so these are not the fix measures and standards but definitely establish the immense similarity on instant working processes in group. This is the concept rise through the group technology. And this inspection method also called as '*Reverse Check*'. And only worker can fully utilise it on opt of precise working. This is the low cost approach to maintain the quality of product while working. But the major disruption in assembly line can create the bottleneck and continues production of defective pieces can occur. To avoid this; temporary countermeasure must be elevated to certain sophisticated calibrations like checking by '*Comparing to Main Prototype*'. Comparing to Main Prototype strategy can be utilise as Process Check in a certain ratio by calibrating relevance of procuring product to the desire one. This is instant tests practice in which there is no need of highly equipped technology. For Example: if the procured product found to have certain different material surface properties than the 'On day Standard' of previously all produced product the next low cost approach must be taken to have comparison with the main prototype available with the worker.

Analyse

The Process Check and '*Continues Reverse Product Check'* collectively bring the desire product as output. But if in case the uncertain disruption occurred in manufacturing or in dimensions or in machining the suspected product must came to '*Sight Lock*'. Sight Lock is the strategy to '*Quantify the Gap*' and analyse the defect. It also called as detecting Gembutsu (in Japanese means something Physical or tangible). In this method the suspected piece is taken in consideration and bring apart from inventory. While working on another part the defective product is analyse simultaneously on an exact where it has gone defective and make concentration on the present product on machine with exact timing and process where the defective product go wrong in manufacturing. In sight lock it may happen that the defective part had gone wrong at very first step of manufacturing process but this must be recognise the machine and measure holder himself. Likewise the phase of accuracy and perfection must be developed in worker through training. Except manufacturing defects dimensional defect and process disruption can cause the defective product. But according to discussed strategy of Next is the Customer and Process Check; manufacturing defect and process disruption will never be occurred.

Act

After this fine analysis the defect get recognise if any. If the procured defect in previous product seems to rising in present product on machine also, process must be stop and one more sight lock must be done on about two defective products i.e. one in hand and one on machine. Now the sophisticated inspection must be carried out and exact cause of defect must be overcome. After using the strategies like *Next is Customer* and *Process Check* most probable reason of defect will be the machining defects, irregular work motion, inline fluctuation, worker's own strategic irregularities, etc which can inspected and overcome on instant. For more complex reasons the problem can be move to more elegant problem solving strategy involving Highly Equipped Technology. On other hand if defect does not rise in the product on machine. The process must be continued. And sight lock for defect must be done on next even and odd turn from the defective product to ensures that process and methods are not going wrong.

To develop Low Cost Approach of Manufacturing Problem Solving

This low cost approach for the manufacturing problem solving on actual working floor is systematically arranged for the primary solution manifestation in productions however the intensity of strategic precautions and use of highly maintained technology is a safer part. But Decision making skill and supervision accuracy always conducted by the worker always plays a major vital role in manufacturing. The strategy elaborated in the paper is oriented to the workers skill, knowledge and experience. So the only cost approach for the implication of it is a skilled worker and correspondent Industrial Trainings. The manufacturing problem solving through industrial training model was developed during a time when the environment within which work was performed was static and when workers were responsible for only small, routine job tasks, consistent with the scientific management approach to work. Problems encountered on the job were solved by supervision and were most often well-structured and predictable. The current manufacturing environment, however, is quite the opposite. The environment in which work is currently performed is dynamic and complex, with tasks which are relatively unstructured and undefined and that involve novel and changing demands. In fact, many of today's manufacturing jobs require complex cognitive skills to deal with more highly technical and sophisticated manufacturing and customer service systems as well as the interpersonal skills necessary to function effectively in work teams.

The historic conclusions suggests that linear problem solving models fail to account for everyday problem solving because they are ill-suited to the dynamic and generally chaotic conditions of the workplace. Current research supports problem solving as a situational and context-bound process that depends on the deep structures of knowledge and experience. Open skills, such as problem solving and decision-making may proceed through the use of contextual cues that interface with tacit knowledge rather than through the systematic application of explicit steps in the problem solving stage models. Such a training models and working session must be carried out with the implicit regular working training to the labours and workers. Experience breeds the worker more mature at strategic level and on accuracy quotient. This low cost approach contributes tremendously in productive rate of the manufacturing floor or service consultancy desk.

Conclusion

All told, manufacturing floors should strive to develop a comprehensive problem-solving and implementation strategy that increases the speed and likelihood of resolution and allows everyone within the organization to assume successful problem- solving responsibilities.

Where on a scenario; the world is moving to full automation, the sustainability of Man (worker) working must be develop in manufacturing industry through the strategic measures explained in this paper. Basically the workers must be trained and made flexible to the change and problem confront by the methodologies explain here. Work Experience and strategic functioning add value to the Man working in manufacturing Industry. And it's that open to the world that man working is always a better choice than machine working at strategy usage level and problem solving level.

These problem-solving strategies should be balanced and flexible and include multiple structured method options so as to increase effectiveness and speed to resolution. This only can be possible with the maximum usage of strategies and increasing experience gain in accuracy and perfection. Effective problem solvers appreciate the importance of having organized approaches for problem solving. Orderly methods contribute positively to efficient and timely problem resolution and increase the odds of a successful implementation.

Equally important as having a set process empowered and inspired Standards and measures are critical to problem-solving success. Without positive inter-personal interaction, problem-solving is usually fruitless. Together, high-performing measures and an effective process combine to create a problem- solving environment that produces results prefect and spruce as desired.

References:

1. Roth 1997
2. Ford 1998
3. Brockman Case Study 2006
4. Achieve Globe Case Study 2008
5. Kaizen by Masaaki Imai