

Theory Of Constraint At An Industry

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Abstract- *the Theory of Constraints is a methodology for identifying the most important limiting factor (i.e. constraint) that stands in the way of achieving a goal and then systematically improving that constraint until it is no longer the limiting factor. In manufacturing, the constraint is often referred to as a bottleneck.*

The Theory of Constraints takes a scientific approach to improvement. It hypothesizes that every complex system, including manufacturing processes, consists of multiple linked activities, one of which acts as a constraint upon the entire system (i.e. the constraint activity is the “weakest link in the chain”).

Keywords- Theory of Constrains, bottleneck solutions, TQM, Weakest link.

I. INTRODUCTION

Theory of Constraints (TOC) is a management philosophy which is focused on the weakest ring(s) in the chain to improve the performance of systems. ... Since the TOC first put forth by Goldratt (1984) in his novel *The Goal*, the theory has drawn wide attention from practitioners and academic researchers. Goldratt, who [died](#) in 2011, wanted a theory that focused on resource flow in a process and overcoming the constraints that impede it. In this regard, it resembles the idea of [continuous flow](#) that is the goal of Lean practitioners. It means a process that flows continuously and does not stop adding value to the product and the customer. In the final year of ME I started my project at Laxmi Foundry task given from them to find a bottleneck solutions of their problems so I went with TOC.

1. Identify the bottleneck. Is it a pebble or a boulder?
2. Exploit the bottleneck. This means that we make quick changes (e.g., remove the rock from the water bottle).
3. Subordinate. We'll see this with a later example, but at this step you shift other people/resources around to support removing the bottleneck.
4. Elevate. If you are still stuck, figure out what else can be done. You might need to get a vacuum and suck out the leaves from the bottle!

5. Repeat! This is a continuous process; true quality/production improvement is never done.

II. PROBLEM DEFINITION

In many production process, the cutting tool is subject to wear and random shocks. If adjustments are not made during a longer production period, the risk of tool failure increases and the quality of the product decreases, resulting in a large proportion of nonconforming items. The problem often faced is the breakage of tool during cutting, which if not detected in the time may lead to various problems associated with spoiled jobs, particularly in unmanned machining shifts. Hence it is necessary to have systems which can detect the breakage of tools through some means resulting in smooth functioning of tool which ultimately reduces the lead time of the component ultimately the production in a given time of the component ultimately the production in a given time is less so this forces us to study various techniques which involves some techniques of TOC.

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III. RESERCH OBJECTIVES.

1. The main purpose of the study is to improvement in productivity by implementing techniques used in TOC.
2. Study and develop a tool monitoring system software that the streamlines the machining process by reducing the number of process interruptions created by tool wear.

IV. METHODOLOGY ADOPTED

Considering the literatures available in TOC and tool monitoring we talk about of any growing manufacturing industry like Laxmi which is sponsored industry for this product, productivity improvement is the main task for the researchers so we have proposed a suitable methodology. It is the specific approach for an improvement.

V. IMPORTANCE OF THESIS

TOC is not a panacea, not a recipe, but it is a Philosophy that helps lead to success. The core concept of TOC is that every process has a single constraint and that total process throughput can only be improved. A very important corollary to this is that spending time optimizing non-constraints will not provide significant benefits. Only improvements to the constrain will further the Goal.

VI. LITREATURE SURVEY

In this project it is important to find out solutions for industrial problems with the help of literature. As this is industrial project and there is very less scope of changes in practical, also experimentation and changes established production units is not feasible. So that study of literature has been done to show the evidences and proofs of experiments done in the past to enhance productivity as well as to complete the project.

- **Robert G. Landers:**

Have presented the major techniques for monitoring and controlling the phenomena arising from the interaction of the cutting tool and the work piece in machining operations

- **Cornelius Schaffer;**

He investigated the use of vibration and strain measurements on machine tools in order to identify the propagating wear of the selected tools.

- **Jari Rep;**

Suggested that, condition monitoring system may utilize information from several sources to facilitate the detection of instabilities in the machining process.

- **Tunde Isaac Ogedengbe, et.al;**

This study revived existing studies in the area of tool condition monitoring. The review revealed the substantial amount of works that have done in the area of tool condition monitoring.

- **A review of Goldratt's:**

Lessons from the international literature the two authors are finalizing the first comprehensive bibliography on TOC. Which is to be published by North river Press.

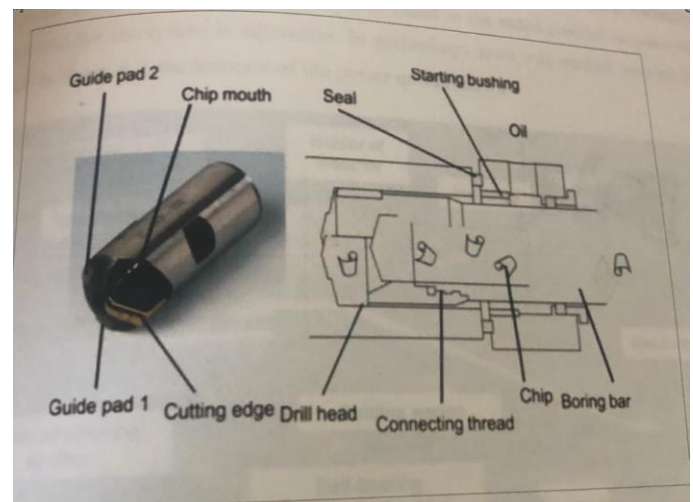
VIII. THINKING PROCESS

The thinking processes are used to answer the following three questions, which are essential to TOC.

1. What needs to be changed?
2. What should it be changed to?
3. What actions will cause the change?

IX. NEW METHOD FOR REDUCING THE HOLE STAIGHTNESS DEVIATION IN DEEP HOLE DRILLING

Deephole drill tool is characterized by an asymmetrical arrangement of the cutting edge. The principle of operation of a drilling process of deep holes OLT is further characterized by an external cooling of lubricant produced by the annular space between the bore and the borehole bar. For a process of drilling of the coolant supply lubricant indispensable on the one hand for the lubrication of slide shoes, and on the other hand for reliable removal of chips .during the resulting radial force composed drilling process are carried out by cutting force F_C and passive force F_p with slide shoes through with a self-guiding effect of the deep drilling tool. The operating principle is given below in Fig.



As regards the machine parts which have a prismatic shape or bores arranged eccentrically, the procedure of this processing is an exclusive rotary tool with a non-rotating part. It is also well known in the literature end in commercial practice several devices have therefore been developed to the hole straightness deviation .These devices are often based on mechanical and reduce the influence of the deep tool .A new method was developed to influence the machining institute of technology is based on a thermally using an external inductive converter.

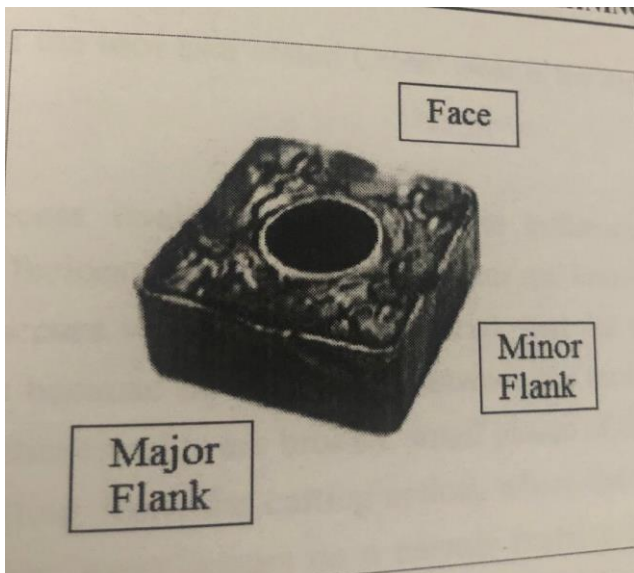
X. RESULTS AND DISCUSSION

As mentioned in previous topic, this is an industrial project. Problems for laxmi pumps is taken for study .As there all are related to different process, Results and analysis of each and every objectives.

Image Processing For Tool Wear Monitoring.

Kurdaet designed a machine vision system that can measure flank wear. They were using image threshold to bring out wear area. We suggested them to used monochrome CCD CAMERA to capture images from tool nose. Ethos included edge operators,texture information and fractal properties of the image were tested to compare their results in extracting the wear information from the tool.

The system was not implemented to be used in cycle, since the tool had to be removed from the tool holder. The aim of this study is to design an image processing tool to determine the amount of wear accumulated on single point cutting tool after successive machining operations. The tool wear was estimated by comparing the grey scale of images. The processing & analysis of the acquired image have been done using the METALB software. Cutting Tool Wear and Measurement of Tool Wear .The word “single point” refers to the fact that the tool cuts the material with a single point.



Above Figure depicts a cutting tool. However, the ordering of the sides is dependent on the application. Major flank is the cutting edge, while minor flank faces the newly cut surface and the face receives the material being cut and forms chips.

The type of cutting tool presented in above figure. It has four unusable cutting edges.

Tool Wear:

The change of shape of the tool from its original shape, during cutting, resulting from the gradual loss of tool material or deformation.

Tool Wear Measure:

A dimension is to be measured to indicate the amount of tool wear.

Tool-Life Criterion:

A predetermined threshold value of a tool wear measure or the occurrence of a phenomenon.

For that we have suggested to use them Image processing

Sr no.	Tool No	Reference image gray value	Wear tool gray Value	Wear measurement	Wear value for one pixel
1	TN1	78.94	74.68	0.06	82.7
2	TN2	78.94	73.84	0.07	82.59
3	TN3	78.94	72.23	0.99	71.88
4	TN4	78.94	71.49	0.115	66.31
5	TN5	78.94	71.02	0.124	66.02
6	TN6	78.94	70.67	0.131	63.87

Images by Images Processing:

Table is Mentioned Above:

XI. CONCLUSION

In this project as mentioned, it is important to give some methodologies of TOC to company to improve productivity. After also discussion with industrial mentor, suggestions were suggested for solving the given problems of the industry:

1. Full TOC techniques were studied in this study and suitable theories like bottleneck theories are suggested to improved productivity of CNC production line.
2. Tool wear and tool monitoring is another issue for the industry. Image processing is the way which is suggested to them for prediction of tool life. Also some simulation work has been done to correlate the tool life with actual.
3. As tool life monitoring is also an issue a softwear is developed for industry on the basis of a predicted life cycle of tool by simulation as well as image processing. This Softwear can be connected to the start button of the machine. This will measure toll change, number of operations done by tool and many more.
4. It was handed over to industry for tool monitoring.

XII. FUTURE SCOPE

TOC is a wide area of a study so that is suggested to an industry. If it is used in day to day practice they can reduce energy as well as time and productivity will get increased

—acknowledgmentl in American English is without an —el after the —g.l Use the singular heading even if you have many acknowledgments.

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