Lead Time Reduction In Press Tool

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Abstract- *One of the major unit in Brakes India is tool room, here huge size of jigs, fixtures and press tools are manufactured, this is the master pattern for producing the brakes component if it delay means production will be logging in other department so we concentrate to reduce the production time of press tools. In today's business climate, the old adage "time is money" has been expanded to mean that time is competitive weapon. Today customer's demands are quick delivery and good quality at reasonable price. Thus to perform in a global market, short lead times are essential to provide customer satisfaction. Lead time in manufacturer point of view is the time elapse between placing of an order and the actually receipt of goods ordered. There are various components of lead time such as setup time, process time, move time and waiting time. This project deals with review of various tools and techniques to reduce lead time. Method study techniques use to examine current way of work and develop effective method base on elimination, combining, changing and simplification of activities. Various lean tools such as ABC Analysis, PERT Analysis, CPM Analysis .Also Manufacturing Resource Planning (MRPII), Theory of Constraints (TOC) classic approaches of Production Planning and Control (PPC) are use to reduce Work in Process (WIP) and flow time.*

I. INTRODUCTION

In today's world of rapid flux, organizations change their focus on speed. Customers, in today's competitive environment demand shorter lead time, low cost, high quality & highly customize product. The customer is king of today market. Hence to compete effectively short lead times are essential to provide customer satisfaction. Lead time is the time elapse between placing of an order and the actually receipt of goods ordered. Most manufacturing firms spend 5% to 30% of total time actually adding value to the product. The rest of the time is waste. So, there is vast opportunity to reduce lead time. Lead time reduction is the significant productivity improvement driver. Lead time reduction does not mean working harder, faster or with reduced quality, but it means working smarter. Reduce cycle time environments actually produce better quality.

1.1 LEAD TIME

Lead time is equal to sum of the processing time, setup, move, queue, wait-in-batch, wait-to-batch, and wait-to-match times. Because queue, wait-in-batch, wait-to-batch, and wait-to-match times all involves waiting, they are collectively referred as waiting time. This is formula for lead time calculation. Waiting time is usually largest of the four components, accounting for as much as 90% of manufacturing lead time in some system.

Lead Time = Setup Time + Processing Time + Move Time + WaitingTime

1.2 SETUP TIME

Setup time is defined as the minimum amount of time before the clock's active edge by which the data must be stable for it to be latched correctly. Any violation in this required time causes incorrect data to be captured and is known as a setup violation.

Setting time is the time required for stiffening of cement paste to a defined consistency. Indirectly related to the initial chemical reaction of cement with water to form aluminium-silicate compound. Initial setting time is the time when the paste starts losing its plasticity.

1.3 PROCESSING TIME

Processing times tell you how long you can expect it will take us to process an application under normal circumstances. A processing time starts the day we receive an application and ends when we make a decision.

If you apply by mail, the time starts when your application arrives in our mailroom. If you apply online or in-person, it starts when you submit your application.

1.4 MOVE TIME

Move time is the time during which materials or works-in-process are moved from one workstation to another. Queue time is the period of time during which the product awaits transfer to a workstation, undergoes further inspection and subsequent manufacturing processes.

1.5 WAITING TIME

Waiting time is the time interval for which one has to wait after placing a request for an action or service and before the action/service actually occurs. In operations, it is the time between the actual processes. The main aim of a company is to minimize the waiting time between the processes.

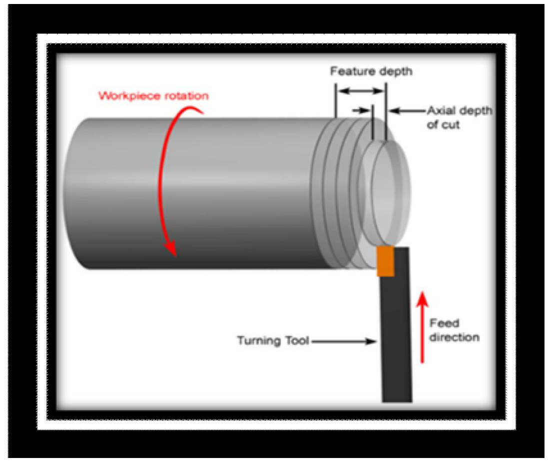
II. TOOL ROOM

A Tool Room is a facility where people make, store, repair tools and machining equipment. It can vary in scope from a storage shed on a worksite to a large facility inside a company for making equipment the factory will use on its production line. In location where these produce and fix tools in the tool room, they may need special training in topics like manual working, machining, equipment manufacture. On the lower end of the scale, a tool room provide a place for people to store tools and make basic repairs to tools that need increasing before people can use them again. It will include racks, shelves and drawers to fit tools along with a workbench where people can work on their equipment. Typically the tool room has the stocks of lubrication and basic suppliers for working on tools. A highly skilled person may be to handle all repairs, while others may need to send complex their problems out for specialty work.

2.1 TURNING

Turning is a machining process in which a cutting tool, typically a non-rotary tool bit, describes a helix toolpath by moving more or less linearly while the workpiece rotates. Usually the term “turning” is reserved for the generation of external surfaces by this cutting action, whereas this same essential cutting action when applied to internal surfaces (holes, of one kind or another) is called “boring”.

Thus the phrase “turning and boring” categorizes the larger family of processes known as lathing. The cutting of faces on the workpiece, whether with a turning or boring tool, is called “facing”, and may be lumped into either categoryas asubset.



2.2 BORING

Machining operation performed on the inside of a hollow work piece of in a hole made previously by drilling or other processes. Deflection of the boring bar can cause dimensional inaccuracy. High stiffness of the boring bar minimizes deflection, vibration and chatter (such as tungsten carbide material or built-in damping devices).

In machining, boring is the process of enlarging a hole that has already been drilled (or cast) by means of a single-point cutting tool (or of a boring head containing several such tools), such as in boring a gun barrel or an engine cylinder. Boring is used to achieve greater accuracy of the diameter of a hole, and can be used to cut a tapered hole. Boring can be viewed as the internal-diameter counterpart to turning, which cuts external diameters.

2.3 DILLING

Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotary cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute.Creating a hole in a work piece by mounting a drill bit on the tailstock. The most accurate holes are produced by centring, drilling, boring and them reaming as well as possibly honing or grinding to improve internal surface and deburring the tool exit surface of through holes. Gangdrilling produces multiple holes at once.

2.4 MILLING

Milling is the process of machining using rotary cutters to remove material by advancing a cutter into a work piece. This may be done varying direction on one or several axes, cutter head speed, and pressure.

A rotating multi tooth cutter remove material and produces multiple chips in a single revolution. CNC machining centres can perform multiple operation in single setup.In slab or peripheral, milling the axis of cutter rotation in parallel to the work piece surface being machined.Cutters may have straight or helical teeth, resulting in orthogonal or oblique cutting action, respectively (helical teeth lower tooth load, tool forces, chatter).

In conventional (up milling) the maximum chip thickness is at the end of the cut, so tooth engagement does not depend upon work piece surface quality or scaling, but clamping forces must be higher and chatter is harder to avoid.In climb (down milling) the cut starts with the maximum chip thickness but high impact forces can be a problem.

2.5 TAPPING

Produces internal screw threads in previously drilled or reamed holes. A tap has two (most commonly), three or four cutting teeth (flutes). Taps are usually made of carbon steel (light duty) or high-speed steels (heavy production).
30-40% of machining operation in automotive manufacturing involves tapping holes, chip removal and coolant delivery are important issues. Drilling and tapping with a single specialized tool is called draping.

2.6 LATHE

A lathe is a tool that rotates the work piece on its axis to perform various operation such as cutting, sanding, knurling, drilling or deformation, facing, turning, with tools that are applied to the work piece to create an object with symmetry about an axis of rotation.

2.7 JIG GRINDING

Jig grinder is a machine tool used for grinding complex shapes and holes where the highest degrees of accuracy and finish are required.

The jig grinder is very similar to a jig borer, in that the table positioning and spindles are very accurate (far more so than a manual milling machine or lathe). It is almost exclusively used by tool and die makers in the creation of jigs or mating holes and pegs on dies. The machine operates by a high speed air spindle rotating a grinding bit. The air spindles are removable and interchangeable to achieve varying surface speeds. Some spindled are fixed speed (60000 rpm), other are adjustable (30000-50000 rpm), and still others are very high speed (175000 rpm).

2.8 JIG BORING

The jig borer is a type of machine tool inverted at the end of world war I to make possible the quick-yet-very-precise location of hole centres.

Although capable of light milling, a jig borer is more suited to highly accurate drilling, boring and reaming, where the quill or headstock does not see the significant side loading as it wound with mill work.The result is a machine designed more for location accuracy than heavy material removal.

III. SAMPLE CALCULATION

DETAIL : DIESET (MS)

MACHINING OPERATION

- Lathe operations
  1. Facing
  2. Turning
- Drilling
- Surface grinding

MILD STEEL PROPERTIES

Carbon steel are steels with carbon content up to 2.1% by weight. American Iron and Steel Institute (AISI) definition of carbon steel states:

Steel is considered to be carbon steel when no minimum content is specified or required for chromium, cobalt, molybdenum, nickel, titanium, tungsten, vanadium or zirconium, or any other element to be added to obtain a desired alloying effect.

The specified minimum for copper does not exceed 0.40 percent or the maximum content specified for any of the following elements does not exceed the percentages noted: Manganese 1.65, Silicon 0.60, Copper 0.60.

The term "Carbon Steel " may also be used in reference to steel which is not stainless steel in this use carbon steel may include alloys steels.

As the carbon percentage content rises, steel has the ability to become harder and stronger through heat treating; however, it becomes less ductile. Regardless of the heat treatment, a higher carbon content reduces weld ability. In carbon steels, the higher carbon content lowers the melting point.

DIESET MODIFICATIONS (MS)

TOP DIESET

1.Drilling(10mm=1min)
T=ϕ65 x 65 = 32 min x 2 holes
= 64 min
= 1 hr 4 min

2.Tapping (M10 x 25)T= M10 x 25 = 24 min x 4 holes
= 96 min
= 1 hr 36 min

3. Reaming (ϕ12 x 65 mm)
T=ϕ12x65 = 21 min x 2 holes
= 42min

BOTTOM DIESET

1.Drilling(@35*65mm)
T=ϕ35*65mm = 26min x 8 holes
=208min
= 3hr 28min

Total time required = setting time + cleaning time + machining time + work measurement + unloading and cleaning + inspection time

= 5+5+(64+96+42+208)+5+5+5
= 435min
= 7 hrs 20 min

IV. TIME REDUCTION

Actual time taken for die set = 9hrs 25 min in our tool room, normal cutting speed and depth of cut, speed are depends upon the material.

Depth of cut will be increased so the number passes count will be increased this is not affect the overall material. This time reduction, for that material overall operation.

V. CONCLUSION

Former the process is done for during of 20 days by ABC and Process Evaluation Review Technique (PERT) analysis. We have reduced the duration for 18 days including machining time and component purchasing time. As a result of ABC and PERT analysis the time period of has been successfully reduced. By increasing the speed(rpm), feed we can reduce the time but still it is very small value for a single machine but overall it is considerable value. By increasing the speed, feed and depth cut are damaged to the material but small amount will be increased that is not affect the material.

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