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Review on Chamfering Machine Operations

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Abstract - Generally for gear manufacturing we used chamfering machines but still we are using manually operated chamfering machines and for every operation we have to do all the setups by human interference. This manual interference is more time consuming and have more chances of physical injuries to the human working nearby to it. The main aim of this paper to study all the possible solutions for converting manual operated chamfering machines to automated chamfering machine, increase productivity of them and reduces human interference while operating of the machines.

In this paper various previously used method of operation of chamfering machine are discussed. Analysis has is done considering various previously used techniques and find out one new method that will helpful for the operation of chamfering machine by using hydraulic systems.

Keywords- Chamfering machines, hydraulic systems.

INTRODUCTION

The Manually operated Chamfering Machine is used for gear tooth chamfering. The Manually operated Chamfering Machine concept has the following features as we can see in below figures also.

- Fixturing devices provided with rotary motion and cutting toll to perform chamfering operation i.e. Gear is fitted manually by means of bolts, which carry out required further processes.
- All stations along the line operate non-synchronously, independently of each other.

Fig 1 – Manually operated Chamfering Machine

Fig 1 shows how gear plate has been fixed with fixture or we can say base by using bolts and L & N keys. Here all operations are performed by humans and not automated operations are there.

Fig 2 – Manually operated Chamfering Machine

In fig 2 we can see that once gear is clap on the base by using bolts and tighten by using L & N key, gear chamfer start its operations and chamfering is going on. After complete operation of chamfering we again have to remove this gear plate and take new one and clamp it again by using nut to fixture.

Here in above figures we can see that gear plates has been clamped on jigs & fixture by using some nuts and that nuts will be clamped or tight by L&N keys. The clamping of the wear plate in most of the industries is done manually. They use L-clamps, C-clamps, nut and bolts for the clamping. Even though the clamps are used, some packing materials always require for filling the gap between the clamps and wear plate surface. The size of the bed is fixed but wear plate size may always varies.

BACKGROUND OF IDEAS

Clamping of the gear plate in most of industries is done manually where human interference is there. They use C-clamps, L-clamps, nut and bolts for clamping. Even though clamps are used, the some packing of the materials always require for filling gap between clamps and wear plate surface. The size of bed is keep fixed as the size of wear plate always varies or changing. The bed having less size, there is always needed of some temporary welding or bolting for fixing the clamps. These welded/bolted clamps are removed when the chamferingis over and for these operations one welder or worker is always required for every single chamfering cycle.

Also there is need of operator or worker to remove the particles that are generated after chamfering operations i.e. to clean the work area of chamfering machine.

SOLUTION TO AVOID ABOVE PROBLEMS

Instead of using manually operated chamfering machine can we make some modified chamfering machines to reduce manual interference to lower level and make all the operations that done by human or live things can be automated?

Here we can remove C-Clamp or L-Clamp and nut and bolts for tighten or fixing gear plate with base. Here we can use external force to clamp gear plate instead of clamps or nut & bolts. Considering fig 2 we can put external load or force from upper side of the assembly i.e. upper side of the gear plate as shown in below fig 3.

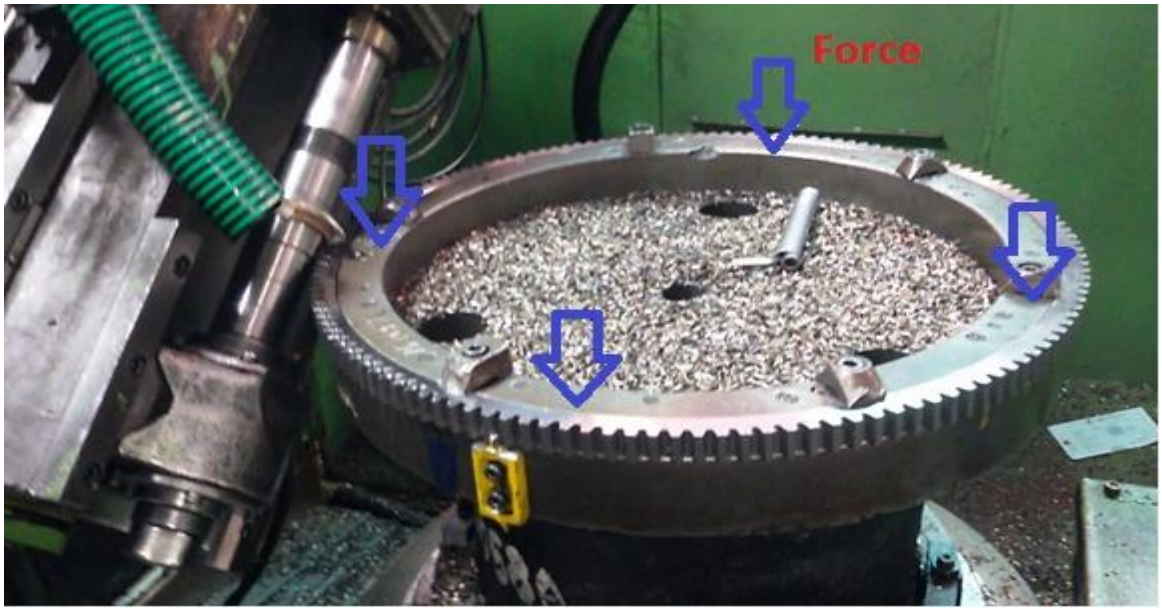

Fig 3 – Possible loading conditions

So by using this force from upper side we can hold the gear plate with fixture. Here the amount of applied force must be greater than the amount of cutting force of the chamfer to zero deviation of the gear plate or we can say gear plate must be steady. We can apply below types of forces on the plate for keeping this plate in steady state -

1. Hydraulic Force by using Hydraulic Pump

2. Pneumatic Force by using Pneumatic Pump

The advantages of such a construction are:

- To increase productivity of existing system.
- Reduces fatigue to operator.
- Reduces cycle time.
- The operator needs to concentrate only on the actual manufacturing task at hand.
- Since stations work independently, every operator or station can operate at its own rhythm.
- Modular construction of the system makes possible highly customized layouts
  Subsequent additions and alterations are also possible.

And we can use Hydraulic system for applying force because of below reasons-

- Pneumatic system is more costly than hydraulic system.
- As oil is used hydraulic system, it absorbs large quantity of heat that generated after operation of the pump.
- Small leakage can be tolerable in case of Hydraulic system where leakage is not tolerable in Pneumatic systems.

CONCLUSION

As discuss in above, nut-bolt or C & L clamps while clamping gear plate for chamfering operations is more time consuming and have large human interference, so to avoid this we can use hydraulic force on the top of the plate in the vertical direction to avoid the bolting arrangements. The amount of the vertical force that we are applying must be greater than the amount of cutting force as we are using this force to holding the gear plates. Here we need to design hydraulic system and its components and will fixed so that we get required force in vertically downward direction.

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