TO REDUCE ENGINE REWORK COST DUE TO GPD TEETH PROFILE

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Abstract:- Efficient transmissions systems are key toproducing competitive motor vehicles that have a smaller environmental impact. Gears are the main components in vehicle transmissions and although they are already highly efficient, there is still room for improvement. In this study, the focus falls on the lubricant used to create separating films between gears and to dissipate heat. When driving, the gears churn this lubricant, giving rise to power losses that are related to the amount and properties of the lubricant. However, any attempt to reduce these losses must not compromise the required lubrication and heat dissipation

Index Term: Effectiveness, gear profile drive, tip relief

INTRODUCTION

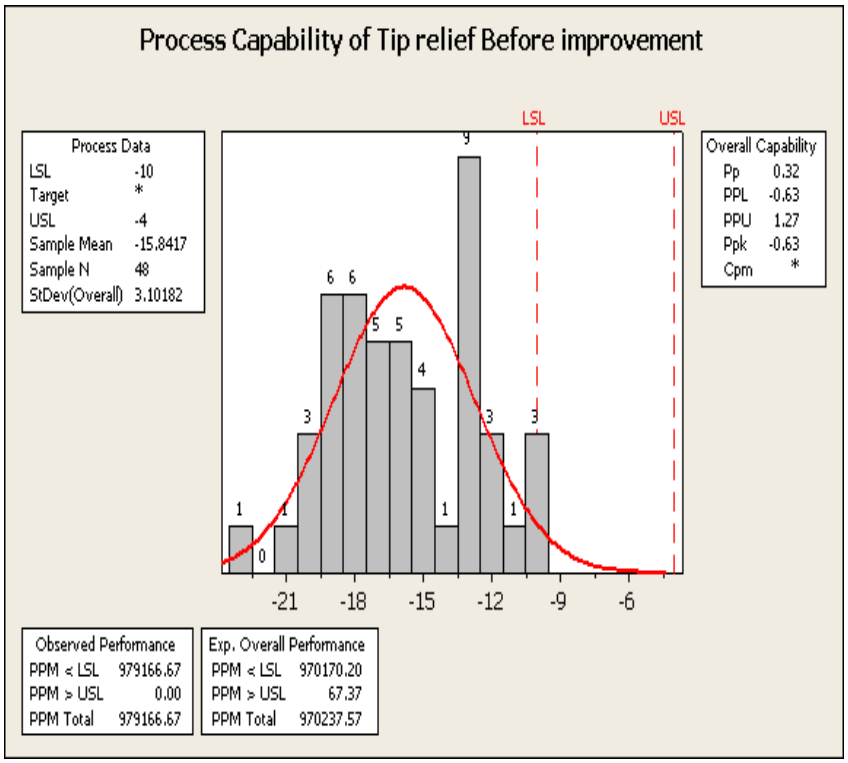
Statement: To reduce the Engine Rework cost by 80% due to

GPD TEETH PROFILE

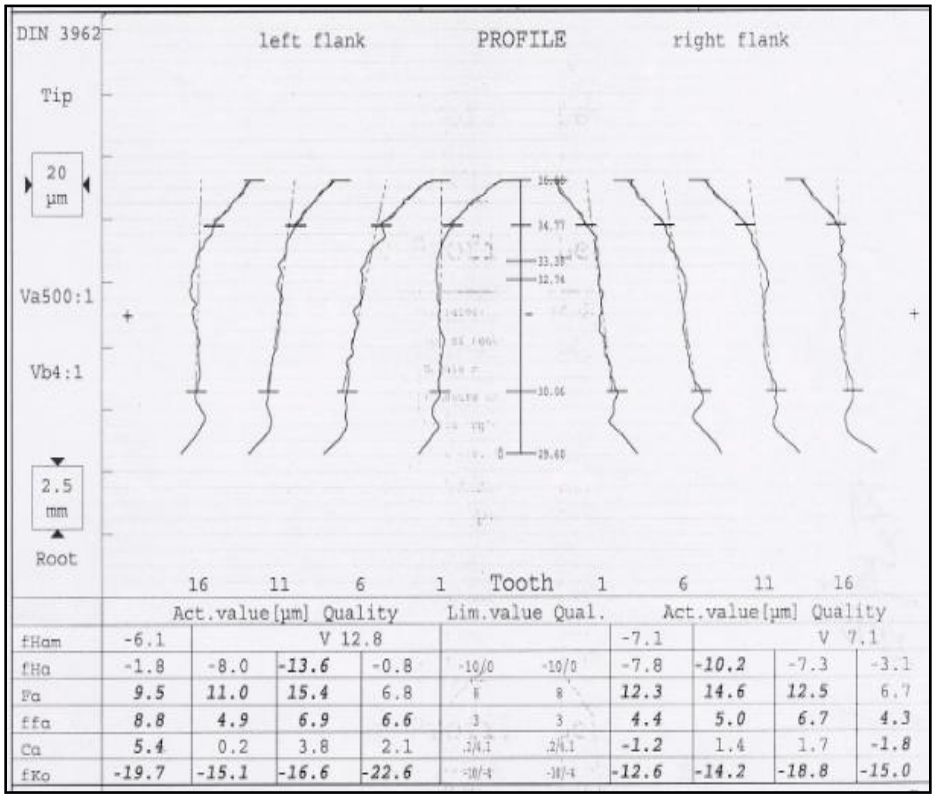
Objective:-To improve Pp/Ppk OF GPD Tip Relief from 0.32/-0.63 to 1.33 by Dec 2017

Gears are toothed members which transmit power motion between two shafts by meshing without any slip. Hence, gear drives are also called positive drives. In any pair of gears, the smaller one is called pinion and the larger one is called gear immaterial of which is driving the other. When pinion is the driver, it results in step down drive in which the output speed decreases and the torque increases. On the other hand, when the gear is the driver, it results in step up drive in which the output speed increases and the torque decreases

PROCESS CAPABILITY OF TOOL PROFILE BEFORE IMPROVEMENT



ACTION PLAN TO OVERCOME COST



RELATED WORK

STUDY OF WORKING MECHANISM OF SHAVING MACHINE

Target setting and countermeasure

1. Reduce the rework cost of engine by using GPD teeth profile variation from 4500 parts per month to 900 parts per month.
2. GPD is gear primary drive primary gear mounted on crankshaft transmit motion to clutch gear there by giving motion to engine.
3. We collect month wise data of engine repair due to GPD teeth profile.
4. After that we study all gear operation and we analyze that we can improve its efficiency by changing shaving tool and heat treatment temperature.
5. After we create a action plan with in the plant and change heat treatment and shaving operation standards values.
6. Change carburization temperature from 880°C to 820.C and and increase soaking time from 20 to 90 minutes
7. Also increase oil quenching time from 40 to 60 minutes on 300 RPM.
8. We see the significant difference in standard deviation of tip relief distortion and tip relief distortion reduced.
9. There is also difference in mean of tip relief distortion after inhouse normalizing and after increasing soaking time
10. After normalizing and changing heat treatment cycle and fixture design change increase soaking time and cutter resharpening at HGL and MATS engine efficiency increased.

Procedure of the experiment

1. Study the milling and shaping operation of gears and we found that there is problem in heat treatment and shaving operation.
2. To reduce the rework of engine caused due to gear primary drive teeth profile variation
3. We found that rework of engine caused by GPD noise problem
4. Change the heat treatment cycle and fixture and also change shaving cutter profile.
5. Also check the GPD normalization but it is not effective
6. Now we going to change carburizing , soaking and oil quenching temperature time and RPM going to be changed
7. We check the graph and take the reading of distortion before and after improvement on different pressure values
8. There is significant improvement in mean of tip relief after cutter resharpening improvements
9. We check the work piece before and after improvement on various conditions than graph of process capability of tip relief is improved
10. Rework quantity of gears in the plant reduce significantely 148 pieces in April 2017 to 19 in January 2018

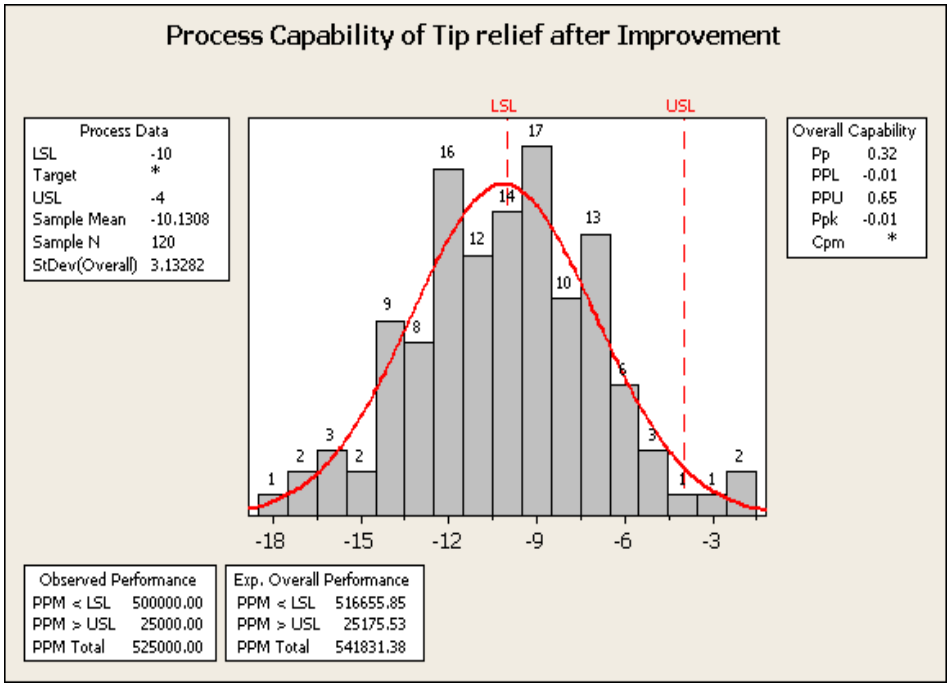
Developing solutions and implementing countermeasure.

Following trials are decided-

Heat treatment cycle has been changed

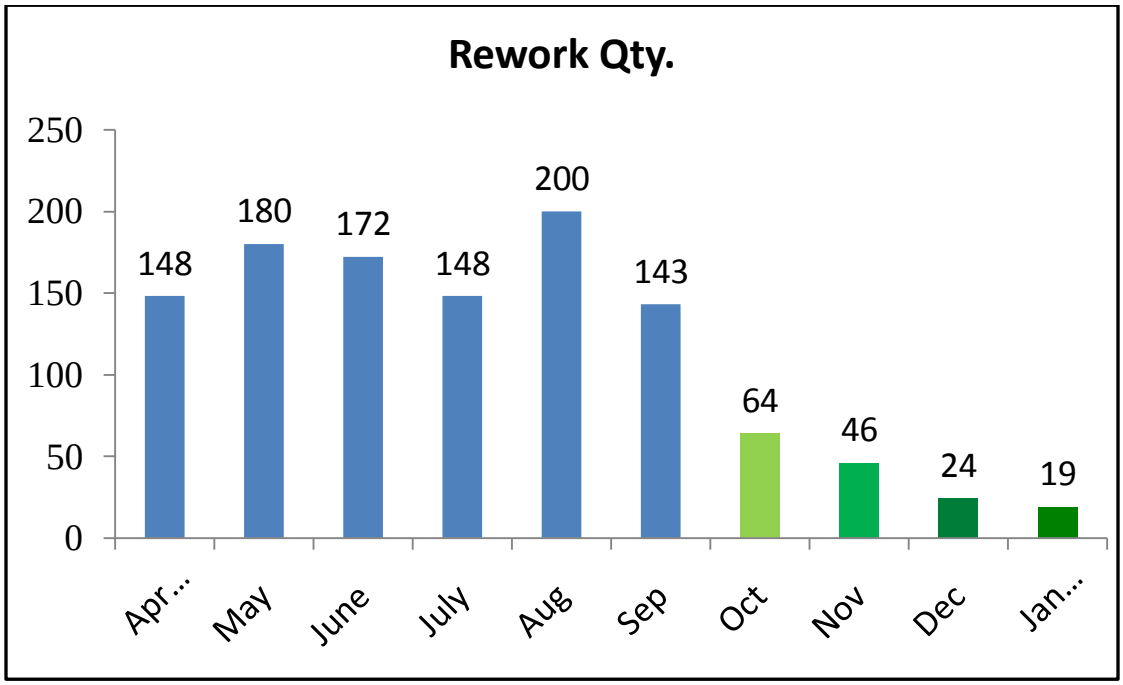
TABLE CHANGES IN THE HEAT TREATMENT CYCLE

Process parameter	Current	Suggested by experts
Enrich temp.	**880**	**900**
Hardening temp.	**830**	**830**
Oil temperature	**95**	**120**
Diffusion temp.	**880**	**900**
Cooling fan rpm	**300**	**250**



DISCUSSION

1. There is significant difference in Mean of tip relief distortion after In house Normalizing & Increase of Soaking Time.
2. After Change Mean of tip relief distortion reduced as per Graph.
3. Reduction in Soaking time is higher than reduction after in house normalizing as visible in graph



CONCLUSION

The finite element method is most widely for find a real model of the geared set using the stress analysis in the pair of gears. The development off finite element analysis model of the spur gear assembly to simulate the contact stress calculation and bending stress calculation is play more significant role in the design of gears. The study is show that Hertz theory is the basis of contact stress calculation and Lewis formula is use for calculating bending stress is a pair of gear. Theoretically result obtained by Lewis formula and hertz equation and result found by comparable with finite element analysis of spur gear

Here for each and every gear operations no difference in standard deviation in tip relief after cutter resharpening improved heat treatment cycle is going to be revised soaking time is improved from 20 minute to 35 minute after changing mean of tip relief distortion is reduced as per graph.

After investigating the effect of load, speed and shaft texture on the bearing the profile pressure has been measured, and then it has been compared with each other in terms of the pressure profile generated. It is also conclude that the Pressure profile of the Gear shaft is also Improve (Increase) using Gear Inner surface texturing.

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