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DEPARTMENT OF MECHANICAL ENGINEERING

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Session 2016 - 2017

CERTIFICATE

This is certify that, the Project entitled **"CONDITION MONITORING OF A SINGLE POINT CUTTING TOOL FOR LATHE MACHINE USING FFT ANALYZER"** is abonafide work done under my guidance and is submitted by **SNEHATAI S. KHANDAIT** to Rashtrasant Tukadoji Maharaj, Nagpur University, Nagpur for the partial fulfillment of requirement for the award of Post-Graduation degree, **Master of Technology (M.Tech.)** in **Mechanical Engineering Design (MED)**.

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ABSTRACT

Machine tool vibration plays a dominant role in the surface finish, dimensional and geometrical tolerances of the machined work piece. Condition of the machines includes collected data, such as vibration analysis, oil and wears debris analysis, ultrasound, temperature and performance evaluation. To improve availability, the system is redesigned for higher reliability and the need for maintenance is minimized. The maintenance is also be carried out in more effective manner, and in a planned way. Finally, some condition indicators are monitored to observe deterioration and detect onset of failures.

Here, an attempt has been made by modeling the lathe using finite element software to find out the response of the structure for defective spindle bearing and unbalance forces. Many Condition Monitoring Techniques are available to monitor the machine tool experimentally. Among these techniques, vibration monitoring is the most widely used technique because most of the failures in the machine tool could be due to increased vibration level. Experiments were carried out on a lathe using the Condition Monitoring instrument to measure vibration severity for different parts of lathe machine.

From the experimental and numerical analysis, it was found that the vibration velocity increases as the spindle speed increases. Also the value of maximum vibration velocity at lathe chuck due to unbalance forces was determined. Condition monitoring of a single point cutting tool using FFT analyzer applied to determine maximum vibration signatures on various parts of lathe machinei.e,Lathe foundation, Bed, Cross slide, Tool post, Chuck.A study performed at various parts of lathe machine but at same working condition.During this experimentation it is observes that maximum vibration signatures creates on lathe chuck as compare to other parts of lathe machine.

CONCLUSION & FUTURE SCOPE

According to result and analysis the following conclusion are taken.

Conclusion

Logically it is concluded that if one increases the load on the shaft of head stock then the vibration amplitude produced by the chuck will also increases. In the other word it is said that if load gets linearly increased then the vibration amplitude at particular frequency will also increases linearly.

Conclusion:

1) All the experiments are carried in frequency domain.
2) As the frequency increases amplitude of vibration decreases i.e.at 40Hz frequency, the amplitude is $10m/s^2$. And at 5Hz frequency the amplitude is 35 m/s^2.
3) There is non-linearity in the experimentation of vibration at different location. i.e. frequency range varies as 14Hz,23Hz,22Hz,21Hz.
4) As load increases amplitude of vibration increases. It means that when depth of cut of material increases, amplitude of vibration increases, when depth of cut decreases, amplitude of vibration decreases.
5) Out of 5-location amplitude of vibration is maximum at chuck. i.e. when the frequency is 5Hz,the amplitude is $35m/s^2$ and at 40Hz frequency, the amplitude value is $10m/s^2$.