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ANALYSIS OF THE CUTTING PROCESS (VIBRATIONS) PROCESSING PROCESS

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Annotation: This article (thesis) provides information on the analysis of vibrations in the cutting process. If the cutting angle of the cutting tool is large enough, it will also affect the vibration intensity.

Keywords: Vibrations in the cutting process. Forced oscillations Auto-oscillations Deformation in the process of cutting thermal phenomena.

АНАЛИЗ ПРОЦЕССА РЕЗАНИЯ (ВИБРАЦИИ) ПРОЦЕССА ОБРАБОТКИ

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Аннотация: В данной статье представлена информация по анализу вибраций в процессе резания. Если угол резания режущего инструмента достаточно велик, это также повлияет на интенсивность вибрации.

Ключевые слова: Вибрации в процессе резания. Вынужденные колебания Автоколебания Деформация в процессе резания тепловые явления.

The application of high-efficiency cutting rhythms of machining is a key factor in determining the movements in the cutting process. In order to obtain high speed and high accuracy of the workpiece without cutting the cutting period of the cutting tool, the vibration of the (machine-tool) system must not be allowed, ie the cutting process must be resistant to vibration.

To date, the physical nature of the vibration phenomenon in the process of cutting metals is being studied in depth. Studies show that in some types of machining, it is advisable to use forced oscillations with a frequency and amplitude that are technologically effective.

During the cutting process, two types of vibrations are observed: forced and spontaneous oscillations, ie auto-oscillations.

Forced vibrations are not difficult to eliminate due to the specificity of the causes. Forced vibrations that occur under periodic forces during processing can occur in the following cases:

- a) when the processing has an intermittent appearance; the oscillations are caused by the non-uniform operating environment of the cutting tool (eg milling) and the dimensions of the surface to be machined;
- b) imbalance of rotating parts of the machine, part or cutting tool; in which case the oscillations are caused by a change in the direction of motion of the mobile force;

Auto-oscillations are oscillations in which the variable force and the oscillations of its constituents are generated and controlled by these effects. During the cutting process, strong vibrations may be generated for a certain period of time. There may be no external periodic force, and the vibration force is generated at the input of the cutting tool and at the output of the cutting edge.

Given that the occurrence of auto-vibrations in the cutting process is not associated with an increase in the cutting speed and a decrease in the frictional forces, they can be explained differently.

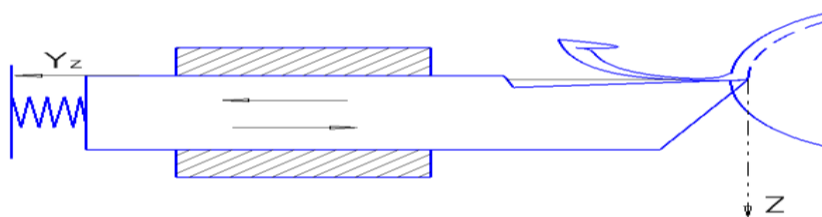


Figure 1.1

Figure 1.1. Schematic of an oscillating system with a single degree of freedom in direction.

Figure 1.1 shows a schematic of an oscillating system with a single degree of freedom. In this system, the detail is a circular cutting tool that oscillates in a normal direction along the axis.

Conclusion

1. When the cutting process is considered as an autotuning process, the primary cause of system vibration is the frictional forces acting on the front and back surfaces of the cutting tool.

2. As the cutting speed increases, the radial component of the cutting force decreases. Since the frictional force on the front surface is mainly determined by the radial component of the shear force, the formation of auto-vibrations depends on the decrease in the frictional force.

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