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Regenerative chatter Phenomenon in the Turning Process based on the alloy steels 1020, 1035 and 1045

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Abstract : Regenerative vibration is a major drawback in machining processes reducing the geometric accuracy and dynamic stability of the cutting system. Achieving a dynamically stable cutting operation represents a significant decrease in the production time and therefore in the costs associated with this process. The information provided by the stability lobe diagrams is of great importance, since from them we know the range of spindle rotation speeds and chip thicknesses at which the cutting operation takes place in a state free from the phenomenon of regenerative chatter, avoiding the rapid wear of the cutting tool and achieving quality surface finishes.

In the present investigation, the behavior of the turning operations in steel 1020, steel 1035 and steel 1045 is characterized, with the objective of verifying the presence of instability in the machining caused by the regenerative chattering in the machine tools. Based on the analytical models proposed by Altintas and Budak for the stabilization of self-excited vibrations, a computer tool is developed capable of generating stability lobe diagrams, which allow us to appreciate the operating conditions in which machining presents stable behavior, to simulate the material removal process considering certain parameters specific to the machine tool.

Keywords : turning, regenerative chatter, lobe diagrams.

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