

Optimal delay distribution selection for chatter avoidance in milling operations

Jokin Munoa¹ and Zoltan Dombovari²

¹*IK4-IDEKO, Dynamics & Control Department, Elgoibar (Basque Country), Spain
(e-mail: munoa@ideko.es)*

²*Budapest University of Technology and Economics, Department of Applied Mechanics,
Budapest, Hungary (e-mail: dombovari@mm.bme.hu)*

There are various machining processes that are subjected to regenerative effect, when the past solution of the dynamic system affects the present dynamic behaviour through the evolution of the machined surface. This behaviour can be modelled well by delay differential equations (DDEs). The complexity of the governing DDEs very much depends on the properties of a given machining operation. It is well known in the industry, the more regeneration effect is disturbed, the more stability gain can be achieved. In this manner industrial solutions tend to introduce some kind of variation on the anyway simple regenerative delay pattern of the original bare machining process. The work presented takes different industrial solutions and points out its mathematical relevance and explaining the effect on the process stability. By considering an artificial milling operation with two degrees of freedom different attenuation techniques are applied and discussed critically. Apart of the theoretical study the discussed special behaviour is strengthened by measurement examples.