Structural and elastodynamic analysis of rotary transfer machines by means of a Finite Element model

Martini A., Troncossi M., Vincenzi N.

Journal of the Serbian Society for Computational Mechanics / Vol. 11 / No.1, 2018

Vibration monitoring and control are central topics for machine tools, since high vibration levels reduce the quality of machined surfaces and shorten the tool life. In order to predict potential vibration issues since the early design stage, it is necessary to implement ad hoc numerical models for modal analysis. This requires significant efforts and possible conflicts with tight production scheduling of companies. This work focuses on a specific family of rotary transfer machines for the manufacturing of parts related to lock&keys industry. It investigates the possibility to achieve an acceptable estimation of the elastodynamicbehavior of the machine tools through limited modifications of the Finite Element (FE) models used for structural analysis, which are generally available in the early phases of the design process. The structural FE model of a new machine tool is implemented and validated through experimental tests performed on a prototype. Then, the elastodynamic FE model is derived and simulated. The numerical results are consistent with the data provided by Experimental Modal Analysis (EMA). Hence, the proposed approach is confirmed viable and will be integrated in the company workflow of future machine designs.