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Analyzing the jamming of parts on the shaft in assembly processes

Abstract

Purpose - The purpose of this paper is to investigate the process of jamming of the hollow parts on the shaft and to derive a mathematical model for jamming in an assembly process. Design/methodology/approach - The mathematical model for jamming of parts on the shaft in an assembly process is based on the sizes, geometry, angular declination of part and shaft axes, and the frictional factor. Findings - The equation for angular positional tolerance of coaxial parts and shafts, based on their geometry and sizes and leading to jamming, was derived. Research limitations/implications - A mathematical model of parts jamming on the shaft is developed for assembly mechanisms. This research does not consider flexible deformations of components in assembly mechanisms, which results in the axis concentricity of part and shaft in the assembly process. Practical implications - The results presented in the form of angular positional tolerance for coaxial parts and shafts based on their geometry and sizes make it possible to avoid the jamming of the parts. The results allow for formulating the angular positional tolerance of the assembly mechanisms that clamp the parts. Originality/value - The proposed method for calculating the angular positional tolerance of coaxial parts and shafts for the assembly process should allow for increasing the reliability of the assembly process in the manufacturing industry.

Keywords

Assembly; Assembly process; Boundary conditions; Jamming; Plate type parts; Production engineering