

Effect of rectilinear imperfections, pin friction and wear ring stiffness on hydraulic actuators bending behavior

Sergio Baragetti^{1,2}, Francesco Villa¹

¹ Department of Management, Information and Production Engineering, University of Bergamo, Viale Marconi 5, Dalmine 24044, Italy

² GITT - Centre on Innovation Management and Technology Transfer University of Bergamo, Via Salvecchio 19, Bergamo 24129, Italy

Abstract

Hydraulic actuators are typically designed by obtaining the critical load by Euler's instability theory, considering the component as an ideal beam. This assumption leads to unjustified reduced design compressive loads. Advanced numerical models include further effects, such as the rod and cylinder proper inertias, friction and geometric tolerances. In the present work, these contributions are integrated in a single mathematical formulation. The hyperstatic nature of the interface between the piston and the cylinder is investigated. The proposed relations are validated against an experimental setup. The thus obtained numerical model allows to study the sensitivity of the bending stresses to the design parameters.

