

Virtual Conceptual Design of a Multi-Purpose Fixture for a CNC Milling Machine Using the Controlled Convergence Technique

Boppana V. Chowdary ^{a,Ψ}, Marc-Anthony Richards ^b, and Trishel Gokool ^c

Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, The University of the West Indies, St. Augustine, Trinidad and Tobago, West Indies;

^aE-mail: Boppana.Chowdary@sta.uwi.edu

^bE-mail: marich8@gmail.com

^cE-mail: trishelgokool@yahoo.com

^Ψ Corresponding Author

(Received 27 June 2017; Revised 30 August 2017; Accepted 13 December 2017)

Abstract: *Modern computer numerical control (CNC) machines are capable of performing numerous operations on variety of workpieces. An array of parts that are geometrically and physically dissimilar can be machined on a CNC workstation, provided an appropriate fixture is available. It is however quite common in practice to have many dedicated fixtures serving as accessories to a single CNC workstation. The intent of this paper is to present an integrated approach to designing a multipurpose yet cost effective fixture to perform several milling operations. Pugh's Controlled Convergence (CC) technique was used to generate alternative designs. Finally, the most feasible alternative was modelled using Virtual Engineering (VE) principles which can allow it to be further analysed for downstream operations. The results indicate that the proposed CC and VE principles were applied effectively to design a multipurpose milling machine fixture.*

Keywords: *Product development, milling fixture, integration, controlled convergence, virtual engineering*