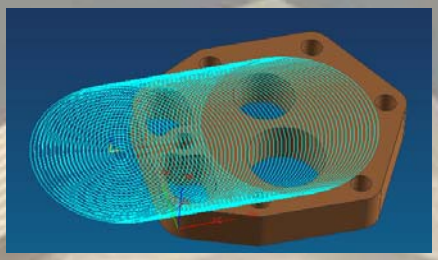
MANUFACTURING & AUTOMATION RESEARCH CENTER

KOÇ UNIVERSITY

Trochoidal Milling



Supported by

TÜBİTAK

Associate Prof.
İsmail Lazoğlu

Manufacturing and Automation
Research Center
Koc University

Rumeli Feneri Yolu
Sariyer, İstanbul 34450

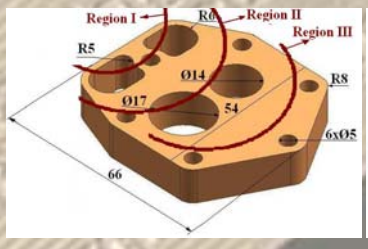
Phone: +90 (212) 338-1587
Fax: +90 (212) 338-1548
E-mail: ilazoglu@ku.edu.tr

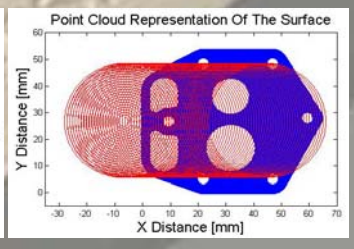
Web: http://marc.ku.edu.tr

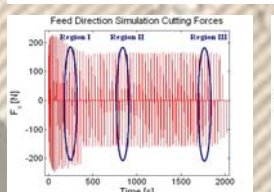
Research Assistant
Murat Ötkür
Phone: +90 (212) 338-1739
E-mail: motkur@ku.edu.tr

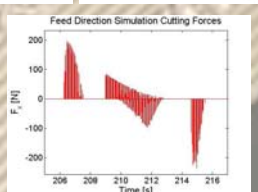
Motivation: As the competition in world marketing gets harder within product life cycles gets shorter. Therefore the main motivation in die and mold industry is to increase productivity and reduce production costs and cycles. In order to increase productivity several strategies are used. One of them is applying different toolpaths in machining operations. As alternates to conventional linear machining methods different toolpath strategies such as zigzag, peripheral, circular and trochoidal paths are used in commercial CAM programs. In trochoidal milling method the cutter traces a trochoidal toolpath enabling the slicing of the workpiece gentle by having light engagement conditions and it is advised for hard part machining as hard part machining requires shallow radial depth of cut in order to minimize cutting forces and heat generation thus improving tool life.

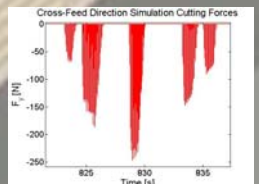
Research: An analytical model for the engagement of simple surface machining is derived. Moreover, a numerical model is developed for defining the engagement for complex surfaces containing hole or bosses on it. Lastly a force model employing the engagement results is carried on for prediction of the cutting forces. In order to maximize the efficiency in the trochoidal milling operation, different toolpath strategies are examined where the back half part of the planetary revolution motion is shortened with a linear motion or completely eliminated with double trochoidal milling. Moreover, a forced based feedrate scheduling strategy is applied for double trochoidal milling for further maximization of machining efficiency. Finally an experimental study investigating the wear comparison of trochoidal and linear milling with cutting forces and surface roughness aspects is performed.

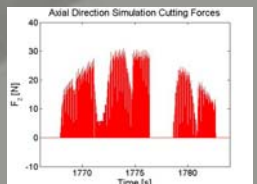


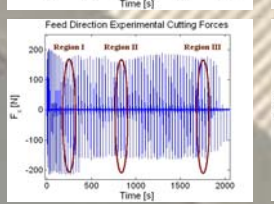


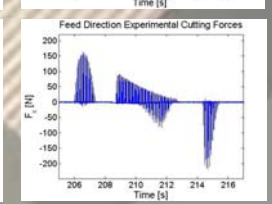


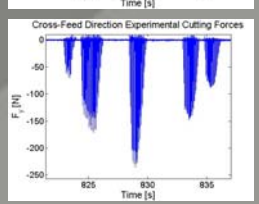


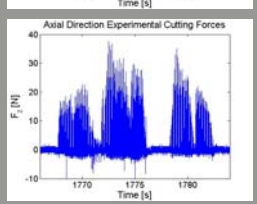












Full Toolpath | Region I | Region II | Region III