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Design and Analysis of Single Point Cutting Tool

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Abstract: The standards of projective geometry. The parameters of geometry characterizing the different cutting apparatus edges are depicted by methods for taking proper projections of the cutting device surfaces. Advancement in the field of PC Aided Geometric Design (CAGD) now give more rich way to deal with indicating the cutting apparatus surfaces as an arrangement of biparametric surface patches. This investigation of machining procedures includes examining the chip development prepare. A long time of research has indisputably demonstrated that it a procedure including plastic twisting in which extensive strains and strain rates are created by restricted shear distortion of work material instantly in front of hardware. Warm produced amid the chip arrangement prepare accordingly of plastic twisting and rubbing.

Key words: CAGD, biparametric, indisputably, work material, warm, arrangement

INTRODUCTION

Plan of single point cutting device is an imperative part of hardware designing. This unit manages the plan of hardware shank, outline of single point cutting device and different powers required amid machining of the workpiece. Quality and unbending nature of hardware is additionally considered while planning single point cutting apparatus. Friction stir welding of aluminium and magnesium alloys gives the overall review (Muruganandam *et al*., 2015). Austenitic stainless steel weldment residual stress analysis is clarified by Jayakumar *et al*. (2015) by finite element method. In review of paper Thermal properties of polypropylene/montmorillonite nanocomposites is presented in following study (Selvakumar and Manoharan, 2014).

MATERIALS AND METHODS

In light of the writing survey and an examination of earlier test contemplates an approach was produced to ponder the movement of flank wears of the cutting devices and the adjustment in the surface unpleasantness of the machined part in turning. The accompanying strides that were taken to accomplish the targets of this investigation. Experimentation in view of taguchi orthogonal exhibit. Regression investigation to approve the trial comes about.

Design of experimentation using Taguchi orthogonal array: The Taguchi strategy is a notable procedure that gives a methodical and productive technique for process improvement and this is a capable device for the plan of excellent frameworks. Taguchi way to deal with outline of examinations is anything but difficult to receive and apply for clients with restricted learning of measurements, thus, increased wide notoriety in the building and academic group.

This is a designing system for acquiring item and process condition which are insignificantly delicate to the different reasons for variety and which create highquality items with low advancement and assembling costs. Flag to clamor proportion and orthogonal exhibit are two noteworthy devices utilized as a part of outline.

For this investigation the clay is utilized as the instrument material, the choice depends on the writing study which show that minimum work is on the multi layered covered earthenware. The accompanying are the vital normal for the earthenware material. Each embed has a dissolving point which mirrors the temperature at which it is made. Artistic's softening point (3.700°F) is higher than sintered carbide which implies it can be driven through the cut speedier. Turning is a practically perfect operation for earthenware production. All in all it is a constant machining process that enables a solitary embed to be occupied with the cut for moderately drawn out stretches of time. In most conventional metal cutting, warm is the adversary. It's terrible for the apparatus and for the most part awful for the work piece (work solidifying). The warmth scattering objective for most carbide slicing embeds is to get warm into the chip and rapidly out of the cut zone not so, for earthenware production (Dimla, 2000; Luthje *et al*., 2004; Ibraheem *et al*., 2008; Abainia *et al*., 2012).

Designing of cutting tool: Figure 1 and 2 discussed the 3D Model.

Analysis of cutting tool: Figure 3 discussed the analysis of cutting tool.

Structural analysis: Figure 4 discussed the structural analysis.

Stress and strain deformation: Figure 5 discussed the stress and strain deformation.

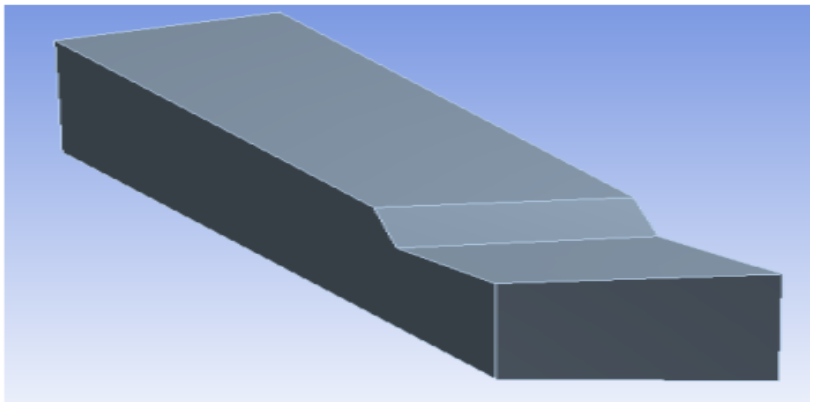

Fig. 1: 3D Model of the cutting tool

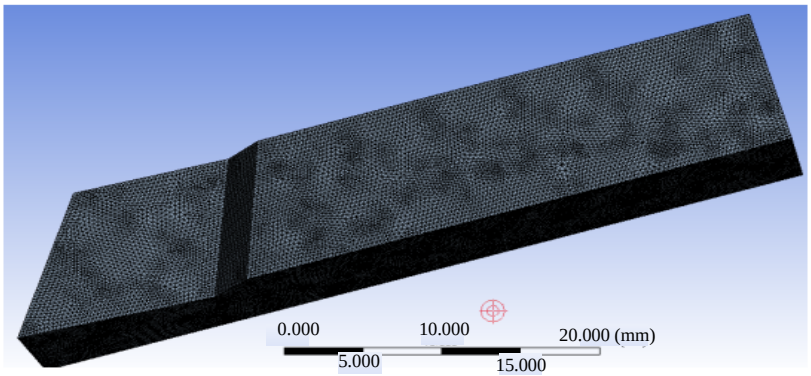

Fig. 2: Fine meshing of the cutting tool

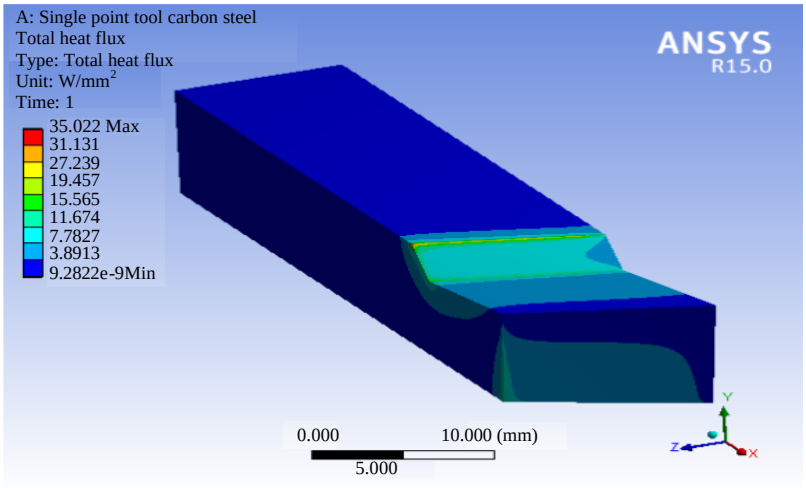

Fig. 3: Total heat flux analysis result

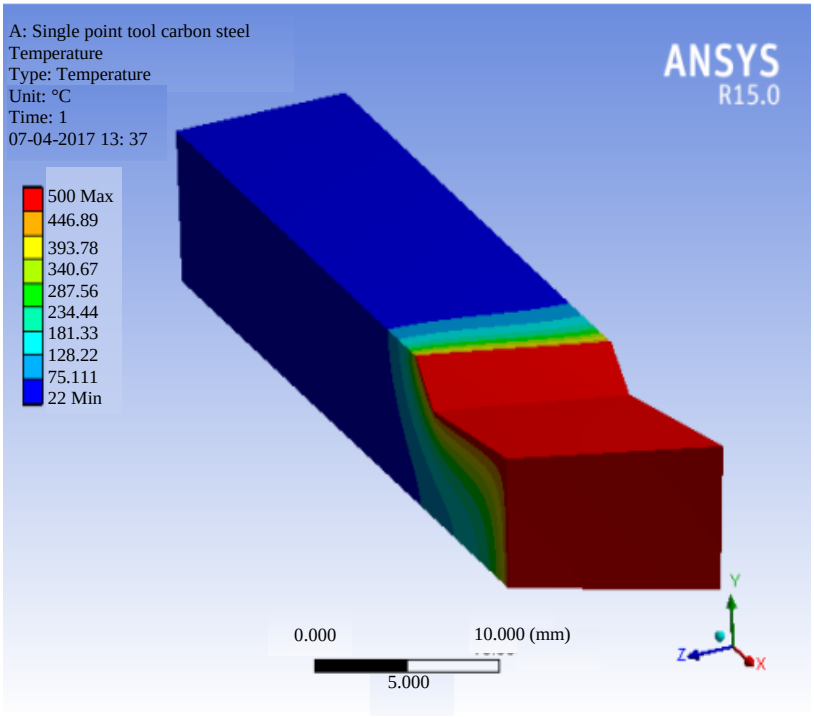

Fig. 4: Thermal analysis result of the cutting tool

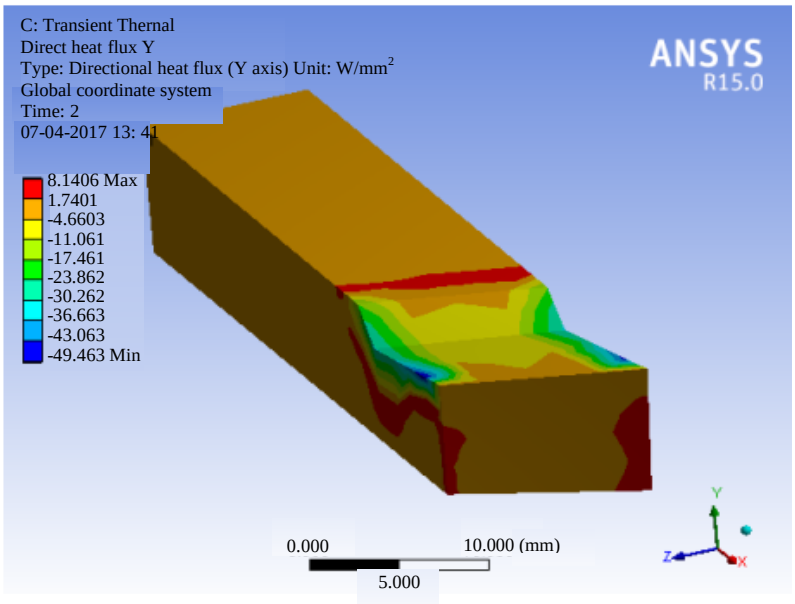

Fig. 5: Heat flux along y axis

RESULTS AND DISCUSSION

From the Table 1-3 it is clear that carbon steel having higher strength when compared to the forged steel and tin. There is a slight change in the stress between the carbon steel and the forged steel but the displacement is higher for the forged steel that much of displacement will cause damage to the tool tips. But tin having the least displacement when compared to the all the materials but it is not suitable for the tool designing because of its less stress. There are negligible variations in the sliding contact results for all the material compared to the carbon

Table 1: Existing properties of cutting tool

Properties	Values
Volume	62.25 (mm^3)
Material/carbon steel	
Coordinates/type	Forged
Mass	1.25 (kg)
Nodes	103
Elements	215

Table 2: Properties of proposed material

Materials	TIN
Density	6.214 (g/cm^3)
Yield strength	56 (MPa)
Compressive strength	654 (MPa)
Modulus of elasticity	324 (GPa)
Vickers hardness	3584
Thermal conductivity	0.232

Table 3: comparison of results obtained in the analysis

	Results		
Materials	Stress	Displacement	Sliding contact
Carbon steel	31.02	0.23e-3	0.44e-5
Forged iron	33.00	0.38e-3	0.42e-4
Tin	24.02	0.19e-3	0.32e-4

steel. But by taking into account of stress and displacement tin and forged steel are not suitable for the tool making.

CONCLUSION

Thus, the analysis and modelling describes the stress and strain constrains in the element of research and the derived values are plotted.

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