Improvement in Production and Quality of Fork Using CAD/CAM

Kamal Kashyap, D.G.Mahto

Abstract- This paper presents improvement of Fork of a universal coupling by process monitoring using CAM. Now days every part must be made so accurate so that it may give assurance to the manufacturer of quality. The cardinal purpose of this project is to identify the process sequence, machining time and accuracy of the finished product by using CAM. To get the perfect result the entire process is simulated by using NX software every aspect is determined like cutting tool, spindle speed and machining parameters, finally software simulates the entire sequence of processes resulting to give us a program from which the same product can be made in the best machining time.

Key words: simulation, process sequence, machining parameters, machining time.

I. INTRODUCTION

Universal joints allow torque transmission through misalignment angles of up to about 20°. Most universal joints are based on the hooks coupling, the universal joints used in the motor car or truck driveshaft are of this type.[1] A hooks joint consist of two fork which are connected to each other with the help of a centre block and pin as shown in Fig 1.1. The main part of the coupling is the fork because by this the universal coupling gets connected to the drive shaft. The entire project is concern with this part of the universal coupling. The traditional way of making this joint is by machining it with the help of traditional machines but the joints made in this way are not so accurately balanced.

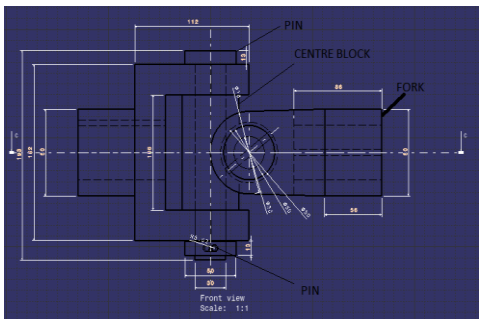

FIG1.1-2D DESIGN OF A HOOKS JOINT

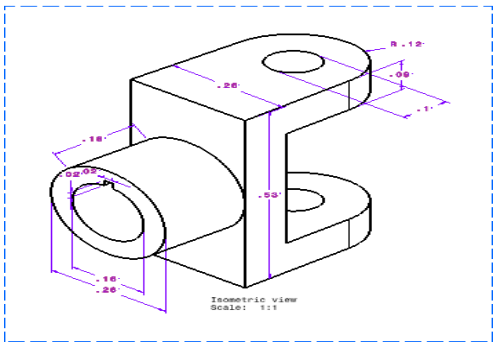

FIG 1.2-2D MODEL OF FORK

Now a days we need accurately precise products which can withstand for the quality aspect and in less machining time. The fork is made in this perticular project with the help of CAD/CAM.The dimentioning of the fork is shown in Fig1.2 and the 3D design is shown in Fig1.3

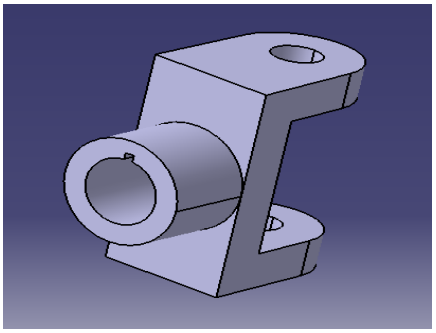

FIG1.3 -3D MODEL OF FORK

II. LITRATURE REVIEW

In this project the fork is made with the help of CAM/CAM and finally is taken to the CNC machine for the formation. According to Jones [2], Computer Numerical Control (CNC) retain the fundamental concept of Numeric Control (NC) but utilizes a dedicated stares program computer within the machine control unit. Valentino et.al [3] defined that the CNC machine is an NC machine with the added feature of an on board computer. The On-Board computer is often referred to as the Machine Control Unit or MCU. Amic [4] mentioned that when Numerical Control is performed under computer supervision is called Computer Numeric Control Computer are the controls of CNC machines. These are linked machines via communication channels.

III. METHODOLOGY

Methodology shows the direction how the entire project was conducted [5]. Several techniques have been used to determine the best solution for producing the product, which has been derived from the project methodology and project tools. The first stage of the project is to make the appropriate shape according to dimensions with the help of CAD software. We use CATIA V5R11 to make the design of the Fork. Second Stage is to get the machining sequence and machining tool that is to be used for the formation of the particular product. The third and the last part of the entire process is to select the cutting parameters like cutting speed (), feed, depth of cut. To get the best result the entire methodology is revised three times to get the best cutting time and best finishing by varying the parameters.

Manuscript received February 2014.

Kamal Kashyap, Department Of Mechanical Engineering, LLR Institute, H.P, India

D.G.Mahtoa, Green Hills Engineering College, H.P, India

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication Pvt. Ltd.

O	M	S	I	DISCRIPTION
		S		material requirement
			I	forging inspection
	M			movement of VMC 1st step
O				VMC 1st setup
	M			movement of VMC 2ND step
O				VMC 2ND setup
	M			movement of VMC 3RD step
O				VMC 3RD setup
	M			movement of VMC 4TH step
O				VMC 4TH setup
	M			movement for keyway making
O				Keyway making
	M			Movement for sandering
O				Sandering
			I	Inspection area
	M			Movement for assembly

Table 1.1 Process Sheet

In table 1.1 , **O**-Operation, **M**-Movement, **S**-Storage, **I**-Inspection. The entire process takes place according to the process defined in the table 1.1.

IV. RESULT AND DISCUSSION

There are three methods of machining sequence that have been analyzed and considered about the machining process like set up work piece, set up tools, no of tools, datum settings, NC program, and Verification of N.C program [2].CNC milling is used in all the procedures. Table 1.1 shows the machining time on CNC machine.

Job sequence	1	2	3	4	5
Spindle speed (RPM)	800	1000	200	3000	3000
Feed in mm	3000	1000	50	1600	1600
Tool Dia (mm)	32.0	32.0	26	16.0	16
Cor Radius /Tip Angle	1.7	1.7	118	1.1	1.0
Generate N.C Program	1	1	1	1	1
Flute Length	50.0	50.0	35.0	50.0	50.0
Time taken for M/C Process in minutes	10.8	8.2	5.01	11.8	19.1
%AGE Of Job Completed	20%	15%	5%	25%	35%

Table 1.2 Machining Time On CNC Milling

As we see from the values of TABLE NO.1.2 that the machining sequence in which we have the minimum machining time.

V. CONCLUSION

Based on the fact findings analysis done, it could be concluded that after conducing a series of analysis, all of the objective elements are met up to the expectations.
The determination of the suitable cutting tool and the machining sequence that we consider to make the fork of hooks joint come up with an appropriate result that we need at last. and this may improve the quality any production of a hooks joint fork and will be useful in terms of cost reduction and quality.

REFRENCES

[1] www.engineersaustralia.org.au.
[2] Leatham-Jones, Barry. Introduction to Computer Numerical Control. Singapore: Longman. 1986
[3] Raid Al-Aoma and Ala'a Al-Okaily, A GA-based parameter design for single machine turning process with high-volume production. Journal of Computers & Industrial Engineering 2006; 8: 317-337.
[4] Amic, Peter J. Computer Numerical Control Programming. USA: Prentice-Hall. 1997.
[5] S. Sulaimana*, Tang S Honga, S. Pawanchia, G. R. Esmaeiliana, M.K.A. Ariffinaa, B.T.H.T. Baharudin, "Improvement of Tops Spinning Manufacturing with CNC Lathe",Procedia Engineering 15(2011) 3886-3890.

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication Pvt. Ltd.