International Journal of Innovative Technologies
WWW.IJITECH.ORG
ISSN 2321-8665
Volume.06, Issue.01,
January-June, 2018,
Pages:0358-0362

Development of Bearing House Fitting using Cad and CAM Application

KATTA VENKATA PRASUNA[1], G. VIJAYA PRAKASH[2]
[1]PG Scholar, Dept of Mechanical Engineering, Nalanda Institute of Technology, AP, India,
E-mail: prasuvits@gmail.com.
[2]Associate Professor, Dept of Mechanical Engineering, Nalanda Institute of Technology, AP, India,
E-mail: vikram14391439@gmail.com.

Abstract: In modern CNC systems, end-to-end component design is highly automated using computer-aided design (CAD) and computer-aided manufacturing (CAM) programs. The programs produce a computer file that is interpreted to extract the commands needed to operate a particular machine by a post processor, and then loaded into the CNC machines for production. Since any particular component might require the use of a number of different tools – drills, saws, etc., modern machines often combine multiple tools into a single "cell". In other installations, a number of different machines are used with an external controller and human or robotic operators that move the component from machine to machine. In either case, the series of steps needed to produce any part is highly automated and produces a part that closely matches the original CAD design. This project deals with generating NC program using CAM software for bearing house fitting to manufacture on modern CNC machine. Bearing house fitting is a component that separates moving parts and takes a load. Using NX-CAD software 3D model of bearing house fitting is created and program is generated using NX-CAM software.

Keywords: CNC, Computer-Aided Design (CAD), Computer-Aided Manufacturing (CAM).

I. INTRODUCTION

A. Introduction About Component

Bearing housings are essential requirement for safe operating and enhancing the durability of any industrial bearings. It is used basically to mount the bearing safely. The bearings housing position the insert bearing and at the same time support loads that are transferred from the shaft through the bearing. A bearing housing is also known as a pillow block or a Plummer block. It is mounted on a roller bearing or plain bearing or any other bearing type to provide support for a rotating shaft with the mounting surface on a parallel line with the shaft axis. Pillow blocks are usually referred to the housings which have a bearing fitted into them and thus the user need not purchase the bearings separately. Pillow blocks are usually mounted in cleaner environments and generally are meant for lesser loads of general industry. These differ from "Plummer blocks" which are bearing housings supplied without any bearings and are usually meant for higher load ratings and corrosive industrial environments. However the terms pillow block and Plummer block are used interchangeably in certain parts of the world. The fundamental application of both types is the same which is to mount bearings safely enabling their outer ring to be stationary while allowing rotation of the inner ring. The housing is bolted to a foundation through the holes in the base. Bearing housings are either split type or unsplit type. Split type housings are usually two piece housings where the cap and base can be detached, while certain series are one single piece housings. Various seals are provided to prevent dust and other contaminants from entering the housing. Thus the housing provides a clean environment for the expensive bearings to freely rotate, hence increasing their performance and duty cycle.

B. Introduction of CAD

Computer aided design (CAD) is assistance of computer in engineering processes such as creation, optimization, analysis and modification. CAD involves creating computer models defined by geometrical parameters which can be readily altered by changing relevant parameters. CAD systems enable designers to view objects under a wide variety of representations and to test these objects by simulating real¬ world conditions. There are several good reasons for using a CAD system to support the engineering design function.

C. Introduction of CAM

Computer-aided manufacturing (CAM) is the use of computer software to control machine tools and related machinery in the manufacturing of work pieces. This is not the only definition for CAM, but it is the most common; CAM may also refer to the use of a computer to assist in all operations of a manufacturing plant, including planning, management, transportation and storage. Its primary purpose is to create a faster production process and components and tooling with more precise dimensions and material consistency, which in some cases, uses only the required amount of raw material (thus minimizing waste), while simultaneously reducing energy consumption. CAM is a subsequent computer-aided process after computer-aided design (CAD) and sometimes computer-aided engineering (CAE), as the model generated in CAD and verified in CAE can be input into CAM software, which then controls the machine tool. Integration of CAD with other components of CAD/CAM/CAE Product lifecycle management (PLM) environment requires an effective CAD data exchange. Usually it had been necessary to force the CAD operator to export the data in one of the common data formats, such as

IGES or STL, that are supported by a wide variety of software. The output from the CAM software is usually a simple text file of G-code, sometimes many thousands of commands long, that is then transferred to a machine tool using a direct numerical control (DNC) program.

D. Introduction of NC

Numerical control (NC) refers to the automation of machine tools that are operated by abstractly programmed commands encoded on a storage medium, as opposed to controlled manually via hand wheels or levers, or mechanically automated via cams alone. The first NC machines were built in the 1940s and 1950s, based on existing tools that were modified with motors that moved the controls to follow points fed into the system on punched tape. These early servomechanisms were rapidly augmented with analog and digital computers, creating the modern computer numerical control (CNC) machine tools that have revolutionized the machining processes. In modern CNC systems, end-to-end component design is highly automated using computer-aided design (CAD) and computer-aided manufacturing (CAM) programs. The programs produce a computer file that is interpreted to extract the commands needed to operate a particular machine via a postprocessor, and then loaded into the CNC machines for production. Since any particular component might require the use of a number of different tools-drills, saws, etc., modern machines often combine multiple tools into a single "cell". In other cases, a number of different machines are used with an external controller and human or robotic operators that move the component from machine to machine. In either case, the complex series of steps needed to produce any part is highly automated and produces a part that closely matches the original CAD design.

II. LITERATURE REVIEW

Schaeffer is setting a new standard with the innovative large-size bearing housing SNS. The unique housing design increases the bearing life of the fitted spherical roller bearings by up to 50 percent compared to conventional Plummer block housings. This is made possible by the innovative housing design, which ensures optimum load distribution in the bearing. The housing also provides a very high sealing action against the ingress of contamination under extreme environmental conditions. An SKF Bearing housing, together with appropriate SKF bearings constitute economic, interchangeable bearing units that meet the demand for designs that are easy to maintain. SKF bearing housings have the following advantages

- large assortment of design and sizes
- high quality of bearing housings design and manufacturing
- worldwide availability.

III. 3D MODELLING OF BEARING HOUSING

A. 2D Drawing Of Bearing House

A 2D drawing is used to design a 3D model for our component using Unigraphics NX 7.5 CAD software. Below shows the 2D drawings of the bearing house with all the required dimensions representations the suits the best for manufacturing the component without any errors. Below Figs.1 to 6 shows the 2D sketch of bearing house:

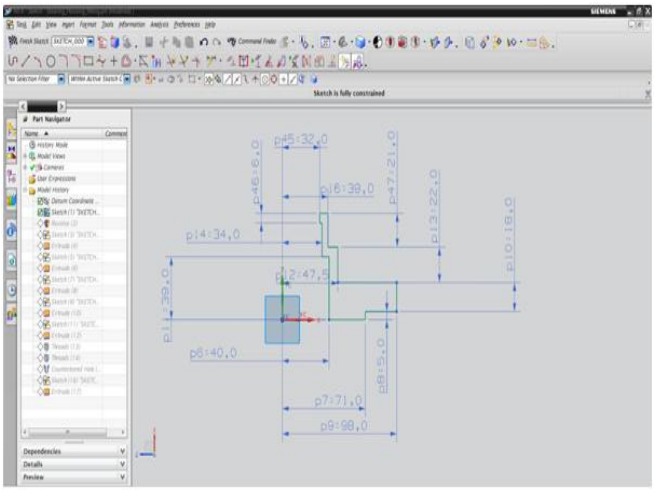


Fig.1. 2D sketch of bearing house.

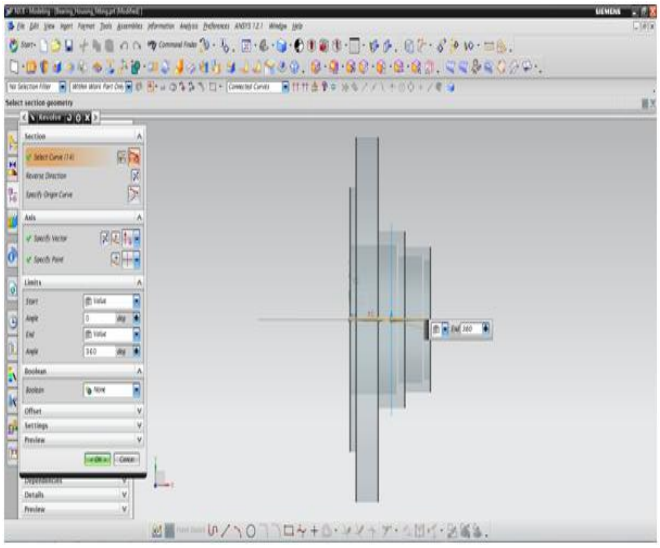


Fig.2. Revolving of bearing house.

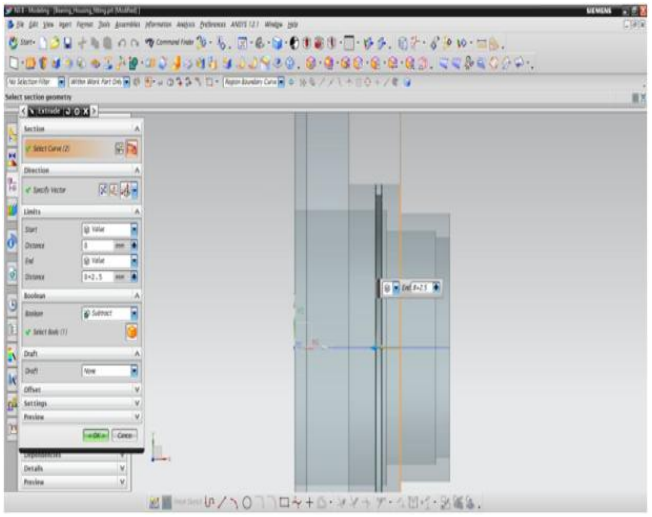


Fig.3. Extruding of bearing house.

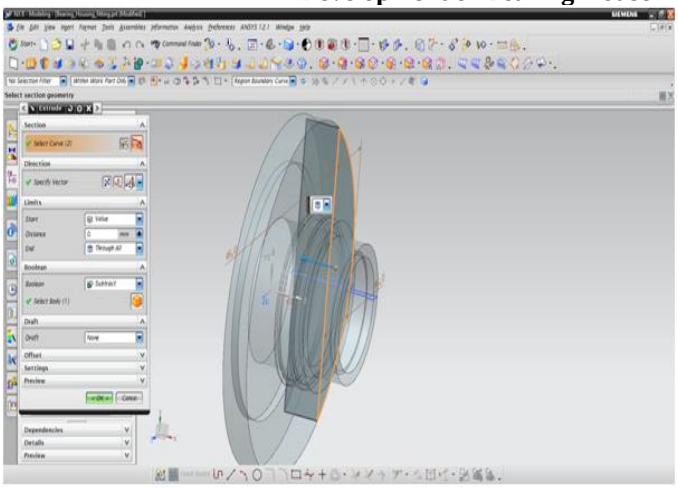


Fig.4. Extruding of bearing house.

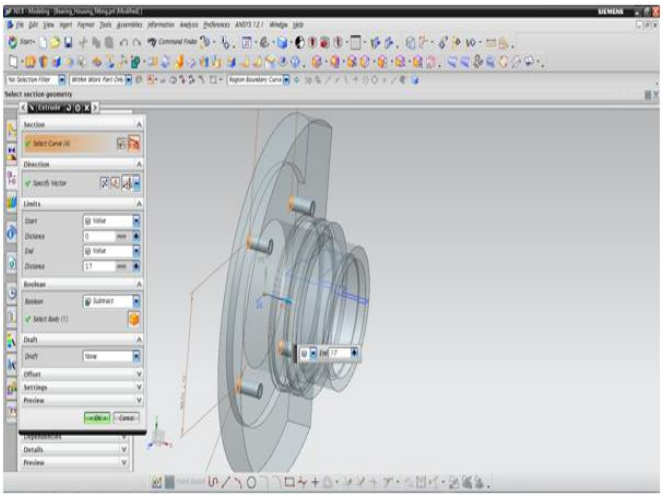


Fig.5. Extruding of bearing house.

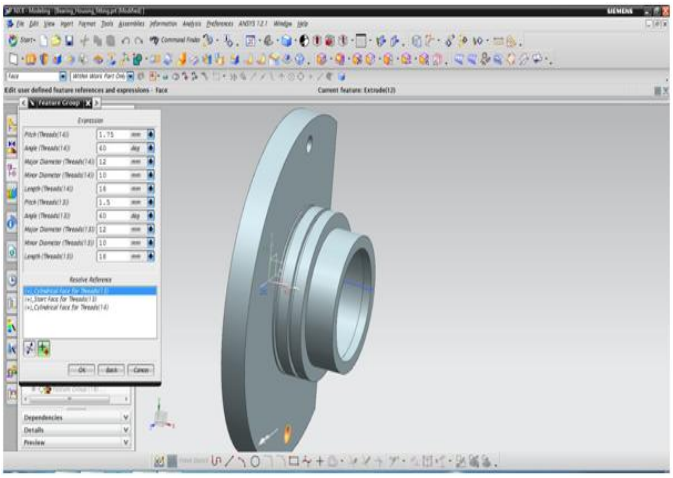


Fig.6. Thread on bearing house.

IV. COMPUTER AIDED MANUFACTURING OF BEARING HOUSE

The generation of tool path on 3D model of Steering knuckle will be done using NX-CAM software. By generating tool path NC program will be generated. This NC program is given input to the CNC machine to run operations. The main objective of the project is to obtain to reduce machining errors and collision of tools and rotary table by developing virtual kit as shown in Figs.7 and 8.

Fig.7. 4-axis CNC MORI SIEKI turning machine.

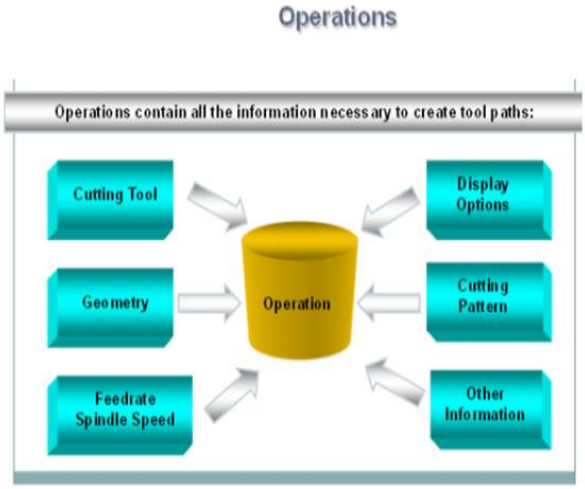


Fig.8. Manufacturing Process Planning.

Below Figs.9 to 14 shows the blank and part of bearing housing.

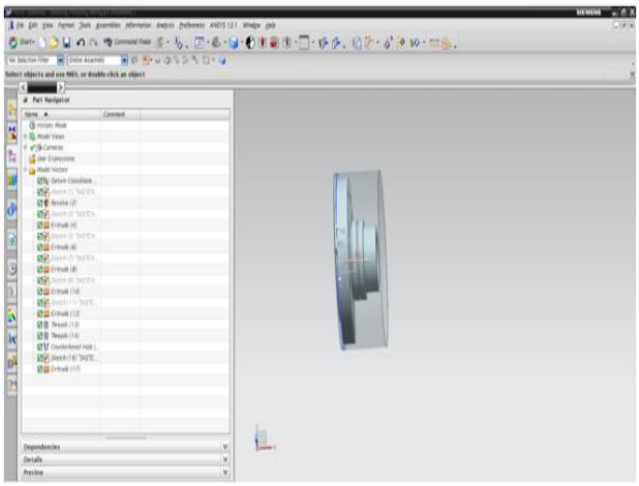


Fig.9. Blank and part of bearing housing.

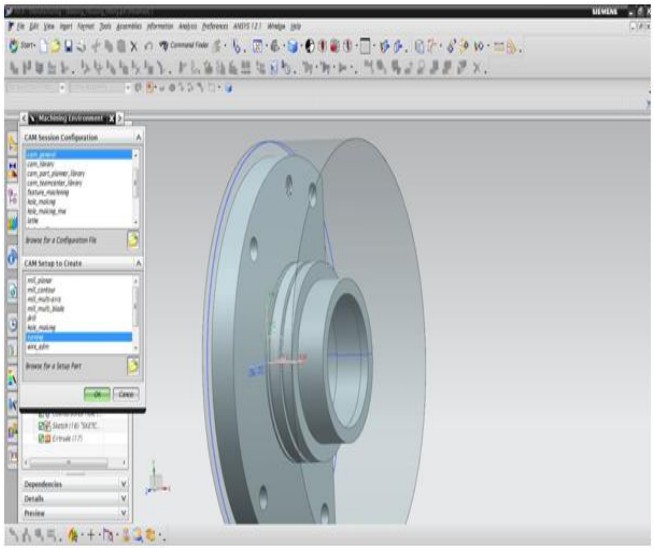


Fig.10. Manufacturing process of bearing housing.

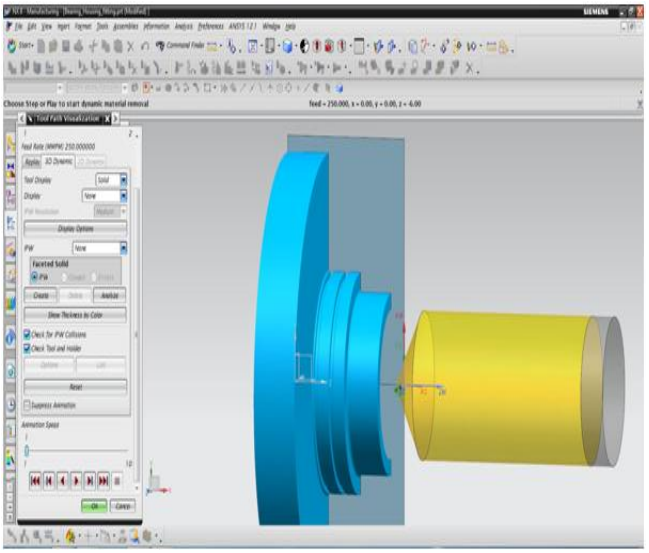
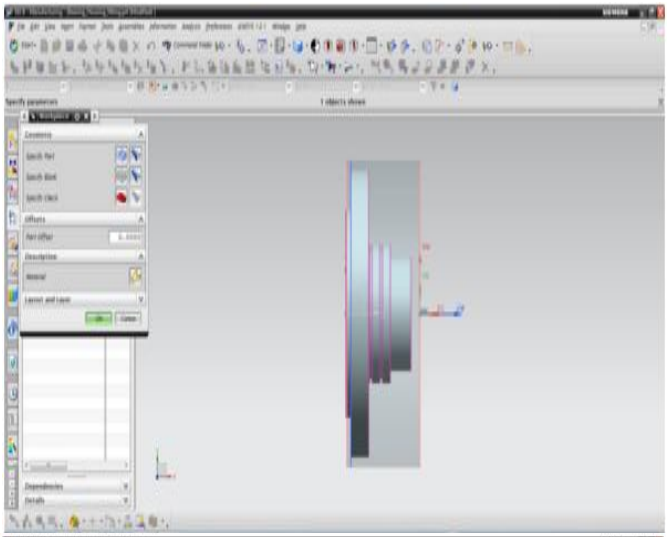


Fig.12. Tool path verification of drilling operation.



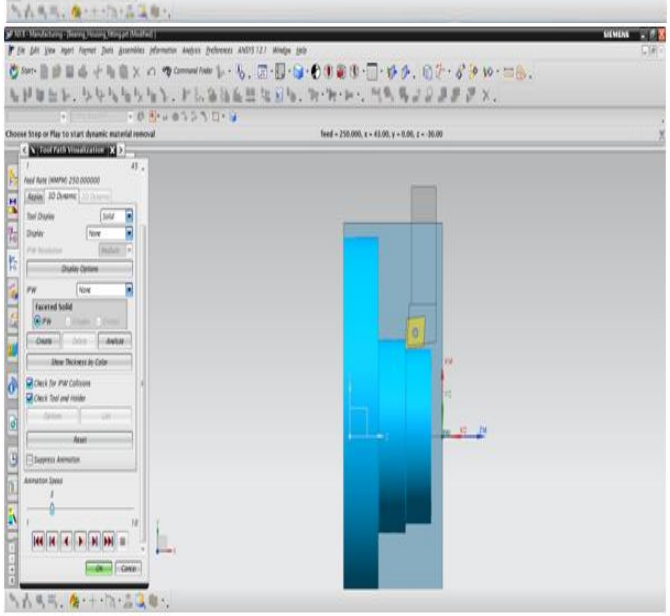


Fig.11. tool path verification of Roughing operation for setup1.

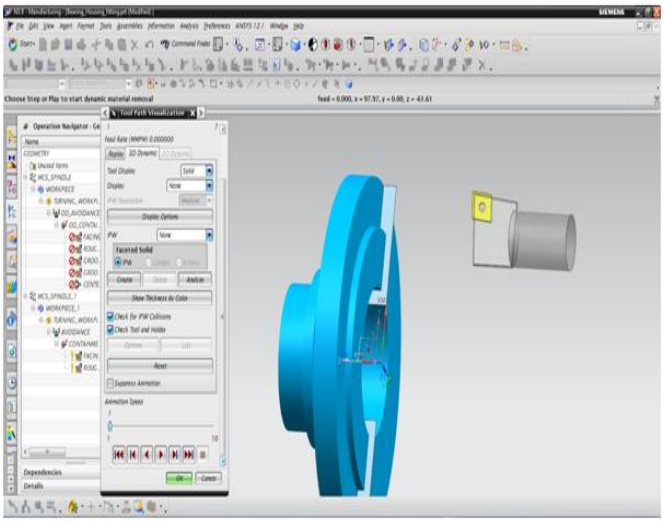


Fig.13. Setup2 roughing operation.

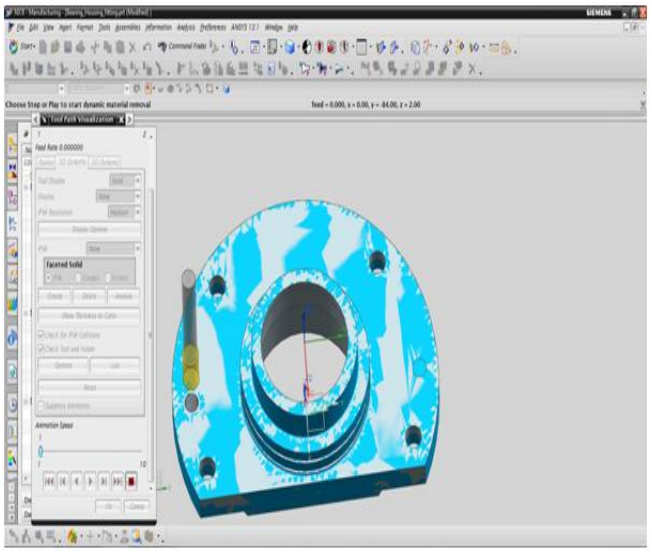


Fig.14. Tool path verification of Threading operation.

V. CONVERT TO NC CODE

Using the post processor we have to convert CL file data into machine specified NC part program

- In the Project Manager, select the first operation on the Operations page, then hold down the Shift key and select the last operation. All the cutting operations are selected.
- Press the right mouse button and select NC Code from the menu.
- Select a Machine Format file from the pull down list (3-Axis/5-Axis).
- Select Apply.

VI. RESULTS

[1]3D model of Bearing house fitting is done using NX-CAD software by considering tolerances given in 2D input.

[2]Generated 3D model is drafted and cross checked with 2D inputs for verification.

[3]Tool path is generated on 3D model of bearing house fitting using NX-CAM software.

[4]NC program is generated for Bearing house fitting component and this program is given to 4-axis TURN-MILL CNC machine through DNC line.