INTEGRATED MECHANICS FOR AUTOMATED MANUFACTURING SYSTEM-A CASE STUDY

Dhanpal Nandhagopal
Research Scholar JJT University
Email id - dhanpal009@gmail.com

Dr.S.Chakradhar Goud
Principal of Sana Engineering College
Email id – cgsakki@gmail.com

Abstract

A system consisting of a set of interconnected stations for material processing that are capable of automatically processing a wide variety of types of pieces simultaneously and controlled by computers. Programmable mechanical manipulator (arm) capable of moving along several directions describing complex trajectories with its end effect or (the device that is attached to the end of the arm). It is designed to carry out factory work usually performed by human workers. Distribution feeder circuits usually consist of overhead and underground circuits in a mix of branching laterals from the station to the various customers. The circuit is designed around various requirements such as required peak load, voltage, distance to customers, and other local conditions such as terrain, visual regulations, or customer requirements. These various branching laterals can be operated in a radial configuration or as a looped configuration.

Key words: *Integrated mechanics, industrial automation, conveyor systems.*

Introduction

The DTH hammer is one of the fastest ways to drill hard rock. A pneumatic tool is first thought to have been used for rock drilling in 1844. Many quarries used hand held tools that required the driller to suspend himself from a rope over the quarry face in order to place the drill hole in the required position. This system used small diameter holes and was not only terribly inefficient but very dangerous due to flying rock as a result of the inaccuracy of the drilled borehole. In DTH drilling, the percussion mechanism – commonly called the hammer – is located directly behind the drill bit. The drill pipes transmit the necessary feed force and rotation to hammer and bit plus compressed air or fluids for the hammer and flushing of cuttings. The drill pipes are added to the drill string successively behind the hammer as the hole gets deeper. The

piston strikes the impact surface of the bit directly, while the hammer casing gives straight and stable guidance of the drill bit. This means that the impact energy does not have to pass through any joints at all. The impact energy therefore is not lost in joints allowing for much deeper percussion drilling. This is a great breakthrough for smaller portable water well drilling rigs, that before were limited. The DTH on smaller rigs now can get same results as large heavy truck rigs. In the present project bit preparation and its design analysis has been taken in to consideration and the whole properties have been observed.

Application

Base plate is used to protect the vibrating loads while digging the application at the top of the hydraulic assembly. The design applicable for the over flow hydraulic oil control and the increasing of cooling performance.

Problem findings

By the physical observation of the product there is no locating areas except fixing with bolts which may leads more pressure on screwed areas while hammering. It is now becoming damages to the fixed plate and the vibration control is nominal. An attempt has been made to modify the design with in locator limits to get optimum result. In this modification angular hole drilling in base plate become critical and the use of jig is necessary for large production.

Scope of work

Jig design and preparation is a sophisticated work because it guides the drilling and increase the overall efficiency of the product. Present project describes the design techniques by using Siemens NX 8.0 and all the manufacturing process has been carried out for assembly of jig plates to check the feasibility of production.

Objectives

1. To enhance the modelling by using 3d-software techniques.
2. To analyze the manufacturing problems with design modifications.
3. To check out the machining strategies while assembly.
4. To analyze the drilling jig capability while drilling critical holes.

IMPORTANT CONSIDERATIONS WHILE DESIGNING JIGS AND FIXTURES.

Designing of jigs and fixtures depends upon so many factors. These factors are analyzed to get design inputs for jigs and fixtures. The list of such factors is mentioned below:

a) Study of work piece and finished component size and geometry.
b) Type and capacity of the machine, its extent of automation.
c) Provision of locating devices in the machine.
d) Available clamping arrangements in the machine.
e) Available indexing devices, their accuracy.
f) Evaluation of variability in the performance results of the machining, rigidity of the machine tool under consideration.
g) Study of ejecting devices, safety devices, etc.
h) Required level of the accuracy in the work and quality to be produced.

DESIGN METHODOLOGY

Introduction to Siemens NX 8.0

Unigraphics software is one of the world's most advanced and tightly integrated CAD/CAM/CAE software package developed by Siemens PLM Software, offers several pre-packaged Mach Series solutions for NC machining. Available in a range of capability levels, these solutions accelerate programming and improve productivity for a variety of typical manufacturing challenges, from basic machining to complex, multiple-axis and multi-function machining, as well as mould and die manufacturing it also merges solid and surface modelling techniques into one powerful tool set. The packages include complete capabilities for geometry import, CAD modelling and drafting, full associatively to part designs, NC tool path creation, verification and post processing, along with productivity tools that streamline the overall machining process.

NX streamlines the entire tool development process including part design, tool assembly layout, and detailed tooling design and validation. Using NX‟s advanced functionality, step-by-step guidance and associations with part designs, you can work with even the most challenging tooling and fixture

designs.

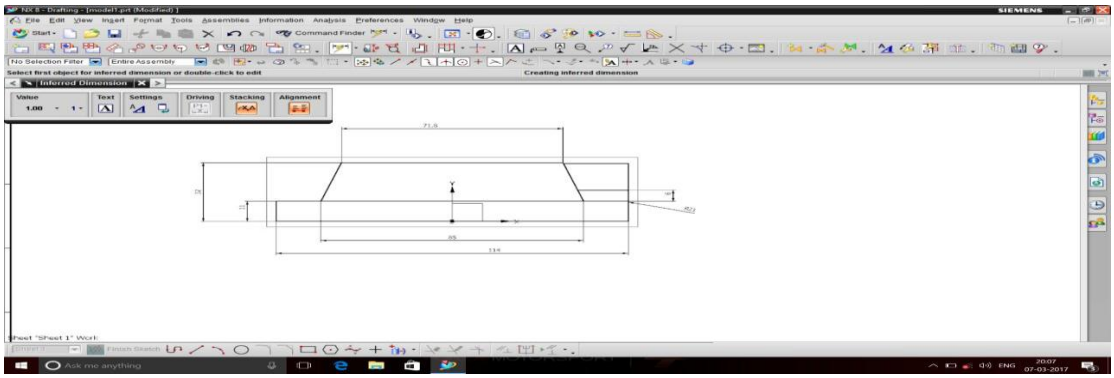


Figure 3.1 shows the 2d layout of work piece

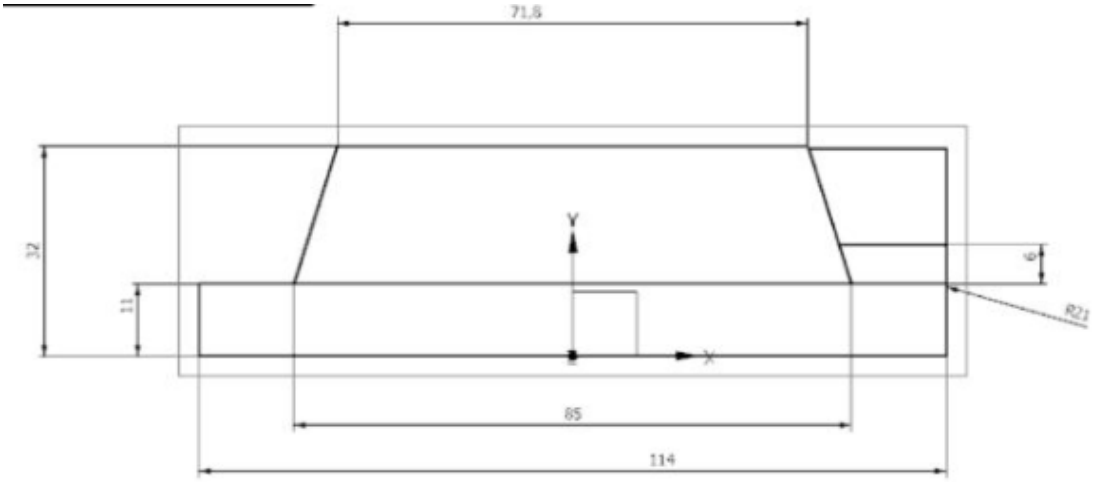
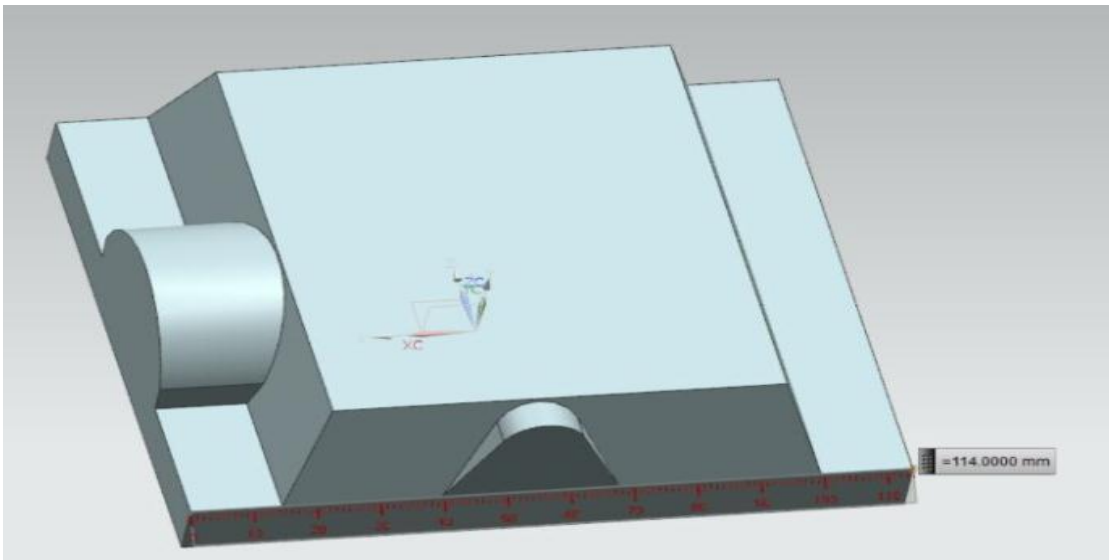


Figure3.2 shows Dimensions



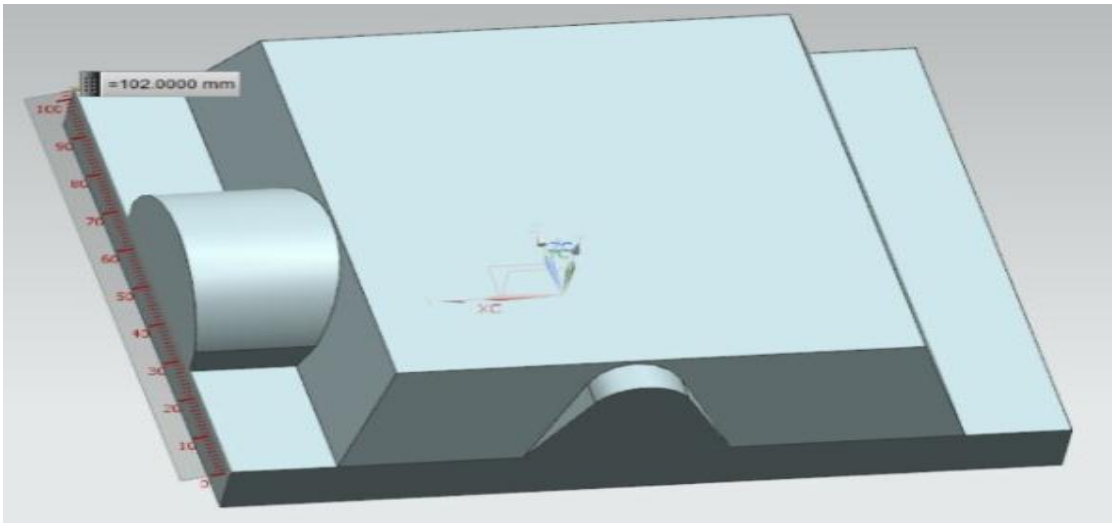


Figure3.3 shows the locators for new modifications.

After the preparation of design specified drawing of main block diagram the work piece modified with drill and clamp locations.

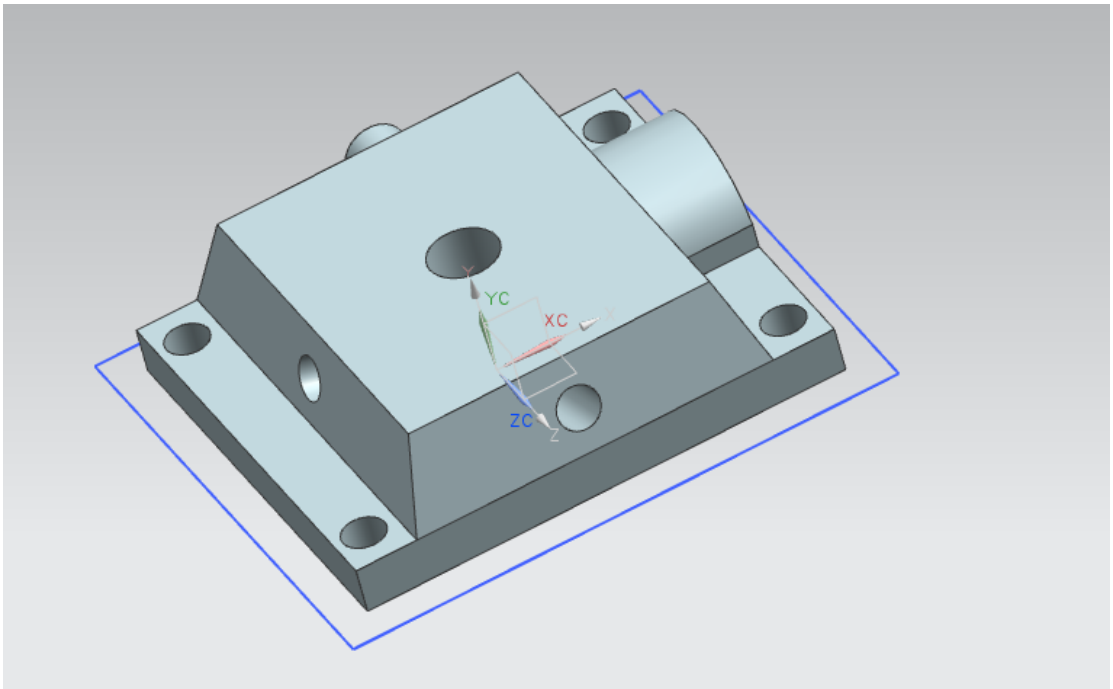


Figure3.4 shows the drilling holes of the base plate design

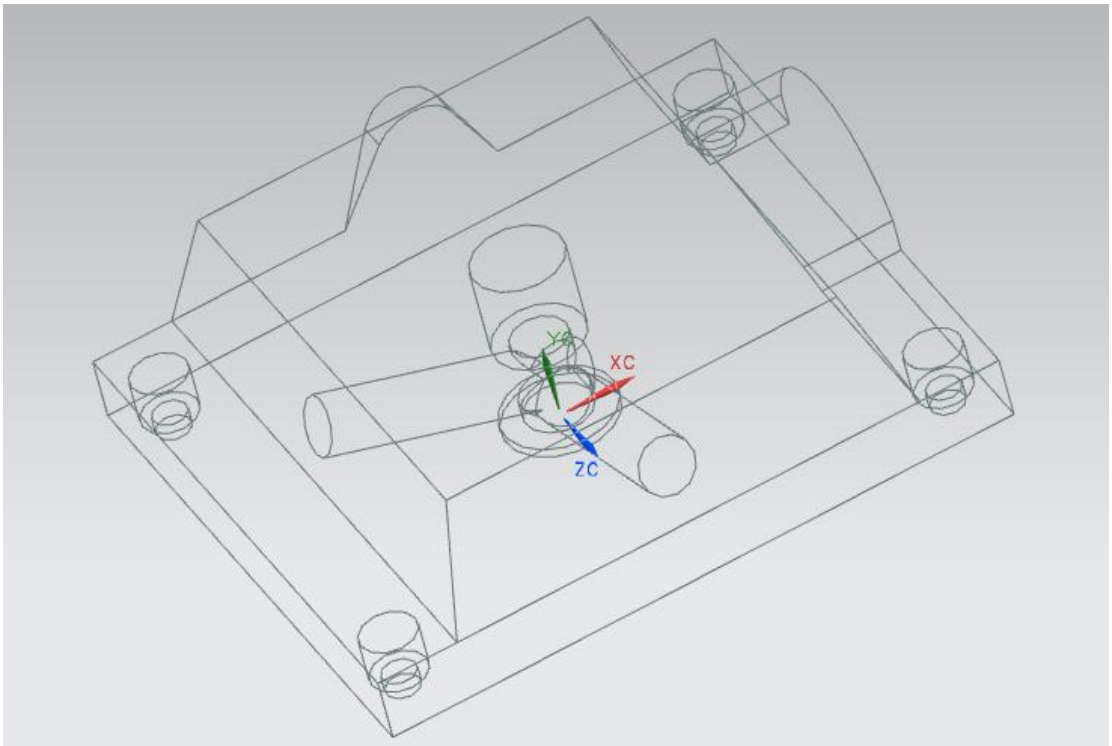


Figure3.5 shows the junction assembly of fluid flow

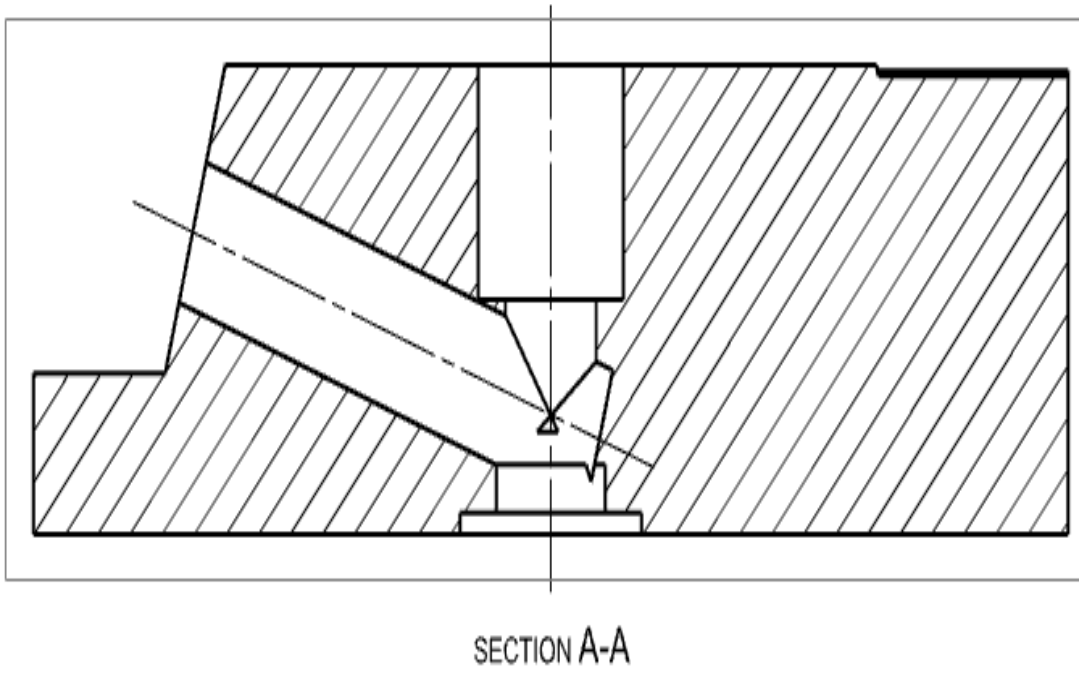
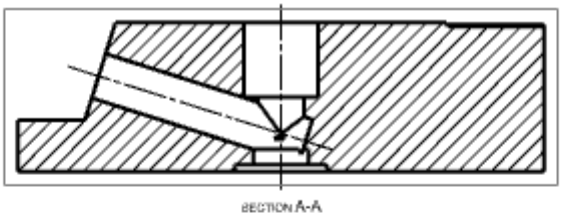
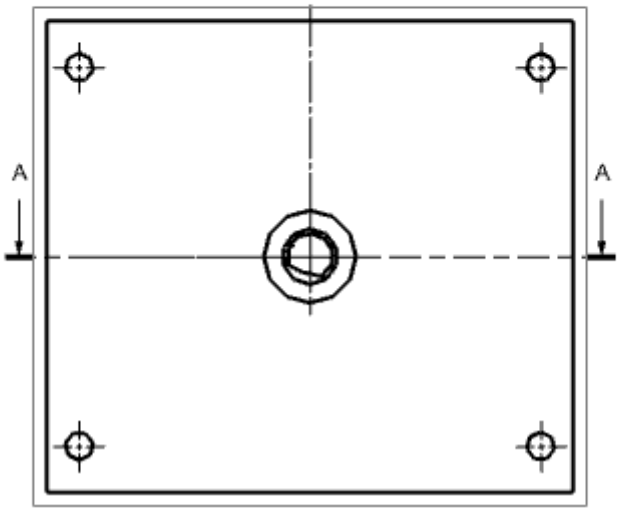


Figure3.6 shows the junction location of hydraulic oil





entry

Figure3.7 shows Clamping location at the bottom

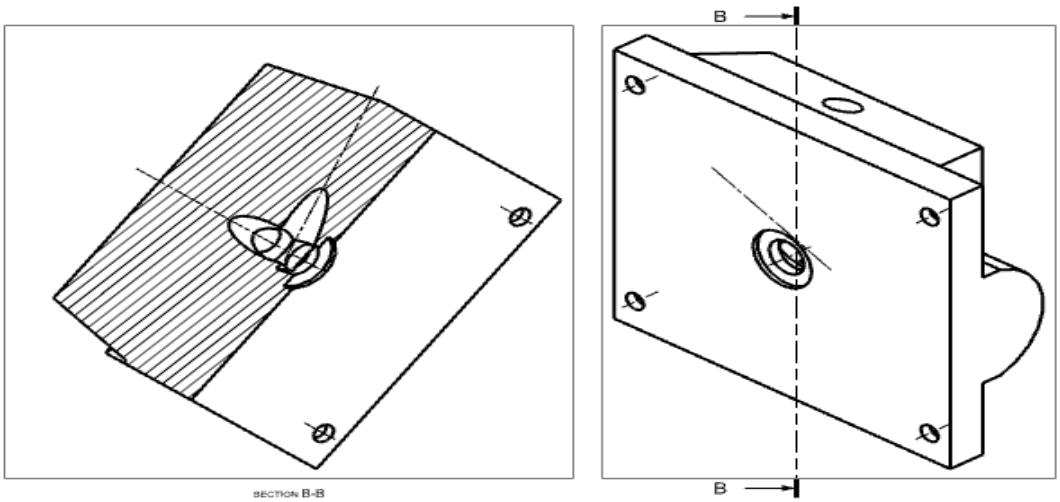


Figure3.8 shows the critical area of junction

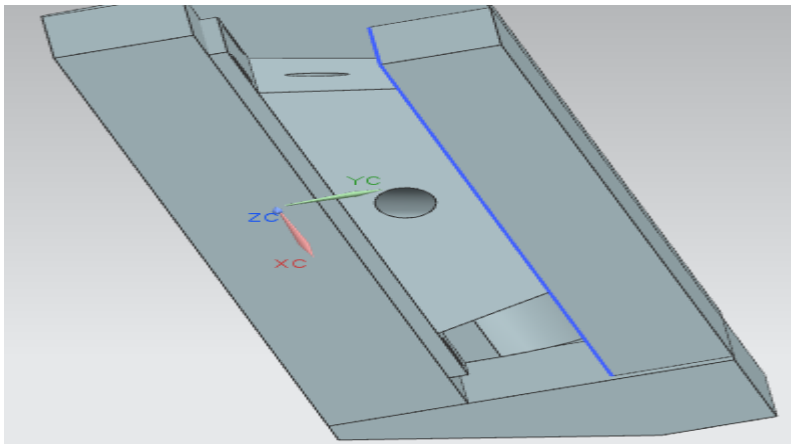
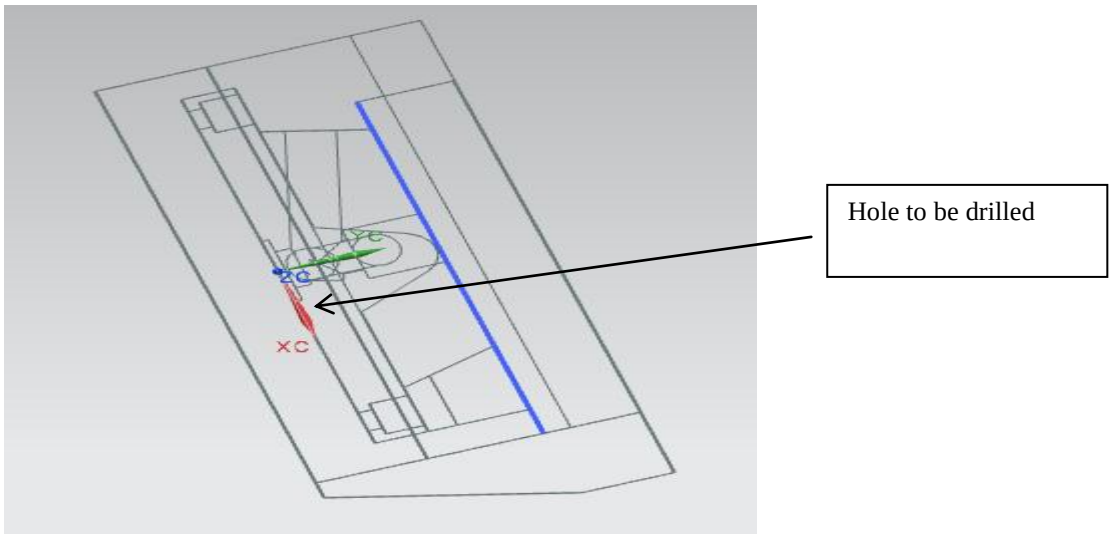


Figure3.9 shows jig mounted area of drilling hole



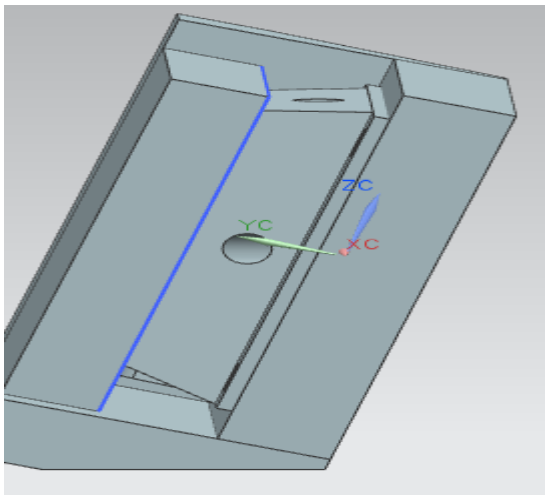


Figure3.10 shows the mount base area of jig for drilling second angled hole.

The assembly of the jig has fastened with Allen screws such that the modifications made very easy to re assemble if any modifications appears.

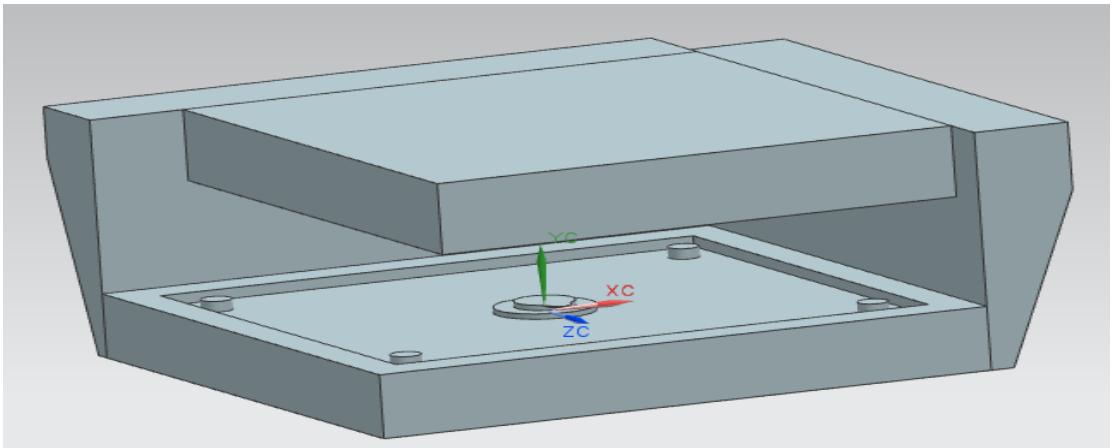


Figure3.13 shows the mount base area of jig for base plate assembly

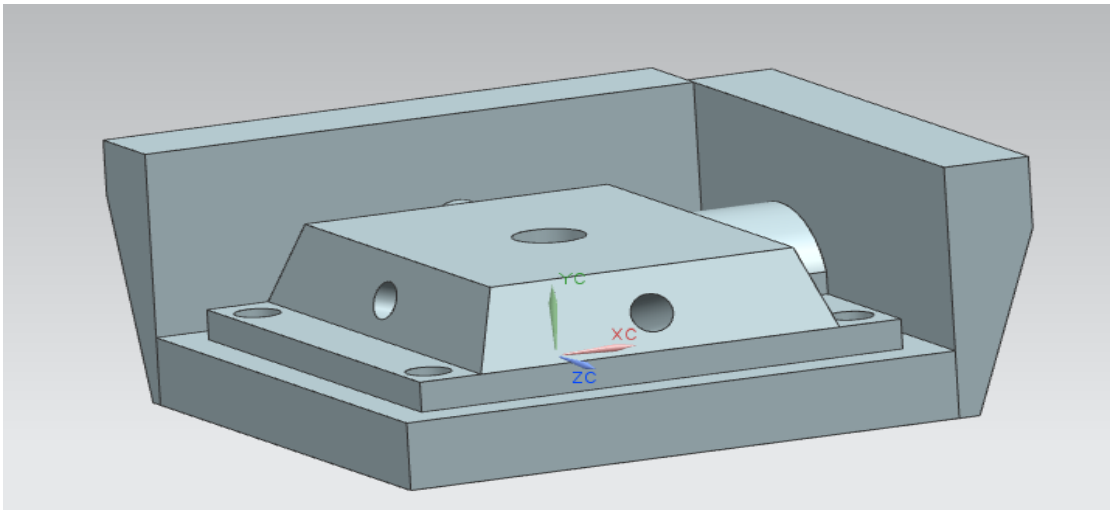


Figure3.14 shows the mounting of base plate in drill jig for

The jig designed as the drill hole position and drilling is normal to the position of rest direction of the jig base.

Discussions

The model designed as per the locators of assembly to increase the strength at the two edges . The main purpose of preparation of drilling jig is because of locators the job cannot sit in a proper way for drilling. Whole work has been carried out in a practical way to optimize component quality and production improvement.

Conveyor integration after drilling

DESIGNING PROCEDURE

Starting NX

Toolbars and tools

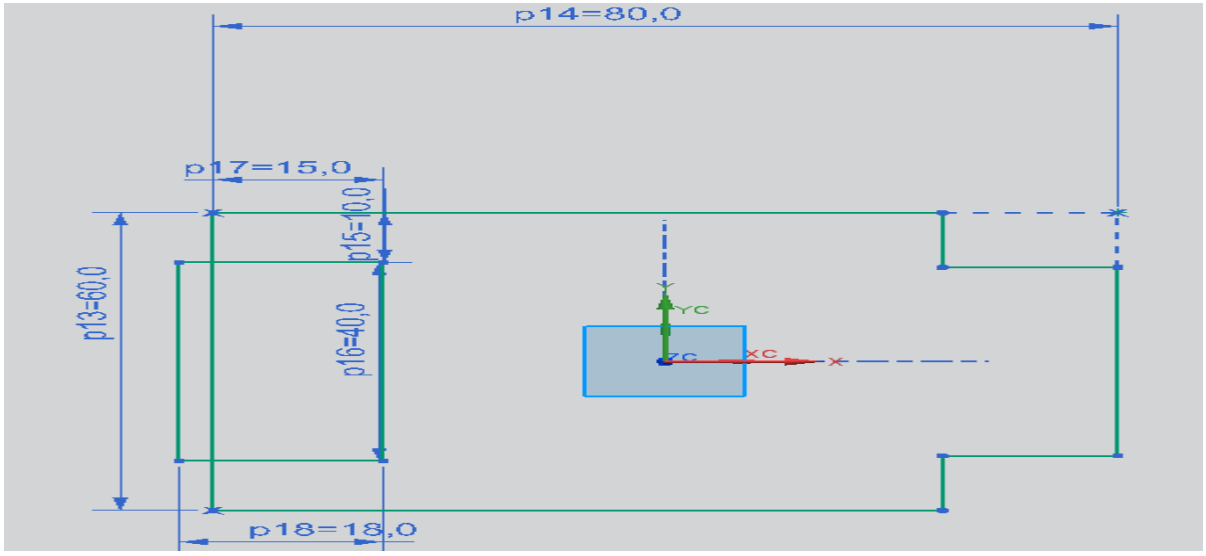


Fig 1 shows project 2d sketch view

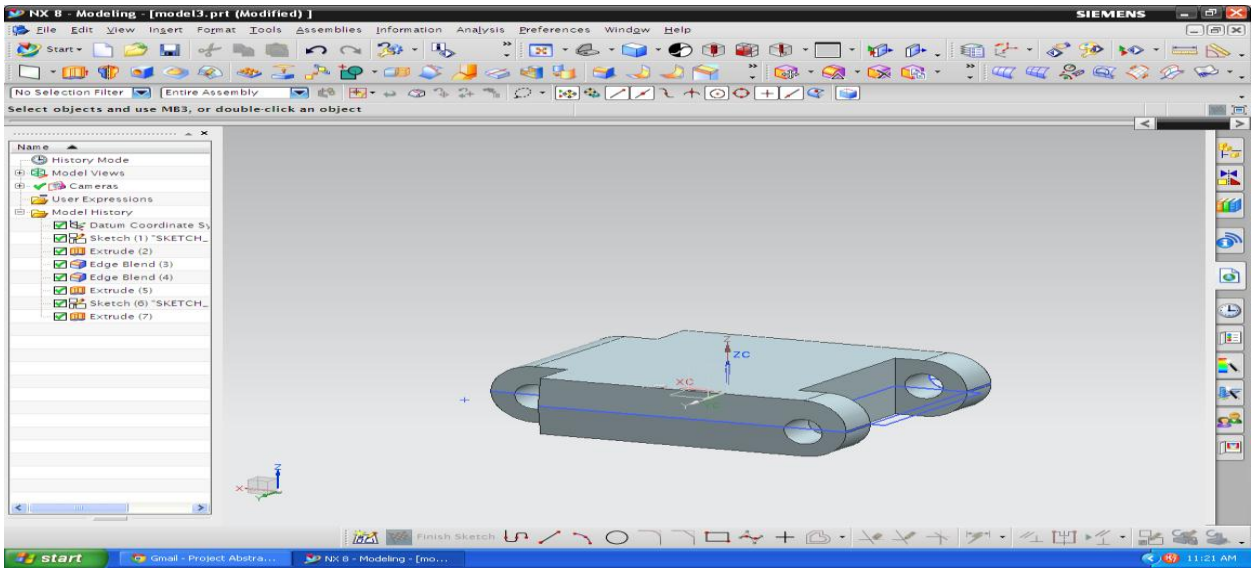


Fig 2 shows the 3d component with model tree

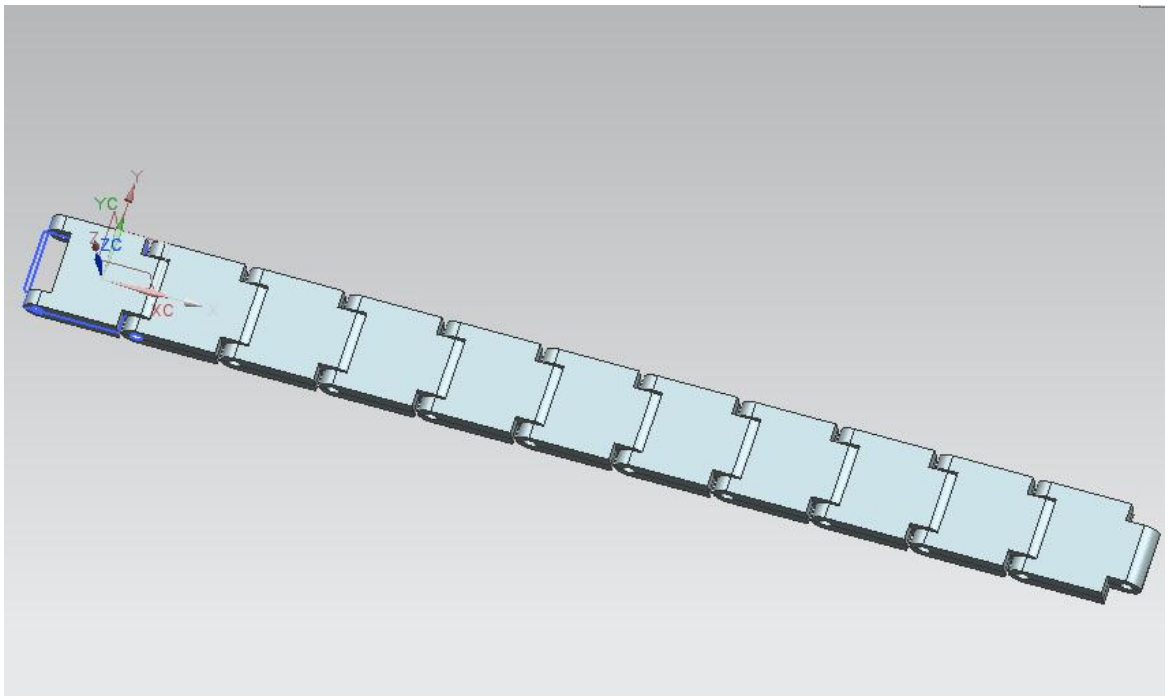


Fig 3 3d assembly of conveyor chain

Time study analysis after integration

Actual time of drilling=30sec

After integration with jig=25 sec

After conveyor erection automation=22 sec

Bulk quantity time reduction= 2 hrs per day

Conclusions

Time reduction analysis studied in the case of drilling by prepare drill jig and

installation of conveyors. Optimum time reduction study by quality concepts have to be compare with TOQ method for further research to get better improvements in present case studies.

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