BIW-Jigs & Fixture Design Using CATIA V5

Duration (3Month)

Design of Fixture - Specialization

INTRODUCTION

Body in White (B.I.W.) refers to the welded sheet metal components which form the vehicles structure to which the other components will be assembled, i.e., engine, chassis, exterior and interior trim. In the Car Industry BIW is the common term used in Weld Shop and also it is Sheet Metal body before going to paint shop

Course in BIW Fixture Design which gives the insight to Study and understanding of process, Concept design, Create 3D-Modeling and drafting. The course explains further on the Fixtures, Grippers, Clamping Units, Locating Units and Dump Units & Pin Units.

The course also gives an exposure to the automotive industry standards, Design & Manufacturing methodology briefly for the fresh Engineer to enter the industry with confidence. The training will be on software Catia for 3D Modeling, Assembly, BOM, 2D Drafting. The training will be completed with a Project.

The course is structured with introduction to Fixture Design basics to final design. Design of fixture is key to effective utilization of machine tools. Basics of fixture design if not implemented correctly results in poor productivity & quality problems. Set-up time and cycle time reduction, increased accuracy on components, deskilling the job setting operation are the obvious advantages of a good fixture. Competence in right fixture differentiates excellent organizations.

A complete process of fixture design will be carried out from concept to finish design. Pre-design activities like design input, conceptualization, process planning, accuracy consideration, cycle time estimation,

POKAYOKE, 3D modeling of parts and assembly, using popular design CAD tools and preparing the final manufacturing drawings. Design for Accuracy, Manufacturing and Assembly will be addressed during the course. It will be highly interactive and hands on training session and covers entire 360° view on fixture design aspects.

CATIA V5

A] Introduction to CATIA

- Understand CATIA Software

- Different versions of Catia

- What is CATIA V5?

- Open CATIA

- Starting CATIA using the Start Menu

- Opening an existing Document

- Understand the CATIA Interface

- The Windows Philosophy

- The Workbench Concept

- CATIA User Interface

- Workbenches

- Menus and Toolbars

- The Specification Tree

- Manipulating the Specification Tree

- Selecting Objects with the Mouse

- The Object/Action and Action/Objects Approaches

- Moving Objects with the Mouse

- What is the Compass?

- Graphic Properties

- Changing the Graphic Properties

- Rendering Styles

- Hide/Show

- View toolbar

- Standard toolbar

B] Sketcher

- Entering into Sketcher mode

- Different types of projections methods

- Plane selection

- Profile toolbar

- Operation toolbar

- Constraint toolbar

- Sketch Tool

- How to exit from sketcher mode

- Practice

C] Part Modeling

- Create a new Part

- Select and Appropriate Sketch Support (considering projection method)

- Create Pad Feature

- Save and Close the Document

C.1] Basic Features

- Determine a suitable Base Feature

- Create Pad and Pocket Features

- Create Holes

- Create Fillets and Chamfers

C.2] Additional Part Features

- Create Feature Profiles and Axis System

- Create Multi-profile Sketch Features(Multi section Solid & Multi Section Pocket)

- Create Shaft and Groove Features

- Shell the Model

- Multi Pad & Multi Pocket

- Drafted filleted pad and Drafted filleted pocket

- Create a Rib and slot

- Create Stiffener and Solid Combine

C.3] Dress-up Features

- Apply a Draft

- Create Threads and Taps

- Apply thickness

- Remove face

- Edit Features

C.4] Transformation Features

- Duplicate Features(Translate, Rotate, symmetry, axis to axis)

- Mirror

- Pattern

- Scaling

- Apply Material Properties

D] Assembly Design

- Create a new CATProduct

- Assemble in the Base Component

- Types of assembly methods

- Manipulate the position of the Component

- Snap

- Explode

- Clash detection while moving and in assembly

- Assemble and Fully Constraint Components

- Rearrange tree

- Multi instance

- Save the Assembly

- Space analysis

D.1] Designing

- Open an existing assembly

- Insert a new model

- Create a Sketch in Context

- Create Assembly-Level Features

- Measure inertia, distance

E] Drafting:

- Introduction to Generative Drafting

- General Process

- Accessing the Workbench

- The Drawing Environment

- Drafting Toolbars and Objects

- Start a New Drawing

- Setting the Drawing Sheet Format and Drafting Standards

- Starting a Drawing with a Blank Sheet

- Sheet Properties

- Title Blocks

- 2D catalogs

- Inserting Catalog Items

- Create Views

- Types of Views

- About Projection Plane

- CGR Views

- Create Dimensions and Annotations

- Section Views and Section Cuts

- Adding a Detail View, Clipping View, Broken View, Breakout View

- View Modifications

- Save the Drawing

- Print the Drawing

BIW FIXTURE DESIGN

FOCUS AREAS

1. Introduction to BIW Welding Fixture

- Introduction to fixture
- Principal used in BIW Fixture Design
- Carline concept and terminologies
- Introduction to Basic elements of fixture (Nomenclature)

2. 2D Drafting

- QC of 3D (check points before stating 2D)
- GA Detailing with orthographic and isometric view ballooning
- Materials used
- Mylar Detailing
- Gascut creation
- Location Pin
- Pin Retainer
- Simple shape (L,T, Z Blocks)
- Dolly plate
- Weldment (Simple and Critical)
- Mylar 2D using Scene (If mylar not at 0,0)
- 2D of GA if not design at 0,0
- Unit at Angular position
- 3d mylar 3d parts
- Background information filling
- Parameter and its link
- Tooling hole concept
- Base detailing
- Hole chart
- Bom

All 2D training given on Indian std and then after understanding all concept German std difference will be taught.

3. 3D Concept

- Inputs required to start design
- Process design(Theory from one example)
- 1st simple project
- Creation of simple fixture using start model
- Creation of multiple units with only mylars
- New form command
- Then create one simple Rest and clamp unit
- Unit combine
- Fixed Pin Unit
- Combine Pin Unit with adjacent units
- Retracting Pin unit using Tunker, Welker and MGPM Cyl.
- Base unit

All 3D training given on Indian Standard and then after understanding all concept German Standard method will be taught. (PLP publication)

4. Simulation

- Overview of simulation cell, zone
- Scope of Simulation Engineer
- Different types of Gun
- Gun selection overview
- Gun orientation
- Human ergonomics
- Criterion for manual welding

5. Modification

- Unit Modifications as per simulation

6. 3D Finish

- QC of 3D
- Reordering of tree
- Renaming using macro

- Rounding off concept

- Rounding off of mylar by changing PLP

- Rounding off of mylar by without changing PLP

- Hole adding

- Mylar splitting

- Machining steps

- Hardware add

- Color code

8. Data Management

- Folder management to avoid duplication

- Save management

- Unit folder wise saving

- How to send data to clients (send to directory)

8. Project 2

- Pokayoke study with example

- Clamp unit pivot point adjustment and opening angle consideration

- Use of magnet

10. Project 3

- Shimming concept

- 2way 3 way shimming criteria with example

- Angular pin unit using tunker and MGPM cyl.(one direction angle)

11. Project 4

- Pin-on Clamp concept 0,0 angle

12. Project 5

- Pin-on Clamp concept one direction angle

- Stopper concept and its types

13. SMC – CKG Cylinder Calculation

Use of Std parts from NAAMS library

Key Take Away

After undergoing the course, the participants will be able to -

1. Comprehensive design knowledge fixture design
2. Knowledge on design of simple fixture to complex fixture
3. Knowledge of process sheet
4. Hands on experience in fixture design
5. Good knowledge about gun selection
6. Knowledge in systematic approach on fixture design
7. Conceptualization towards BIW, Assembly, Welding and Inspection fixtures
8. Overall view about BIW robotic simulation

Benefits

- Thorough knowledge on fixture design fundamentals
- Specialization in fixture design
- Develops full confidence on fixture design, process design, gun selection, simulation
- Techno commercial considerable growth of an industry