IFS ACADEMY

Training For The Future!!

Career Program in Seating System Design using CATIA V5

Course Curriculum (Duration: 4 Months)

Mode of Training: Classroom & Instructor-Led Online Live

Module A: Domain Theory

Chapter 1. Introduction to Vehicle Seating System

A. Basic Components of Vehicle Seat and Terminology
B. Introduction to SGRP and H Point
C. Various Types of Seats and Seating System Mechanisms
D. Importance of Head Restraints in automotive seating system
E. Marketing department requirements in seat design
F. Comfort requirements in seat design
G. Government Regulations and OEM requirements in seat design
F. Introduction to seat costing

Chapter 2. Initial Seat Design Process

A. Starting seat layout from H Point and STO (Seat Trim Outline)
B. Selection of carryover components
C. Documentation of Target Definition Matrix (TDM)
D. Introduction to DFMEA (Design Failure Mode Effect Analysis) process
E. CAE Simulation Plan and CAE Cost
F. Design Verification Plans (DVP) and Testing Cost
G. Design for Manufacturing and Assembly considerations

Chapter 3. Prototype Seat Design and Development

A. Collection of CAD Models of carryover parts
B. Packaging of carryover parts with respect to H Point & STO (Seat Trim Outline)
C. Design of new parts [Metal - Plastic and Foam Parts]
D. Design Reviews and Design Changes
E. Prototype Seat Visual Bill of Material (BOM)
F. Estimation of prototype tooling cost and piece price cost
G. Supplier Selection and Prototype Project Management
H. Prototype Assembly fitment trials and OEM approval

Chapter 4. Introduction to Hand Calculations in Seat Design

A. Use of Shear Force and Bending Moment Diagrams
B. Spring Design
C. Deflection related Calculations
D. Fatigue Failure Calculations

Chapter 5. Introduction to seat CAE Simulations

A. Why CAE Simulations required?
B. Meshing of Seat
C. Various CAE Simulations required before proceeding to Tooling
D. Importance of CAE Data and it's use for design changes

Chapter 6. Seat Foams - Manufacturing Process & Design

A. Foam types and manufacturing processes

B. Seat Foam Design Process [A Solid and B Solid]
C. Seat Foam Hardness and Seat Foam Density
D. Comfort Study of Seat Cushion and Seat Backrest
E. Seat Foam Testing

Chapter 7. Introduction to Seating System Mechanisms

A. Seat Track Mechanism
B. Seat Recliner Mechanism
C. Seat Height Adjuster Mechanism
D. Seat Lumbar Mechanism
E. Seat Latches
F. Seat Head Restraint Mechanisms

Chapter 8. Seating System Government Regulations

A. European Union Regulations and seat tests
B. USA Regulations and seat tests
C. Indian Regulations and seat tests
D. NCAP Testing requirements
E. OEM specific testing requirements
F. How to reduce product failure risks

Chapter 9.Seating System Layout Drawings

A. Safety Layout
B. Comfort Layout
C. Packaging Layout
D. Environment Layout
E. Overall Seat Assembly Drawings

Chapter 10. GD&T and Part Drawings

A. Introduction to GD&T (Geometric Design and Tolerances)
B. Types of Fits
C. Part Drawings
D. Introduction to tolerance stacking

Chapter 11. Seating System Welding & Checking Fixture Design

A. Welding Fixture Design for Seat Structure Welding Assemblies
B. Checking fixtures for sheet metal parts
C. Various considerations in sheet metal parts design
D. Sheet Metal forming simulations

Chapter 12. Various Considerations in Seat Plastic part Design

A. Plastic Part design to eliminate defects in plastic parts
B. Introduction to Plastic Injection moulding process
C. Plastic part tool design considerations
D. Plastic parts tooling related simulations

Chapter 13. PPAP Process

A. DVP Sign off
B. PVP Sign off
C. Run at Rate and PSW Sign off

Chapter 14. Quality issues after SOP (Start of Production)

A. Documentation of Quality related issues after SOP
B. Process to take corrective actions of such issues

Chapter 15. Design Change Process
(ECR- Engineering Change Requests)

A. Typical ECRs
B. Documentation required for ECR implementation

Module B: CATIA V5 Tool Based Contents

Chapter 1: Concepts Design - CAD Model

A. Concept CAD of Vehicle Exterior

- Compilation of Inputs from Styling Team and Marketing Team
- Preliminary vehicle exterior CAD
- Design Reviews and CAD Changes

One assignment will be given to students and guidance will be provided by trainer to complete this assignment.

B. Concept CAD of Seat

- Compilation of Inputs from Styling Team and Marketing Team
- Preliminary Seat CAD
- Design Reviews and CAD Changes

One assignment will be given to students and guidance will be provided by trainer to complete this assignment.
This assignment is to enhance creativity of trainees and enhancing their concept design skills. This training will be a combination of concepts design and use of CAD to develop various concepts. This is a key skill for new product development.

Chapter 2. Seat Sheet Metal Part Design

A. Sheet Metal Part Design

- Concept sketch as an input will be given
- The strength requirement for this specific sheet metal part will be communicated
- Does and Don'ts for this sheet metal part will be provided.
- Trainee need to design the part on CAD terminal
- Trainer will review the design and communicate changes required with reasons
- Trainee will incorporate the changes
- After 3D CAD is approved by Trainer, Trainee will make part drawing with GD&T symbols.
- Trainer will review Part drawing and communicate changes.

B. Sheet Metal Welding Assembly Design and Drawing

- Welding Assembly CAD
- Welding Assembly Drawing

In this session, trainee will learn to prepare Welding Assembly CAD and Welding Assembly Drawing under guidance of trainer.

Chapter 3. Foam Pad Design for Vehicle Seats

A. Design of a Solid for Foam

- STO (Seat Trim Outline) as an input will be provided
- Trainee will design A Solid for seat foam with the help of Trainer

B. Design of B Solid for Foam

- Seat Structure will be provided as an input.
- Trainee will design B Sold for seat foam with the help of Trainer
- Foam Pad will be created using A Solid and B Solid. Foam Design will be reviewed.

Chapter 4. Plastic Part Design for Vehicle Seat

- Requirement for plastic part will be provided
- Trainee will make CAD for plastic part with the help of Trainer
- CAD review and change

Chapter 5. Seat Assembly Safety Layout

A. Seat Safety Layout

- The safety related data required on seat assembly drawing will be provided
- The trainee will create Seat Assembly Safety Layout Drawing.
- Trainer will review this layout drawing and interactively make changes.

B. Other type of Seat Layouts

- Introduction to other types of seat layout drawings
- Few Select Cases
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Chapter 6. CAD of Seat Mechanism

A. Trainer will select a seat mechanism

- Design requirements will be provided
- Trainee will prepare mechanism CAD with the help of Trainer

B. Packaging of mechanism with seat

- Mechanism and Seat CAD will be provided
- There will be changes in seat mechanism
- Trainee will modify seat mechanism CAD as per requirement and package it with seat CAD under guidance of Trainer.

Chapter 7. Preparation of Visual Bill of Material

- Seat CAD will be provided.
- Trainee will prepare Visual BOM with parts weight data

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