Surface Modelling:

Course Objectives	- Develop proficiency in the extruding technique to transform wireframe geometries into solid models. - Surface modeling principles and techniques. - Explore the impact of surface relimitations on aesthetics, functionality, and manufacturability. - Foster a quality-driven mindset by incorporating surface check tools into the design validation process.
Course Outcomes	- Exhibit the fundamentals of Generative Shape Design and its application in creating wireframe geometry. - Proficient in the extruding technique to transform wireframe geometries into solid models. - Explore the impact of surface delimitations on aesthetics, functionality, and manufacturability. - Quality-driven mindset by incorporating surface check tools into the design validation process.

Course Duration: 45 Hours

Course Curriculum:

UNIT 1: GENERATIVE SHAPE DESIGN

Introduction to Surface Design- Advantages of using generative shape design- Designing a surface-based feature- Managing features- Introduction to ordered geometrical set- Geometrical set versus ordered geometrical set- About hybrid design-Creating a Reference Geometry-Introduction to Reference Geometry- Creating Reference Geometries- Introduction to local geometries- Creating Multiple axis systems.

UNIT 2: CREATING A WIREFRAME GEOMETRY AND EXTRUDING

Creating 3D curves **-** About the curve continuity- About the impact of tension- creating curves from scratch- Creating a 3D Corner- Creating a Boundary- Projecting elements- Creating parallel curve **-** Extruding and revolving a profile and sweeping a profile - Selecting profiles for extrude and revolve- Extruding a profile - Revolving a profile- Extruding/revolving a profile using the context toolbar-Creating a surface offset from a Reference-Creating an offset surface- Sweeping a profile**-** Importance of the Spine- Calculating a spine using a plane or guide curve- About explicit Sweep- About conical sweep

UNIT 3: CREATING SURFACES

Creating a Multi-Section and an Adaptive Sweep Surface - Creating Multi-section

surface-Create an Adaptive Sweep Surface-Calculating an Adaptive Sweep- Adaptive Sweep and simple Sweep- Constrained Sketch- Common errors when computing the Sweep- Create an adaptive Sweeping using Existing Surface

UNIT 4: SURFACE RELIMITATIONS

Surface Re-Limitation and Connection - About the Re-limitation of Surfaces- Commands to Re- limit Surfaces and Curves- About the split Command- Splitting Elements- About the Trim Command- Trimming an Element- About Extrapolation of Elements- Create a Car Door handle - Connecting Surfaces Smoothly   - Understanding the need to connect the Surfaces smoothly- Types of fillets- Managing Shape fillets extremities- Creating an Edge Fillet Using the Context Toolbar- Criteria for Selecting the Blends and the Fillets- Exercise: Create the Fillets for Existing Surface

UNIT 5: SURFACE CHECK TOOLS

Checking the Surface Continuity - Understanding the need of Surface Continuity- Exercise: Analyze the surface Continuity- Types of Flaws- Detecting the Geometric Connection in the Surfaces- Connection Analysis- Analyzing Surface - Curve Connections- Healing Operation

LIST OF EQUIPMENTS FOR BATCH OF 5O STUDENTS			
S NO	**Type**	**Description**	**Qty**
1	Workstation	32 GB RAM, Intel i7 Processor, 4 GB Graphics Card, Operating System 250GB, Storage 250GB hard disk, Mouse, Keyboard.	50
2	Projector	LCD Projector or Smart Board	1
3	Internet	50 to 100 Mbps High Speed Internet Connection with Wi-Fi facility	1
4	Computer Lab	Computer lab with 50 Students Capacity	1
5	Software	Dassault Systems 3DEXPERIENCE R2022x Hotfix6.28	50

Test Projects:

Use Cases:

INDSUTRY SCOPE:

Automotive, Industrial Equipment, Aerospace, Agriculture, Electric Vehicle, Manufacturing, Production, Heavy Machinery industry.
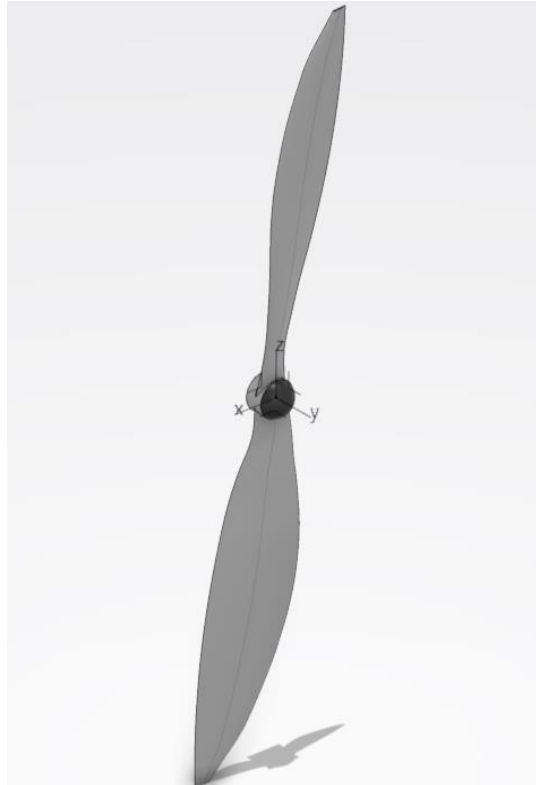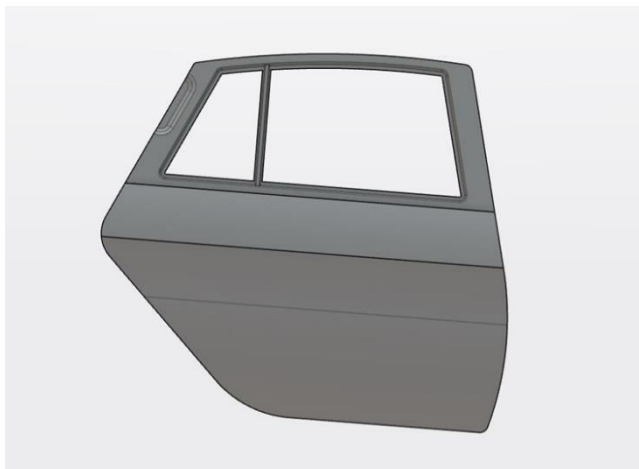
TASK 1: Design of Badminton bat frame.
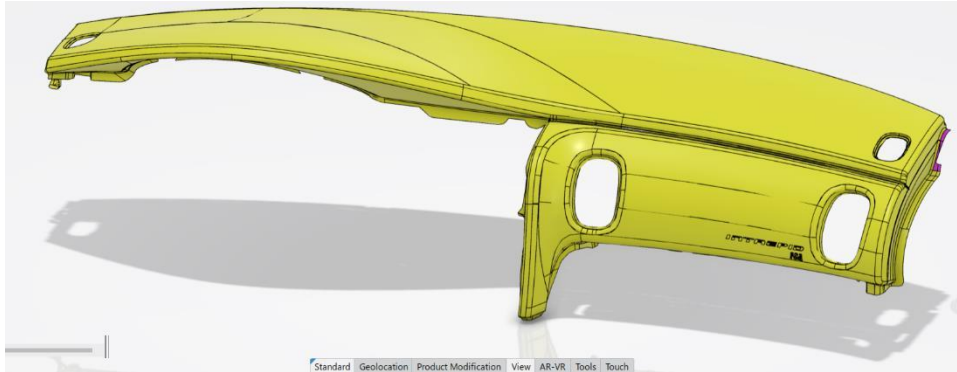

TASK 2: Design of Dryer

TASK 3: Design of Aircraft Prope.

TASK 4: Design of Car door panel.

TASK 5: Design of Car Dashboard

INDUSTRY USE CASES

1. Automotive industry: Creating and refining complex car body designs, including exterior surfaces and aerodynamic components.
2. Aerospace industry: Designing aircraft fuselages, wings, and engine nacelles with precise surface curvature and aerodynamic characteristics.
3. Product design and consumer goods: Developing consumer products such as electronics, appliances, and furniture with sleek and ergonomic surface designs.
4. Industrial machinery: Designing complex machinery and equipment with smooth and functional surface profiles for efficient operation.
5. Architecture and construction: Creating 3D models of buildings, structures, and interiors with accurate surface representation for visualization and design evaluation.
6. Medical devices: Designing prosthetics, orthopedic implants, and medical equipment with anatomically accurate and patient-specific surface shapes.
7. Jewelry and accessories: Designing intricate and detailed surfaces for jewelry, watches, and fashion accessories.
8. Packaging industry: Designing product packaging with attractive and functional surface textures, patterns, and branding elements.
9. Consumer electronics: Designing smartphones, tablets, laptops, and other electronic devices with visually appealing and ergonomic surface forms.

10. Furniture design: Creating stylish and comfortable furniture designs with visually pleasing surface contours and textures.

11. Sports equipment: Designing sports equipment like bicycles, helmets, and tennis rackets with optimized aerodynamics and performance-enhancing surfaces.

12. Film and entertainment industry: Creating visual effects and character models with detailed and realistic surface textures for movies, games, and animations.

13. Industrial design: Designing industrial equipment, tools, and machinery with optimized surface profiles for improved functionality and ergonomics.

14. Packaging design: Creating innovative and visually appealing packaging designs for food, beverages, cosmetics, and other consumer products.

15. Art and sculpture: Designing and visualizing artistic sculptures and installations with intricate and unique surface forms.

16. Footwear design: Designing comfortable and stylish footwear with optimized surface shapes and contours for proper fit and aesthetics.

17. Marine and shipbuilding industry: Designing ship hulls and marine structures with hydrodynamic surface shapes for optimal performance and fuel efficiency.

18. Interior design: Creating 3D models of interior spaces with accurately represented surface materials, textures, and finishes.

19. Consumer appliances: Designing appliances such as refrigerators, washing machines, and kitchen gadgets with user-friendly and visually appealing surface designs.

20. Sustainable design: Designing environmentally friendly products with optimized surface forms to minimize material waste and improve resource efficiency.