Fusion 360 Generative Design and AI-Driven Product Optimization Professional Training

Target Audience

This course is designed for product designers, mechanical engineers, industrial designers, design analysts, manufacturing engineers, and innovation professionals who want to leverage Autodesk Fusion 360 for next-generation engineering design workflows. It is suitable for learners with basic CAD knowledge who want to build strong modeling fundamentals and advance into AI-driven generative design, lightweight optimization, sustainable product development, additive manufacturing workflows, and performance-based engineering design decision making.

Course Outcomes

- Understand the Autodesk Fusion 360 cloud-based product development environment
- Create parametric sketches, solid models, and advanced engineering geometry
- Apply constraints, dimensions, and construction geometry effectively in product design
- Build advanced solid models using sweep, loft, rib, web, emboss, shell, and pattern tools
- Understand Generative Design principles and AI-driven engineering optimization workflows
- Create preserve geometries, obstacle geometries, and starting shapes for design studies
- Apply structural loads, constraints, and manufacturing criteria to generative studies
- Select materials and manufacturing methods for performance and cost optimization
- Explore, classify, and compare multiple generated design alternatives using analytical tools
- Optimize designs for lightweighting, manufacturability, sustainability, and performance
- Transfer generated outcomes into production-ready engineering workflows
- Execute real-world optimization projects using Fusion 360 Generative Design

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Course Objectives

- Develop strong fundamentals in Fusion 360 sketching, modeling, and product development workflows
- Build proficiency in advanced modeling techniques required for engineering-grade design creation
- Introduce AI-driven Generative Design concepts and engineering optimization strategies
- Enable learners to define preserve regions, obstacle zones, loads, constraints, and design goals
- Train participants in selecting materials and manufacturing methods for optimized engineering output
- Build analytical understanding of design comparison, ranking, and performance-based decision making
- Introduce sustainable engineering concepts through material reduction and lightweight design
- Reinforce learning through practical optimization exercises and end-to-end industry projects
- Prepare participants for modern product innovation workflows using Autodesk Fusion 360

Course Outline

The course comprises **40-hours** of theory and labs and is divided into **14** different chapters. Each chapter will be followed by hands-on lab exercises to reinforce learning and gauge understanding of the topics covered.

Table of Contents

- Managing Data by Using the Data Panel
- Saving a Design File
- Exporting a Design to Other CAD Formats
- Opening an Existing Design File
- Working in the Offline Mode
- Recovering Unsaved Data
- Sharing a Design
- Invoking a Marking Menu
- 3D Printing
- Design and Analysis with Fusion 360

Chapter 2. Parametric Sketching Fundamentals

- Creating Sketches
- Working with Selection of Planes
- Specifying Units
- Specifying Grids and Snaps Settings
- Drawing a Line Entity
- Drawing a Tangent Arc by Using the Line Tool
- Drawing a Rectangle
- Drawing a Circle
- Drawing an Arc
- Drawing a Polygon
- Drawing an Ellipse
- Drawing a Slot
- Drawing Conic Curves
- Drawing a Spline
- Editing a Spline
- Adding Fit Control Points in a Spline
- Controlling the Curvature Display of a Spline

- Creating Sketch Points
- Inserting Text into a Sketch

Chapter 3. Sketch Editing, Constraints and Design Intent

- Trimming Sketch Entities
- Extending Sketch Entities
- Offsetting Sketch Entities
- Creating Construction Entities
- Mirroring Sketch Entities
- Patterning Sketch Entities
- Creating a Sketch Fillet
- Creating a Sketch Chamfer
- Scaling Sketch Entities
- Breaking Sketch Entities
- Working with Constraints
- Applying Constraints
- Controlling the Display of Constraints
- Applying Dimensions
- Modifying Editing Dimensions
- Working with Different States of a Sketch
- Working with Sketch Palette

Chapter 4. Core Solid Modeling and Construction Geometry

- Creating an Extrude Feature
- Creating a Revolve Feature
- Navigating a 3D Model in Graphics Area
- Creating a Construction Plane
- Creating a Construction Axis
- Creating a Construction Point

- Working with a Sketch having Multiple Profiles
- Projecting Edges onto a Sketching Plane
- Creating 3D Curves
- Editing a Feature and its Sketch
- Editing the Sketching Plane of a Sketch

Chapter 5. Advanced Product Modeling Techniques

- Creating a Sweep Feature
- Creating a Loft Feature
- Creating Rib Features
- Creating Web Features
- Creating Emboss Features
- Creating Holes
- Creating a Thread
- Creating a Rectangular Box
- Creating a Cylinder
- Creating a Sphere
- Creating a Torus
- Creating a Helical and a Spiral Coil
- Creating a Pipe
- Creating 3D Sketches
- Creating a Rectangular Pattern
- Creating a Circular Pattern
- Creating a Pattern along a Path
- Mirroring Features Faces Bodies Components

Chapter 6. Introduction to Generative Design and AI-Driven Engineering

- What is Generative Design
- Important Differences Between Generative Design and Topology Optimization

- Using Generative Design in Fusion 360
- Examining the Features of the Target Design
- AI-driven engineering optimization concepts
- Lightweight engineering design philosophy
- Sustainable engineering design concepts
- Tips for Custom Design Projects
- Usage Fields and Future of Generative Design

Chapter 7. Setting Up Generative Design Studies

- Creating a New Generative Design Project
- What are Preserve Geometries
- What are Obstacle Geometries
- Starting Shape and its Features
- Specifying Constraints
- Specifying the Forces Affecting the Part
- Specifying Criteria for Generative Design
- Determining Design Goals
- Changing Parameters
- The Importance of Parameters for Custom Projects

Chapter 8. Materials and Manufacturing Intelligence

- Examining the Fusion 360 Material Library
- Creating Custom Materials
- What are Material Features
- Choosing Materials for the Part
- Applying Physical Material Properties
- Customizing Material Properties
- Calculating Mass Properties
- Measuring the Distance between Objects

- Performance versus material selection
- Material optimization strategies

Chapter 9. Manufacturing-Aware Generative Design

- Examining Manufacturing Methods
- Introduction to Manufacturing Methods with Generative Design
- Additive Manufacturing
- Manufacturing with Milling
- Two Axis Cutting and Casting Methods
- Choosing a Manufacturing Method with Generative Design
- Manufacturability constraints
- Production-aware design decisions

Chapter 10. Exploring and Comparing Generated Outcomes

- Exploring Possible Design Outcomes with the Explore Tool
- Design Classification
- Reading Tables with Scatter Plot
- Comparing the Designs Selected
- Tips for Selecting the Optimum Design
- AI-assisted design ranking
- Performance-driven design selection
- Design comparison workflow

Chapter 11. Finalizing and Refining Generated Designs

- Examining Possible Outcomes with Preview
- Transferring the Outcome to the Design Area
- Examining Form Modelling Techniques
- Working with the Press Pull Tool
- Creating Fillets

- Creating Chamfers
- Creating Shell Features
- Adding Drafts
- Scaling Objects
- Combining Solid Bodies
- Offsetting Faces of a Model
- Splitting Faces of a Model
- Splitting Bodies

Chapter 12. Lightweight and Sustainable Product Optimization

- Material reduction strategies
- Weight optimization workflows
- Strength versus weight balancing
- Sustainable product development concepts
- Engineering efficiency optimization
- Product redesign for performance enhancement

Chapter 13. Additive Manufacturing and Innovation Workflows

- Designing for additive manufacturing
- Organic design interpretation
- Production preparation workflows
- Additive manufacturing optimization
- Prototype development workflow
- Manufacturing feasibility analysis

Chapter 14. End-to-End Generative Design Industry Project

- Problem definition
- Design study setup
- Preserve and obstacle geometry creation

- Material and manufacturing selection
- Force and constraint application
- Outcome exploration and comparison
- Design optimization and finalization
- Production-ready model preparation
- Capstone product innovation project