Week 1 – Lecture Conceptual Design
Outline

• Elements of Product Design
• Market Demands and Challenges
• Product Lifecycle Phases
• Conceptual Design Phase
• Digital Conceptual Sketching
• Autodesk SketchBook Designer
• Automotive Seat Project Introduction
Product Design
Products are Always Improving
Defining Design

• “Good design is good business.”
  Thomas Watson, Jr., President, IBM

• “Good design is good citizenship.”
  “Milton Glaser, Designer”

• “Design is the fundamental soul of a man-made creation that ends up expressing itself in successive outer layers of the product or service. Design is not just what it looks like and feels like. Design is how it works.”
  Steve Jobs, CEO, Apple
Product Design Challenges

- High Quality
- Low Cost
- Shorter time-to-market
- Features & configurations
- Customized / personalized
- Green / sustainability / human right
Product Lifecycle

Requirements Management

Portfolio Management

Conceptual Design

Product Engineering

Manufacturing Engineering

Simulation & Validation

Build & Produce

Disposal & Recycling

Maintenance & Repair

Sales & Distribution

Test & Quality
Requirements Management

The capturing, management, and tracking of all product requirements to ensure alignment for market success and reduced risk.

- Integration of requirements throughout the lifecycle
- Captured customer input and requirements
- Relation of final results to requirements
- Provides audit trail documentation
Product Lifecycle

Requirements Management

Portfolio Management

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Product Engineering

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Simulation & Validation

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Sales & Distribution

Test & Quality
Portfolio Management

Product portfolio management is the planning of product lines and relationships of current and future products.

– Product Configurations
– Different Market Requirements
– Hierarchies & Relationships
– Future Expansion and Enhancements
Product Lifecycle – Week 1

Requirements Management

Portfolio Management

Conceptual Design

Product Engineering

Manufacturing Engineering

Simulation & Validation

Build & Produce

Disposal & Recycling

Maintenance & Repair

Sales & Distribution

Test & Quality
Common Terms Used

• **Ideation**
  The process of creating new ideas

• **Conceptual Design**
  Type of art which gives precedence to hypothetical function

• **Industrial Design**
  Improve the aesthetics, ergonomics, and usability of a product
Conceptual Design Process

Brainstorming

- Concept Selection

Theme Ideation
(Thumbnail Sketches)

- Review
- Theme Selection

Theme Refinement
(technical renderings)

- Concept Selection

Design Product
Design Objectives

• Reference Products
• Technical Specification
• Feature Requirements
• Target Customer Profile
• Voice of Customer
Brainstorming Phase

- Ensure Alignment to Design Objectives
- Combination of Individual Activity and Group Activity
- Typically Some Structured Sessions
- No Idea is a Bad Idea
Theme Ideation Phase

- Leverage Brainstorming Results
- Reference Back to Design Objectives
- Create Multiple Theme Thumbnail Sketches
Theme Refinement Phase

- Leverage Aspects of Multiple Themes
- Technical Feasibility and Manufacturability
- Quality, Cost, and Time-to-Market
- Compete Presentation of Design
Automotive Seat Introduction
Concept Brainstorming
Design Expressions (Thumbnails)
Design Expressions (Thumbnails)
Theme Selection
Conceptual Design Surfacing / Modeling

The conceptual design phase often includes the creation of high quality “A-Side” surfaces to define the product’s shape.

- Used for complex styled free formed shaded objects
- Used for high “Class-A” surfacing requirements
Digital Sketching Benefits

• **Sharing & Collaboration**
  The digital file can easily be shared with others without scanning

• **Productivity – Faster**
  Ability to sketch faster and make edits to explorer more design options

• **Leverage Existing Assets**
  Use existing digital files like photos and CAD files for reference

• **Downstream Use**
  Reuse the digital sketch vectors and graphics for 3D model creation
Digital Sketching Input Devices

• **Mouse**
  All general computer mouse devices

• **Touch**
  Tablet based mobile or computer devices like the Apple iPad

• **Stylus / Pen**
  Wacom Cintiq devices are industry leading pen-and-screen devices
Autodesk® SketchBook® Designer

• Explore concepts and product stunning artwork with a hybrid paint and vector workflow.

• SketchBook Designer provides the functionality creative professionals need to quickly transform ideas into compelling design iterations.
Autodesk® SketchBook® Family

• **Autodesk® SketchBook® Mobile**
  Sketch on the go designed for mobile phone devices

• **Autodesk® SketchBook® Pro for iPad**
  Premium sketching app for the Apple iPad tablet

• **Autodesk® SketchBook® Pro**
  Robust full version for paint based digital sketching

• **Autodesk® SketchBook® Designer**
  Highest level version with all features of Pro and vector workflows

*Note: You use this version in class.*
Computer-Cluster Project (CP1)
Cluster Project 1

Cluster project instructions for sketching and shading basic shapes to learn Autodesk SketchBook Designer 2013.
Cluster Project 2

Cluster project instructions for sketching a water bottle design.
Cluster Project 3

Cluster project instructions for creating an automotive wheel design.
Problem Set Assignment

Problem set assignment overview
Demo: SketchBook Designer
User Interface

A

B

C

D

E

F

G

H
Area A – Menu Bar

The standard general file and software commands are located here like:

- Open
- Save
- Print
- Import and Export
- Software preference settings
Area B – Canvas Manager

Canvas (sheet of paper).
- Sketching take place
- size
- color
- resolution
- opacity
Area C – Navigation Bar

- Zoom in and out
- Fit to view
- Rotate the canvas
- Reposition the canvas
- Flip the canvas
- Show actual size

Hold down the spacebar
Area D – Layer Manager

Layers
- Vector
- Paint
- Opacity
- Symmetry

Layer Marking Menu
- Create New
- Duplicate
- Merge
- Delete
- Clear
Area D – Layer Manager Cont’d

Rearranging Layers

- Top Layer covers all the layer/sheets of paper below it
- Click the icon and drag to rearrange layers
Area E – Toolbars

• Paint Toolbar:

• Vector Toolbar:
Area F – Attribute Editor

Editing properties

- Width
- Color
- Type
Area G – Color Editor

Editing Colors
- Color Picker
- Wheel
- Sliders
- Reference
Area H – Custom Palette

- Custom Fill Palette

- Custom Color Palette

- Custom Brush Palette