Review of Sweep Operations

- Types of sweep operations are:
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- Elements of sweep operations are:
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Types of Freeform Surfaces

1. **Surfaces from points**
   - **Point interpolation**
     Surface is incident with a grid of points.
   - **Control points**
     Grid of points “pull” surface. (Not necessarily incident.)
   - **Point cloud**
     Best fit to jumble of points. (E.g., laser scanned data)

2. **Surfaces from multiple sections**
   - **Ruled surface**
     Matching points on each curve are joined by straight lines.
   - **Through curves (loft)**
     Best fit of surface to curves. (If only two curves, same as ruled.)
Types of Freeform Surfaces

2. **Surfaces from multiple sections**
   - Through curve mesh
     
     Best fit to two sets of curves, one set for each direction.

   - Advanced/variational sweep
     
     Similar to basic sweep, but “guide rails” can be used to change size and orientation of cross-section. Sketch constraints may also be used for control of swept profile.

   - Bounded plane or surface
     
     Best fit to bounding curves.

   - Can sometimes also control edge tangency/curvature to match adjacent face.
Types of Freeform Surfaces

3. **Surface construction from existing surfaces**
   - **Offset surface**
     Offset surface is same perpendicular distance from original surface at every point.
     Can also offset in specific directions.
   - **Midsurface**
     Midsurface is same perpendicular distance from both original surfaces at each point.
   - Both of these surfaces are associative.

Others we already use:
Types of Freeform Surfaces

4. Operations on sheets and faces
   • Trim sheet
   • Split face
   • Sew face

Practical Hints

• Choosing loft direction:
• Fixing twist:
• Difference between sweep and loft:
• Rounding ends: