**Design Guidelines for Machining Operations – Doweling & Countersunk Screws**

Proper design considerations for **doweling and countersunk screws** help ensure accurate alignment, secure fastening, and ease of assembly.

**1. Doweling Procedures & Design Guidelines**

**A. Purpose of Doweling**

Dowels are used for:
✔ **Precise alignment** of mating components.
✔ **Load distribution** in assemblies.
✔ **Preventing shear and rotation** in joints.

**B. Design Guidelines for Dowels**

✔ **Standard dowel sizes** → Use standard diameters (e.g., **3, 5, 6, 8, 10 mm**).
✔ **Hole Tolerance** → Use **press-fit (H7/m6) for fixed dowels** and **slip-fit (H7/g6) for removable dowels**.
✔ **Spacing** → Maintain at least **2× dowel diameter** distance from the edge.
✔ **Hole Depth** → At least **1.5× dowel diameter** for secure fitting.

**C. Common Dowel Materials**

* **Steel (hardened)** → High-strength applications.
* **Brass or Plastic** → Electrical or lightweight applications.

**2. Countersunk Screws & Design Guidelines**

**A. Purpose of Countersunk Screws**

✔ Provides a **flush surface** to prevent interference.
✔ Used in **high-precision assemblies** (e.g., aerospace, automotive).

**B. Design Guidelines for Countersunk Screws**

✔ **Countersink Angle** → Standard angles **90° (metric) or 82° (imperial)**.
✔ **Countersink Depth** → Match the screw head height for a flush fit.
✔ **Hole Tolerance** → Use **H7** tolerance for accurate fitment.
✔ **Spacing** → Maintain at least **3× screw diameter** from the edge.

**C. Common Countersunk Screw Materials**

* **Stainless Steel** → Corrosion resistance.
* **Alloy Steel** → High strength.
* **Titanium** → Lightweight, high-performance applications.