

# DFM Design Review Checklist

Process-specific guidelines for catching manufacturability issues before release. Check items that pass. Flag items that fail. Focus on drivers of cycle time, setup, tooling, and secondary ops.

## General DFM Principles

### Design fundamentals

- **Geometry simplified to minimize operations and tool changes**
- Tolerances relaxed where function allows (tight only at interfaces)
- Surface finish specified only on mating, sealing, or cosmetic faces
- Standard stock sizes and material grades used where possible

### Standardization and process

- **Features accessible without special fixturing or awkward setups**
- Hole sizes, threads, and hardware standardized across design
- Process selected based on volume, tolerance, and cost (not habit)
- DFA applied to ensure part optimization doesn't miss assembly wins

## Process-Specific Checklists

### CNC Machining

- **All critical features reachable from 2 or fewer setups?**
- Internal corner radii large enough for standard end mills?
- Pocket depth-to-width ratios within tool capability (< 4:1)?
- Tight tolerances limited to functional interfaces only?
- Part can be fixtured without special tooling?
- Finish requirements specified only where functionally needed?
- Material grade readily available in standard stock forms?
- No features requiring EDM, wire EDM, or hand finishing?
- Thread sizes and depths standardized across the design?

### Injection Molding

- **Wall thickness uniform (within +/-10% variation target)?**
- Draft angles  $\geq 1$  deg on all vertical surfaces?
- Undercuts eliminated or manageable with simple side-actions?
- Ribs  $\leq 60\%$  of adjacent wall thickness to prevent sink?
- Gate locations chosen to minimize flow length and weld lines?
- Part ejects cleanly without sticking or distortion?
- Snap-fits and living hinges within material limits?
- Boss diameters and wall thickness follow resin guidelines?
- No sharp internal corners (stress concentrators)?

### Sheet Metal

- **Bend radii  $\geq$  material thickness?**
- Hole-to-edge spacing  $\geq 2x$  material thickness?
- Hole-to-bend spacing  $\geq 2x$  thickness + bend radius?
- Gauge is a standard available thickness?
- Flat pattern nests efficiently on standard sheet?
- Bend sequences feasible without interference?
- Tabs, slots, and relief cuts included where needed?
- Minimum flange length met for all bends?
- Hardware insertion locations accessible after forming?

### Die Casting

- **Wall sections reasonably uniform?**
- Draft  $\geq 1$  deg on all surfaces parallel to die pull?
- Parting line and ejector locations acceptable?
- Cores can be pulled without complex slides?
- As-cast tolerances acceptable (or secondary machining planned)?
- Porosity acceptable in structural areas?
- Alloy compatible with die life requirements at volume?
- No deep, thin ribs that increase thermal stress?
- Fillets and radii adequate for metal flow?

## Process-Specific Checklists (continued)

### Hot Forging

- Part geometry achievable in closed-die forging?**
- Draft angles adequate for die removal (typically 3-7 deg)?
- Fillet radii generous enough for material flow?
- Parting line location minimizes flash removal?
- Web thickness to rib height ratios within limits?
- Grain flow direction aligned with primary loads?
- Flash and trimming allowances accounted for?
- Secondary machining planned only where needed?

### Investment Casting

- Wall thickness achievable for selected alloy?**
- No re-entrant features that prevent wax extraction?
- Gate and riser locations planned for clean fill?
- Tolerances achievable as-cast (or machining planned)?
- Surface finish requirements compatible with process?
- Part volume and weight within casting capability?
- Core complexity manageable with soluble or ceramic cores?
- Inspection requirements defined for internal features?

### Extrusion (Metal/Plastic)

- Profile cross-section within press capability?**
- Wall thicknesses uniform or within process limits?
- No re-entrant features that prevent die flow?
- Hollow sections achievable with standard mandrels?
- Tolerances achievable as-extruded (or machining planned)?
- Standard alloy/resin selected for availability?
- Cut lengths and tolerances specified?
- Secondary operations (punch, drill, bend) minimized?

### PCB Fabrication and Assembly

- Component placement accessible for pick-and-place?**
- Pad geometries follow IPC standards for selected process?
- Trace widths and spacing within fab house capability?
- Via sizes and types appropriate for layer count?
- Thermal relief pads used on ground/power planes?
- Test points accessible for ICT or flying probe?
- Solder paste stencil openings appropriate for component pitch?
- Fiducial marks present for alignment?

### Review notes and action items


Reviewed by: \_\_\_\_\_

Date: \_\_\_\_\_

Part / Assembly: \_\_\_\_\_

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