CHECKLIST G-02

12 DFM checks before you cut steel

Steel is the expensive part of a mould, and changing it after machining costs time and money. Run your part through these twelve checks before you release it for tooling. Tick each one off, or note why it doesn't apply.

- [ ] **01 Wall thickness is uniform**

Uneven walls cool at different rates, which causes **sink marks, voids and warpage**. Keep the nominal wall consistent and change thickness gradually.

> Typical: 1.0–3.5 mm for most resins. Taper transitions over about 3× the thickness change.

- [ ] **02 Every vertical face has draft**

Faces parallel to the mould opening need draft so the part releases without **drag marks or sticking**. Textured faces need more.

> Typical: at least 0.5–1° per side on polished faces; add about 1° per 0.025 mm of texture depth.

- [ ] **03 Ribs are thinner than the wall**

Thick ribs leave **sink marks on the opposite face**. Use more, thinner ribs rather than one thick one, and radius the base.

> Typical: rib 50–60% of the wall, height ≤ 3× wall, spacing ≥ 2× wall.

- [ ] **04 Bosses are cored and supported**

Solid bosses sink and trap gas. **Core them out**, keep their walls thinner than the nominal wall, and tie tall bosses to nearby walls with ribs.

> Typical: boss wall about 60% of nominal; outer diameter about 2–2.5× the screw diameter.

- [ ] **05 No sharp inside corners**

Sharp corners concentrate stress, block plastic flow and are **where parts crack**. Radius inside and outside corners together so the wall stays even.

> Typical: inside radius ≥ 0.5× wall; outside radius = inside radius + wall.

- [ ] **06 Undercuts are removed or planned for**

Anything that stops the part leaving the mould in a straight line needs a **slider or lifter**, which adds cost, lead time and maintenance. Can a slot, hole or redesign remove it?

> List each undercut and the action it needs before you ask for quotes.

☐ 07 The parting line is agreed

The parting line leaves a witness mark and can flash. Decide where it runs **before tooling**, keep it off cosmetic faces, and avoid shut-offs at shallow angles.

> Typical: shut-off faces at 3–5° or more, so the steel doesn't wear and flash.

☐ 08 Gate and weld lines are acceptable

Where plastic enters decides how the part fills. Gate into the thickest section, and check that **weld lines and gate marks** stay away from loaded features and A-side surfaces.

> Ask for a fill simulation on cosmetic or structural parts.

☐ 09 There is room to eject

Ejector pins push the part out and leave small round marks. Give them **flat, non-cosmetic areas** on the B-side, near ribs and bosses where the part grips the core.

> Mark the faces where ejector marks are not allowed.

☐ 10 Shrinkage and tolerances are realistic

Every resin shrinks as it cools. Identify the **few dimensions that are critical to function**, give the rest general tolerances, and keep critical features "steel-safe" so they can be tuned after first shots.

> See the shrinkage table below; confirm against your resin's datasheet.

☐ 11 The exact resin grade is fixed

"ABS" isn't enough. The grade sets shrinkage, steel choice and process. **Glass-filled resins** are abrasive and shrink unevenly. Note flame (UL94), UV, food-contact or medical needs.

> Give the supplier and grade name, colour, and any certificate you need.

☐ 12 Finish is specified face by face

Polish and texture are applied per surface and change cost, draft and lead time. Call out a **finish for each visible face** instead of one note for the whole part.

> Use a standard: SPI finish (e.g. A-2, B-2, C-1) or VDI 3400 / a texture code.

Typical mould shrinkage

RESIN	SHRINKAGE
ABS	0.4–0.7%
PC	0.5–0.7%
PC/ABS	0.5–0.7%
PP	1.0–2.5%
POM (acetal)	1.8–2.5%
PA66, unfilled	1.0–2.0%

Typical ranges only; glass fill and processing change them. Use your grade's datasheet.

What to send with your RFQ

- 3D model as **STEP** (or IGES), not only STL
- 2D drawing with critical dimensions and tolerances
- Resin supplier, grade and colour
- Annual volume and first order quantity
- Number of cavities, if you already know
- Cosmetic faces and finish for each face
- Undercuts list and any assembly features
- Target date for first samples (T1)

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