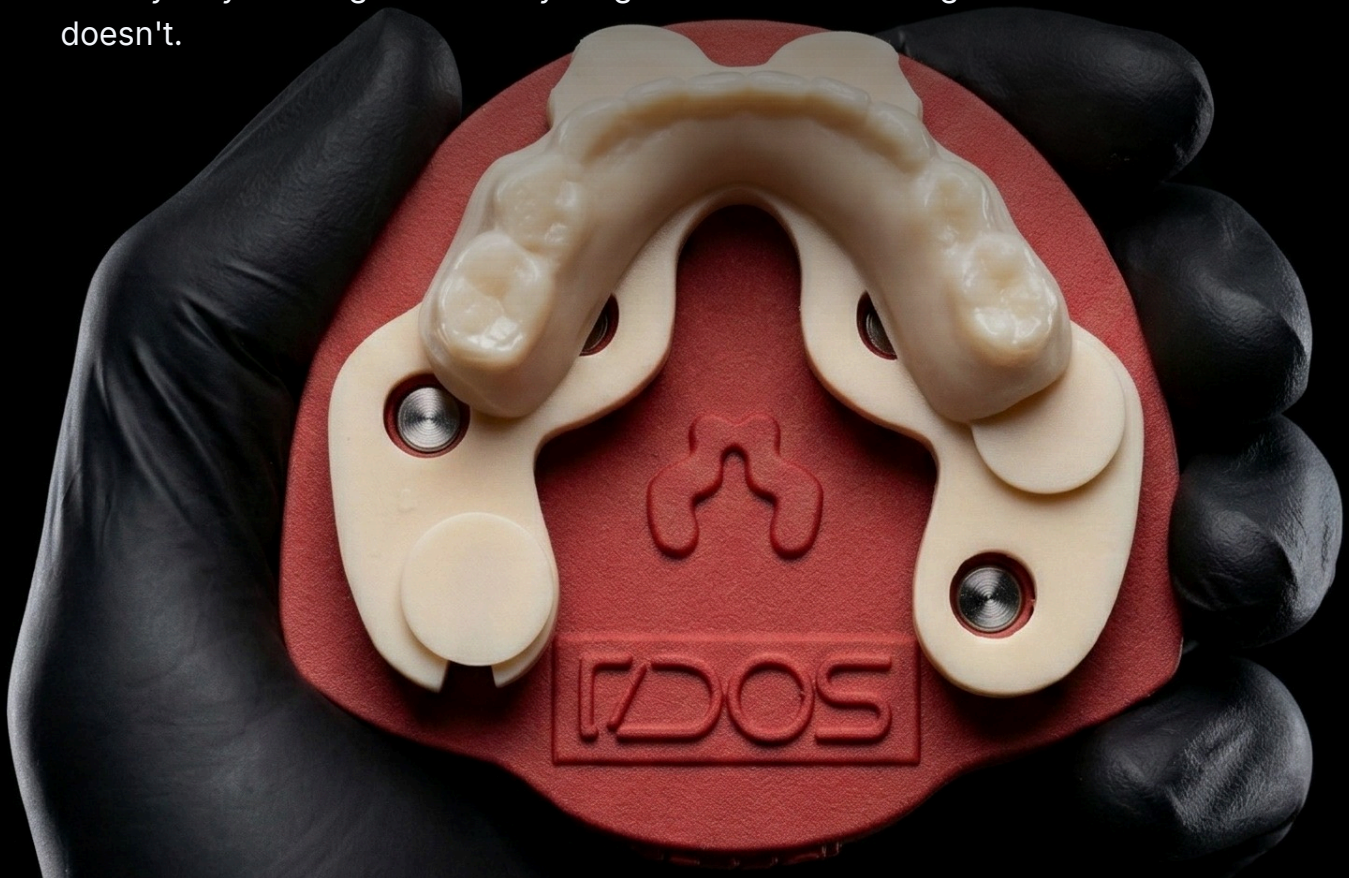
THE 3D PRINTING PROTOCOL

Print Precise.
Print Repeatable.

Orientation, supports, parameters, post-processing — the four things that decide whether your model arrives at the articulator exactly as you designed it. Everything that matters. Nothing that doesn't.



DLP / LCD WORKFLOW · VALIDATED STARTING PARAMETERS · BUILT FOR ZERODRIFT™ TRANSFER

WHY THIS MATTERS

A perfect design dies in an average print.

Your occlusion was right in CAD. If the model that comes off the plate is a few micrometres off, the case was lost before it ever reached the articulator — and you will spend the rest of the day blaming the mount.

The digital workflow is a chain. Of its seven links, the transfer is the one DACOS removes. But the three links immediately before it — **the printer, the resin, the cure** — are yours, and they are where most "mystery" error is actually born. This protocol hands you those three links.

<100 µm

The accuracy a well-run print holds for a full arch. The clinical ceiling for prosthodontic models.

Etemad-Shahidi 2020

10–90 µm

How far post-curing alone can move a model's accuracy — larger than the error most technicians chase.

Morali 2025

+4%

Oversize measured on a part left too long in IPA — a 50 mm part read 52 mm. Cleaning can distort.

Ember Prototypes

THE FOUR VARIABLES YOU ACTUALLY CONTROL

Not your scanner. Not the patient. These four — and only these four — decide whether your print is dimensionally honest:

- **Orientation** — how the model sits on the plate, and what that does to its surfaces.
- **Supports** — where you attach them, and where you must never.
- **Parameters** — exposure, layers and lift, calibrated to your resin.
- **Post-processing** — wash, cure and finish, in the right order, within the right limits.

1 — ORIENTATION

Two rules. Zero doubt.

Every orientation is a trade-off. The skill is not picking one — it is knowing why you picked it. Here are the two that matter for transfer-fidelity models.

A Flat, or up to ~20°

RECOMMENDED FOR DACOS BASES

- → The base prints on — or very close to — the plate. No supports in the contact zone.
- → Occlusal surfaces and the base stay off the heavily-supported face.
- → Lowest build height = shortest print = most parts per plate.
- → Published accuracy: 0° and 20° orientations are the most accurate, and clinically equivalent.

B Steep / vertical

AVOID FOR MODELS

- × Lowest trueness of all orientations in the model-accuracy literature.
- × Maximises build height — longest print, fewest parts, most resin.
- × Layer stair-stepping lands on functional occlusal and base surfaces.
- × More support scars in exactly the places precision depends on.

THE HONEST NUANCE ON "FLAT"

A fully flat base gives the best surface for a flat-based transfer plate, but it also presents the whole cross-section to the peel force at once. If your printer struggles to release a large flat first layer, a few degrees of tilt eases the peel **without costing accuracy** — 0° to 20° test as equivalent. Tilt for reliability if you must; never past the point where stair-stepping reaches the occlusal or base surface.

2 — SUPPORTS

The golden rule.

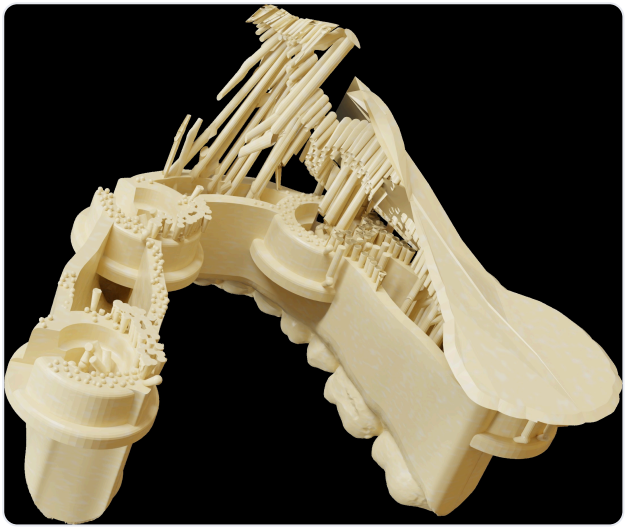
Never in the contact zone. Never where the model meets the plate. A single support scar in the seating surface becomes a rocking model — and a drift reading that has nothing to do with your articulator.

WHERE SUPPORTS GO

- Increase density **only** in collapse-risk areas — thin walls, free gingival margins.
- Light supports on outer walls, where a scar is cosmetic, not functional.
- Everything else: leave it free. Over-supporting adds contact points that all leave marks.

SOLID VS HOLLOW BASE

- Solid base: enough raft and density to resist peel without flexing the first layers.
- Hollow / arch-only base: add **drain holes** and internal supports so it can't form a suction cup or trap uncured resin.



SUPPORTS CARRY THE MODEL — NEVER THE SEAT

WHY THE DACOS BASE CHANGES THIS

ShieldBase™ Geometry is engineered so the contact zone is protected by design: a two-step blind seat and a peripheral lip thin enough to print support-free. The part of the model that decides repeatability is the one part you are never asked to support — which is why it can print flat in the first place.

3 — PARAMETERS

The numbers that count.

Starting points, validated on DLP/LCD printers. They are **not** universal truths — exposure and lift depend on your exact resin, printer and light engine. Start here, then run the resin vendor's calibration and an exposure test before production.

PARAMETER	STARTING VALUE	WHY IT MATTERS
Layer thickness	**50 µm**	Best accuracy/speed balance. Finer (25 µm) adds time, not accuracy. Drop to 30–40 µm only for implant precision.
Bottom layers	**4–6**	Adhesion to the plate without over-building the first layers.
Bottom exposure	**25–40 s**	Adhesion. Highly printer- and resin-specific — tune for a clean, released raft.
Normal exposure	**per datasheet**	Follow the resin spec; monochrome LCD is often ~1.5–3 s. Dial in ±0.2–0.5 s from a calibration print.
Rest before exposure	**1–3 s**	Lets the resin settle so the layer images flat, not rippled.
Lift height	**5–7 mm**	Enough clearance to re-flow resin under the part between layers.
Lift speed	**40–80 mm/min**	Slower = gentler peel = less distortion. Bottom layers slower still.
UV wavelength	**385 or 405 nm**	Must match the resin. A 405 nm resin will not cure correctly on a 385 nm engine, or vice-versa.

PRE-FLIGHT — FIVE THINGS BEFORE YOU HIT PRINT

- **Shake the resin.** Settled pigment and filler shift the cure — every bottle, every time.
- **Resin and room at 22–30 °C.** Cold resin is viscous and prints short.
- **Level the platform.** First-layer adhesion and Z-accuracy start here.
- **Stir the vat, clear cured debris.** One cured flake pits the flat base.
- **Filter if the vat has been sitting.** A cured fragment kills a whole print.

4 — POST-PROCESSING

Five steps, in this order.

This is the sequence for the top result. Plenty of labs snap supports off first because a green part is softer and quicker to clean — and for many jobs that is fine. For accuracy-critical models, the order below protects the geometry.

01 **Wash — briefly**

IPA, ideally two stages: a dirty bath first, a clean-IPA final rinse. Keep **total** solvent contact short — around 5–10 minutes, and never past your resin's stated maximum. Over-washing swells the model.

02 **Dry — fully**

Compressed air through every crevice, margin and undercut to clear residual solvent and uncured resin. Then let it dry completely: **trapped IPA distorts dimensions during cure.** Never post-cure a wet part.

03 **Post-cure — matched**

Cure at the resin's wavelength and its specified time and temperature. Both directions cost you: under-cure leaves the part weak and incompletely converted; over-cure shrinks and distorts it. Warmed cure chambers reach full conversion faster.

04 **Remove supports & finish** FOR BEST ACCURACY: AFTER CURE

Precision cutters, never near the contact zone or seat. Removing supports before cure is easier and common — but an unsupported green part can warp under the cure lamp's light and heat, which is why Formlabs and others recommend cutting after. With a DACOS base it is a low-stakes choice either way: the seat is support-free, so no cutter ever touches the surface that decides repeatability.

05 **Verify — against the file**

Measure the finished model against the STL, or print an accuracy test bar alongside it. Confirm dimensions before the model ever touches the articulator.

THE IPA TRAP

Solvent doesn't just clean — it absorbs. Leave a model in IPA too long and it swells, plasticises and reads oversize. A cleaning step meant to protect precision becomes the thing that destroys it. Short, clean, done.

THE WAVELENGTH TRAP

If your cure unit's wavelength doesn't match your resin, the model looks finished but is under-converted — soft, unstable, and drifting for days. Confirm your chamber's wavelength against your resin spec once, in writing.

PRE-MOUNT QC

Before it touches the articulator.

Ten seconds with this list saves a returned case. If every box is ticked, the print is not your variable — and you can prove it.

- [ ] Printed **flat (0°)** or within ~20° — base and occlusal surfaces off the supported face
- [ ] Zero supports, scars or debris in the contact / seat zone
  run a fingernail across it — it should be glass-smooth
- [ ] Upper and lower printed in the **same job**, same resin bottle, same parameters
- [ ] Resin was shaken and at temperature; vat was clean before printing
- [ ] Total IPA contact kept short and within the resin's stated maximum
- [ ] Model dried **fully** before post-cure — no trapped solvent
- [ ] Cured at the correct wavelength, for the resin's specified time and temperature
- [ ] Supports removed **after** cure, cleanly, nowhere near the seat
- [ ] Dimensions checked against the STL or a test bar — within tolerance
- [ ] Seat inspected: model sits fully home on the plate, no rock, no lift

ALL TEN TICKED?

Then you have done your half of the job to the limit of what you control. Whatever happens at the articulator next, the print didn't cause it — and that certainty is worth more than any single case. Pin this page above the printer and run it on every model that matters.

THE COMPLETE PICTURE

Printing well is only half the job.

A flawless model still loses everything the moment it meets a mount that can't hold zero. The print is the starting line. The transfer is where the case is decided.

This protocol gets your model off the plate dimensionally honest. DACOS Omni with **ZeroDrift™ Transfer** keeps it that way from plate to articulator — four proprietary pillars, one protocol:

1 **ShieldBase™ Geometry**
Base geometry engineered for 3D printing. Protected contact zone, support-free, three tolerance variants.

2 **DockingMatrix™ Configuration**
8 magnets, 4 per model, 9 combinations. Full implant-analog freedom on any case type.

3 **TrueZero™ Calibration**
A calibrator you print yourself, on your own printer and resin — so your printer's own error cancels out.

4 **Dedicated CAD Libraries**
exocad, 3Shape, Blender for Dental. The protocol lives inside the workflow you already use.

You control the print. Let us take the transfer off your list.

60-second configurator — tell us your articulator and your cases,
get the exact DACOS Omni setup for your lab.

DACOS.DENTAL

Parameter ranges validated on DLP/LCD dental workflows; always confirm against your resin vendor's datasheet and a calibration print. Context sources: Etemad-Shahidi Y et al., *J Clin Med* 2020;9:3357 (model accuracy & orientation); systematic review of build-angle accuracy, *BMC Oral Health* 2024; Morali A et al., *Appl Sci* 2025;15:11123 (post-cure effects); manufacturer wash-time limits (Formlabs; AmeraLabs) and IPA swelling behaviour (Ember Prototypes).

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