

Printing on Acrylics

Fluid Color flatbeds (Ricoh and Kyocera)

Acrylic is one of the most popular substrates for UV LED printing thanks to its clarity, smooth surface, and ability to produce high-impact color and depth. When paired with the Fluid Color flatbeds (Ricoh and Kyocera), the results can be stunning—vibrant, durable, and precise. However, acrylic presents its own challenges, including static buildup, outgassing, and surface contamination. Following the proper preparation and print procedures will help you achieve consistently high-quality results.

Understanding the Challenges: Static, Surface Contaminants, and Outgassing

Acrylic (PMMA) typically has a surface energy around 38 dynes/cm, which is marginal for optimal UV ink adhesion (ideal: 42+ dynes/cm). Its smooth surface and static charge attract dust and debris, leading to print defects. Additionally, freshly manufactured or laser-cut acrylic may outgas—releasing trapped solvents that can cause bubbles or adhesion issues during curing.

Keep in mind:

Cast and extruded acrylics behave differently under UV exposure.

Recycled or specialty blends may require adhesion testing.

Some manufacturers offer Digital Grade acrylic with an ink-receptive coating or copolymer cap layer.

Always test your specific material before production.

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• Step 1: Surface Inspection and Preparation

- Handle with Care

Avoid touching the print area with bare hands. Oils and residues can affect adhesion and leave fingerprints.

Keep the protective film on the non-printing side until printing is complete.

- Clean the Acrylic

Use a lint-free cloth and 99% isopropyl alcohol (IPA) to remove dust, fingerprints, and contaminants.

Allow the surface to air-dry completely before printing.

Neutralize static using an ionizing air gun or anti-static brush.

Fluid Color printers are equipped with ionization bars on both sides of the carriage, helping dissipate static during printing.

- Surface Treatment (if needed)

For challenging materials, apply a wipe-on adhesion promoter designed for acrylic.

Alternatively, increase surface energy with a quick propane torch treatment ("flame washing"): move the flame evenly across the surface without overheating.

Tip: A heat gun is less effective than a propane torch.

Always follow manufacturer-recommended drying or flash-off times before printing.

Step 2: Conduct Adhesion Testing

Before starting production:

- Measure surface energy using Dyne Pens on incoming materials. This helps determine whether additional surface prep is required.
- Print a small test area on the prepared acrylic.
- Fully cure the ink using the Fluid Color Flatbed's LED curing system.

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Step 2 continued: Conduct Adhesion Testing

Perform adhesion tests:

- Crosshatch or tape pull tests to verify bond strength.
- Test across all ink channels—different pigments may bond slightly differently.

Step 3: Printing Best Practices

Optimize Printer Setup:

- Adjust printhead height for consistent ink placement and to prevent head strikes.
- Use the vacuum zones to secure thin or warped sheets flat against the bed.
- Fine-tune print speed and curing intensity to balance adhesion, color, and productivity.

Use the Correct Inks

- Fluid Color LED UV inks are formulated for high adhesion and vibrancy on rigid substrates like acrylic.
- Utilize white and clear inks strategically for backlit or second-surface (reverse) effects.

Control Static and Dust

- Maintain a clean print environment with 40–60% relative humidity.
- Use anti-static air blowers before and during printing as needed.

Monitor Curing

- Proper curing ensures durability and adhesion.
- Avoid over-curing (brittle ink) or under-curing (tacky ink, poor adhesion).
- Fluid Color's adjustable LED curing system allows precise control for material thickness and ink load.

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• Step 4: Post Printing Handling and Finishing

Inspect Quality

- Verify adhesion, color consistency, and absence of dust inclusions.

Protect the Print

- For reverse (second-surface) prints: apply a white flood coat for opacity and depth.
- For first-surface prints: consider a clear coat or laminate for added abrasion and UV resistance.

Cutting and Fabrication

- Allow printed sheets to cure and rest for at least 24 hours before routing, cutting, or bending. This prevents edge chipping and ink lift.

Additional Tips for Consistent Results

Always run a small test batch before full production.

Store acrylic sheets flat and clean, away from dust and moisture.

Avoid temperature extremes before and after printing—acrylic can expand or contract.

Keep a production log of print settings, ink batches, and prep methods for repeatability.

By following these best practices—and leveraging the precision, vacuum control, and LED curing technology of Fluid Color flatbeds—you'll achieve crisp detail, brilliant color, and durable adhesion on acrylic substrates.