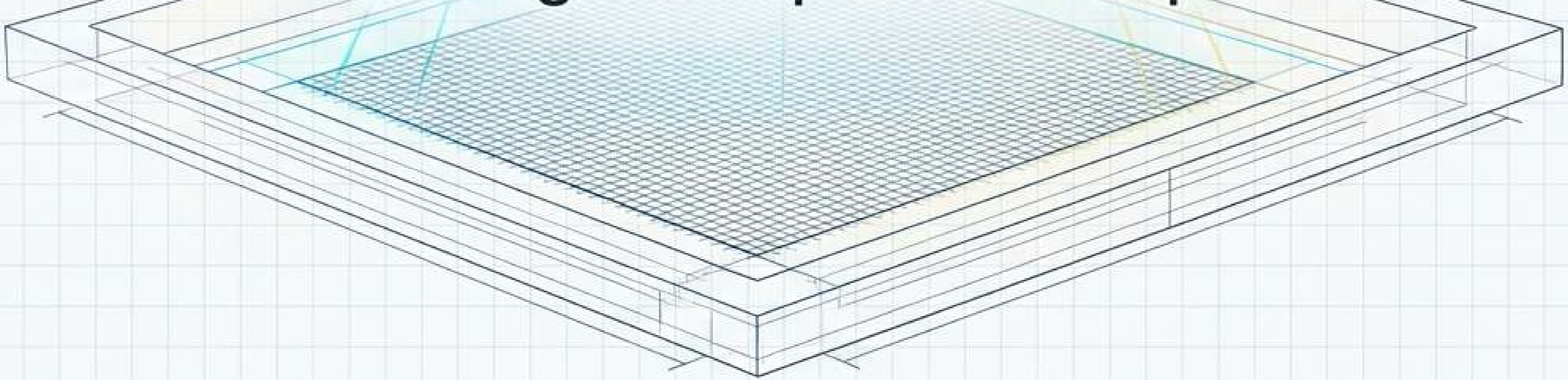
The Perfect Print Starts Here

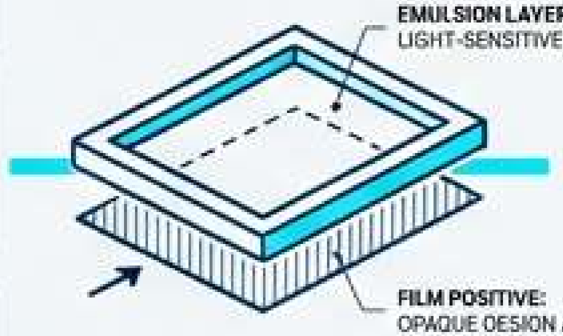
Mastering the Exposure Blueprint



The Foundation of a Flawless Stencil

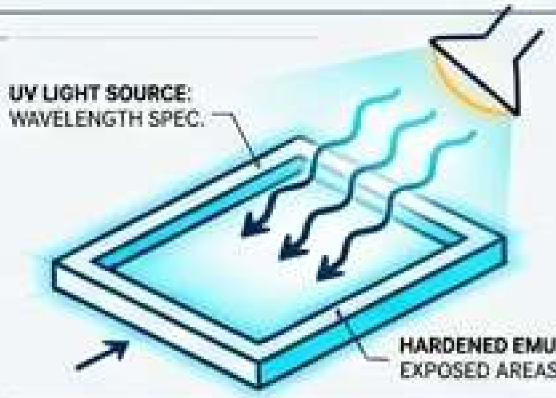
An exposure unit is the core device in the pre-press workflow. It uses UV light to harden a light-sensitive emulsion, creating the stencil that defines print quality, detail accuracy, and durability. In essence, it creates the blueprint for every single print.

The Exposure Process Flowchart



1. Screen Prep

A screen coated with emulsion is placed over a film positive.



2. UV Exposure

Light hardens the emulsion everywhere *except* where the design blocks it.

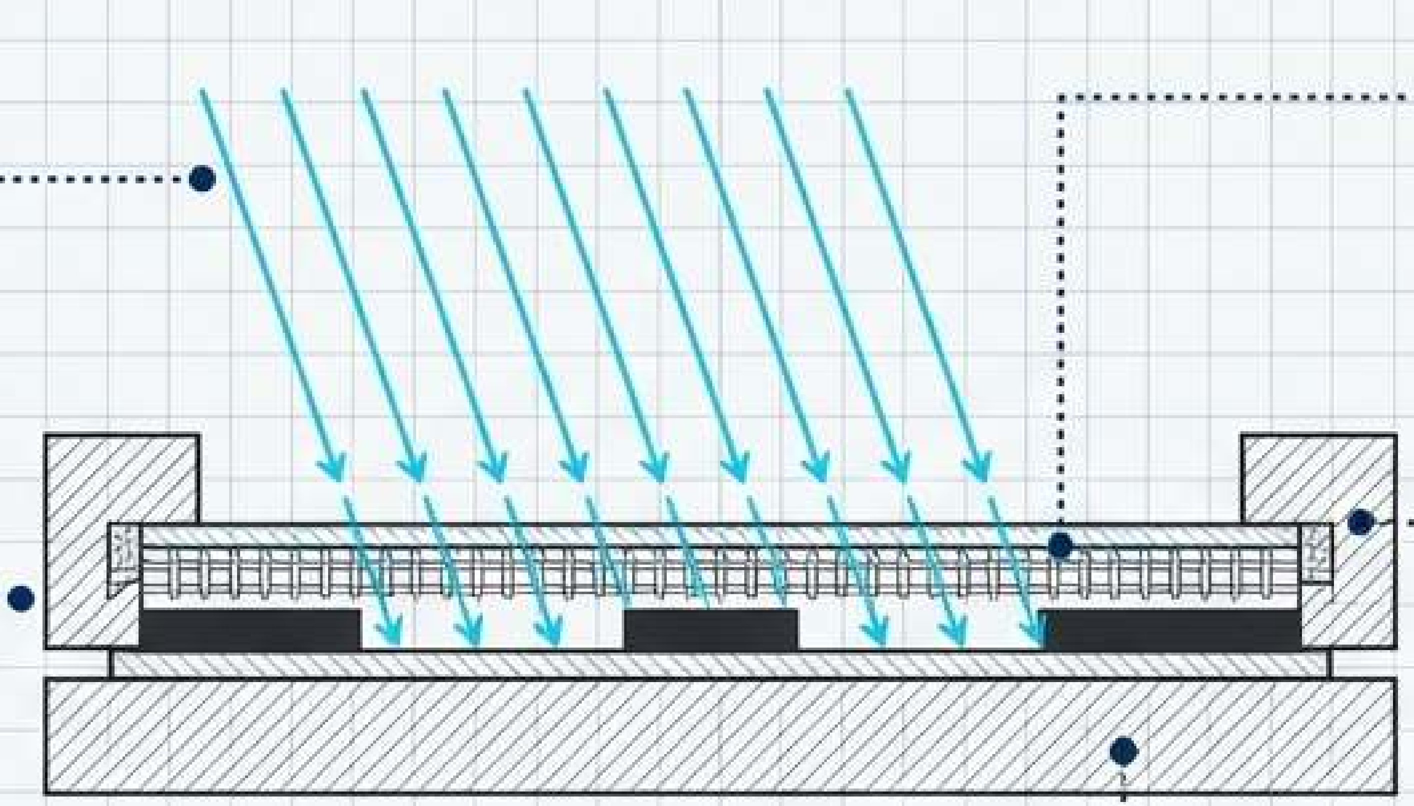
3. Washout

The unexposed, soft emulsion dissolves, revealing the sharp, printable image.

The Anatomy of a Perfect Exposure

Achieving a sharp, durable stencil depends on controlling several critical factors. Each element must be precise to ensure the blueprint is flawlessly transferred to the screen.

Correct UV Wavelength: The ideal range for polymerisation is **380–420 nm.**



Uniform Light Distribution: Consistent UV intensity across the entire screen surface.

Maximum Film Contact: Perfect, tight contact between the film positive and the emulsion is essential to prevent light bleed.

Consistent Light Output: Stable energy from the light source, exposure after exposure.

Controlled Exposure Time: Precisely timed exposure to achieve maximum crosslinking without losing detail.

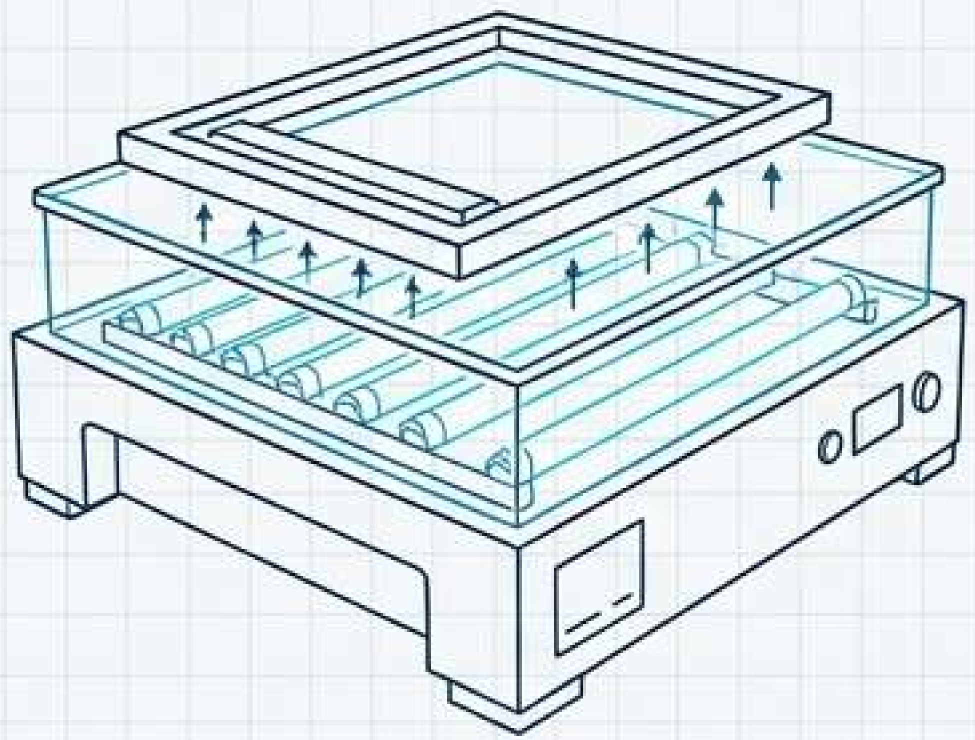
The Engine: Comparing UV Light Sources

Metric	UV Fluorescent Tubes	Metal Halide Lamp	UV LED System
Detail/Resolution	Lower (Diffused light)	Exceptional (Point light source)	Excellent (Stable, focused UV)
Exposure Speed	Slower	Fast	Very Fast
Energy Use	Moderate	High	Very Low
Heat Output	Low	High	Very Low
Lifespan	Short (Periodic replacement)	Medium (Requires warm-up)	Extremely Long (Stable output)
Best For	Hobbyists, small screens, basic designs	High-volume, large screens, halftones	All professional applications

*While sunlight can be used, its inconsistency makes it unsuitable for professional production.

Choosing Your Tool: The Hobbyist’s Start

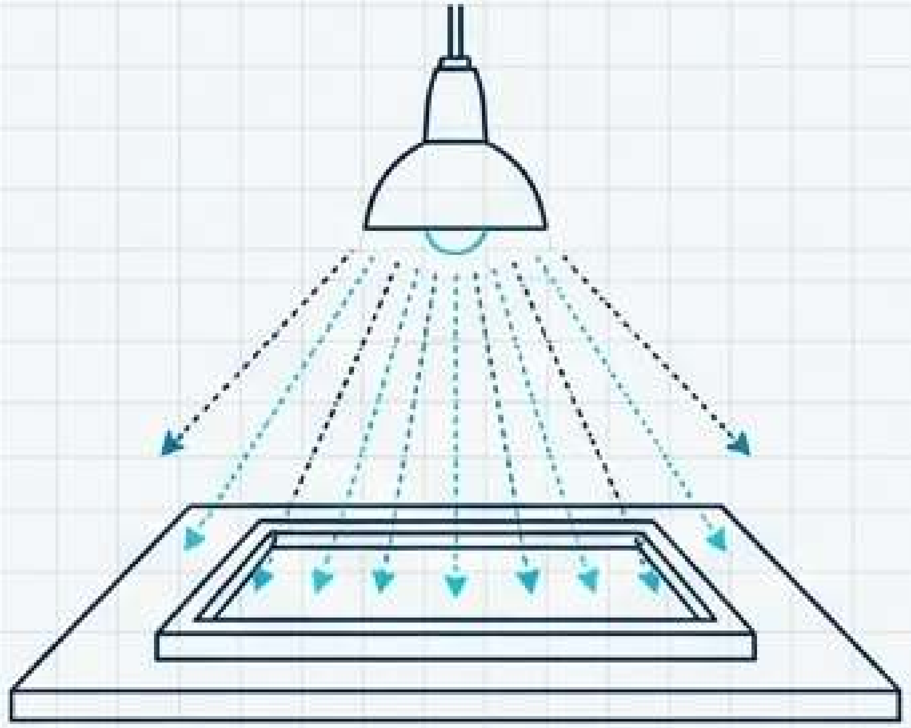
Tabletop Exposure Units



Compact, budget-friendly units often using fluorescent or LED tubes. An excellent entry point for craft shops and low-volume studios.

Pros: Affordable, small footprint.
Cons: Limited resolution and consistency without a vacuum system.

Overhanging Lamps



A basic, low-cost option common in DIY setups. The lamp is positioned above the screen.

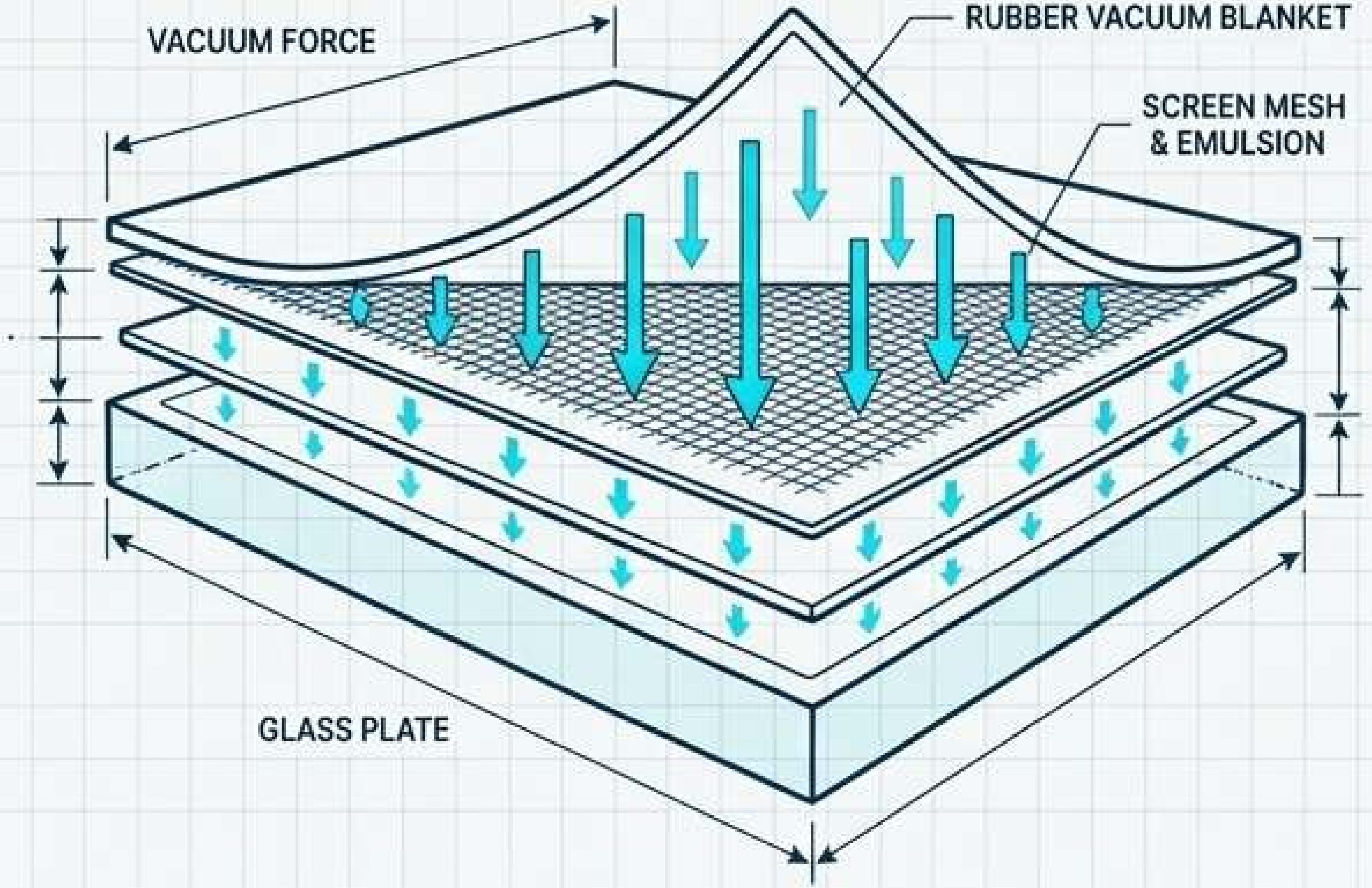
Pros: Very low cost.
Cons: Inconsistent UV coverage and weak film contact, leading to poor detail resolution. Not recommended for professional use.

The Professional's Workhorse: Vacuum Exposure Units

The single most important feature for professional-grade exposure is perfect screen-to-film contact. Vacuum units achieve this, eliminating common issues and unlocking superior detail.

- An integrated **vacuum blanket** creates flawless contact.
- Eliminates **halation** (light halo) and **undercutting** (light creep).
- Essential for sharp **HD halftones**, micro-detail, and high-tension mesh.
- Ensures maximum sharpness and consistency.

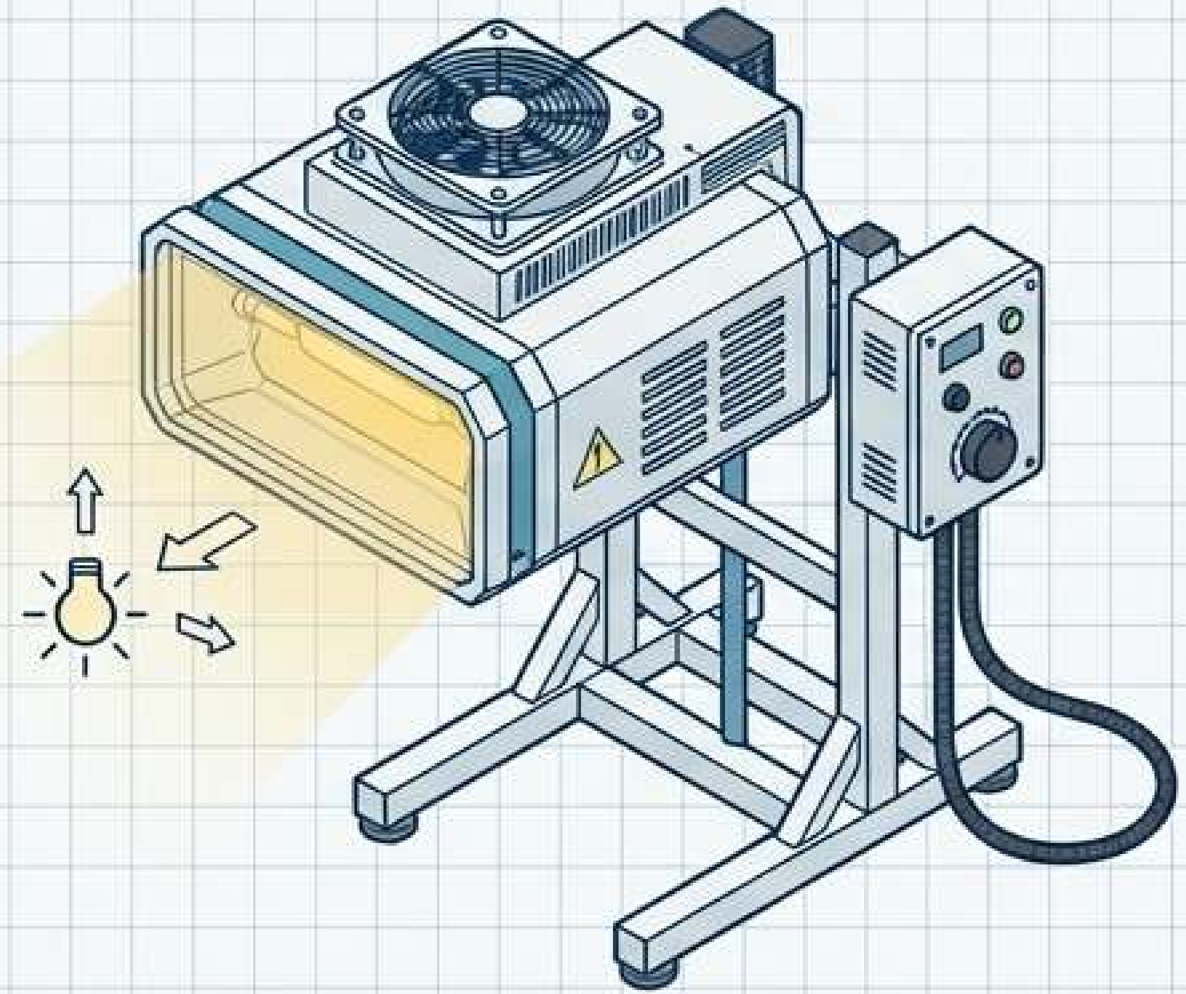
Vacuum Exposure Cross-Section



Available with modern **LED** systems or traditional **Metal Halide** lamps.

The Industrial Powerhouse: Large-Format & High-Volume Systems

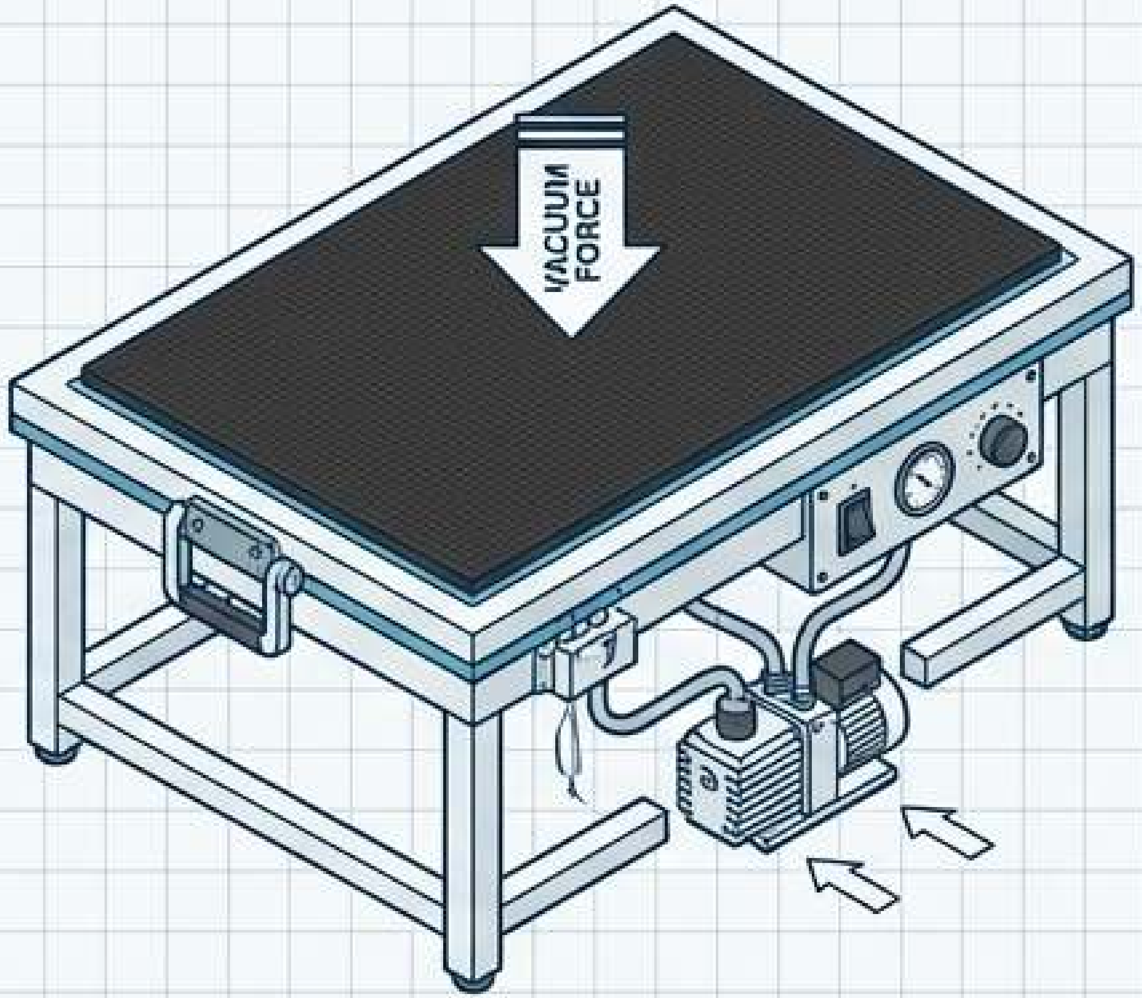
Freestanding Metal Halide Units



High-intensity systems designed for speed and power. The traditional choice for high-volume shops, these units deliver fast exposure cycles for large-format screens.

Use Case: Often paired with a separate exposure vacuum frame for maximum efficiency.

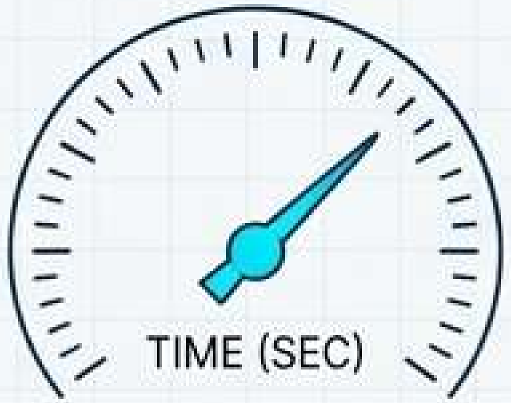
Exposure Vacuum Frames



These are not light sources themselves, but specialised contact surfaces. They provide a large vacuum area and are used with an external light source.

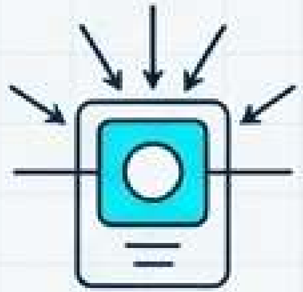
Use Case: Ideal for oversized screens, multi-screen workflows, and integration with advanced **Direct-to-Screen (CTS)** systems.

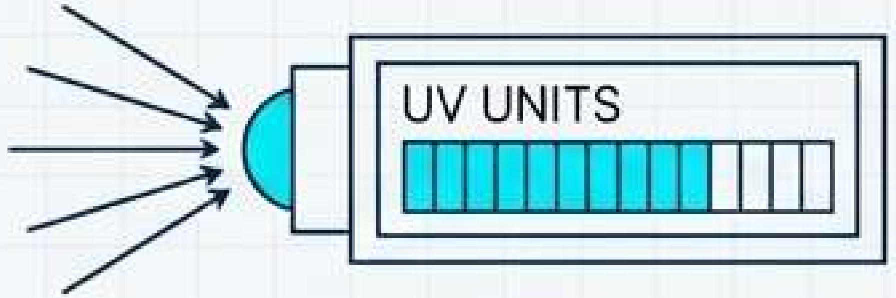
Mastering the Variables: Your Control Panel for Precision



Exposure Time

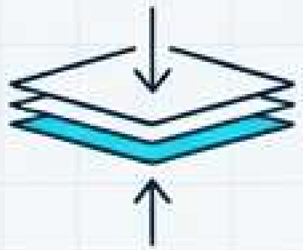
- **Function:** Determines the degree of emulsion crosslinking.
- **Calibration:** Fine-tuned using step tests or exposure calculators.
- **Goal:** Achieve maximum hardness without losing fine detail ("blowing out").

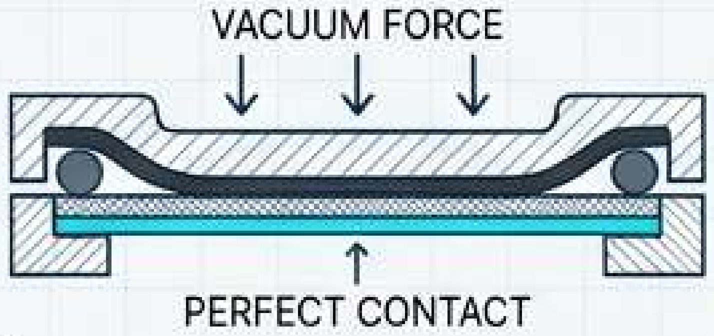




Light Integrator

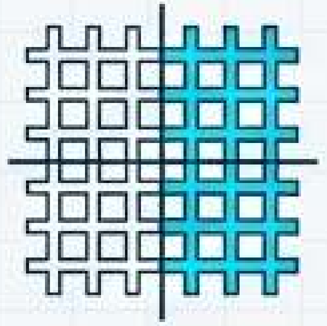
- **Function:** Measures actual UV output in units of light, not seconds.
- **Benefit:** Compensates for bulb warm-up and ageing, ensuring perfect consistency over time. A feature of professional units.

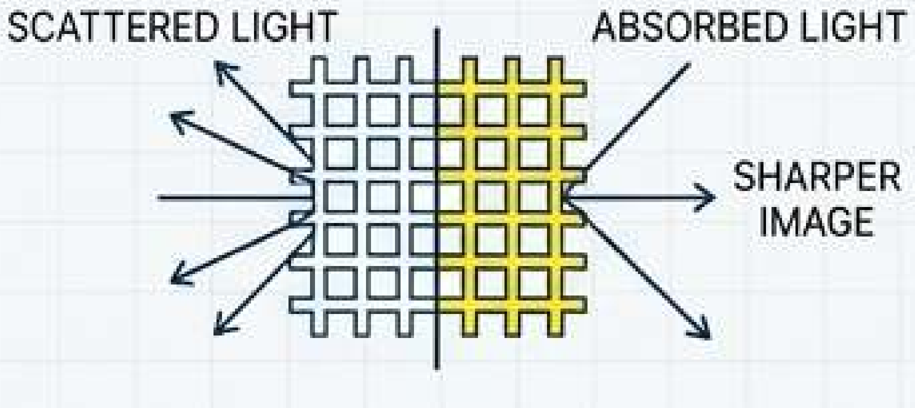




Film-to-Screen Contact

- **Function:** Prevents blurry lines and undercutting.
- **Method:** Achieved with vacuum blankets or glass compression frames. Advanced registration systems (e.g., Tri-Loc, PinLock™) ensure perfect alignment.





Mesh Colour

- **Function:** Dyed mesh (yellow/orange) absorbs scattered UV light, producing sharper results than white mesh.
- **Adjustment:** Requires an increase in exposure time of approximately **30%**.

On-Press Diagnostics: Common Problems & Proven Fixes

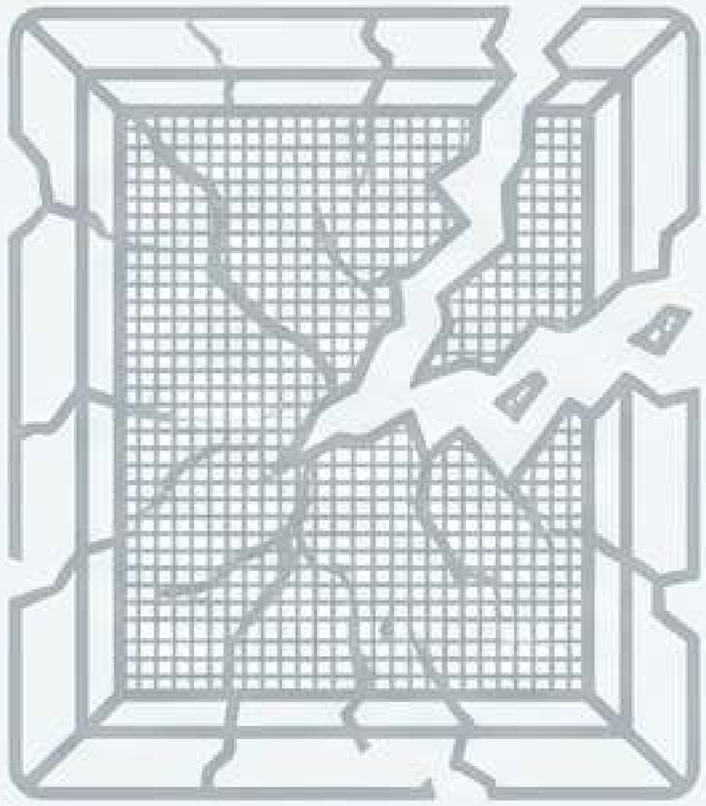
Problem	Cause	Solution
Slimy or Weak Stencil	**Underexposure**	Increase exposure time or check light source intensity.
Detail Won't Wash Out	**Overexposure**	Reduce exposure time.
Pinholes in Stencil	**Contamination**	Improve screen cleaning process; ensure darkroom is dust-free.
Soft or Blurry Edges	**Poor Contact**	Use a vacuum unit or add more compression weight. Check film positive for sharpness.

Screen Room Conditions

- Your environment matters. Keep relative **humidity below 50%.**
- Dry screens around **37-38°C**. Avoid temperatures **above 43°C**, which can fog emulsion.
- Use **yellow safelights.**

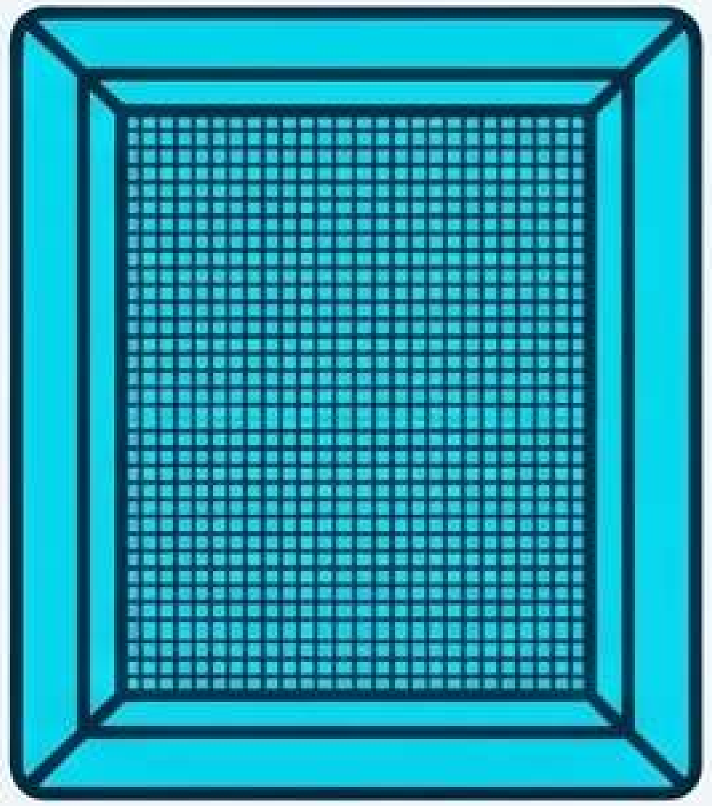
Myth vs. Reality: The Truth About Post-Exposure

The Myth



"Every screen needs to be post-exposed in the sun or exposure unit to fully harden it."

The Reality



- Once a stencil is correctly exposed and developed, the emulsion has *already* completed its hardening process. **Post-exposing a properly made screen is unnecessary.**
- Relying on post-exposure is often a crutch for an initial underexposure. The goal should always be to achieve the correct exposure from the start.
- **The Exception:** In rare cases where a screen is intentionally underexposed to capture extreme detail, a brief post-exposure can add durability. However, this should not be standard practice.

The Blueprint for Your Business: The Decision Matrix

Choosing the right exposure unit is an investment in quality and efficiency. Assess your needs against these four key factors to make the right choice.

Screen Size

What is the largest frame size you print with?

Your unit's capacity must accommodate your largest screens.

Production Volume

How many screens do you prepare per day or week?

High throughput demands the speed of LED or metal halide systems with a vacuum.

Detail Requirements

Do your prints involve fine lines, halftones, or micro-detail?

If yes, a vacuum unit is non-negotiable for achieving the required sharpness.

Budget

What is your budget for this core piece of equipment?

Ranges from entry-level tabletop units to professional LED vacuum systems and industrial metal halide setups.

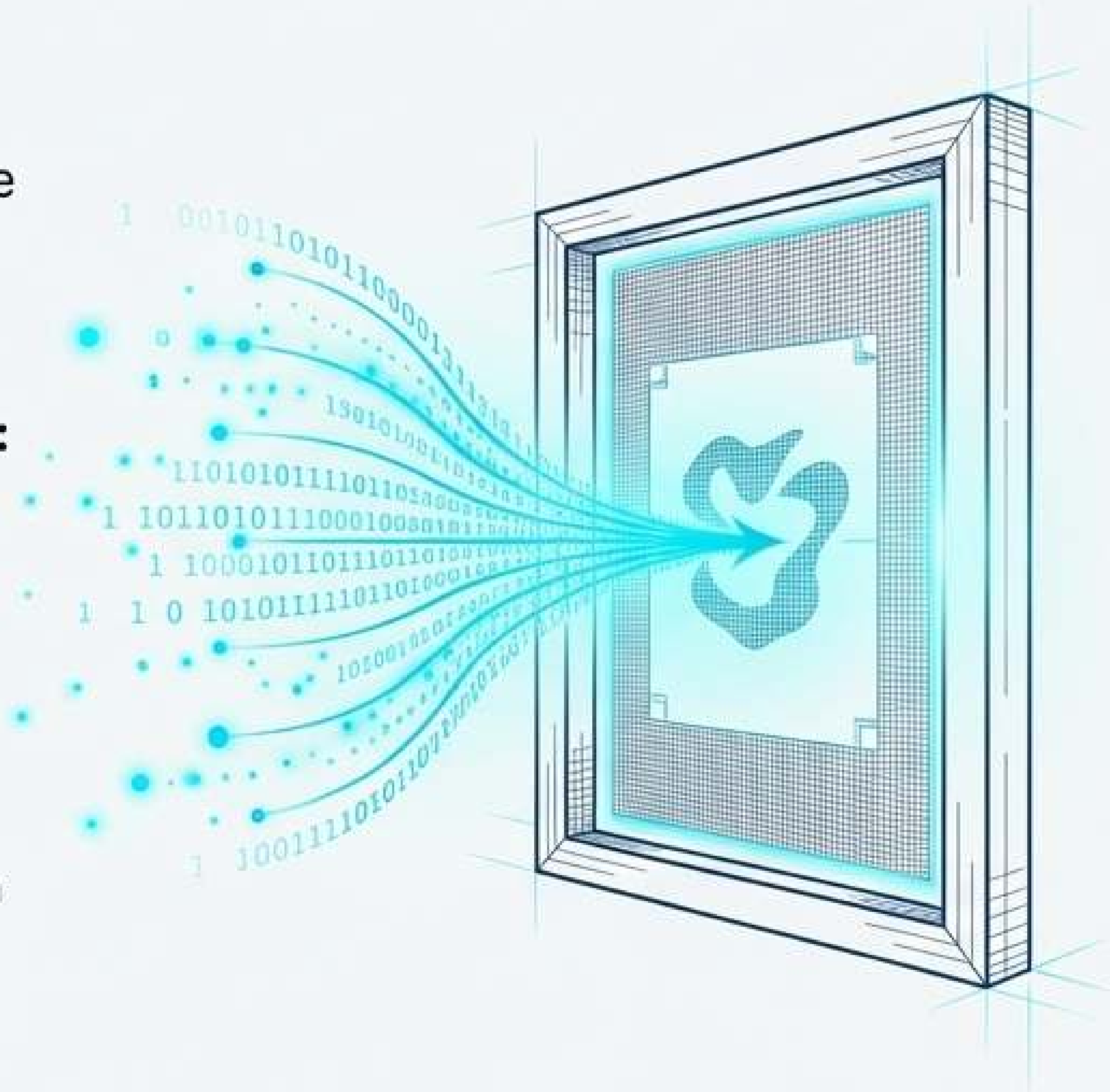
The Future of the Blueprint is Here

Exposure technology is continuously advancing, driven by demands for greater automation, precision, and sustainability.

LED Domination:
Multi-spectrum LED arrays are becoming the new standard.

Direct-to-Screen (CTS/DTS):
Digital workflows that eliminate the need for film positives entirely, imaging directly onto the screen.

Smart Exposure Units:
AI-driven exposure calibration and automated workflows.



IoT Integration:
Real-time monitoring of bulb health, vacuum pressure, and output stability.

Eco-Friendly Design:
A focus on low-energy, sustainable equipment.

Mastering exposure is the single most effective way to elevate print quality, reduce waste, and achieve consistent, professional results.

The perfect print begins with a perfect blueprint.