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February 24–27, 2026 ✦ Horseshoe Las Vegas



Harnessing UV Galvo Lasers

FOR THE AWARDS & PERSONALIZATION INDUSTRY

Precision, Profitability & New Premium Applications

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Session Code 111 | Intermediate Level

Introduction

UV (Ultra Voilet) laser technology is **reshaping how awards and personalized products are decorated**—offering unmatched precision, speed, and versatility.

This session provides a practical overview of **UV laser systems and how they compare to sandblasting, CO_2 lasers and fiber laser** for the materials and applications most common in the industry.

Beyond the technical insights, this session also examines the business case and **ROI potential, including cost savings, throughput improvements, and opportunities for premium pricing** that can transform your bottom line.

We'll also explore the exciting application of **sub-surface (inside-the-glass) engraving**—a unique capability that can set your offerings apart from the competition.



Quick Audience Poll



Sandblasting

Who here relies on sandblasting for their premium glass and crystal work?



CO2 Flatbed or Galvo

Who uses a gantry CO2 laser as their primary workhorse today?

Anyone using a CO2 galvo?



Fiber Laser Flatbed or galvo

Who has already added a fiber source for marking metals?



UV Laser

Anyone using a UV laser for marking on glass or other materials?

Anyone doing sub-surface (inside the glass) marking?



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LASER

Light Amplification Stimulated Emission Radiation



Think of a laser as *a* ***super-focused beam of light*** that's very well behaved.

Normal light spreads out in all directions and is made of lots of different colors going every which way.

A laser is more like a **perfectly organized parade** of light where all the waves are the same color line up (are ***coherent***) , move together, and head in the same direction.

Because of that:

- Laser light can travel very far without spreading out
- It can be extremely precise (great for cutting, measuring, or reading small data)
- It can be very gentle (like in barcode scanners) or very powerful (like in a metal cutter)

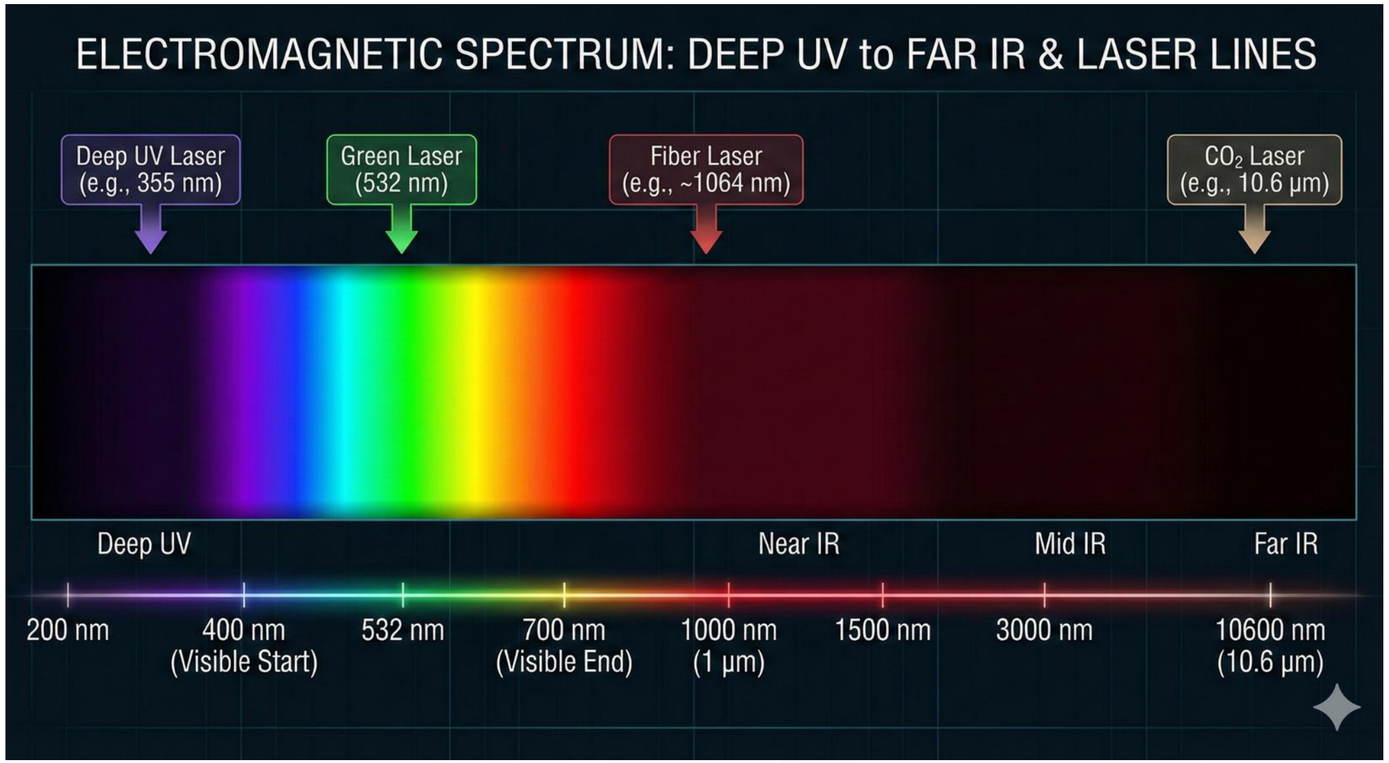
So, in everyday terms:

A laser is **light that's been concentrated, synchronized, and aimed with incredible precision**—kind of like the difference between a flashlight and a sharp, glowing pointer that never loses its focus.

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What does UV mean?

- The term UV (Ultra-Violet) is simply referring to the wavelength (color) of the laser light being used.
- CO2 and Fiber lasers have different wavelengths as shown in the spectrum chart to the right.



Note: Many other LASER wavelengths and types are not shown here

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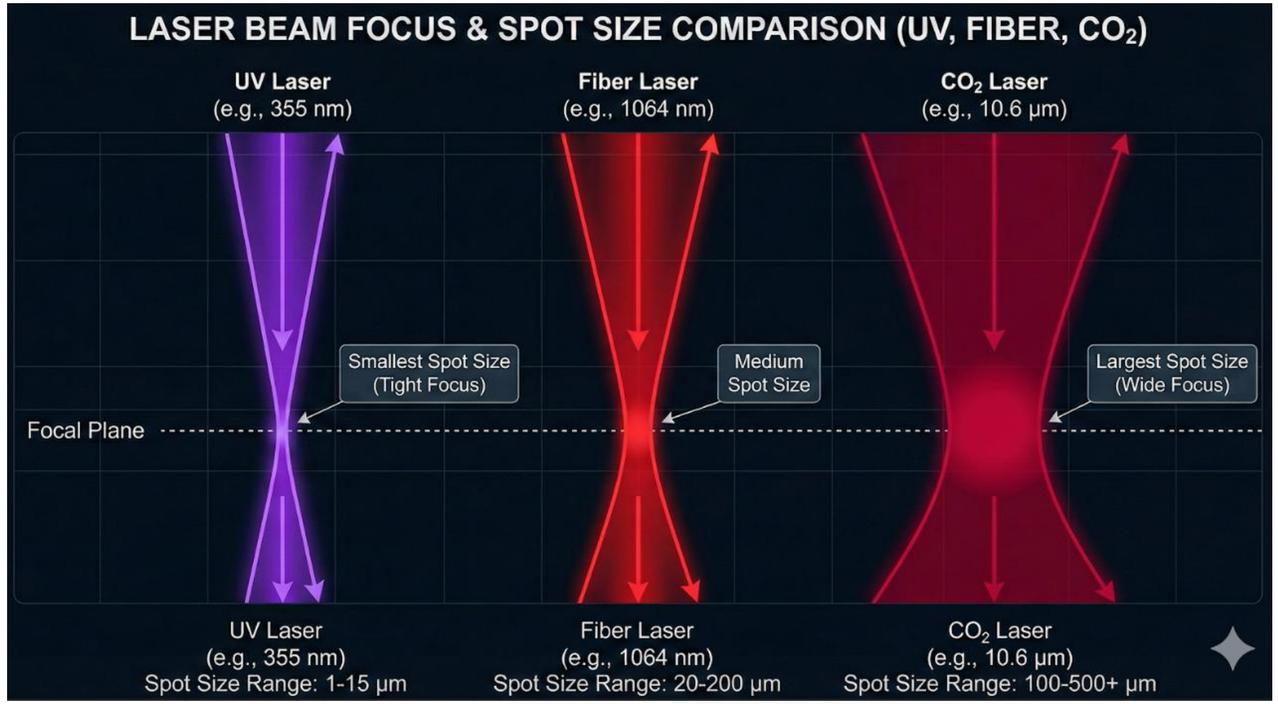
Spot Size & Heat Comparison

Smaller Spot = Finer Detail

UV lasers feature a focused spot size approximately 10x smaller than a standard CO2 laser. This allows for photo-realistic engraving and micro-text.

Less Heat = Cleaner Edges

Operating at 355nm, **UV lasers use "cold ablation"** to break chemical bonds, significantly reducing the Heat Affected Zone (HAZ) that causes melting or charring.



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Why does it matter?

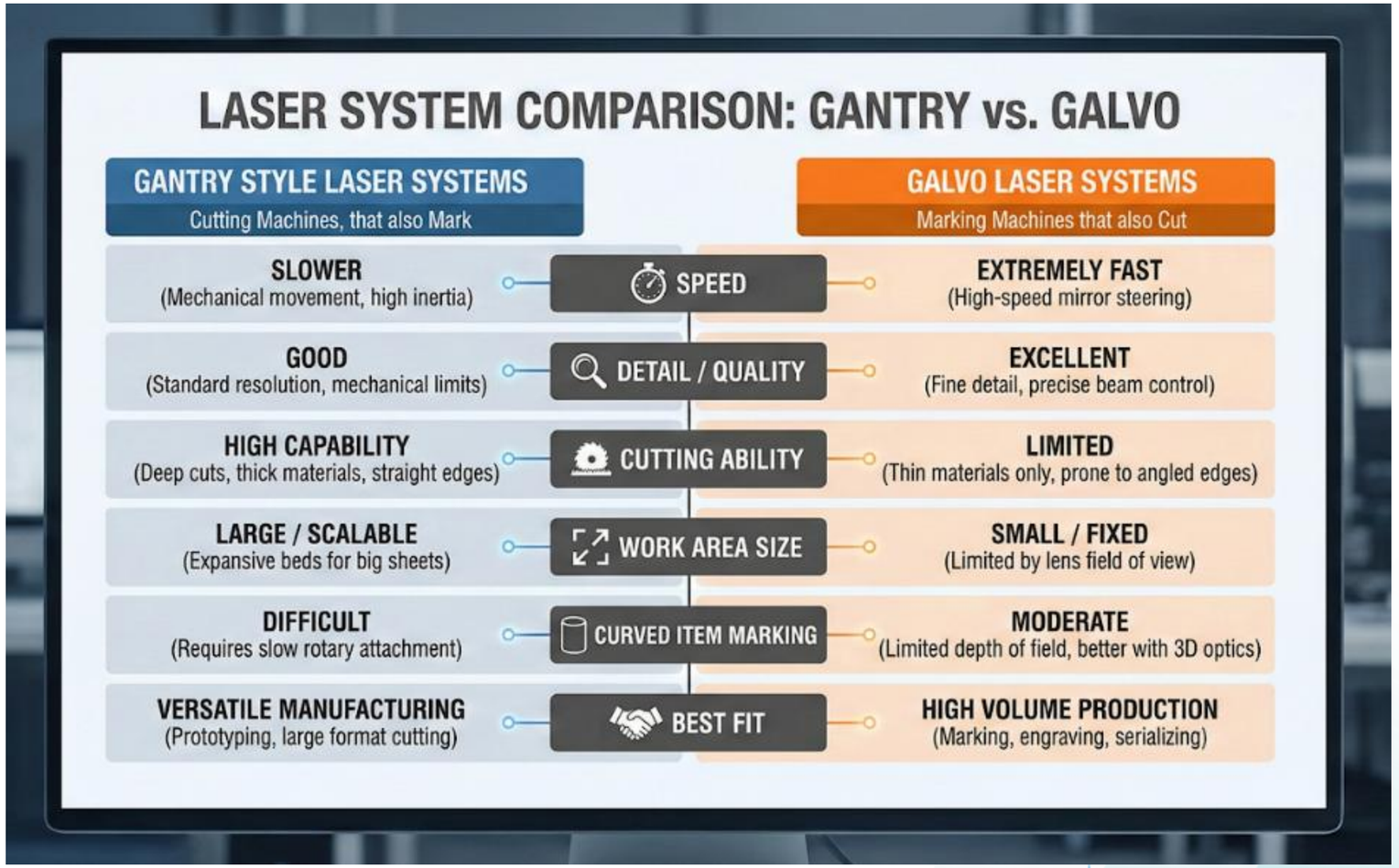
- It matters because different materials respond differently to the different wavelengths / colors

- You need to use the right tool / method for the job at hand

Technology	Primary Material	Key Strength	Weakness
CO2	Organics such as Wood, Acrylic, leather	Cutting & Area Engraving, material removal	Gantry machines are Slow, Thermal Stress. Spot size is large
Sandblasting	Glass, Stone	Depth & Finish	Labor Intensive, Multi-Step Process, Messy
Fiber Galvo	Metals, some plastics	Deep Engraving, Speed, Detail	Cannot mark many materials
UV Galvo	Broad ranch of materials including Glass, Plastic, Wood, Metal Marking, Leather	Cold Marking, Detail	Cannot cut thick material. Small marking field to achieve smallest spot



Laser System Configurations



NOTE: Many exceptions exist and the two methods can also be combined

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Why UV LASERs are perfect for glass

UV lasers mark glass through a process called **photoablation** rather than heat.

This process uses **photons** to break molecular bonds without generating excessive heat.

The process—often called **cold marking**—along with the small spot size helps to ensure flawless, high-contrast results that look sharp and professional.



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Mastering Glass

The Problem with CO2

CO2 lasers work by thermally shocking the glass, causing micro-fractures. This results in a rough, "sharded" surface that can chip and varies in quality.



The UV Solution

UV lasers vaporize the surface with minimal heat. The result is a smooth, frosted finish that rivals sandblasting, but with digital precision and zero consumables.



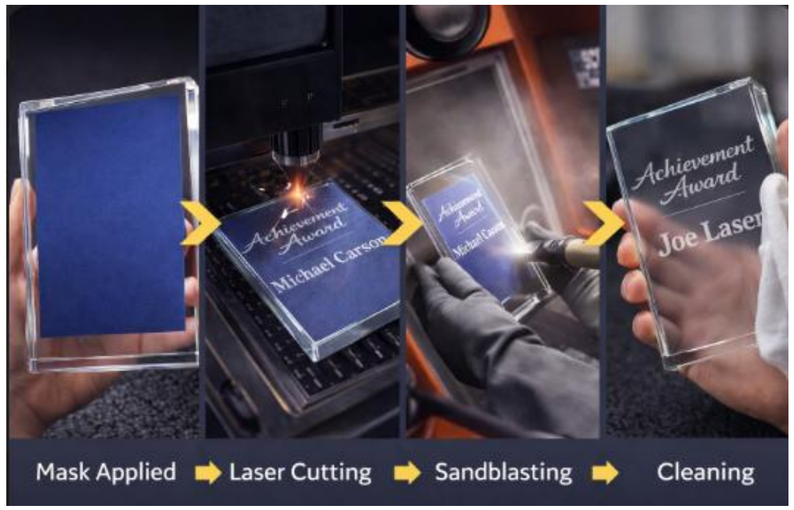
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Mastering Glass

The Problem with Sandblasting

Sandblasting produces beautiful results, but is **slow**

- Apply Laser Mask
- Use a laser to cut the mask
- Weed out the mask
- Use a sandblasting gun / cabinet to blast out the glass.
- Clean the glass
- Consumables



The UV Solution

UV lasers vaporize the surface with minimal heat.

The result is a smooth, frosted finish that rivals sandblasting, but with digital precision, faster overall processing time and zero consumables.



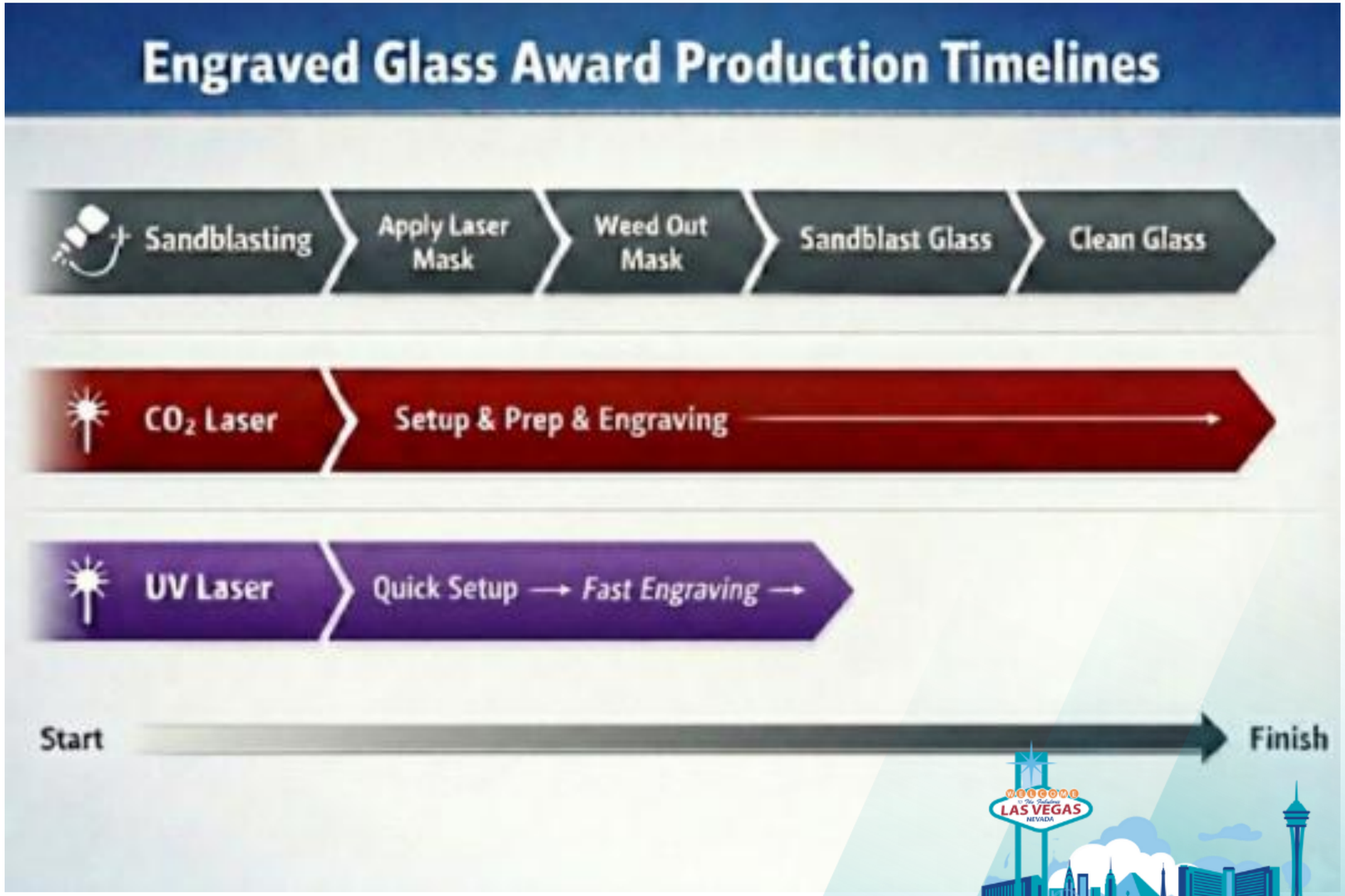
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Mastering Glass 3D Glass

Curved glass marking Common application for Sand Blasting, CO2 and UV



Throughput Comparisons



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Coated & Anodized Metals

Surface Ablation

UV lasers excel at ablating paint and powder coat to reveal the base metal. Because of the low heat, there is very low risk of warping thin metal tags or damaging the surrounding coating.

Note: CO2 galvos do a great job with this application as well, however they cannot compete with the fine details due to spot size limitation



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Wood and Leather



Surface marking

UV lasers are excellent for marking on wood and leather, offering high-precision,, clean, and detailed engraving with minimal charring or heat damage.

They work via photochemical interaction to produce high-contrast marks without burning or warping, making them ideal for delicate, intricate, and high-quality, professional, or industrial applications.

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Plastics & Coated Items



High Contrast, No Melting

Standard CO2 and fiber lasers often melt plastics, leaving raised edges or illegible text. UV lasers create a photochemical color change (often turning white plastic black) without damaging the surface texture.

- **Legibility:** Perfect for small QR codes and serial numbers.
- **Speed:** Mark hundreds of parts in minutes.

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Small Spot size = High Precision Engraving

UV is Perfect for detailed artwork



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Sub-Surface Engraving

The "Wow" Factor

UV lasers can focus the beam *inside* clear glass or crystal without damaging the surface. This creates a floating 3D image encased within the award.

Why It Sells

This capability is virtually impossible to replicate with other common shop tools, allowing you to offer a truly exclusive, high-value product.



Sub-Surface Engraving







Sub-Surface Engraving with UV color printed backside

UV Limitations / cautions

UV is a precision tool, not a brute force tool.

Glass Variability: Small spot means short focal beam waist. Better results achieved with auto-focus, advanced software compensation methods, higher power and larger field sizes.

Deep Metal Engraving: It is too slow. Use a Fiber laser for removing material volume.

.

Thick Cutting: UV can cut thin foils, but for 1/4" acrylic or wood, a CO2 laser is vastly superior for organics, Fiber for metals.

Reflective Bare Metals: Polished chrome or silver can reflect the beam; fiber is needed for efficient coupling.



UV vs. Sandblasting – Process Comparison

Step 1

Apply Mask

Step 2

Install into Laser

Laser Engrave the Mask

Step 3

Weed Design

Step 4

Sandblast

Step 5

Removed mask

Clean & Wash

UV Laser Workflow: Fixture -> Print -> Done



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Operational Cost & Efficiency Comparison

Head-to-Head: UV Laser vs. Sandblasting

1. The Equipment Investment

- **UV Laser (10-15W):** ~$30,000 (Avg)
- **Sandblasting Setup:** ~$6,000 (Avg)

initial CapEx Gap: **$24,000**

2. Speed & Throughput

- **UV Laser:** 3 Minutes / Unit $**160 Units / Shift**
- **Sandblasting:** 12 Minutes / $**40 Units / Shift**

Advantage: Laser increases production capacity by **400%**.

3. Cost Per Unit Breakdown (Labor @ $20/hr)



Cost Component	UV Laser	Sandblasting	Note
Consumables	$0.05	$2.25	*Laser saves on film, grit, nozzles*
Labor	$1.00 (3 min)	$4.00 (12 min)	*Laser reduces manual prep time*
TOTAL PER UNIT	**$1.05**	**$6.25**	**Laser saves $5.20 per glass**

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ROI & Strategic Outlook

1. The Payback Period

- **Scenario:** Production of 20 units/day (5 days/week).
- **Daily Savings:** $104.00 (vs. Sandblasting).
- **Time to Break Even: ~11.5 Months**.
  - *Note:* At 50 units/day, break-even drops to **4.5 months**.

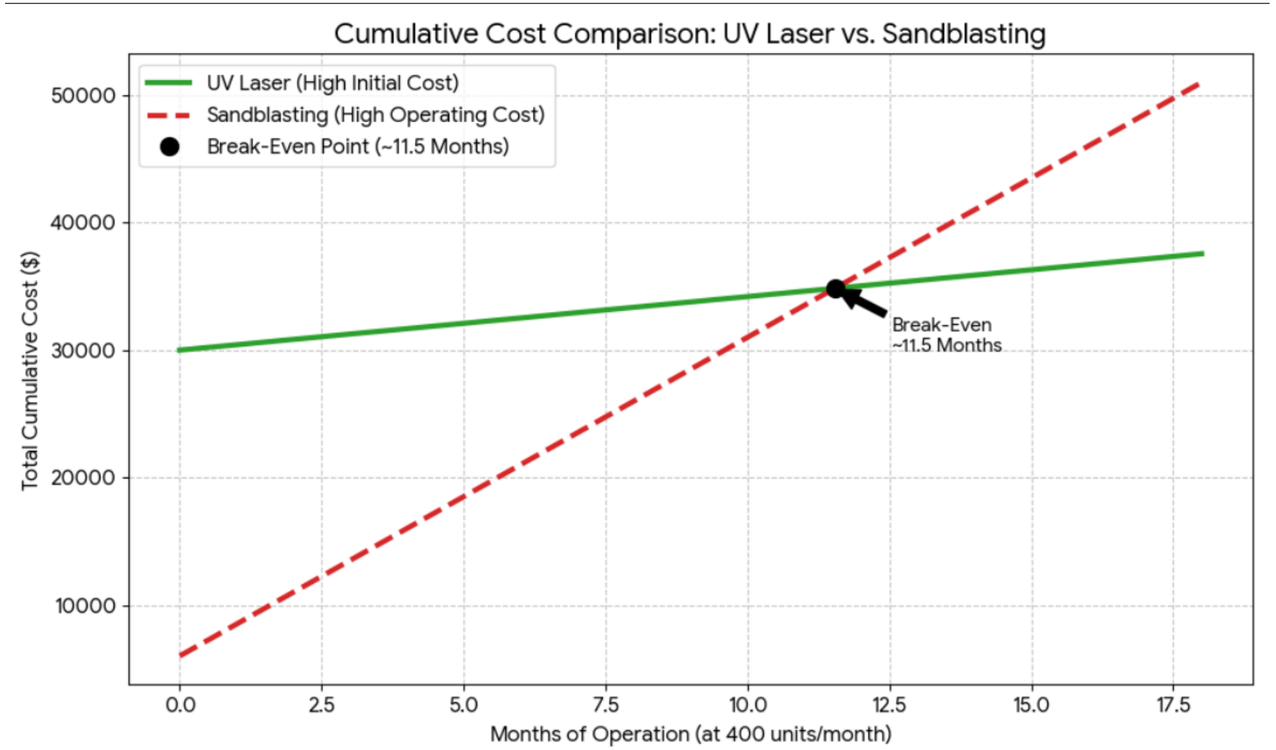
2. The Long-Term Value

- **Year 1:** Machine pays for itself.
- **Year 2+:** The **$5.20 savings per unit** becomes pure profit margin.
  - *Impact:* For every 5,000 units marked after break-even, the laser generates **$26,000** in additional profit compared to sandblasting.

3. Strategic Recommendation

- **Choose Sandblasting if:** Volume is low (<100/week) and capital is restricted under $10k.

- **Choose UV Laser if:** You need to scale. The laser eliminates the "labor trap"—allowing you to quadruple output without hiring more staff, turning the equipment into a profit center after the first year.



Same Job. Four Technologies.

CO2 Laser

- Heat-driven process
- Wider kerf width
- Risk of glass chipping
- Frosting inconsistency

Sandblasting

- Consistent finish
- High labor cost
- Requires masking
- Cannot do micro-detail

Fiber Laser

- Metal-first solution
- Limited glass interaction
- Surface contrast only
- Not for organics

UV Galvo Laser

- Cold marking (no heat)
- Sharpest edges
- Highest micro-detail
- Zero consumables



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Key Takeaways

- **UV = Precision + Premium:** It allows you to potentially charge more for work competitors can't touch. Or, charge the same, but provide better service and make more profit.
- **Productivity:** The speed of the UV galvo combined with low setup time drives profitability.
- **Right Tool for the Job:** UV doesn't replace your CO2 or Sandblaster; it complements them to maximize shop efficiency.



Questions
?
Let's talk about your shop.

Tom Tamburrini



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