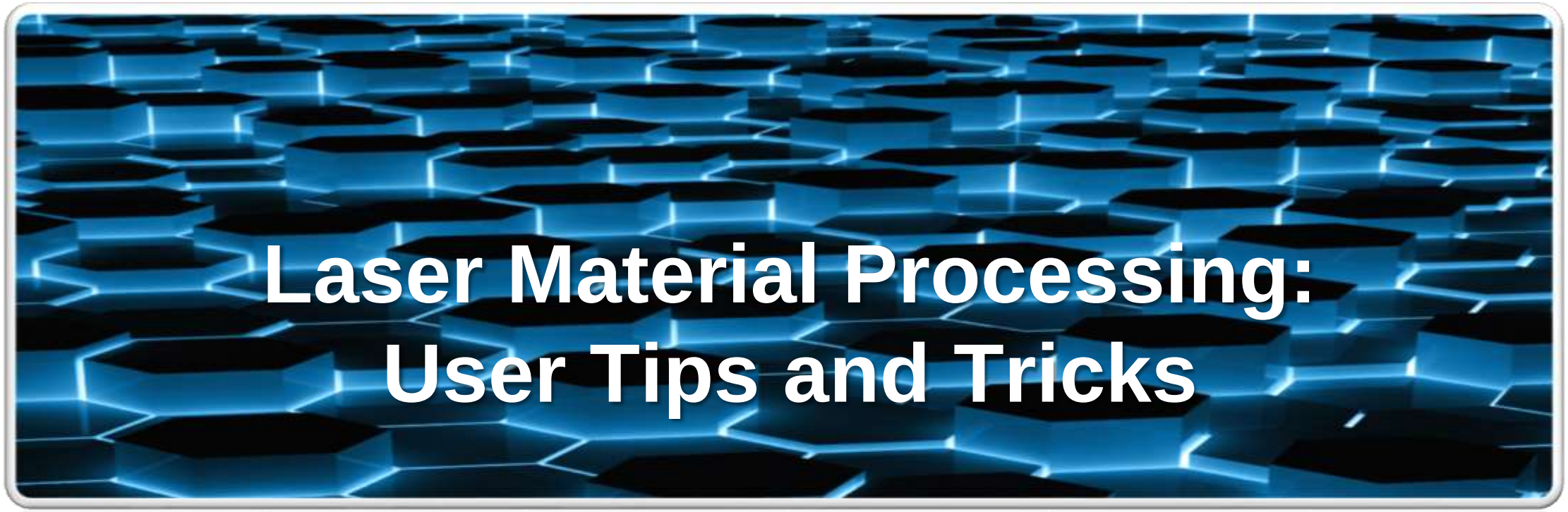


Laser Material Processing: User Tips and Tricks

Manny Oropeza
Universal Laser Systems Inc.

UNIVERSAL®
LASER SYSTEMS

Seminar Digital Download

Scan code above or type in web address:

service.ulsinc.com/support/Educational Seminars/
Tip sheets can also be downloaded at this location

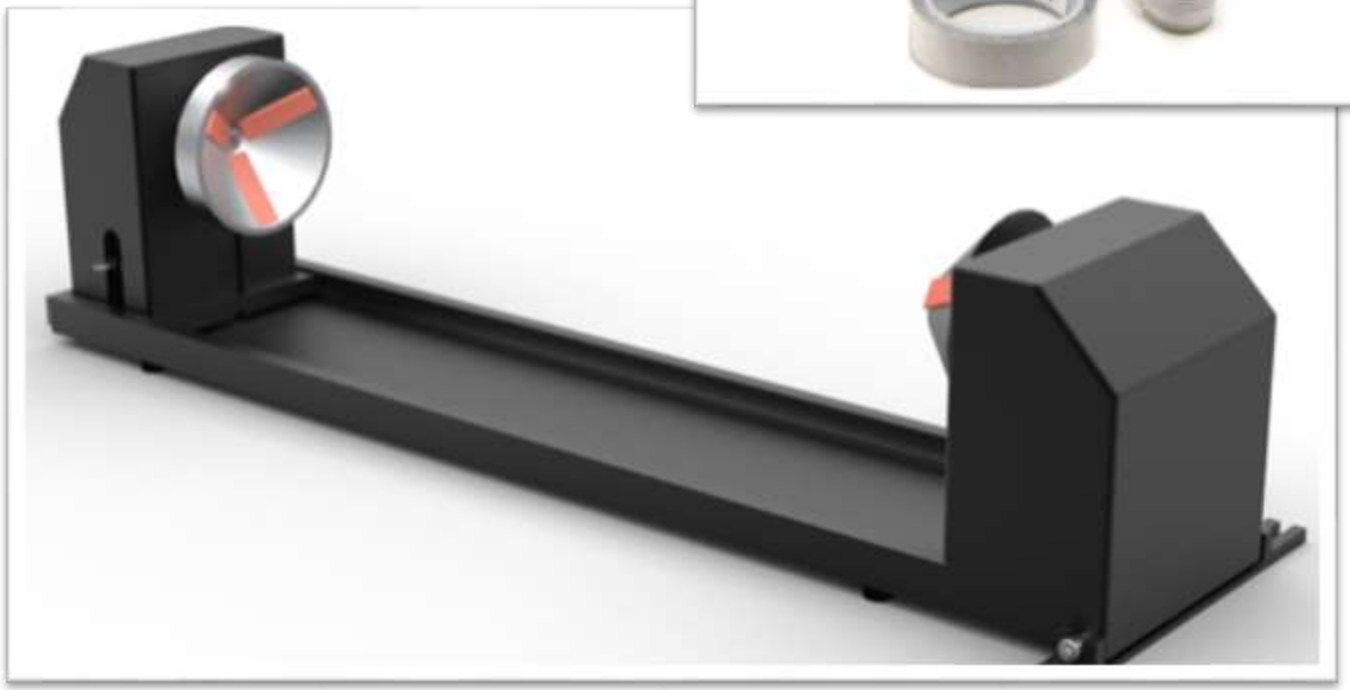
The goal of this seminar is to provide the necessary knowledge and understanding of laser material processing using a variety of methods so that you can effectively achieve the same quality results for your business.

Seminar Outline:

- Laser Processing Drinkware
- Laser Wavelengths and their effects on Heat Transfer Materials
- Laser Processing Leather
- Laser Processing Photos
- Integrating Color into Laser Processing

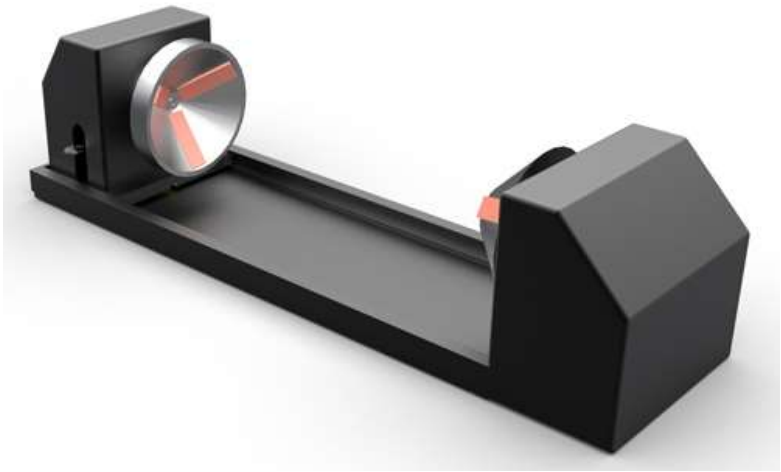
UNIVERSAL LASER SYSTEMS

Processing Drinkware



Rotary

The Rotary extends the capabilities of laser systems by giving the user the ability to mark, engrave or even cut cylindrical objects by automatically rotating them within the laser system.



Different Ways to Process Steel Tumblers

Pre-Coat Ceramic Coating

High Power Density Focusing Optics

Different Ways to Process Steel Tumblers

Annealed Mark with Fiber Laser

Engraved Mark with Fiber Laser

Most Common Laser Wavelengths

1.06 micron – Fiber Laser

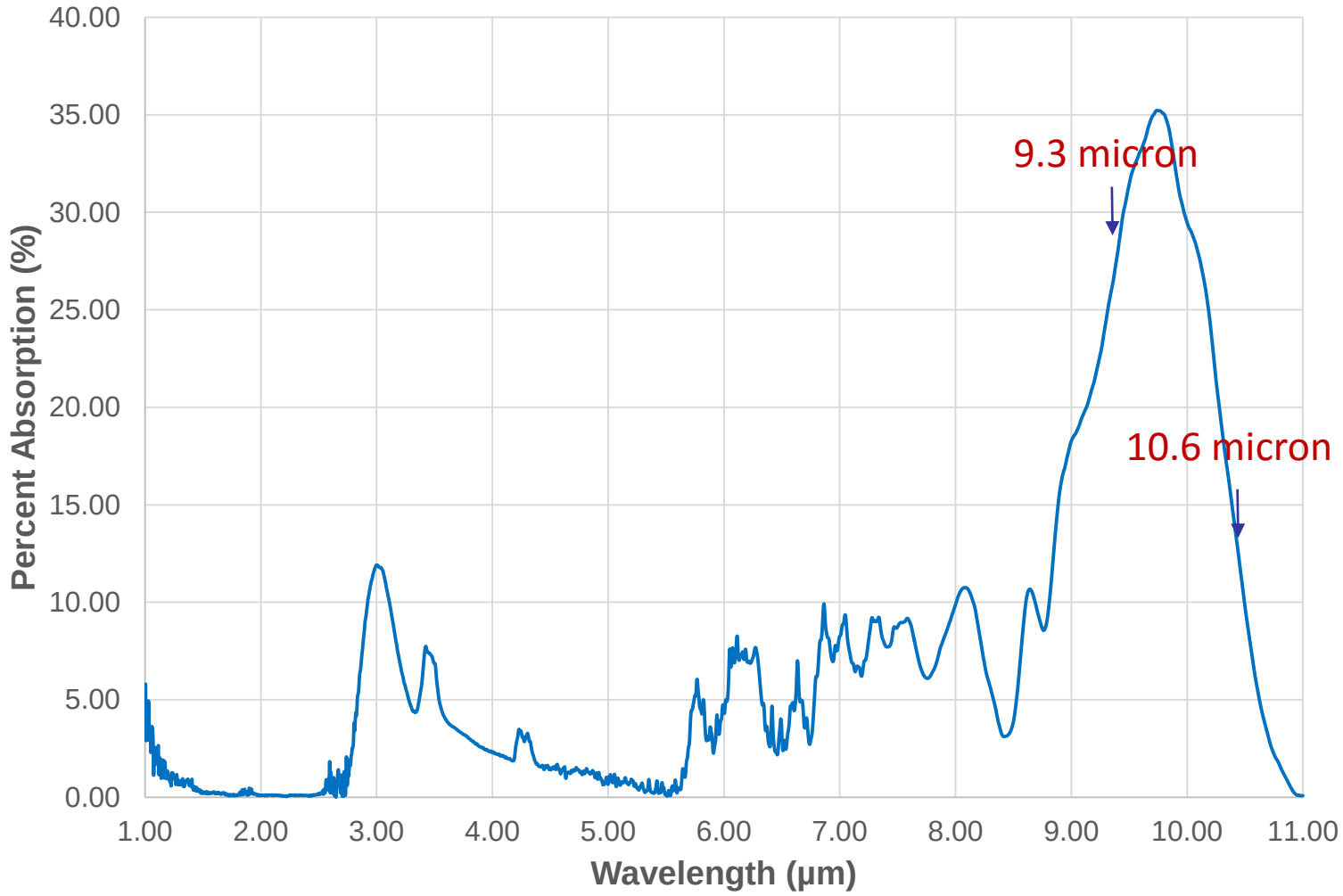
Most Common Laser Wavelengths

10.6 micron – CO_2

Most Common Laser Wavelengths

9.3 micron – CO_2

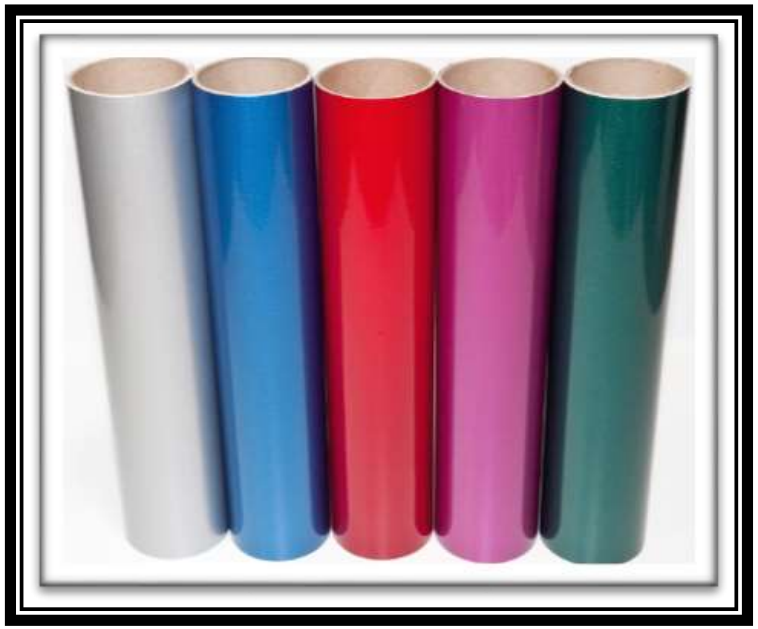
Optical Absorption for Cherry Wood



10.6µm and 9.3µm on Wood

Questions

Laser Processing Heat Transfer Films



Tested Brands:

STAHLS' · sef AMERICAS · LASERFLEX · Siser THERMO TRANSFER FOR TEXTILE · Chemica

Traditional Method of Cutting Heat Transfer Materials

FEED MATERIAL into cutter so that the carrier is on the bottom.

CUT LOGO words or numbers in reverse *(mirror image).*

WEED away excess material leaving only the desired graphic on the carrier.

Laser Processing Heat Transfer Films

This application tip will explain the laser marking and cutting process with heat transfer materials. Using laser technology dramatically increases the level of detail you can achieve with heat transfer materials and will dramatically reduce or completely eliminate weeding.

Use heat transfer materials with a laser system to customize a variety of apparel including sports jerseys, tee shirts, performance apparel, bags, jackets and more.

Heat Transfer Films (Vinyl Warning)

- Most brands have switched to a polyester film vs. vinyl film, though in many cases the material is still called “Heat Transfer Vinyl”
- These new materials are *not* made from vinyl, making them laser-friendly
- If unsure, please check with the manufacturer before laser processing these materials: true vinyl produces corrosive out-gassing that will damage or destroy laser systems over time

Overview

- Heat transfer materials are available in many different styles, color options and brands
- The ULS Materials Database currently supports STAHLS materials, with Siser and Adchem materials being added in the 2nd quarter database release
- Over 30 total heat transfer materials supported

Need to Know

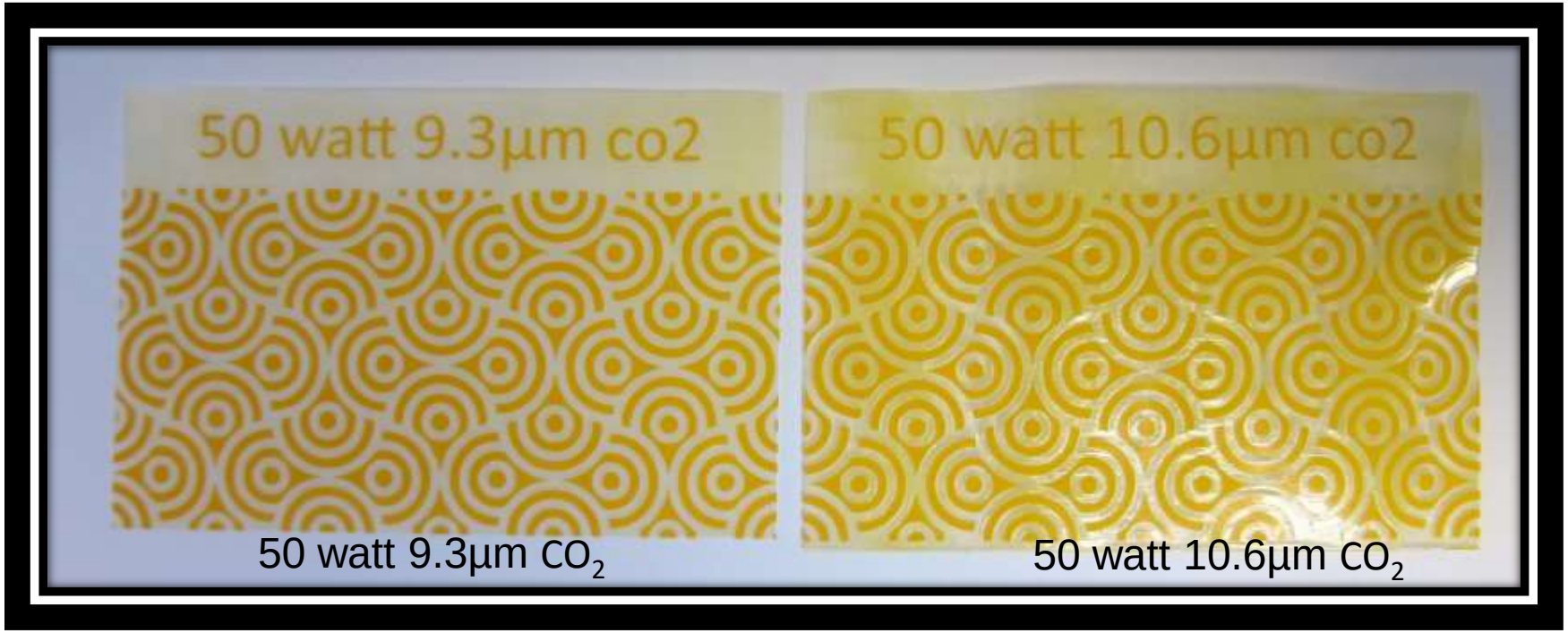
- Not all materials or colors will work well with all processes
    - Glitter material may not be suitable for photo imaging
    - Certain film colors may not show up well on light-colored fabric with the 10.6µm CO_2 laser wavelength, causing engraved areas to possibly show "shadowing”
- Due to the variety of colors and material types, testing is recommended before beginning any kind of production

Necessary Options and Accessories

- **9.3µm** Co_2 laser, 30 watts and up for best results
- **10.6µm** laser, will only work with some colors (testing is advised)
- Cutting table with heavy vacuum
- ULS 1-Touch Laser Photo software (for processing photos or color logos)

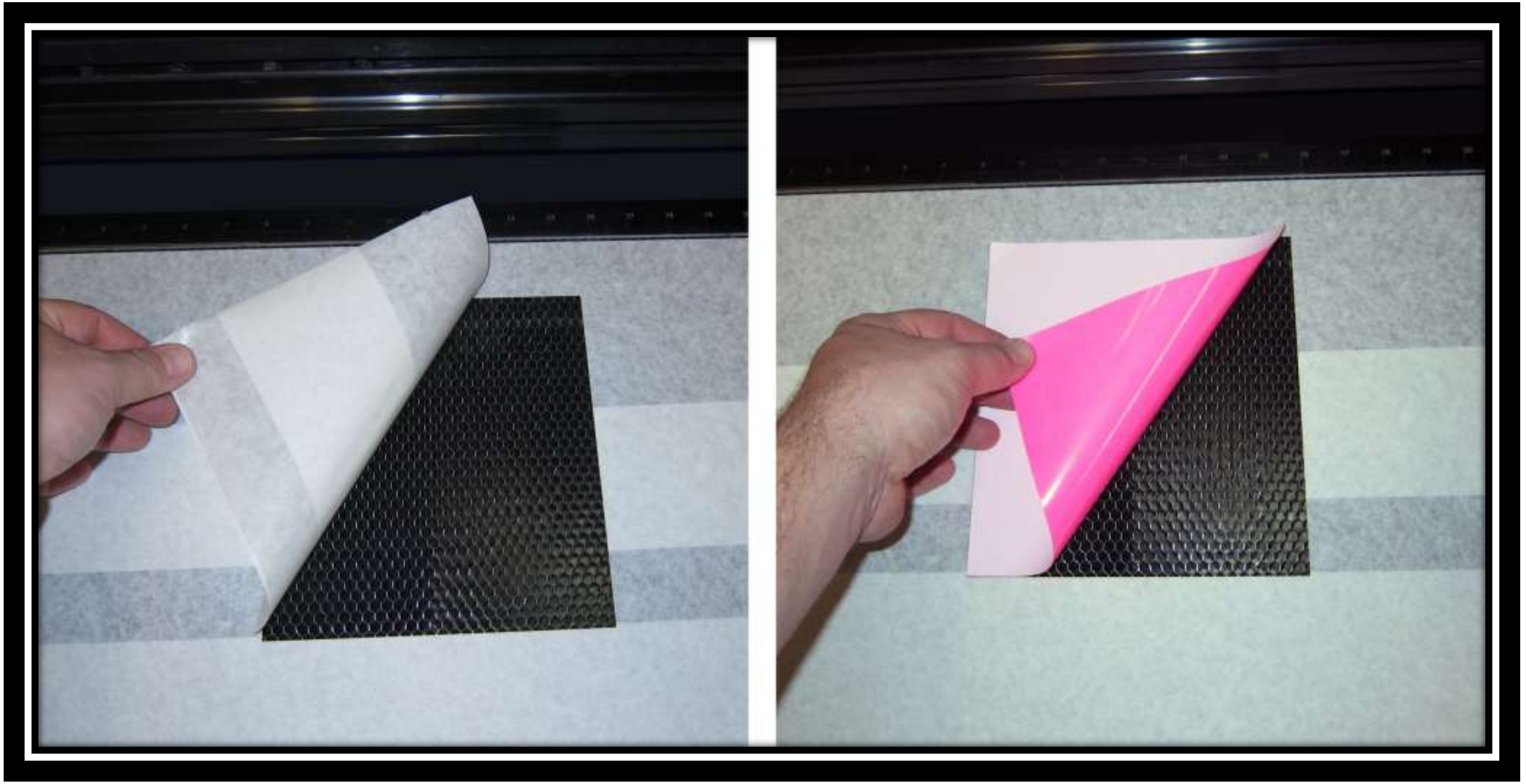
10.6µm CO_2 Laser vs. 9.3µm CO_2 Laser Comparison

Example engraved on *Stahls® CAD-CUT® Fashion-FILM®* with same settings with each wavelength



10.6µm causes bulging and residue distortions, caused by increased heat from wavelength

Vacuum Table



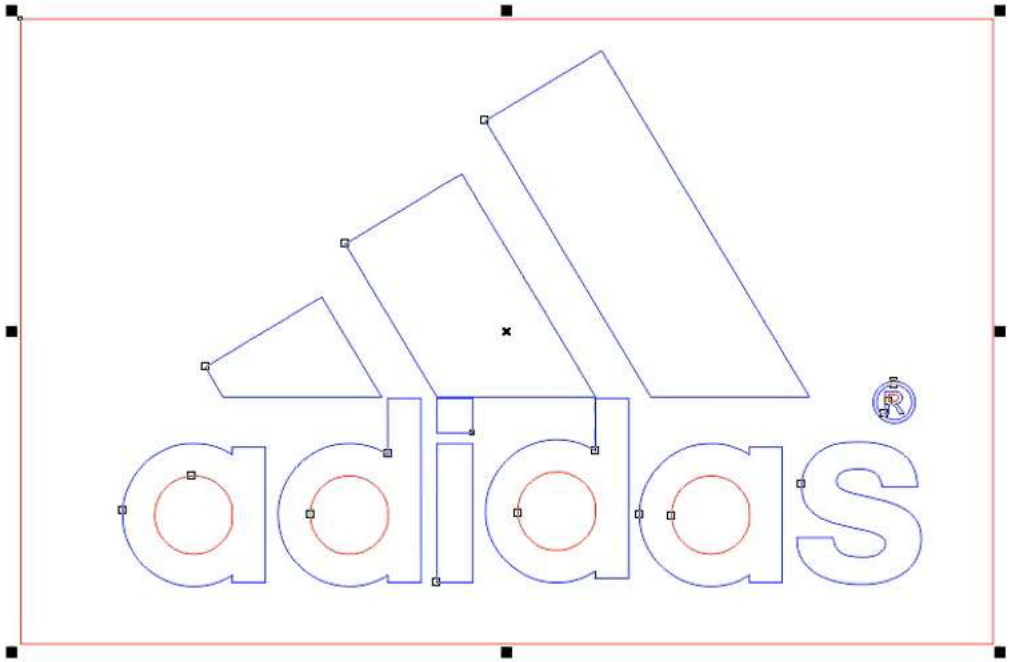
Laser Cutting

Reduced Weeding

CorelDRAW X8 (64-Bit) - W:\David S\TRANSFER\Glitter .cdr

File Edit View Layout Object Effects Bitmaps Text Table Tools Window Help

Glitter .cdr



1: Black and White | 2: Photo | 3: Kiss cut example | 4: Multi color

(5.906 , -6.875) 19 Objects Selected on Layer 1

None Outline Color

Laser Engraving

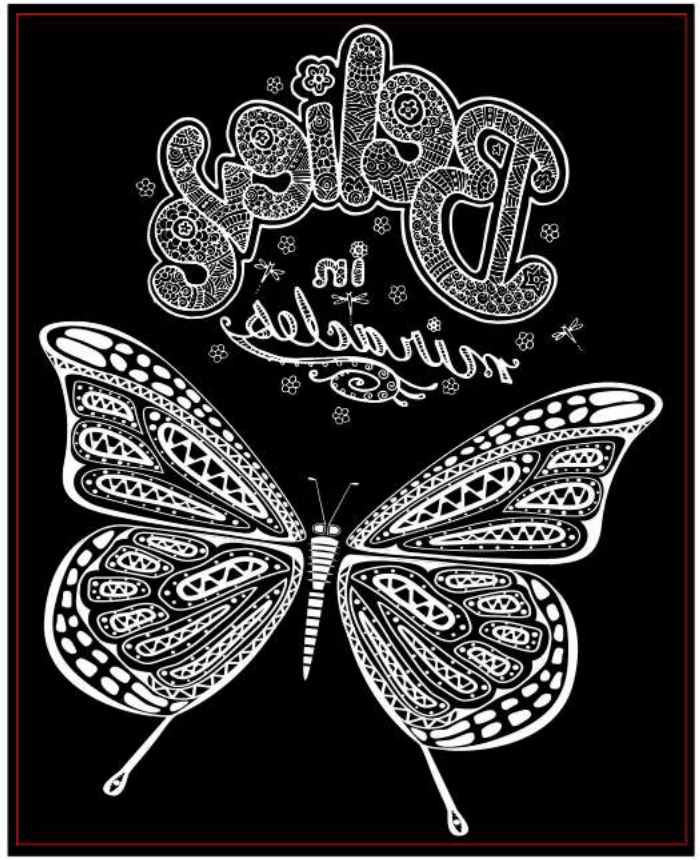
No Weeding

CorelDRAW X8 (64-Bit) - Untitled-2

File Edit View Layout Object Effects Bitmaps Text Table Tools Window Help

Broad Sheet 24.0 " 18.0 " Units: inches 0.01 " 0.0 " 0.0 "

Untitled-2



1 of 1 Page 1

Drag colors (or objects) here to store these colors with your document

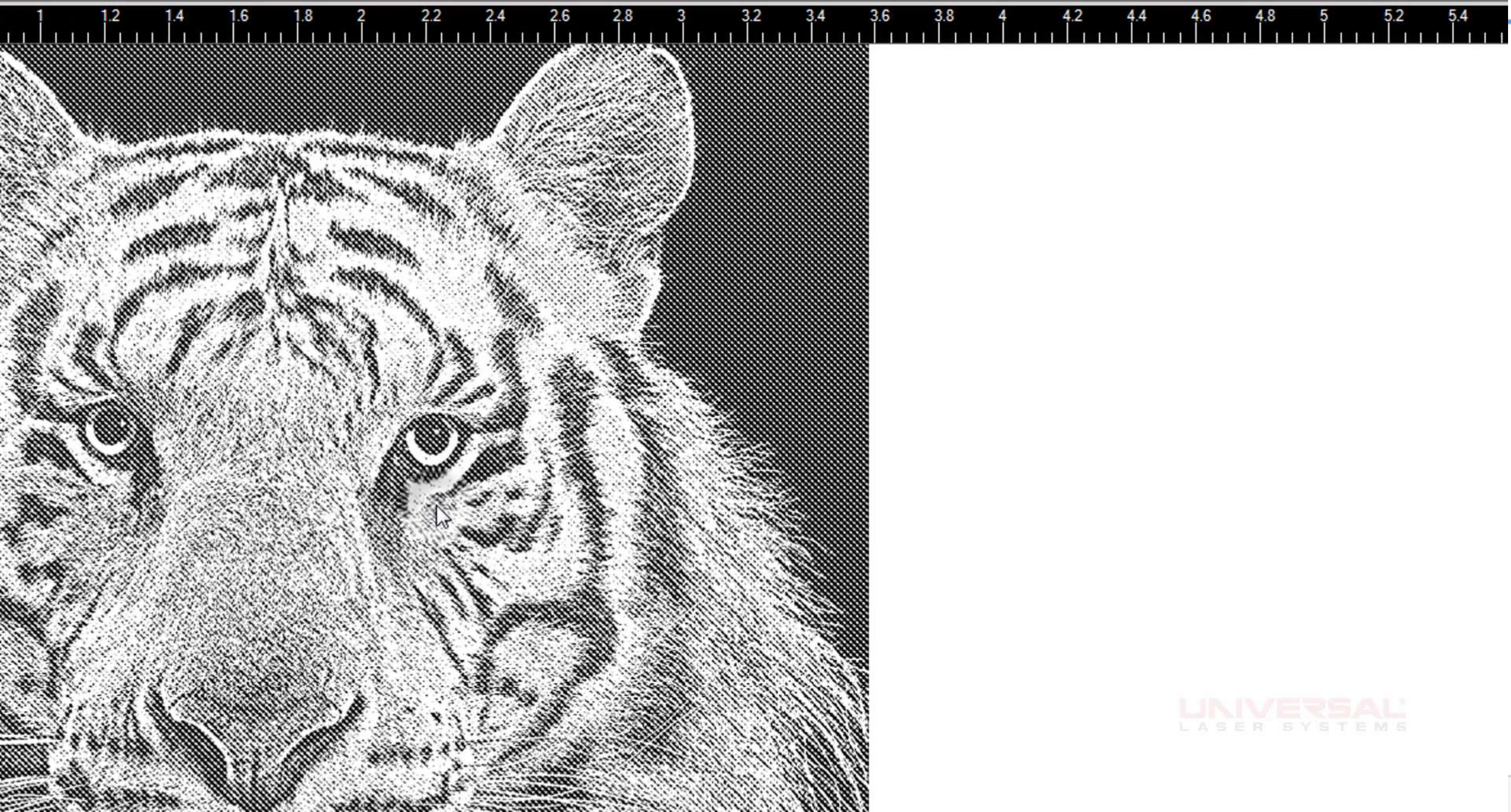
(18.299, -3.000)

None Red Hairline

Laser Photo Imaging

No Weeding

1-Touch Laser Photo™



Multi Colors
No Weeding

Examples

Questions

Leathers

Leather Description

- A durable, flexible material created by the tanning of animal rawhide and skin
- Produced in both cottage and heavy industry
- Used for various purposes including clothing, bookbinding, wallpaper and furniture
- Produced in a wide variety of types and styles
- Decorated using a wide range of techniques

Leather Reaction to CO_2 Laser

The leather absorbs light and converts to heat, chemically degrading and vaporizing the organic material producing a surface darkening effect or cut.

Preferred Laser Wavelength is:
10.6 µm CO_2

Leather Types

- Animals
- Tanning types
- Thicknesses
- Subdivisions

Leather Types

- Bovine
- Snakes
- Deer/Elk
- Stingray
- Alligator
- Ostrich
- Many more

Thicknesses

- **Thickness or Weight** – Leather is measured in terms of ounces. One ounce equals 1/64th inch thickness.

In leather thickness terms, one ounce equals:

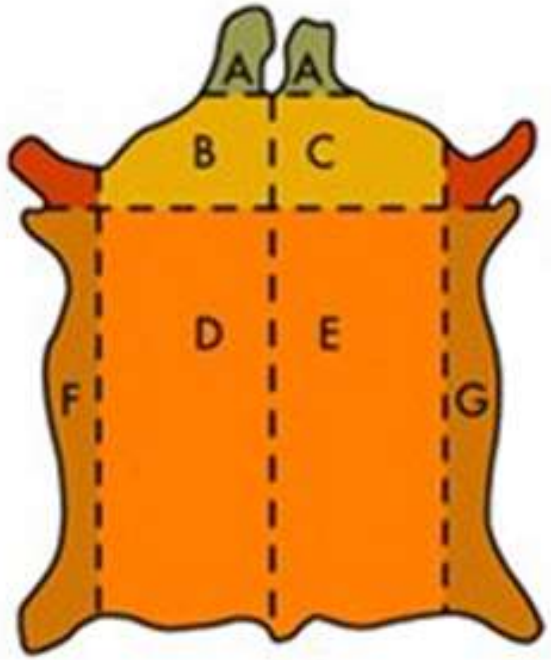
1/64 fractional inches	.016 decimal inches	.40 millimeters

Table of Comparable Measurement Values

Ounces	Fractional Inches	Decimal Inches	Millimeters
1	1/64	0.016	0.40
2	1/32	0.031	0.79
3	3/64	0.047	1.19
4	1/16	0.063	1.60
5	5/64	0.078	1.98
6	3/32	0.094	2.39
7	7/64	0.109	2.77
8	1/8	0.125	3.18
9	9/64	0.141	3.58
10	5/32	0.156	3.96
11	11/64	0.172	4.37
12	3/16	0.188	4.78
13	13/64	0.203	5.16
14	7/32	0.219	5.56

Leather Terms & Subdivisions

- Grain
- Full Grain
- Split
- Suede Split
- Back
- Belly
- Kip



Subdivisions of Leather

Belly.....F or G
Single Bend .....D or E
Double Back .....B+C+D+E+A
Side .....A+B+D+F or A+C+E+G
Back.....A+B+D or A+C+E
Double Shoulder..B+C
Single Shoulder...A+B or A+C

Common Applications

Leather is commonly used for shoes, clothing trim, personal accessories and upholstery.

Leather Advantages

- High contrast (on most leathers)
- Unique
- High engraving details
- High perceived value

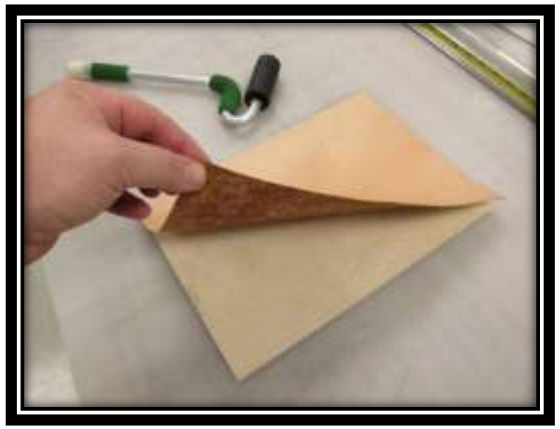
Leather Limitations

- Must masked before cutting
- Grain issues
- Focus issues
- Difficult to keep flat

Keeping Leather Flat (option)

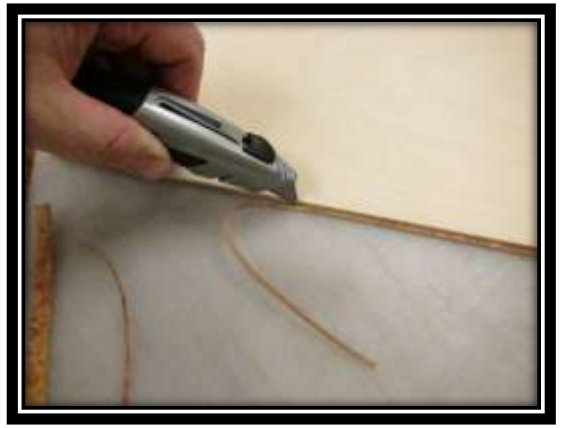
Use spray or brush adhesive (contact adhesive) to adhere leather to a flat object

1. Spray each part



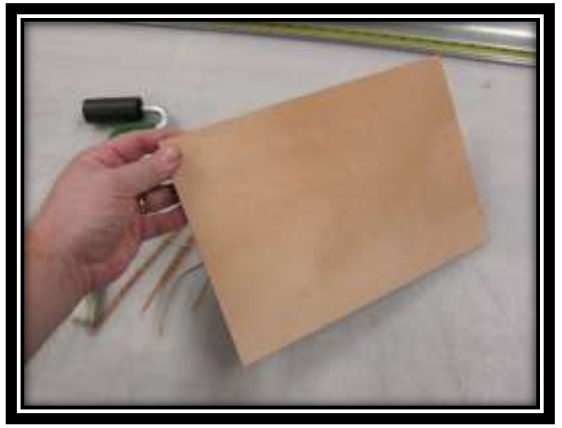
2. Put together

3. Press together



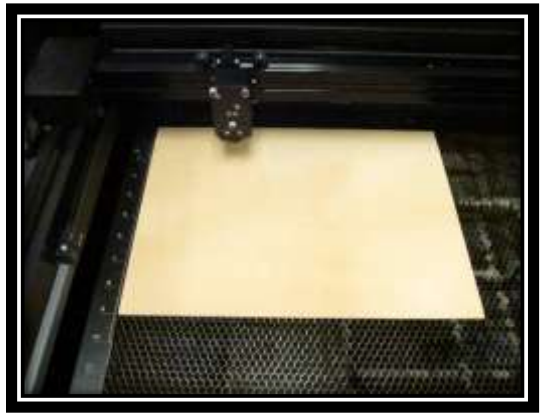
4. Trim excess

5. Edge close-up



6. Ready for laser

Laser Processing Leather



1. Place on Cutting table

2. Tape Edge, Engrave

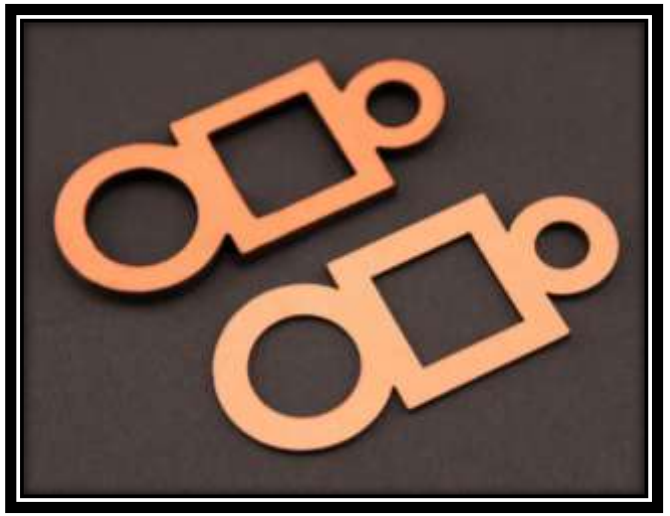
3. Mask over engraving

4. Squeegee mask

5. Cut file

6. Peel mask, finished

Laser Cut Leather Examples



Laser Marked Leather Examples

Laser Imaged Leather Examples

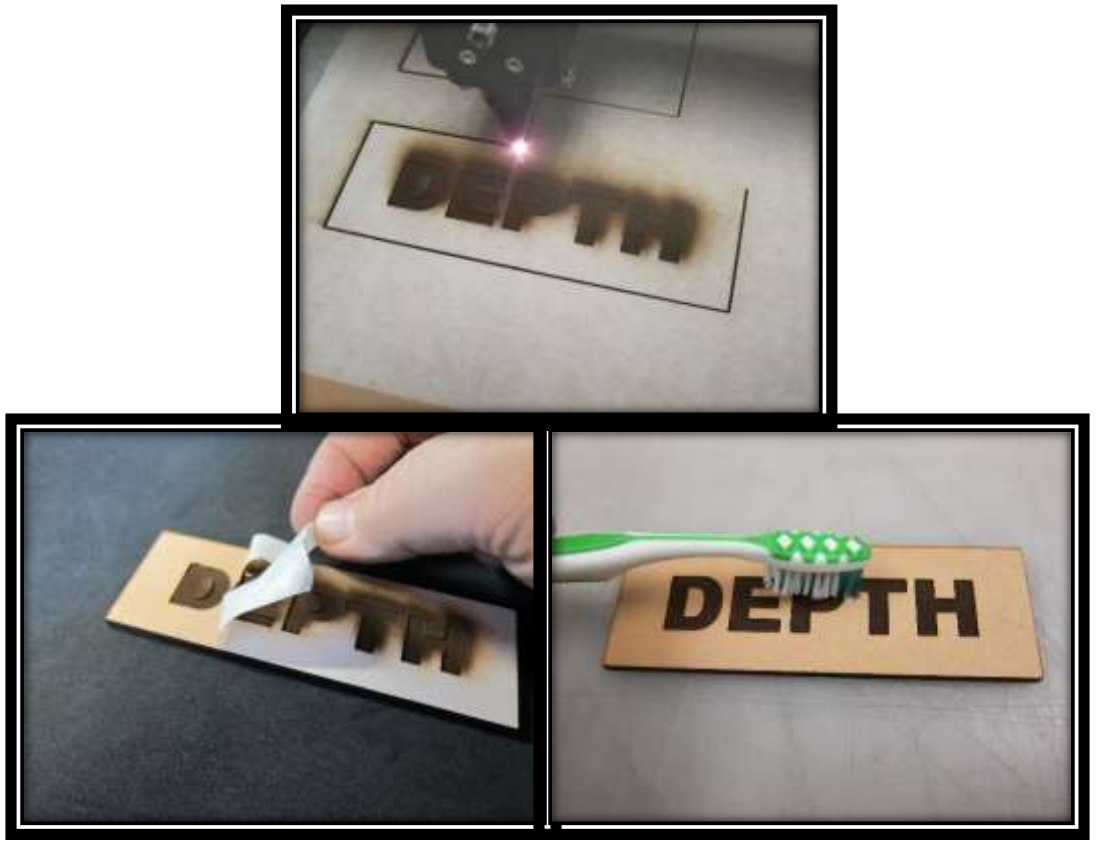
Large Laser Photo Imaged Leather (24”x36”)

Laser Marking and Cutting Leather

- Marking design and cutting for stunning new looks

Deep Engraving

- Mask the leather
- Place into laser on cutting table
- Engrave through the mask
- Remove and peel mask
- Clean out the engraving



Cleaning Leather

- When deep engraving or cutting thick leather you may need to clean the charred or sooty residue.
- Scrub it gently with Fast Orange or a similar non-abrasive hand cleaner. Apply the hand cleaner liberally to a small area of the leather and then scrub in small circles with a toothbrush. Wipe the excess off with a paper towel and then repeat the process on the next area. Avoid letting the leather soak up water.

Questions

Laser Processing Photos

How to best laser process photos onto a variety of materials

Original Image

Cherrywood Engraving

Overview

- Acquiring an image
- Quality and resolution
- SDR vs. HDR
- Photo editing software (*Photoshop*®, *Photo Paint*®)
- Photo rendering software
- Lenses
- Selecting quality materials for processing photos

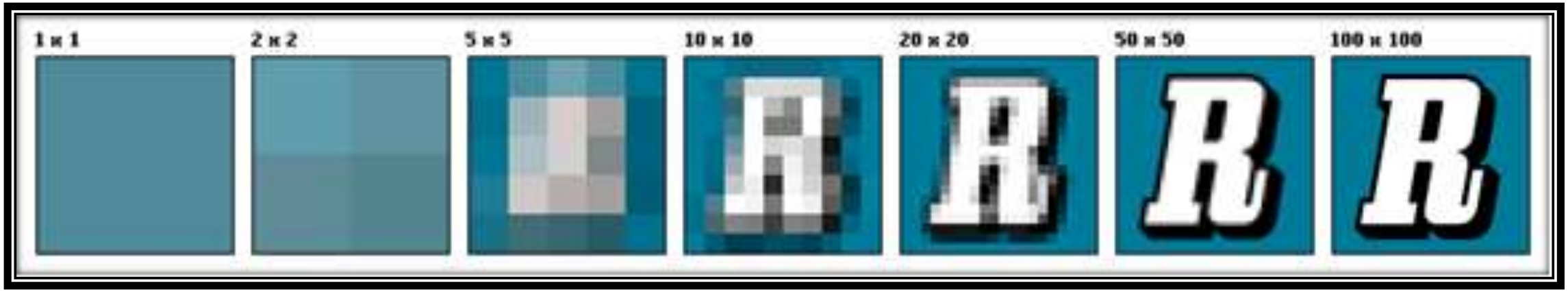
Acquiring an Image

- Certain digital images work better than others for engraving
- Understanding quality photography is the first step toward producing quality engraving
- Brightness, contrast, focus, detail and definition are key
- Garbage-in, Garbage-out

Good vs. Poor Quality Photography (laser marked on painted aluminum)

Quality and Resolution

- Types: JPG, GIF, PNG, BMP and TIFF
- Quality photos
- Camera quality
- Low resolution
- Contrast



SDR vs. HDR

HDR (High Dynamic Range)

Original Image

Engraving on Black Glass

Photo Editing Software

Allows you to perform many advanced image processing techniques:

- Resizing
- Changing resolution
- Sharpening edges
- Adjusting brightness
- Contrast and sharpness levels
- Shadow, highlight corrections
- Adding lighting effects
- Adding texture
- Dropping out backgrounds
- And more

Corel PHOTO-PAINT X8

Adobe Photoshop


File Edit Image Layer Type Select Filter 3D View Window Help
1. Tone curves or Levels.bmp @ 124% (RGB/8)
Color
Swatches
Libraries
Adjustments
Styles
Layers
Channels
Paths

Examples: Before and After

Example run on anodized aluminum

Preparing the Image for Material

Imaging capabilities of laser systems are largely dependent on photo converting software. Image processing software like ***1-Touch Laser Photo***®, ***PhotoGraV***® and ***PhotoLaser Plus***® are used to improve images and prepare them for materials.

1-Touch Laser Photo®

PhotoGraV ®

PhotoLaser Plus®

Optics on Photos

Example below was run with:

- Same laser system
- Same laser power
- Same laser processing settings
- Three different lenses

Original Photo

Laser marked on black anodized aluminum

As the focal spot gets smaller, sharper details are seen in the processed laser image, producing a brighter more detailed image

Choosing Quality Materials

Selected materials will impact the overall quality of any laser processed photo

- Avoid materials that produce patterns or grains
- Choose materials that produce good detail
- Choose materials that show high contrast

Ideal Materials:

- Cast Acrylic
- Painted Acrylic
- AlumAmark®
- Anodized Aluminum
- Stainless Steel
- Painted Metal
- Glass
- Leather
- Engravers Plastic
- Dark Natural Stone
- Laser Tiles
- Some Woods

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Engraving Examples


Anodized Aluminum


River stone


Leather


Agate Slice


Chocolate

Alder Wood

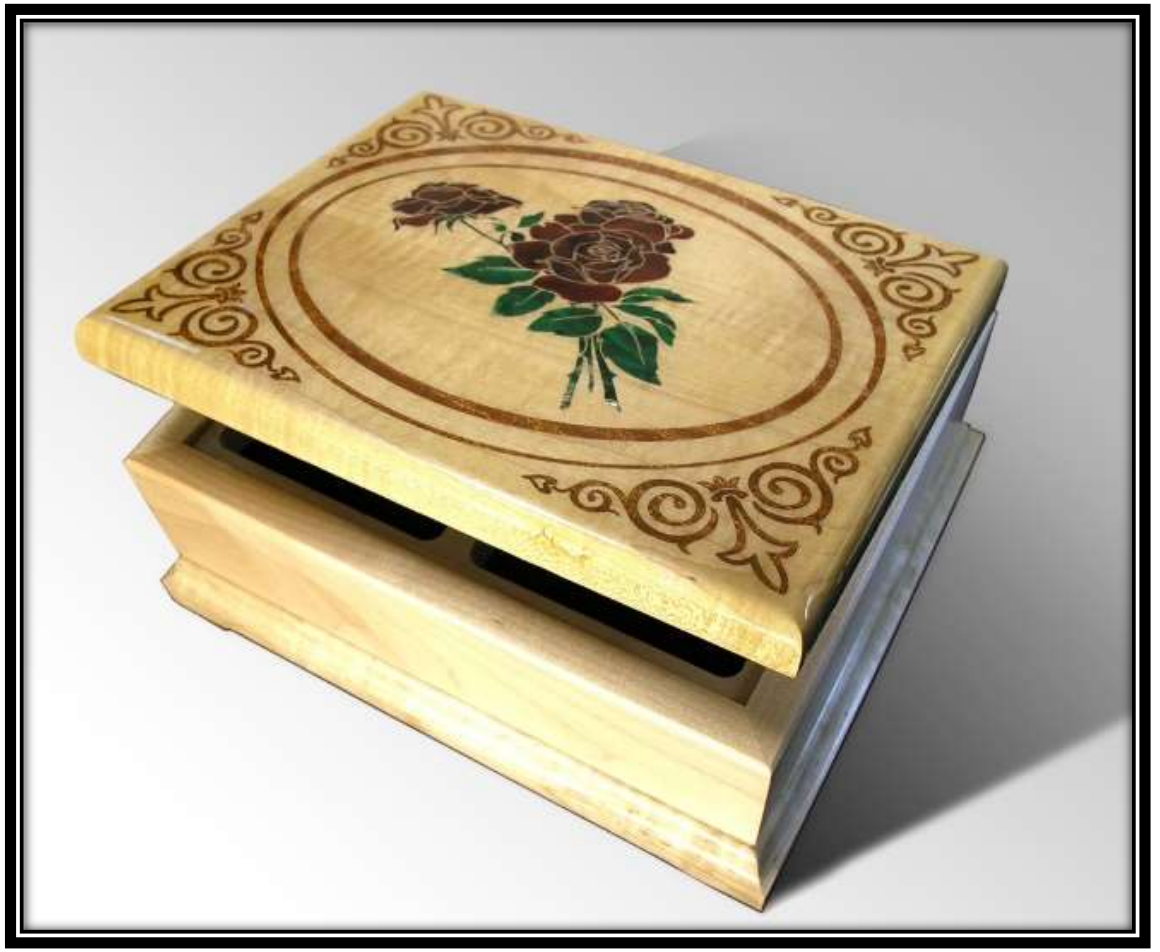

Tanned Leather


Cast Acrylic


Hard Marble

Questions

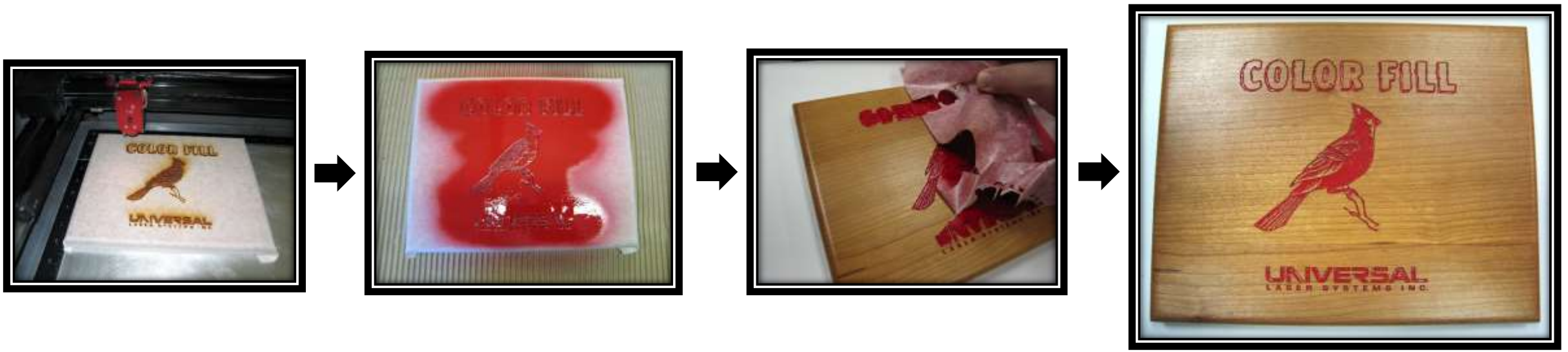
Incorporating Color into Laser Processing



Overview

- Using Paint to Color Fill
- Powder Darkening Engravings
- Inlay

Color Fill



- Mask wood with paper masking tape
- Engrave image into wood
- Apply paint
- Allow to dry and peel off paper mask

Color Fill

-Rub ‘n Buff

- No mask necessary! Just apply onto the surface
- Wipe clean with dry paper towel

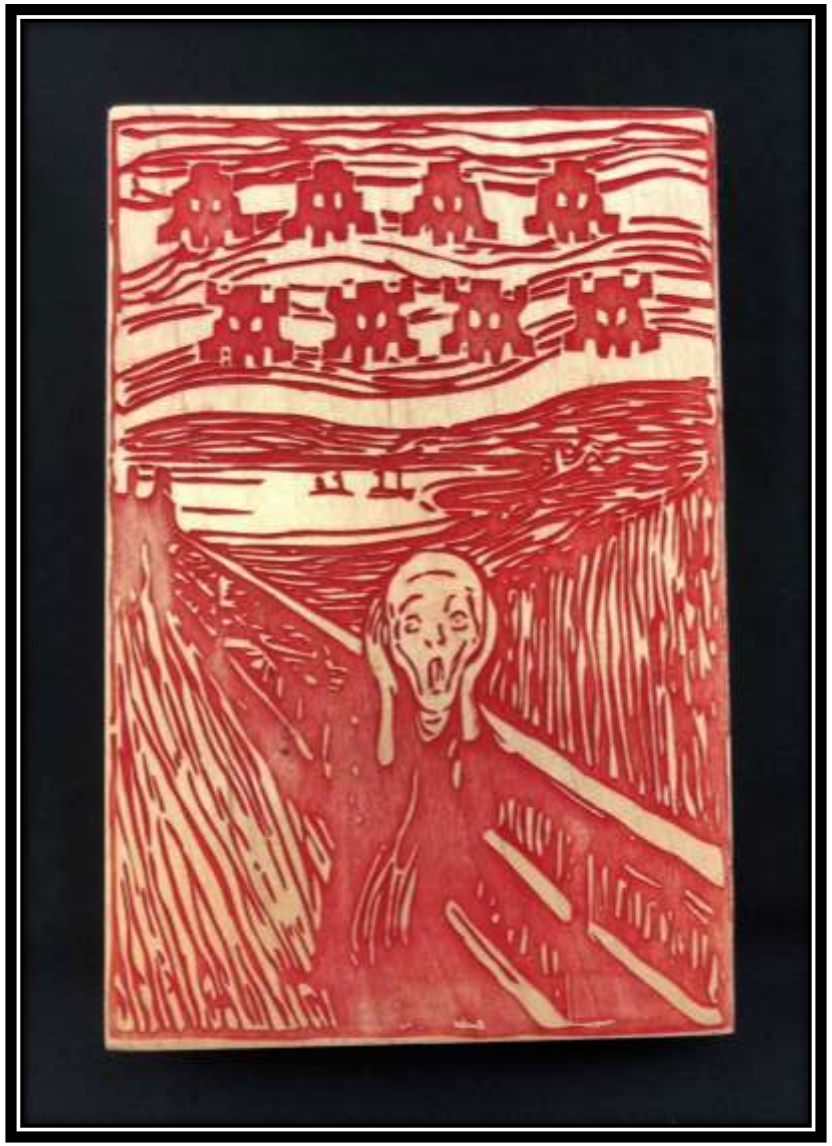
Color Fill

-Rub ‘n Buff

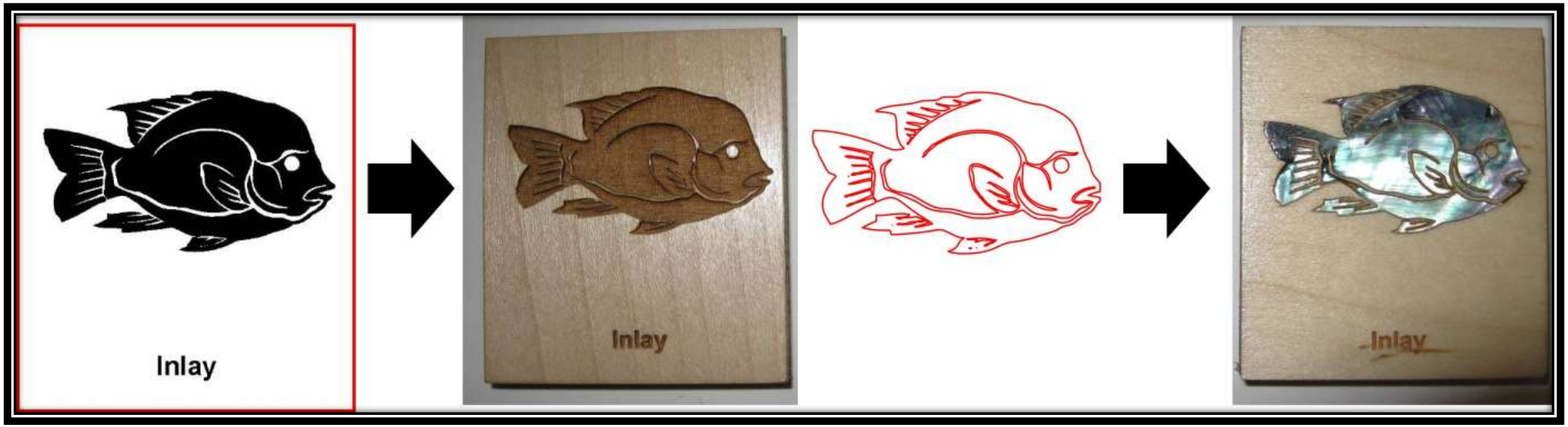
- Multiple colors can enhance the final piece

Powder Darkening

- Improve contrast in woods
- Different colors can be used



Laser Inlay



- Engrave Image into wood
- Outline identical image and cut
- Glue part into engraving

Laser Inlay

- Mask glass
- Tape glass down in laser system
- Engrave Image into material (3-5 passes)
- Scrub out glass with brass wire brush between passes
- Outline identical image and cut
- Glue into engraving

Questions

Thank you!

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