

Laser Technology Basic Overview 2026

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Agenda

- Introduction to the Laser Machines
- Laser Machine Capacity
- Technology Overview
 - Common guidelines
 - Laser compared to Chemical Etching
 - Common Questions and Answers
- Collaborated Technologies
- Open Q&A's / End of Session

Attendance:

- Blow Mold Conference 2026





Introduction: Custom Etch Inc.







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Introduction: Machine Tool - Laser







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Laser Machine Capacity:



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LASER 1000 x 5



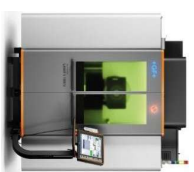
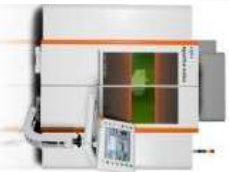
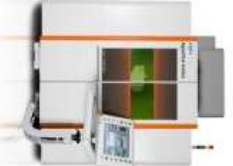
LASER 1200 x 1



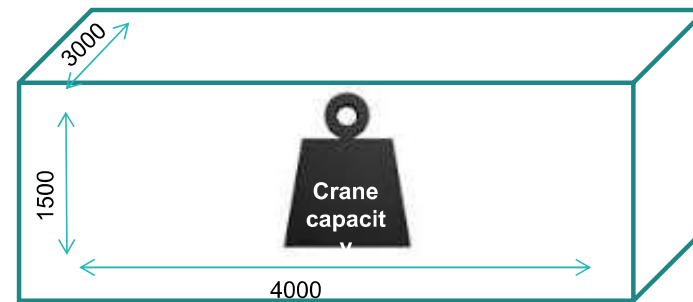
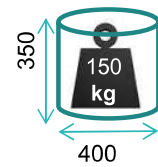
LASER 2500 x 2

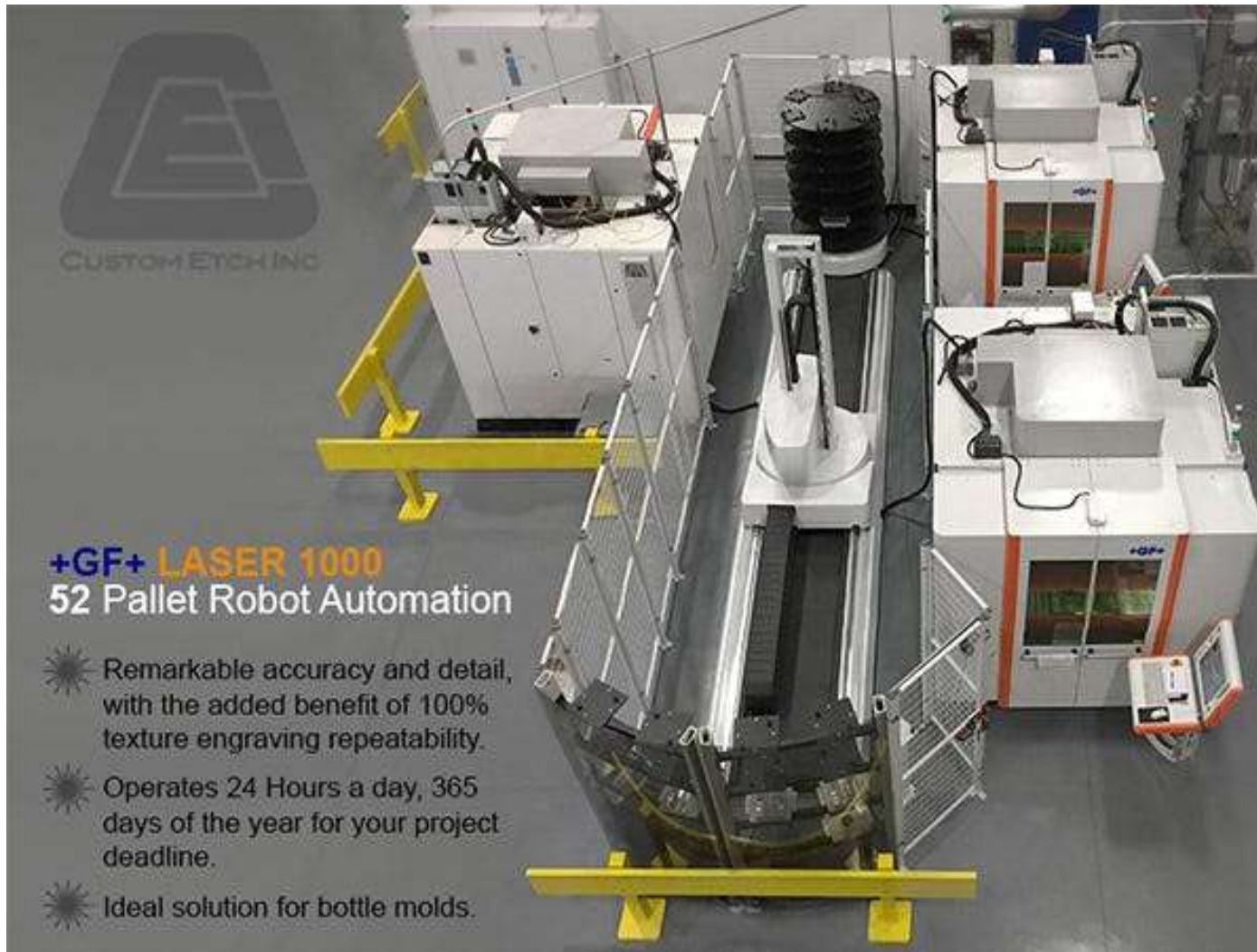


LASER P 4000 x 4



Max. work piece dimensions in 5-axis operation (mm)







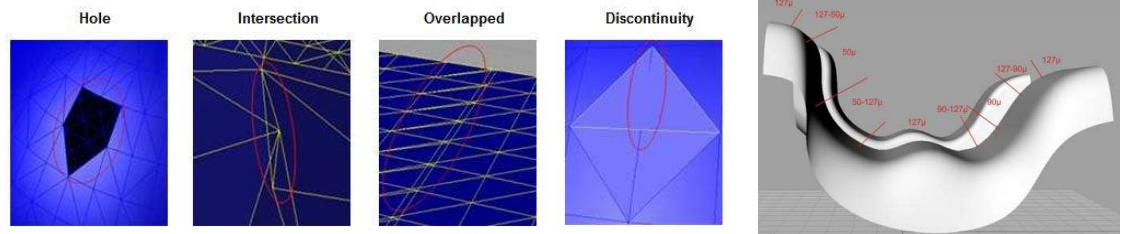
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Technology Overview: Common Guidelines





Common guidelines to understand / needed requirements



How to prepare digital files for Laser Texturing and requirements:

- CAD data needed and the requirements/expectations:
 - Cleanest CAD data as possible
 - Surface defined where texture is to be applied
- Does the texture need to stop a certain distance from the parting line? = No, Laser can go directly to parting line if needed and excellent for geometrical textures
- How are steep draft angles accommodated? = Draft angles are not an issue for the laser technology, draft angles can be dictated by greyscale on the artwork itself. Important fact to always remember = Laser will always leave a natural draft between 8 to 15 degrees (material dependent); a straight wall cavitation cannot be expected/achieved.
- How is the desired gloss level achieved? This is done through a series of technical experience obtained through many years of doing work in the automotive industry, Custom Etch intellectual property

I) 3D texturing engraving:

There are two input CAD files acceptable for Laser (in general), only one format needed:

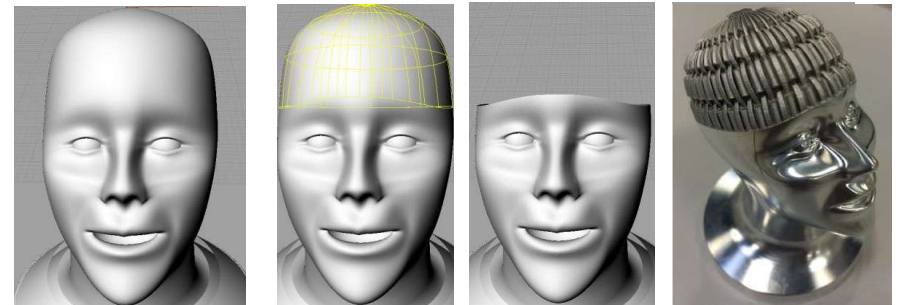
- 3D geometry file of the mold with the surfaces to be textured well identified.
- Picture file of the texture to be applied on the 3D geometry.

a) 3D CAD files:

Input file	*.IGES	*.STEP
3D file tolerance	0.001[mm]	0.001[mm]

b) Picture files of the texture (2D) from Photoshop or other graphic software:

Input file	*.BMP	*.TIF
Minimal resolution	1270 [dpi]	
Type	8- or 16-bits Greyscale	
Depth of the "black"	Yes (User Defined)	
Canvas Size	Must exceed all the surface to be textured	

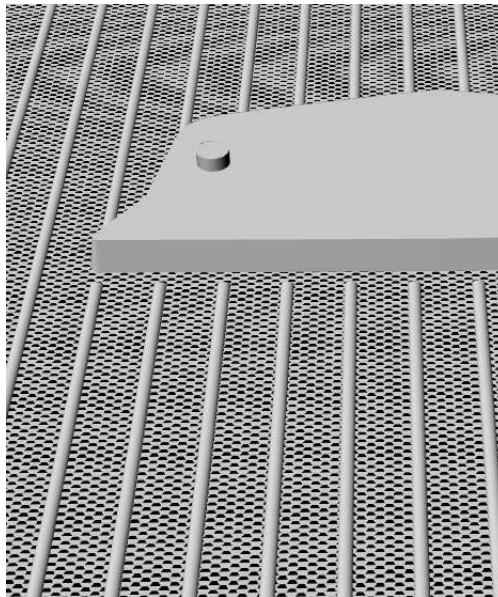




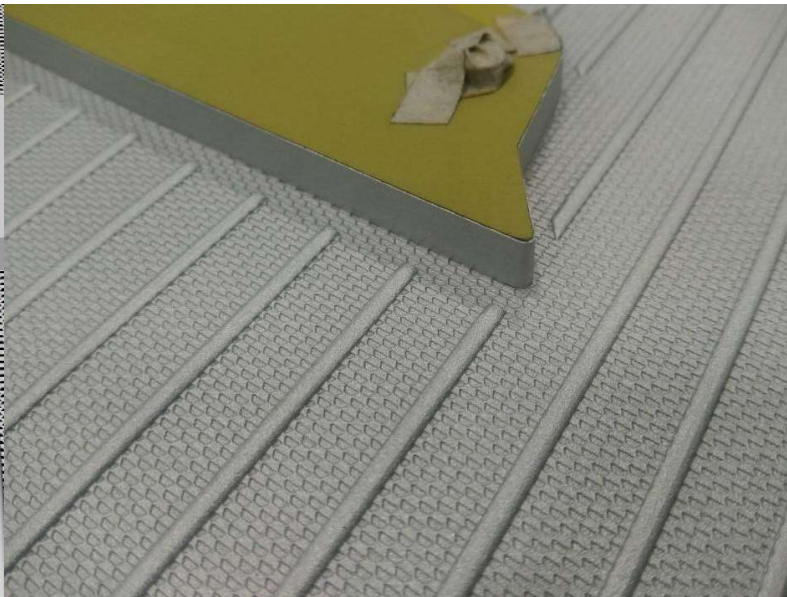
Common guidelines to understand / needed requirements

What you see is what you get:

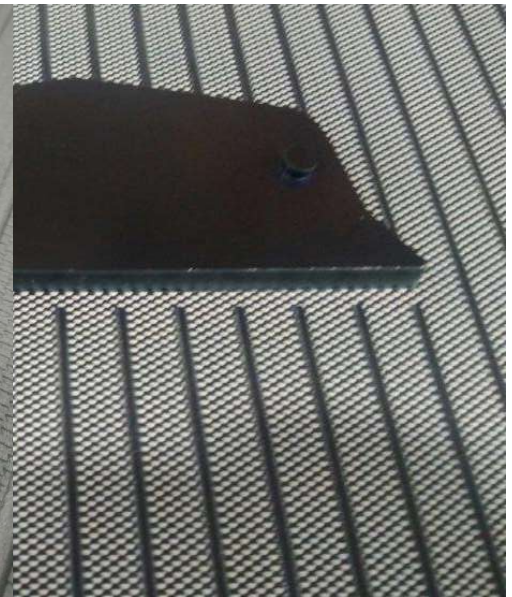
Rendered CAD Model



Finished Results



Paint/Resist Removal

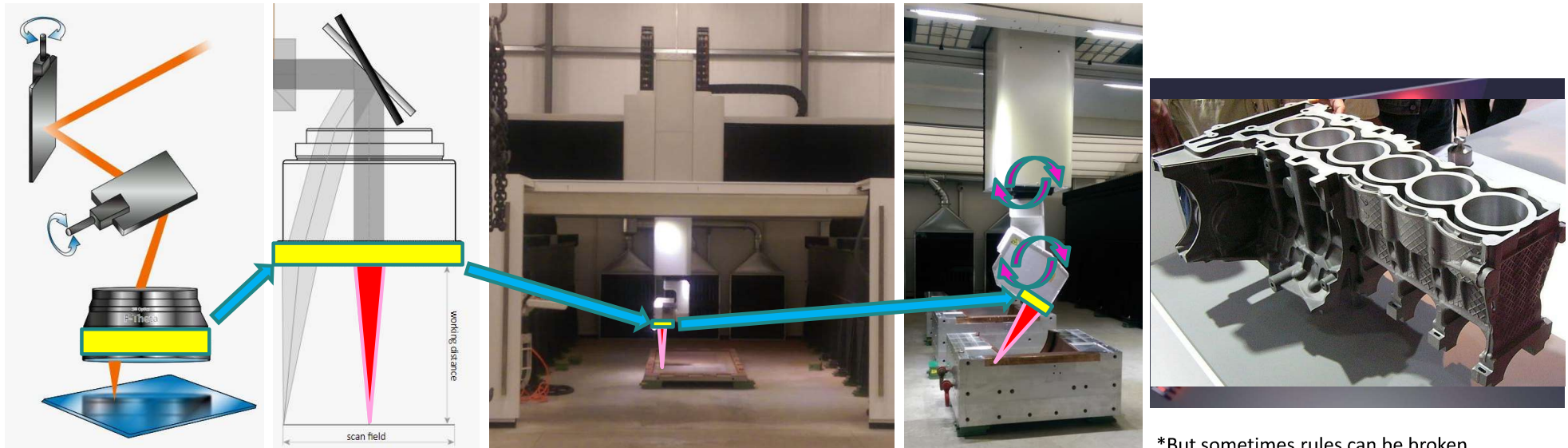




Common guidelines to understand / needed requirements

Understanding the mechanics of what can and cannot be Laser Textured with the machine tool:

- Explain the issues with "line-of-site" for the laser
 - The Laser machine maintains a center point of focus (approximately 12 inches depending on the lens being used), so with these mechanics we need to have line-of-site to perform the ablation process. Rule of thumb = If you can see it by naked eye (without any mirrors/devices) it can be done.



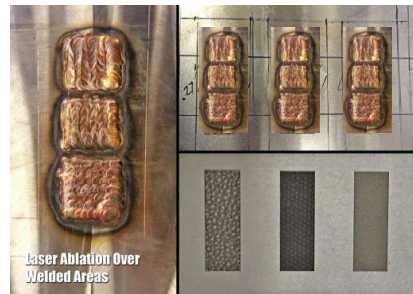
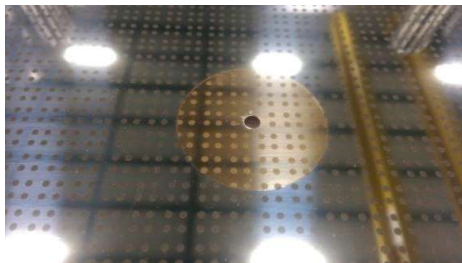
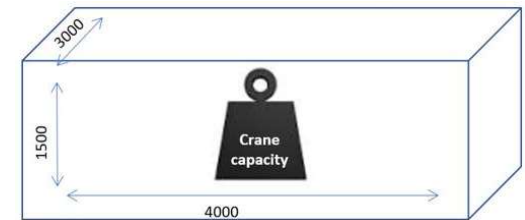
*But sometimes rules can be broken



Common guidelines to understand / needed requirements

Preparations of materials for Laser Texturing and requirements:

- Can steel type, or variations within the block (hardness, chemistry) effect your process:
 - No... best thing about laser and its capabilities with multiple inserts/material and variations of hardness.
- What are the requirement for the mold builders when preparing before bringing the tool:
 - Surface finish to be best as possible (Ra 0.3 as example). **Important to know**... Laser cannot improve a surface finish than what is already provided, laser can only maintain the surface finish at BEST
 - Dimensional tolerance (CAD data to Physical Part) must be as close as possible. If a texture is going to a parting line the data/part MUST be identical
- Material Properties:
 - Any tool steel is acceptable as well as aluminum, titanium, graphite, and most industrial materials. The laser uses a 1064 nm wavelength
 - Tools/Molds can come **fully assembled**
 - No limitation on weight of material
 - Size limitation = 4000mm x 3000mm x 1500mm / 157.48in x 118.11in x 59.05in / 13.1ft x 9.8ft x 4.9ft
 - Tool/Molds should come deburr free and cleaned (rust preventative substance fully acceptable and expected upon delivery)





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Technology Overview: Laser compared to Chemical



Laser Texturing compared to Chemical Etching

Why Laser texturing over Chemical Etching, advantages and disadvantages:

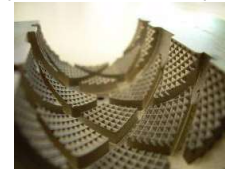
- Molds can be fully assembled. No disassembly required
- Digital Process (CAD data) and texture rendering capabilities for approval prior to graining. No manual layout with anticipated visual results
- Superior texture finish with repeatable results and consistent gloss finish
- Geometrical textures and creative studio/designer grains (morphing) are made possible with laser that are impossible with acid
- Microstructure of laser texture are more stable... therefore lasts approximately 30% longer than acid and sandblasted textures
- Less risk of damage to parting lines and inserts
- Consistent finish across multiple mold materials within same tool/mold
- Functional and 3D technical grains (reduce plastic injection force /cycle time) that is not possible with acid process.
- Superior results over welded surfaces
- Multiple tools can be processed at the same time with the large working envelope
- No hazardous waste removal. Environment friendly for a better/safer/greener future

What other benefits of utilizing Laser Texturing technology:

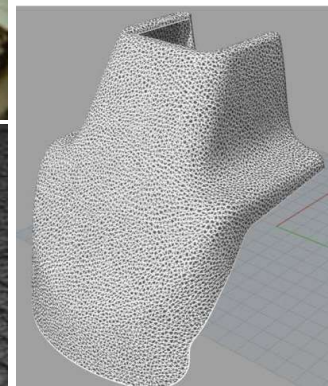
- Repeatability
- Globalization
- Automation
- Traceability and Industry 4.0 complaint

What are some disadvantages of Laser Texturing:

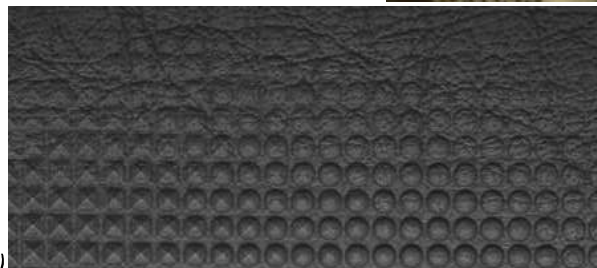
- Market Capacity
 - Five large platform machines (6th coming soon)
- High Angle Texture w/minimal depth (under 0.001in)



Rendered 3D Model



Actual Finished Part





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Technology Overview: Common Questions and Answers



Top 10 common questions and answers

Question 1: Does the Laser Work on Plastic?

- Typical answer is NO (unless using a Femto based laser source), typical plastics are made of materials that cannot absorb a 1064 nm wavelength.

Question 2: What “Class” Laser is the machine?

- Class 4 Laser Product, Class 1 Laser Product with doors shut during operation (cannot run with doors open)

Question 3: What kind of Laser is on the machine?

- Typical laser is a Nanosecond Ytterbium Fiber Laser (IR @ 1064nm wavelength), Power ranges currently from 20W to 200W

Question 4: Is the Laser a constant or pulse type?

- Pulse laser is only used, this is for accuracy and quality with adjustable speed/sweeping distance/pulse duration

Question 5: What tolerance can the machine hold during process?

- When it comes to textures it can duplicate 1 to 1 replication, if asking for dimensional accuracy... it can be around +/-0.0005in

Question 6: What type of files does the process require to get started?

- CAD File (STEP or IGES) and Texture File (TIF or BMP @ 1270dpi greyscale)

Question 7: If we send a sample texture can it be replicated (example... a piece of leather)?

- Yes, if we don't have a texture that meets your needs within our library, or if looking for a specific one... it can be reversed engineered to provide the desired results

Question 8: What are the size limitations of the machines?

- 4000mm x 3000mm x 1500mm / 157.48in x 118.11in x 59.05in / 13.1ft x 9.8ft x 4.9ft

Question 9: What is your average cost / turnaround time?

- We understand that both cost and time is critical, and we try to stay within a margin where both sides can be profitable with a targeted lead time of 10 working days (from tool/mold being received) for standard jobs

Question 10: Does choosing Laser over Chemical cost more?

- Traditionally yes as it gives more definition/details and quality than what chemical etching can offer. But there are certain applications where both technologies are utilized (hybrid method) to save time and money when applicable



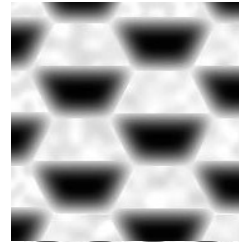
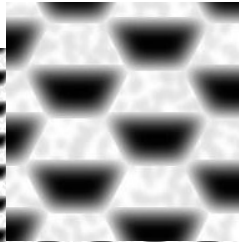
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Collaborated Technologies:

DIGIMARC | 

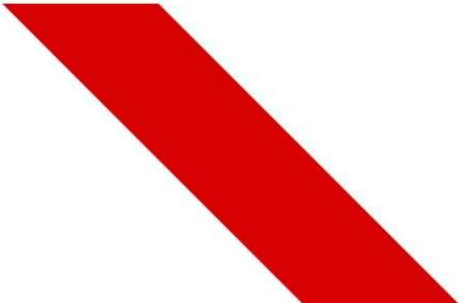


Hana Texture



Original

Digital Watermark



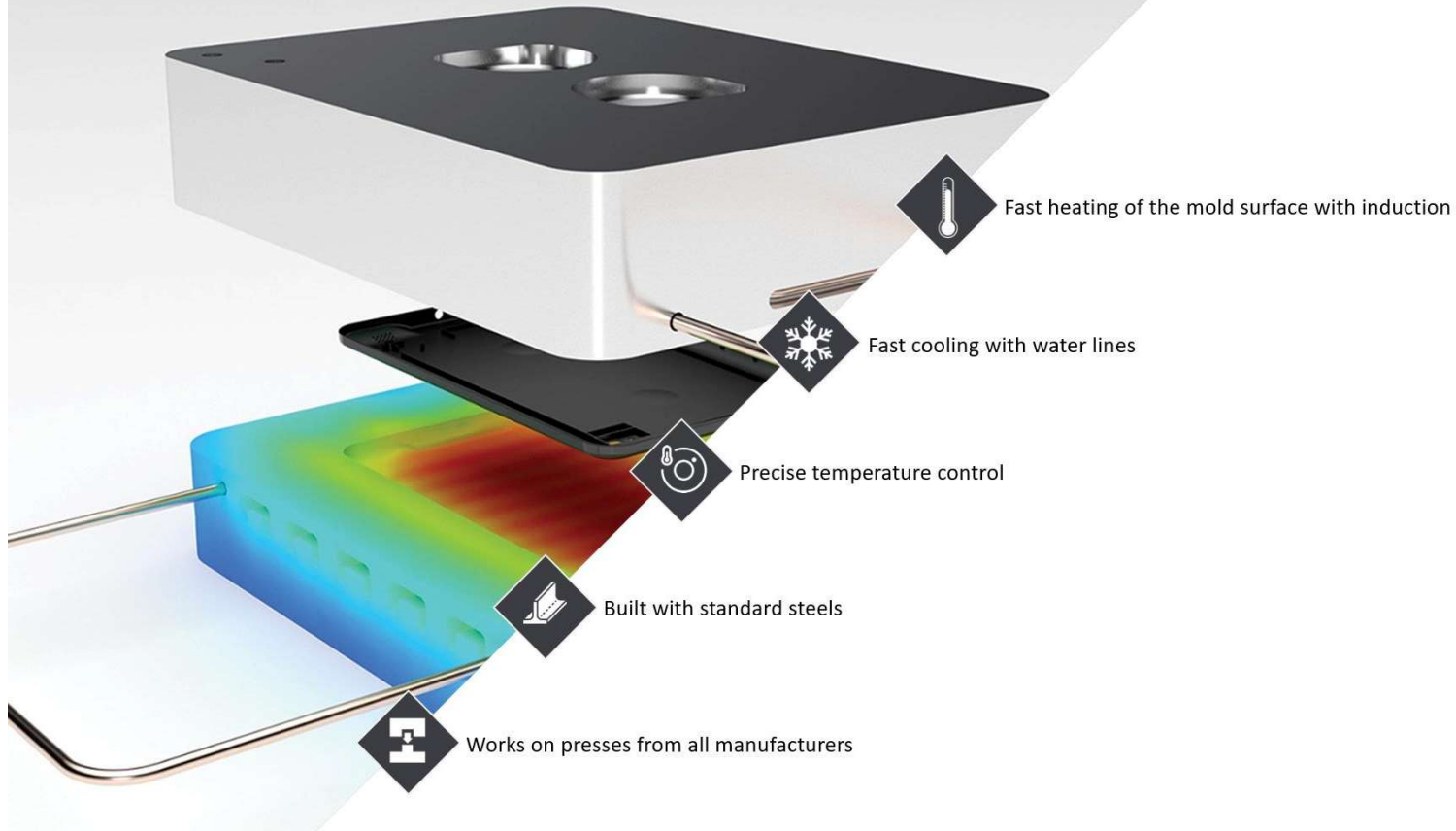
ROCTOOL

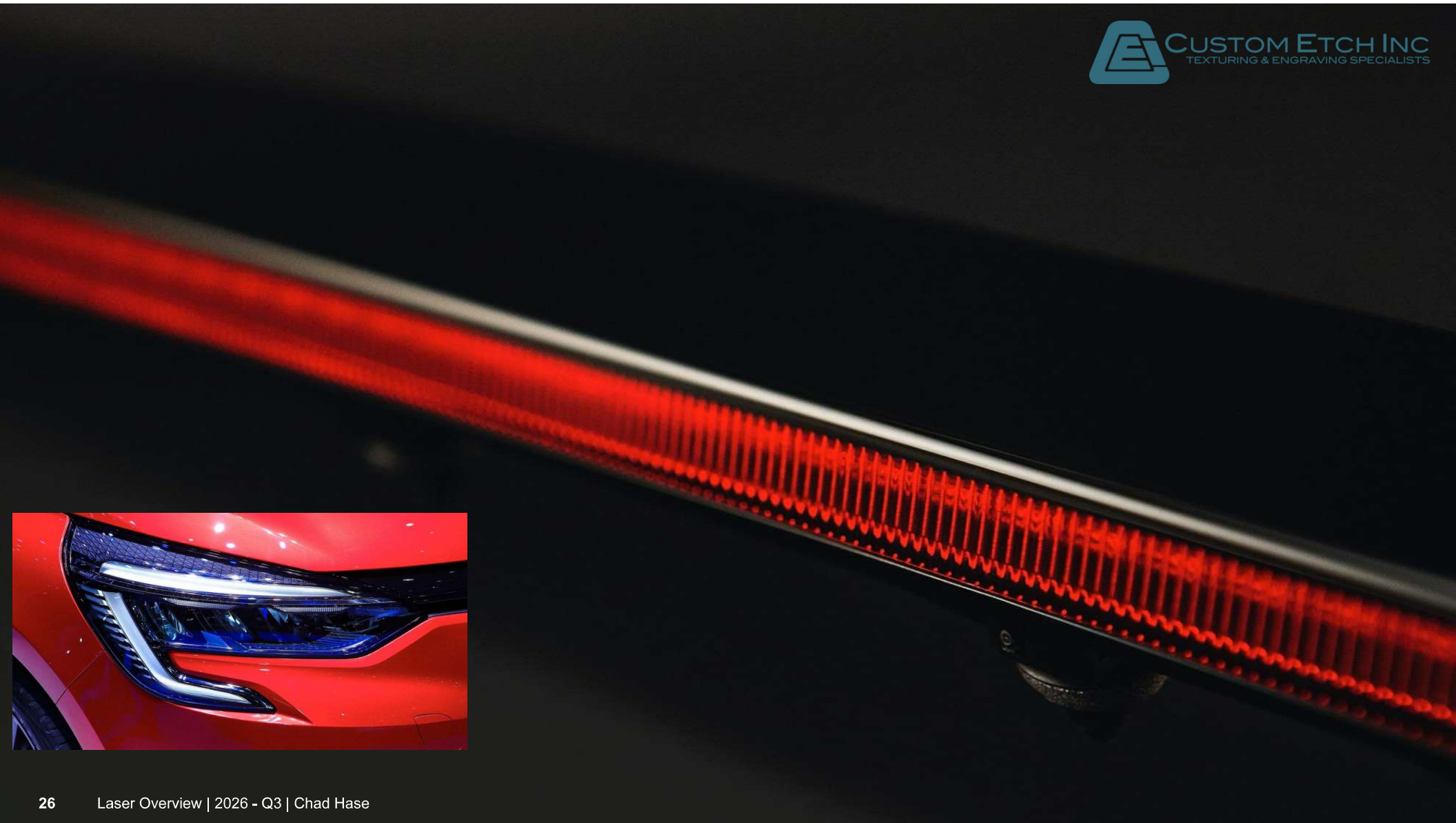
MOLDING MATTERS.

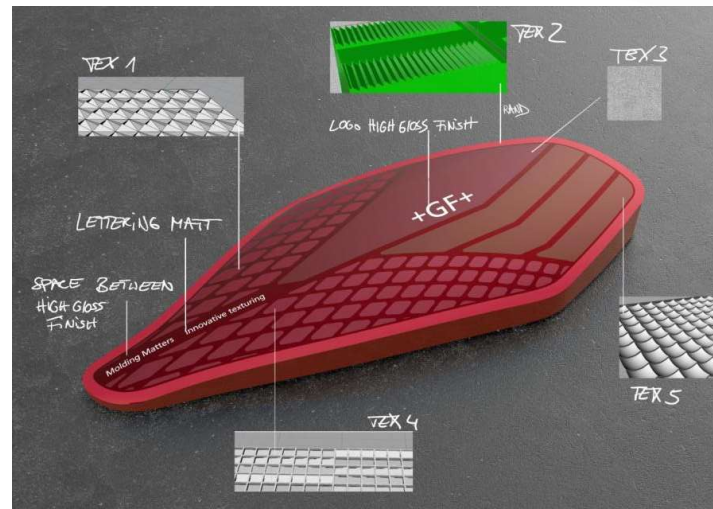
INNOVATIVE LIGHT APPLICATIONS



LEADING HEAT & COOL TECHNOLOGIES.









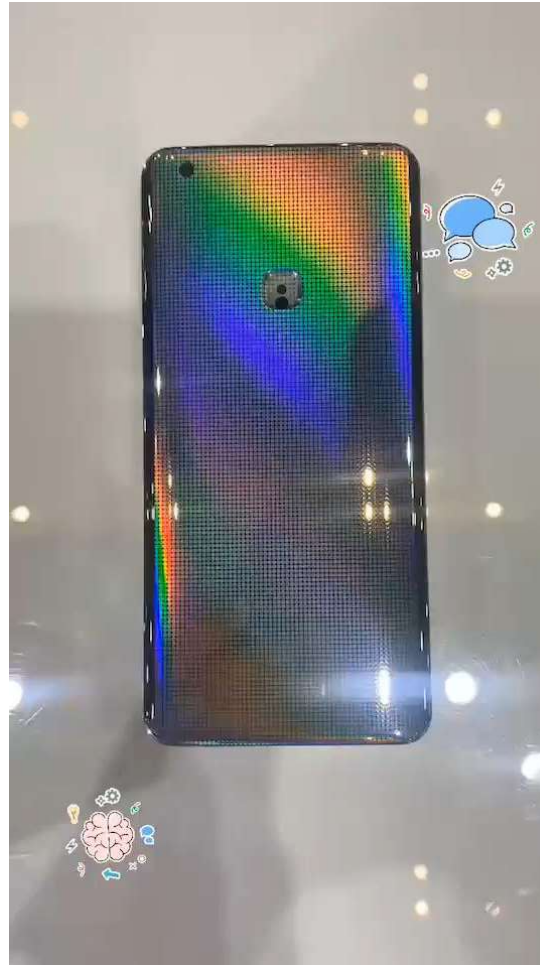
Laser Femtosecond Technology



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Laser Femtosecond Technology

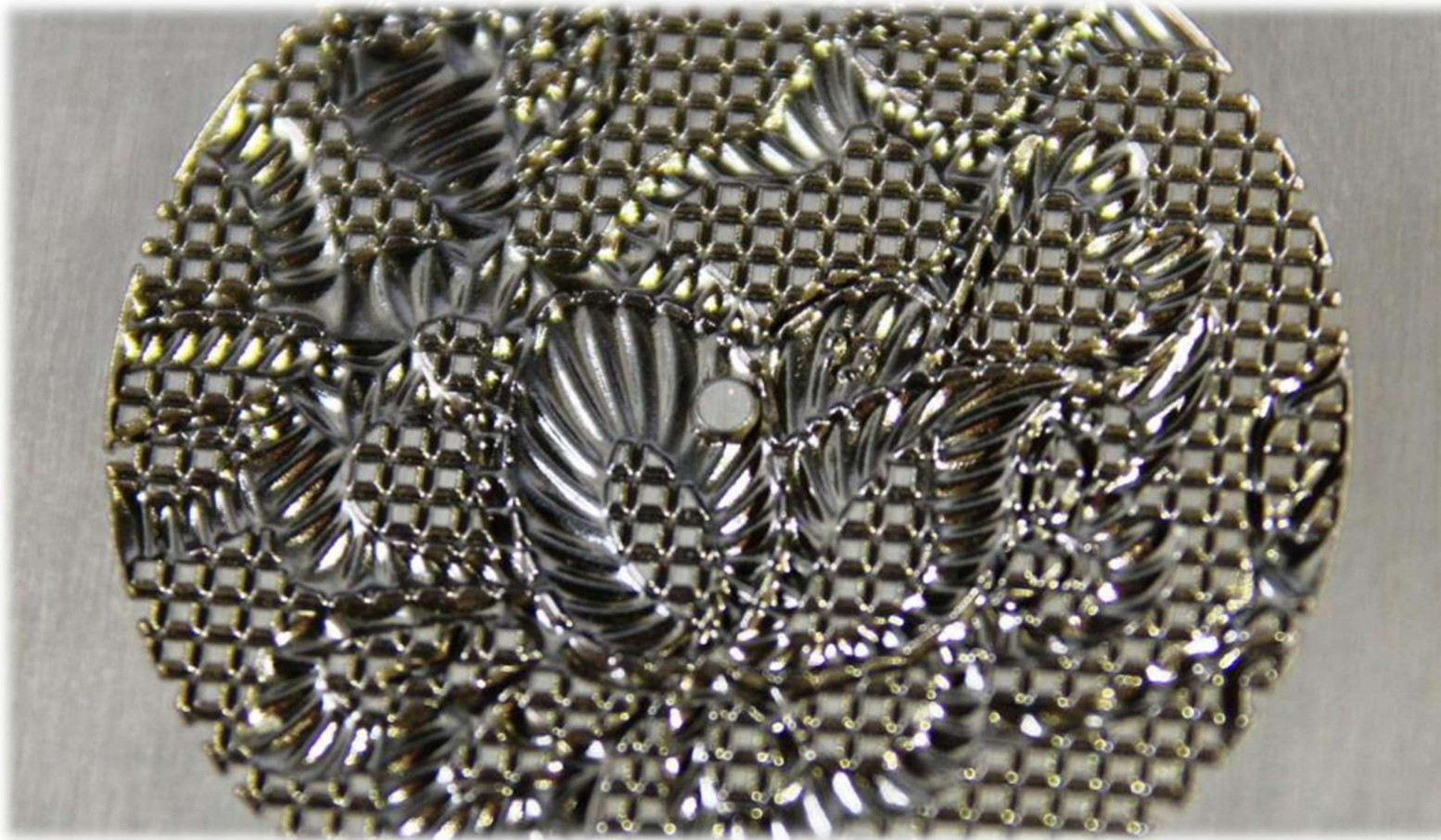


Laser Rumor

RUMOR



Laser Polishing



Laser Ability to Replicate Chemical Etching



Galaxy Note20 Ultra 5G

Laser Ability to Replicate Chemical Etching



Thanks for your Attention/Participation

Open Floor for Questions.

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