

HGLaser

Laser Cleaning Technical Proposal

Wuhan HGLaser Engineering Co.,Ltd



COMPANY
INTRODUCTION

华工激光

 HGTECH

■ HGTECH

为制造的更高荣耀

■ For Higher Glory in Manufacture

PART



Laser cleaning introduction

- Technical principle
- Method
- Samples
- Typical application

Technical principle

Laser cleaning technology refers to the use of high-energy laser beam irradiation surface of the workpiece surface dirt, rust or coating instantaneous evaporation or stripping, so as to achieve a clean process. Laser cleaning technology as a new cleaning technology in many areas of cleaning applications, such as machinery industry, microelectronics industry and art protection.

Laser cleaning technology is practical, efficient, no damage to the substrate, is a "green" cleaning process, the basic environmental pollution. With traditional cleaning methods can not have many advantages, with broad market prospects.

The presence of dirt:



Principle:

- The laser beam emitted by the laser is absorbed by the contaminant layer on the surface to be treated .
- The absorption of large energy forms a rapidly expanding plasma (highly ionized unstable gas), producing a shock wave .
- The shock wave turns the contaminants into pieces and is removed.
- The optical pulse width must be short enough to avoid heat accumulation of the treated surface.

Method

Main methods:

There are 4 main laser cleaning methods:

- ① Laser dry cleaning method, that is, the use of pulsed laser direct radiation decontamination;
- ② Laser + liquid film method, that is, first deposited a layer of liquid film on the substrate surface, and then use laser radiation decontamination;
- ③ Laser + inert gas method, that is, in the laser radiation at the same time, with an inert gas blowing to the surface of the substrate, when the dirt from the surface after stripping immediately by the gas blown away from the surface to avoid surface contamination and oxidation;
- ④ Use the laser to make the dirt loose, and then non-corrosive chemical cleaning.

The most common is the first 3 methods. The 4TH method is only seen in the cleaning of stone artifacts.

Traditional derusting methods:

- ◆ High pressure water jet
- ◆ Pickling
- ◆ Ultrasonic
- ◆ Sandblasting
- ◆ Laser cleaning

Laser rust cleaning is an important application area of laser cleaning technology, which shows a good application prospect in equipment maintenance. And mechanical rust, chemical rust and other traditional derusting method compared with the following characteristics:

- a) Cleanliness is much higher than chemical cleaning process;
- b) Applicable to a wide range of substrates;
- c) By adjusting the process parameters, without damage to the substrate surface on the basis of the effective removal of rust, so that the surface of the old as new;
- d) Laser derusting equipment can be used many times, running low cost;

Samples



Laser rust cleaning



Oxide cleaning



Engine coating cleaning



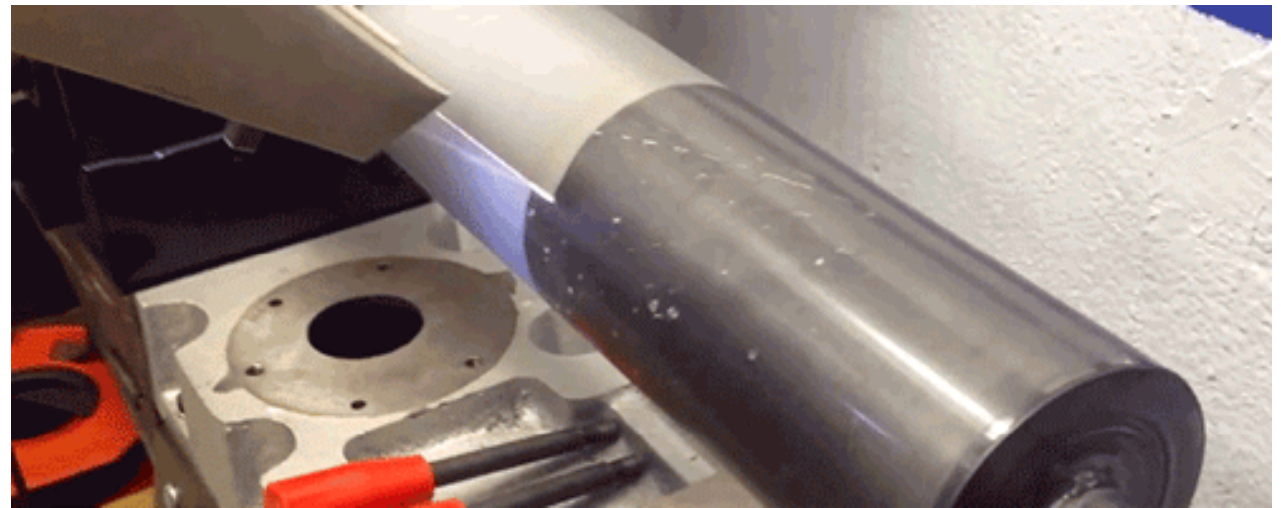
No need disassembly, narrow space cleaning



Tire mould cleaning



Mould cleaning



Roller cleaning

Typical application: Tire mould cleaning

Every year the world's tire manufacturers to produce hundreds of millions of tires, the tire production process must be regularly cleaned up, but also to quickly and reliably, to save time to stop production.

The use of laser cleaning method, the laser beam through the optical fiber transmission, the use of more stable; fiber will be high-energy laser conduction to the mold of the dead or difficult to remove the site, more advantages and more convenient; cleaning process without rubber gasification, harmful gas.



Tire mould cleaning



Tire mould cleaning

- Fiber: square, ~ 600um
- Laser power: 50mJ/500w
- Cleaning efficiency: >40cm²/s

After 1000-3000 cycles, tire mould need to clean. Laser cleaning only uses 45~60min, traditional tool needs at least 8hrs.

Typical application: Metal surface cleaning

- Mold in the course of the use of the surface there will be glue residue
- Metal parts will be used for a long time after the rust layer



Remove the residue of the
titanium nitride coating mold



Clean rust from SS

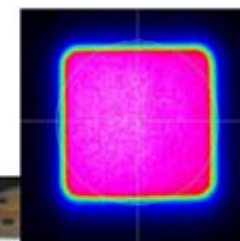


500W average power
12khz pulse frequency
150ns
4000mm/s
500um beam

Laser: 50mJ/500W
Beam: square, ~ 600um
Speed: > 40cm²/s



500W average power
10khz pulse frequency
300ns
6000mm/s
600um beam



Typical application:

Cell phone internal components glue cleaning

Metal and plastic joints, in the process of pressing the phenomenon of overflow glue, the need for positioning, the edge of the overflow rubber for processing.



Overflow
glue

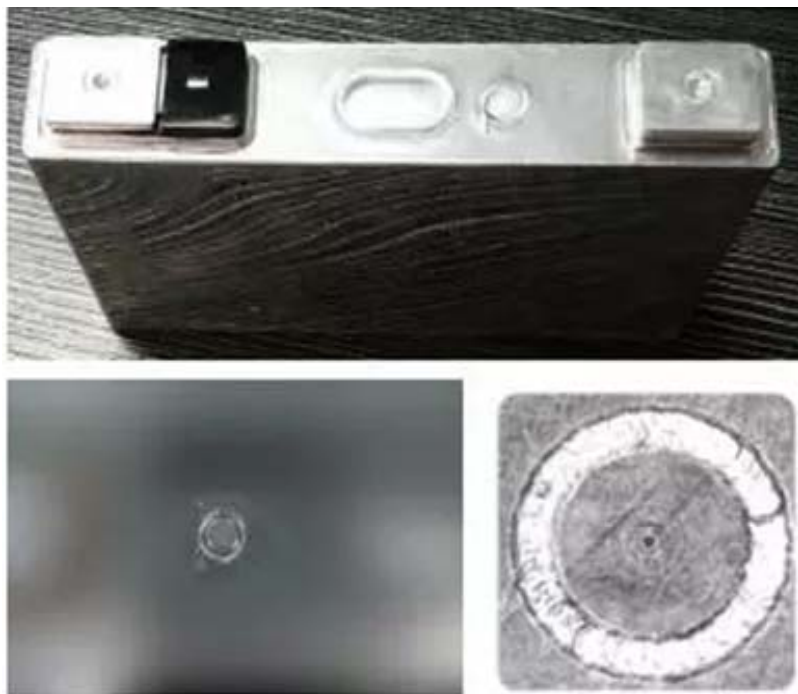
Overflow
glue



Overflow
w glue

Typical application: Power battery cleaning

With laser welding of the oxide to do cleaning, to increase the conductivity of the pole piece, easy to operate.



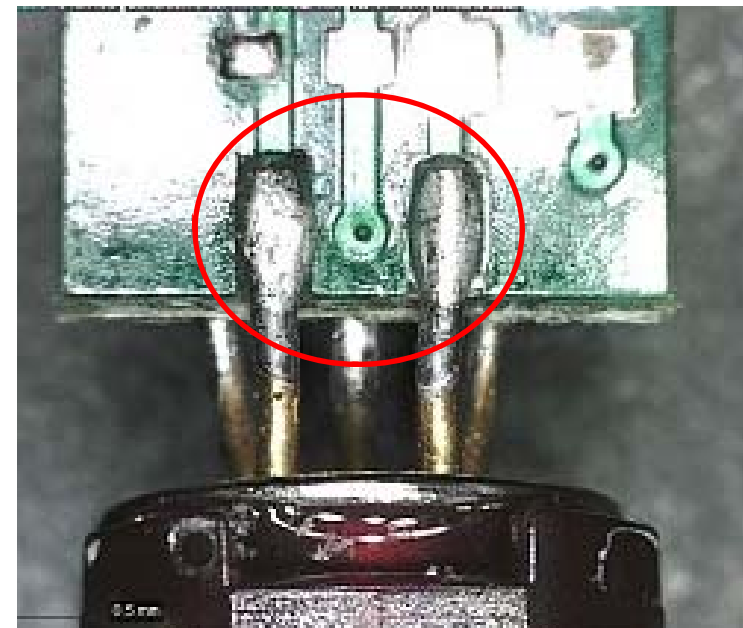
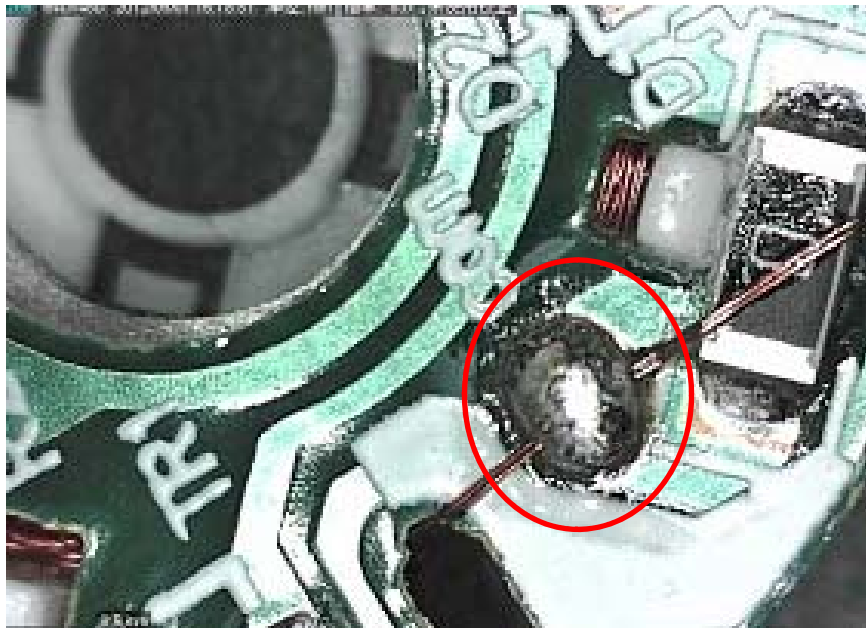
Sealing nails and their actual welding effect



Before & After laser cleaning

Typical application: Pre-processing before tin welding

- Soldering process, the solder paste will flow to other parts of the heat, before welding the surface treatment, to prevent the solder paste during the welding process.
- Surface with grease, impurity oxidation, etc., can be dissolved and washed.
- Before the circuit board is soldered, the component pins must be completely deoxidized to ensure optimum electrical contact.



PART



Laser cleaning machine

- Features
- Structure
- Specifications
- Performance comparison
- Cost comparison

Features

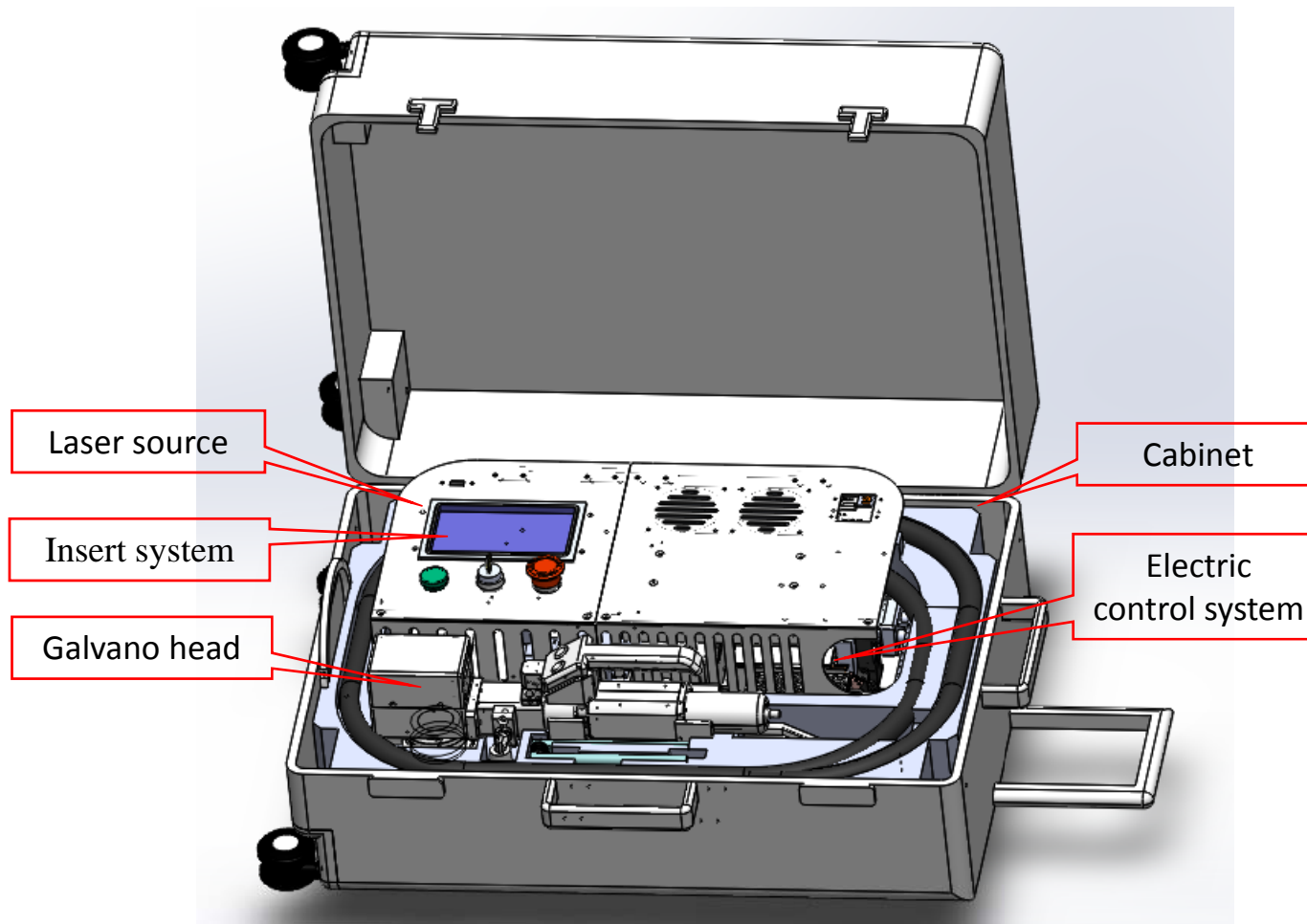


Multi function: Cleaning + Marking

Provide a variety of focusing mirror optional, easy to achieve deep hole, deep groove cleaning

- Germany advanced IPG 50w Fiber Laser Source;
- Advanced hardware control technology and intelligent software, easy to operate, one intelligent control, powerful;
- Long laser life, averaging up to 100,000 hours or more;
- Cost-effective, stable and reliable, safe and efficient;
- No consumables, low operating costs;
- Compact design, nearly 50% smaller than traditional machines;

Structure



Basic structure as left photo:

50W Portable Laser Cleaner LSF50B is consist of laser source, galvano scanning system, electric control system, inserted system and cabinet.

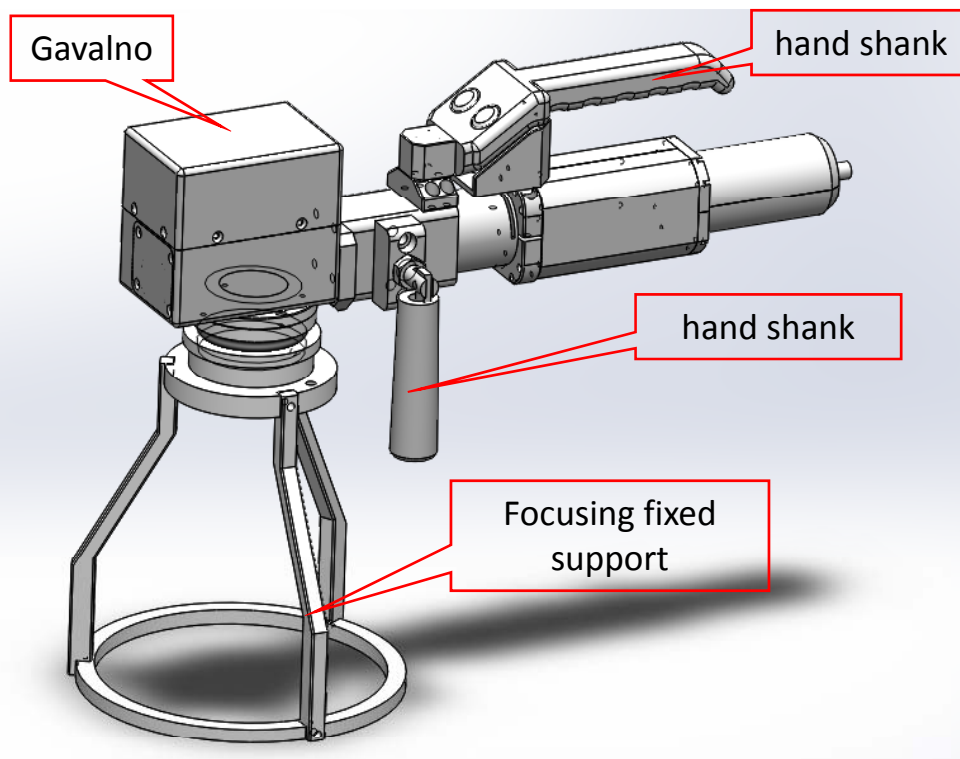


Structure

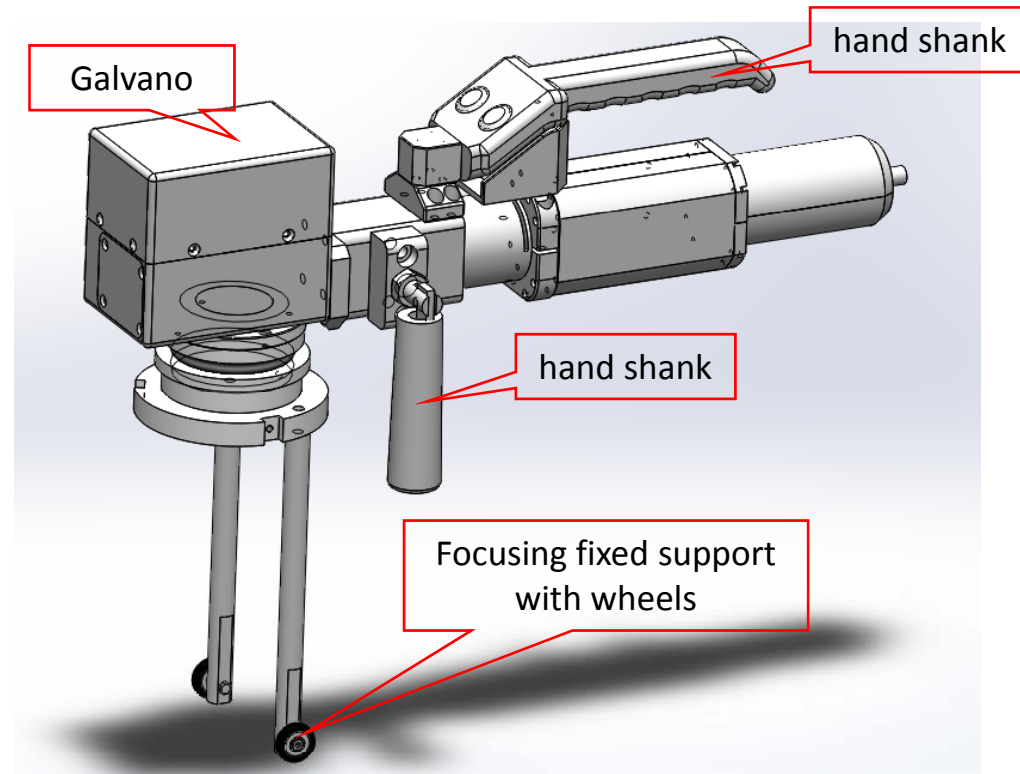
LSF50B handed laser cleaning head is made by aluminum enclosure, advanced optic components, compact design and easy operation.

For marking, HGLaser offers focusing fixed support;

For cleaning, HGLaser offers focusing fixed support with wheels, enable for stable cleaning performance.



Focusing fixed(not movable)



Focusing fixed(movable)

Specification

Item	Specification	Note
Laser source	YLP-1-120-50-50-HC	50W IPG Fiber Laser Source
Galvano meter	German Scanlab	WORLD'S top brand, made in Germany
F-θ lens	HGTECH	Advanced optic mirror
Industrial computer	HGTECH	Suitable for continuous work, high antijamming capability, software edit, smoothly running.
Control card	HGTECH	High stability
Software	EzCad	Spanish EZCAD, mature and easy operation
Cabinet	Integrated structure with air cooling; Dimension: L*W*H=720mm×500mm×300mm	Reinforced structure, heavy load ability, advanced sealing process, good grounding, high antijamming capability.

Performance comparison

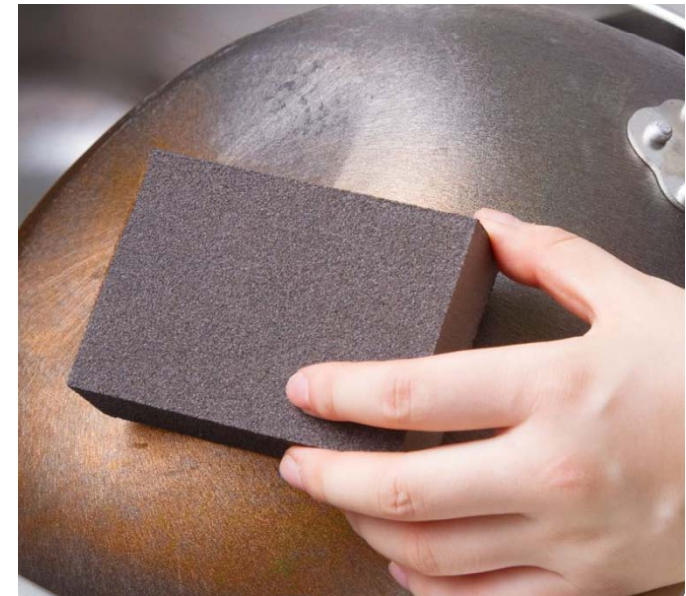
Laser cleaning

No consumables;
Save time
Easy cleaning blind area
No damage for material



Traditional cleaning

Cost tool, chemicals
Cost long time
Blind area hard to clean
Damage for material



Cost comparison

Take 1m² cleaning area for example, laser cleaning machine needs 5 mins, traditional tool need 30~60mins, cleaning efficiency increase **5~10 times**, about **5~10 operators'** efficiency.

Cleaning method	Laser cleaning	Traditional cleaning
Operator	1	2-3 operators
Human cost	about 10000USD/Year	About 20000~30000USD/Year
Efficiency	Fast	Slow
Consumable	None	Tools + Chemicals
Consumable cost	None	About 15000USD/Year



Only 1 year could get investment back!

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About HGLaser

HGLaser Distributions



- 46 years history list group
- One of the largest laser group in China, rely on 3 National Laser Technology platforms
- Millions of projects running, advanced global service ability



Plant

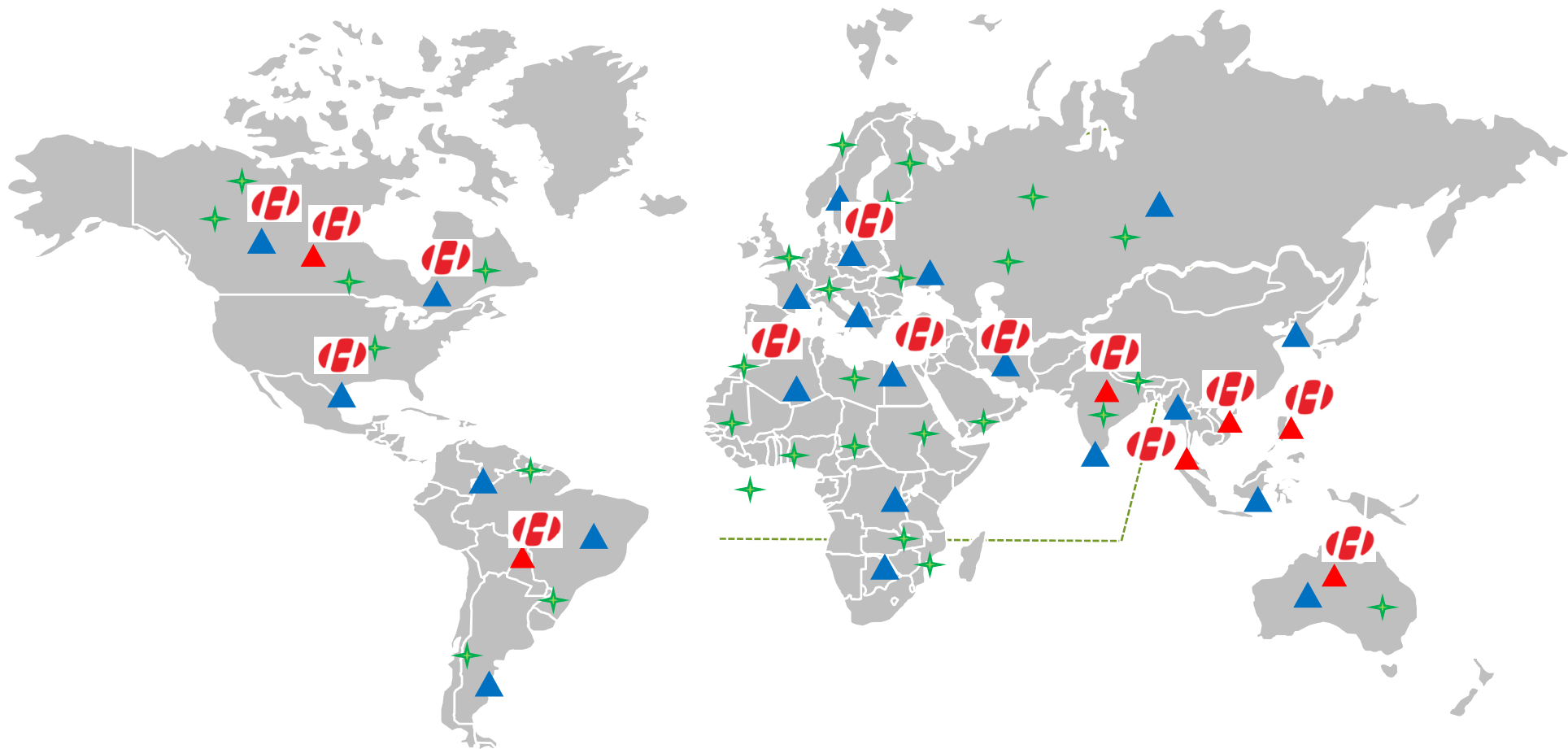
HQ




Show room



Australia plant

HGLaser global network



-  Branches: USA, Australia, India, Vietnam, Malaysia, Taiwan;
-  Agents: Germany, Sweden, Italy, Brazil, Indonesia, Thailand...
-  Thousands of global typical projects...



**THANK YOU
FOR WATCHING**