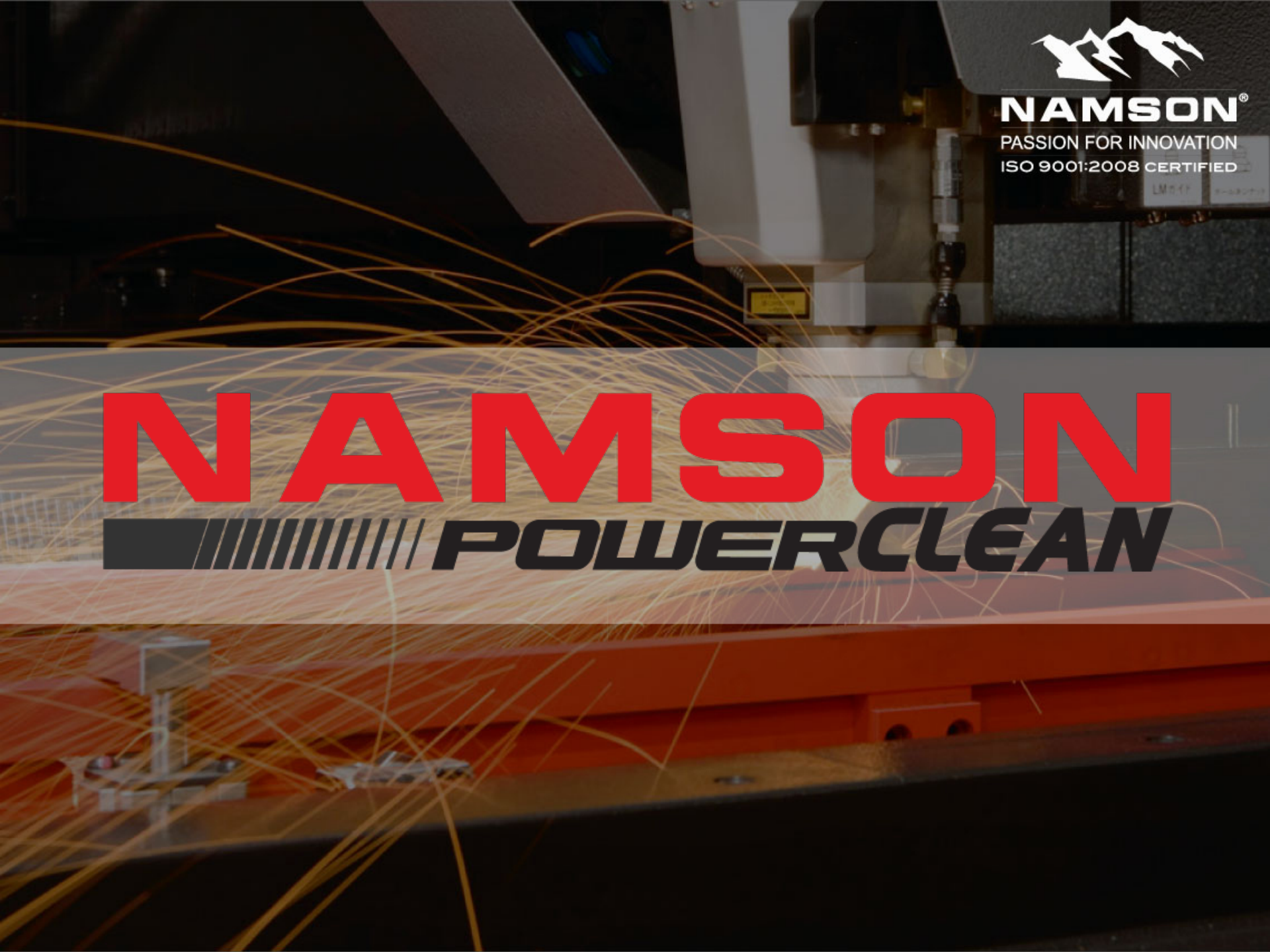

NAMSON®
PASSION FOR INNOVATION
ISO 9001:2008 CERTIFIED
NAMSON
POWERCLEAN

Namson PowerCLEAN

handheld laser cleaning system

PROPLEMS

in **traditional** cleaning industries

Mechanical Friction

Cleaning

high cleanliness,

damage base material

Chemical etching

cleaning

unstressed cleaning

heavier **pollution**

Fluid solid jet

cleaning

high flexibility,

high cost

complex effluent treatment

High frequency ultrasonic

cleaning

good cleaning effect

limited size

dry workpeice

Advantage

Laser cleaning—— **New** technology, **Green** and **Environmental.**

Long-focus cleaning laser source has high surface roughness and high tolerance range of processing height on the workpiece, not only can be used in a **stable industrial enviroment**, more suitable for **complex ourdoor fine cleaning**; the use of special mode laser, both to ensure the high tolerance range of non-stable environment, but also **efficient removal of rust stains** with **no hurt to base material**.

Fiber Laser	**Higher Efficiency**	**No Damage**	**Long Lifetime**

Advantage

Laser cleaning principle

Fully enclosed external optical path system, combined with special mode of laser, the high-energy pulse laser collected in the surface of object, with the principles of plasma blasting, high energy pulse excitation and complex photochemical reactions, and by controlling the effective displacement of the laser beam to achieve cleaning. The whole process is controlled by the computer according to the program.

No Noise	No Residual	No Pollution

Application

Mould Cleaning

Peeling or Coat Removing

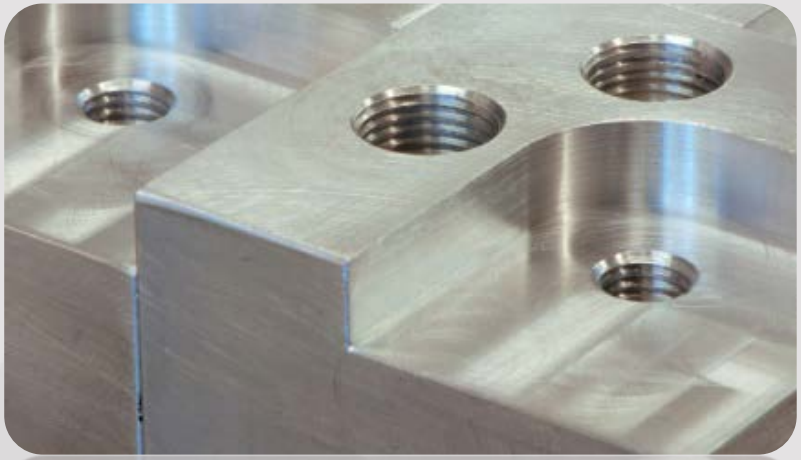
Pretreatment before

Airospace parts cleaning

Application

Soldering & Welding Pretreatment

Clean oxide, smeary, oil stain, residue



Restoration and preservation

Typical Application – Rust Removal

High energy pulsed laser **focusing on the surface of object** to simulate plasma, continuous irradiation of high-energy plasma instantaneous formation and expansion, resulting in a series of tiny explosions, formating plasma blasting, finally achieve the relativel smooth corrosive layer of boject surface to physical blasting burst, and move through the high speed laser spot to form a plume that will clean the debris to complete the cleaning. **Mainly used in metal rust**.

Base material	Corroded degree (mm)	Cleaning efficiency (mm2/s)	Valid focal depth (mm)	Cleaning effect	Base metal damage
Rusty carbon steel cast iron	Medium corrosion 0.05mm	4000	>45	Good	No

Typical Application – Rust Removal

Sample testing: Rust removal on steel mould

Material	Working area	Laser statistics	Working time	Assessment
Steel	50x100mm	Jumper Speed (mm/s):6000 Mark Speed (mm/s):4000 Power (%): 100 Frequency (KHZ): 200 Matrix Delay (us):200 Jumper Delay (us):250 Mark Delay (us):250 Poloygon (us):20 Laser On Delay (us):120 Laser Off Delay (us):120	19s	**Speed: 157,9 cm2/ min. Higher speed on bigger and flatter working area**

Typical Application – Rust Removal

Sample testing: Rust removal on steel mould

Before

After

[Testing video: Link]

Typical Application – Oil Removal

High energy pulsed laser socusing on the surface of object, dirty rust and other irregular structure and dark surface absorpt the laser energy and plasma energy formated by metal surface, is instantaneous vaporization from the base metal. Mainly used in the mold cleaning and cultural relics repair and other industries.

Base material	Corroded degree (mm)	Cleaning efficiency (mm2/s)	Valid focal depth (mm)	Cleaning effect	Base metal damage
Greasy carbon steel	Medium oil pollusion mild rusty	35000	>60	Good	No

Typical Application – Oil Removal

Sample testing: Oil removal on steel mould

Material	Working area	Laser statistics	Working time	Assessment
Steel	80x90mm	Jumper Speed (mm/s):6000 Mark Speed (mm/s):3000 Power (%):85 Frequency (KHZ):65 Matrix Delay (us):200 Jumper Delay (us):200 Mark Delay (us):150 Poloygon (us):20 Laser On Delay (us):60 Laser Off Delay (us):120	12s	**Quick removal with speed of 360 cm^2/min at 85% power**

Typical Application – Oil Removal

Sample testing: Oil removal on steel mould

Before

After

[Testing video: Link]

Typical Application - Paint Removal

For the paint and the surface of the chemical coating and special process, based on the surface and the base material has different absorption and damage threshold on laser, laser destruct the surface coating after focusing, after air contact, there are a series of complex photochemical reactions, oxidation, The final reaction product is in the form of gas discharge, the special mode of the laser below the masterbatch damage threshold, can peel off the coating, do not hurt the base material. Mainly used for paint removal and coating stripping.

Base material	Corroded thickness (mm)	Cleaning efficiency (mm2/s)	Valid focal depth (mm)	Cleaning effect	Base metal damage
White metal painting	>0.1	1500	>30	Good	No

Typical Application – Paint Removal

Sample testing: Paint removal on iron material

Material	Working area	Laser statistics	Working time	Assessment
Iron cabinet	150x150mm	Jumper Speed (mm/s): 4000 Mark Speed (mm/s): 2000 Power (%): 95 Frequency (KHZ): 65 Matrix Delay (us): 100 Jumper Delay (us): 100 Mark Delay (us): 100 Poloygon (us): 20 Laser On Delay (us): 60 Laser Off Delay (us):120	53s	**At 95% power and 65 KHz frequency, the removal is done at the speed of 254.7 cm^2 / min**

Typical Application – Paint Removal

Sample testing: Paint removal on iron material

Before

After

[Testing video: Link]

Core components

Namson Laser 100W pulsed fiber laser cleaning - optical characteristics

The laser with optical fiber output, fully closed and stable light path, **over 100,000 hours continuous service life, lifelong maintenance-free, forced air cooling, machine integrated power 480W,** environmental protection and energy saving, compact and portable.

Main part: LASER SOURCE

		BEAM QUALITY				
		S Type (M^2<1.3)	Z Type (M^2<1.6)	L Type (M^2<1.6-2.0)	H Type (M^2<2.5-3.5)	M Type (M^2<4.0-6.0)
	Pulse Energy Peak power	<0.7 mJ >7 kW	<1.5 mJ >10 kW	<0.8 mJ >12 kW	<1.25 mJ >20 kW	<5 mJ >40 kW
PULSETUNE (pulse duration)	RM 2 waveforms (25-250ns)	-	20W / 30W / 50W / 70W	-	-	-
	HS 24+ waveforms (10-250ns)	20W / 50W	-	20W	40W / 70W	-
	EP 40+ waveforms (3-2000ns)	20W	20W / 50W / 70W / 100W / 130W / 200W	-	-	130W / 200W
	Key Attributes	Fine features <25um	25um – 60um	Multi purpose 35um – 80um	Wider lines >60m	High pulse energy & peak power
	Apps	Scribing / Fine marking	Marking / Engraving / Cutting	Plastic / metal marking	Wide marks / Deep engrave	Cleaning / polishing / welding

All redENERGY G4 Fiber Lasers are OEM devices for incorporation

Specs

Characteristics	Test Codition	Min. Value	Typical value	Max. Value	Unit
Operating Mode			Pulse		
Polarization			Random		
Laser Beam Mode			Customized for cleaning		
Output Power	100% output power	99.9	100	110	W
Power Tunable Range		50%		100%	
Central Wavelength	100% output power	1060	1064	1068	nm
Pulse Width	100% output power	80	100	160	ns
Long Time Power Stability	100% output power		+-2	+-5	%
Total Comsumption			480W (AC110V or 220V)		
Weight			22.7 KG		
Cooling			Forced air		

Laser cleaning - working parameters

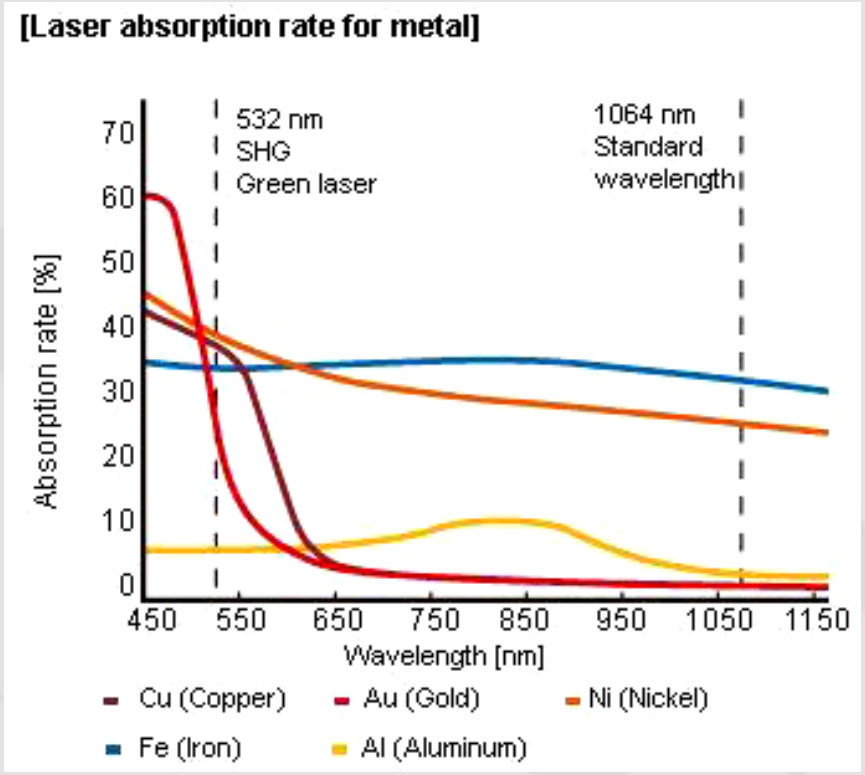
Base Metal	Suface	Valid focal depth	Effeciency (mm2/s)	Effect
Cast iron	Severe corrosion (0.08mm)	>40	3000	Clean surface, no damge
Carbon	Mild corrosion (0.05mm)	>45	4000	Clean surface, no damage
Stainless steel	Oil, slight corronsion	>60	30000	Bright surface, no damage
Mould steel gear	Mild oily with scrap iron	>45	5000	Bright surface, no damagae
Aluminum steel	Oxide / surface spotting	>40	3000	White surface, no damage

Core Laser Comparision

Based on the metal surface cleaning customized laser, according to the laser absorption rate of different wavelength of materias, the prior art selection of 1064 nm solid-state lasers or fiber lasers, metal absorption rate of up to 30%, with special mode spot, both can effectively clean rusty, and also protect Base metal with no damage.

Considering the stability of laser, the use of cost and integration methods and other factors, the latest technology using wavelength of 1064nm fiber laser is better than solid lasers, Namson Laser 100W pulse laser cleaning source, is the best configuration for hand-held laser cleaning.

Laser absorption for metal



Core Laser Comparision

Laser Cleaning Source	Advantage	Disadvantage
Solid Laser	1. High power, high pulse energy, **high cleaning efficiency** **2. Wide range non-metallic** material application **3. Excellent** cleaning effect, excellent cleaning ability	1. Large consumption, need high power chiller 2. Limited integration, complicated maintenance 3. Expensive and high cost
Fiber Laser	**1. Free maintenance**, high cost effective, low cost 2. Forced air cooling, **high stability** of continuous using 3. Good laser beam mode, **wide range metal application** 4. Without light path problem. **Flexibility integration, small and convenient** 5. High photoelectric conversion rate, low consumption, energy saving and environment protection.	1. Low effective for thick coaled metal 2. Power limited

Thank you!