



Cleaning with Bundled Light - Clean Laser Technology

Laser beam cleaning technology – the gentle cleaning process

Cleaning with laser radiation – functional principle

Cleaning with laser radiation means gently removing contamination and coating layers with bundled light.

A powerful focused laser beam strikes the surface for some thousand billionths of a second. The surface absorbs most of the power. The radiation energy of the laser beam is directly transformed into thermal energy and removes (vaporizes) the contamination. The basic material is very gently cleaned - without damage - by the extremely short and locally limited effect of the radiation. The bigger the absorption – the capacity to absorb laser energy – by the contamination, the easier it will be removed.

As the basic material, unlike the surface layer, does not absorb but rather reflects the laser beam, the cleaning process stops automatically once the contamination has been removed. Due to their high reflection factor, metallic materials are especially suitable for laser beam cleaning.

Linear beam deflection - an advantage of the Clean-laser technology

A thousand focused laser pulses per second are distributed onto the contamination layer with a special beam deflection technology. The single laser beam pulses are linearly deflected and placed adjacent to each other. This "cleaning line" can be moved manually or automatically across the part's surface.

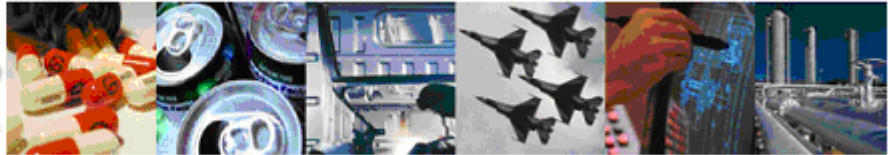
Due to the precise dosage setting of the laser pulses and with the correct parameters, the basic material is not damaged. With this technology of precise beam deflection and with compact powerful laser beam sources, Clean Lasersysteme GmbH are worldwide leaders in laser beam cleaning technology.

Laser beam cleaning technology – technology with decisive advantages

Innovation creates competitive advantages

- gentle and residue-free cleaning
- no need for any abrasives, mordants and detergents
- high positioning accuracy and precise automatization of the cleaning process
- cleaning is possible without interrupting the production process
- high repeatability of the process
- high profitability due to short set-up times and low disposal costs
- manual application possible
- high application flexibility
- industrial, proven technology





Technology with a variety of applications

The Clean-Laser beam cleaning technology serves a variety of applications. It is mainly used for industrial cleaning such as

- cleaning of vulcanizing moulds and tools
- automated cleaning of sensitive surfaces during the production process
- partial de-greasing before welding, soldering or bonding processes
- pretreatment and cleaning of large surface areas before lacquering or coating
- partial de-lacquering of metallic components for bonding or joining technologies

Because of the powerful beam sources and low maintenance costs, the investment in a laser beam cleaning system pays for itself quickly.

Cleaning of plastic and vulcanizing tools

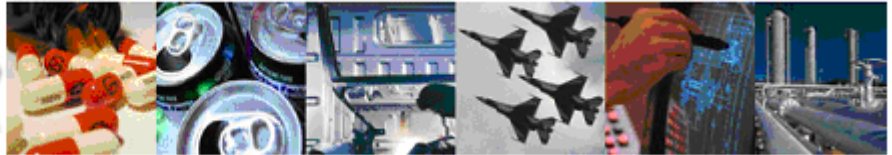
Preserving structures

The cleaning of tools with laser radiation offers clear advantages compared to conventional methods:

- non-abrasive and gentle cleaning offers new possibilities in tool and mould construction
- cleaning of "hot" tools during the production process
- no set-up times for installation and removal of the tools
- no contamination of the working area
- manual cleaning speeds of up to 50 cm² per minute possible even higher cleaning speeds in automated operation

Result: The extended tool life as well as the longer cycles due to slower re-contamination are arguments for the use of the laser beam technology.





Partial removal of coating and de-lacquering of metallic components

Partial removal of coating in seconds

Metals reflect laser radiation and therefore make careful and gentle cleaning possible. In automated operation, cleaning speeds of 2 cm² per second can be achieved and almost every type of structure can be generated.

Other areas of application are:

- de-lacquering of galvanized steel iron without loss of corrosion resistance
- selective de-lacquering (layer per layer) in automated operation
- removal of crack products and other oil residues
- post treatment of (stainless steel) welding joints
- removal of adhesive and sealant residues
- removal of anodizing or vaporization layers

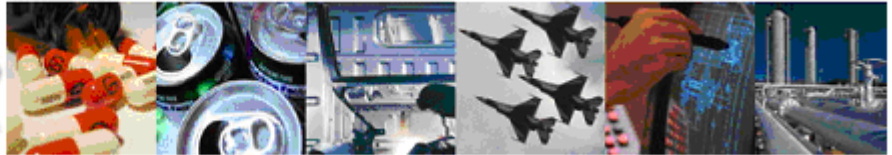
Joining and lacquering pre-treatment

Prerequisite for a good joint

The surface quality of the joining parts is decisive for the quality and durability of a welded, soldered or bonded joint. Laser beam cleaning means:

- pretreat (locally) the joining parts in the junction area
- de-greasing metallic parts (e.g. removal of drawing compounds)
- removal of passivation as well as oxide and corrosion layers
- roughening of bonding areas (surface extension)
- lower costs due to:
 - fully automated in-line cleaning without interruption of the production process
 - easy integration into existing manufacturing sequences
 - high cleaning speeds during the degreasing process





Cleaning of sensitive materials

Preserving treasures

Also in the field of restoration, the gentle laser beam cleaning technology meets the high requirement of the restorators without neglecting economy aspects.

The manual application of the Clean laser beam cleaning systems is an efficient tool for the restorator. With laser technology, dirt and weathering layers can be removed from restorable objects without damaging the natural patina. This is an important argument for the use of laser technology for cleaning art-historical treasures.

Because of their high flexibility and the variable laser beam parameters, the Clean laser systems are suitable for different application areas, such as de-lacquering and removal of layers on woods with fine structures, removal of scumbles, wax coatings or thin coats of paint.

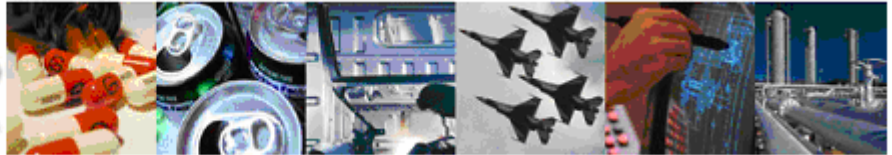
With the Clean laser beam cleaning technology, century old layers can be removed perfectly from valuable iron garnishments and cast-iron decorations.

Clean laser systems – a convincing technology

Individual components

The modular design of our cleaning equipment, consisting of the basic system, the optical light guide and the optics head, guarantees optimal adaptability to the special requirements of our customers. Our systems are characterized by:

- high/ medium laser capacity (80/120 Watt) for efficient process speeds
- extremely compact and mobile construction with integrated compressor cooling system
- low-maintenance and robust construction for high availability
- low operation costs
- highly flexible optical light guide cable for the laser beam transmission (maintenance-free)
- special optics heads for different applications in automated or manual operation
- water-cooled stationary laser system with external cooling water supply
- compact dimensions
- various customizations available



Optics heads for manual application

The direct way to laser beam cleaning

During manual operation, the compact optics heads combine flexibility for different applications with good accessibility and comfortable operating and ergonomical conditions. As the system was specifically developed for surface cleaning, the operator will quickly appreciate the advantages of the Clean optics heads:

- low weight and compact dimensions
- integrated/attachable suction connection
- (remote) operating elements for the laser beam source and the laser beam parameters
- maintenance-free robust construction
- integrated focusing and deflection technology
- safety elements
- variable working distance (30-150 mm)



Optics heads for automated application

Cleaning with robots

Nearly every object can be cleaned by our laser beam cleaning system in connection with modern automation technology without using abrasives. Our optics heads can be coupled to every automation technology, from a simple positioning unit up to a portal robot.



The interfaces of the laser system allow easy communication with other systems and are prerequisite for the integration of the laser beam cleaning technology into the production line. Because of our adaptable cleaning optics that are coupled to the light guide, both delicate and extensive components can be cleaned efficiently and fully automatic.



Our services

Performance in service and system

As a competent partner for laser beam cleaning technology, we offer you many years of experience and know-how, but also a comprehensive service:

- studies and preliminary examinations
- test cleaning
- processing of samples and series in our company
- training courses (for example concerning application technique and safety)
- specification, design and realization of entire laser beam cleaning systems as well as automation technology
- special construction adaptations
- maintenance and service

Please test the Clean laser beam cleaning technology for your individual application. Our team is at your disposal for any question you may have.