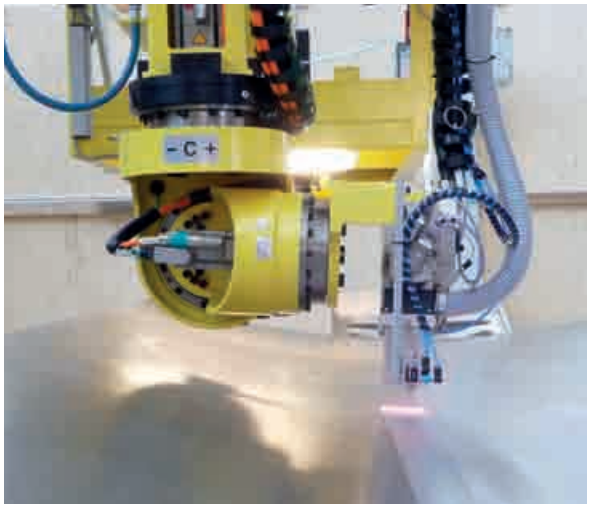
LASER CLEANING
PRODUCTION COMPOSITE MOLDS

cleanLASER

FAST, FLEXIBLE & ECONOMICAL

Awarded
Deutscher Umweltpreis 2010



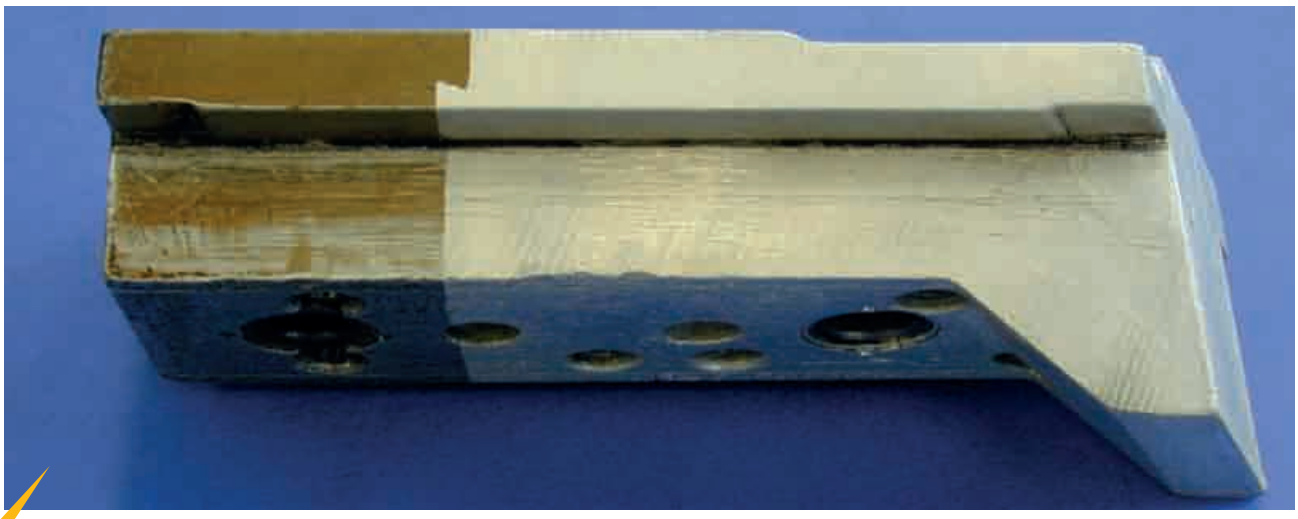
Automated laser cleaning

- Easy to setup & operate
- Suitable for all mold types
- No mold damage – extends mold life
- Works handheld, robotically, or both
- 24/7 reliability – virtually maintenance-free
- Cost-effective, very low operating costs
- Consistant, repeatable results
- Clean & green technology – no abrasives, no chemicals, no secondary waste
- Standard turn-key solutions – available worldwide

cleanLASER composite mold cleaning systems are a cost and time saving alternative to conventional methods. Laser cleaning is a process with very low operating costs. Using only focused light, it eliminates the expense of consumable media, such as dry ice pellets, as it safely cleans precision surfaces. It can be easily automated, it is quiet, and up to 15 times faster than other options.

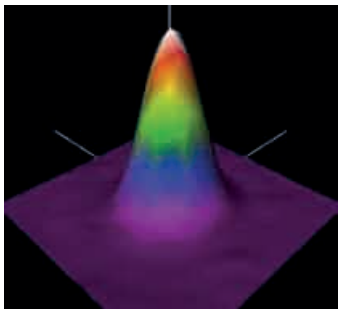
cleanLASER technology uses powerful laser energy to gently remove stubborn mold-release, product residue, oxides and grease. It works without the high noise levels of blast cleaning methods and there is no cleaning media or chemicals to purchase, handle, clean-up or dispose. Laser technology provides an environmentally friendly way to safely clean aerospace molds without harmful abrasion or kinetic forces that can harm or deform sensitive surface features. It quickly removes challenging residues without the need for harmful scrubbing, scratching, or grinding.

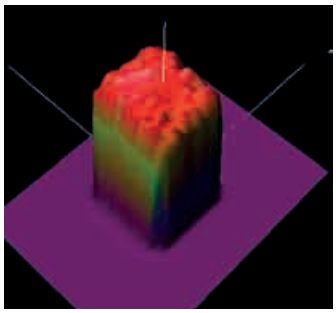
Each laser system is designed for continuous duty and high reliability with technology that is virtually maintenance-free. Laser cleaning systems are compact, require only about 1m² of floor space, and use a flexible fiber optic cable for versatile beam delivery, available up to 50m long. Our systems are constructed using a modular design, enabling optimal configuration to meet each customers' specific requirements.



HOW IT WORKS

Cleaning process stops when target material is removed





A focused laser beam precisely vaporizes the target residue or contaminant. Powerful, very short, rapid & scanned laser pulses react with residues creating micro-plasma bursts & shockwaves with thermal pressure resulting in sublimation & ejection of the target material.

cleanLASER's unique beam parameters are designed to thoroughly clean precision surfaces without surface erosion even after hundreds of cleaning cycles. Optimization of the laser process produces maximum cleaning rates without harm to the base material, which is ideal for aerospace application approval.

***Left**: Typical Gaussian laser beam profile with high center intensity that damages base metal*
***Right:** cleanLASER's unique flat top beam profile provides consistant intensity for damage-free & efficient cleaning*

TECHNOLOGY

cleanLASER provides innovative laser systems designed specifically for precise surface cleaning. They feature laser optics designed with long focal distances and working ranges that help simplify implementation for both manual and automated laser applications.

Laser optics are designed with an integral suction channel to immediately capture vaporized residues while cleaning complex mold shapes and geometries.

Mobile or Stationary Laser Systems
Specially designed for cleaning molds including 150, 300, 500 & 600 watt units

***Laser Optics** – Available for automated & manual applications (pictured from left to right):*

***OSA 70** – for automated use with integrated power & protection window monitoring system*

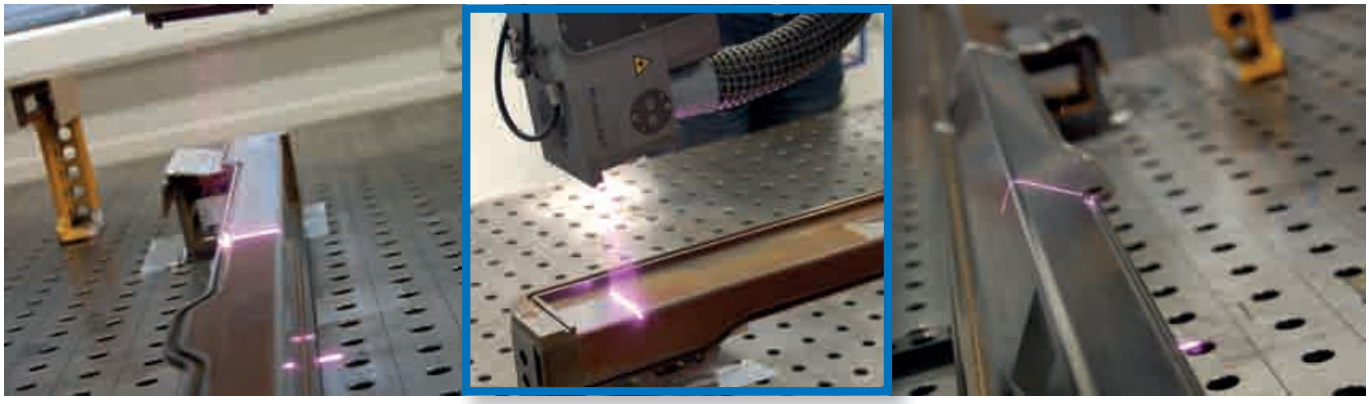
***cleanCUBE 15** – manual & automated version available*

***OSH 50** – ergonomic & lightweight design for hand-held cleaning*

MANUAL OR AUTOMATED LASER CLEANING

cleanLASER offers laser systems that can clean molds using either a handheld or robotic mounted optic, as well as systems that feature both options. All are easy to use with "plug & play" operation for fast set-up.

In cooperation with GÜDEL, cleanLASER offers flexible and precise standard gantry based automation systems. Together, we incorporate the latest technology for the surface treatment of large aerospace molds.



These systems are able to clean very large molds used to make components such as wing skins or fuselages. They do so with optimal efficiency and consistent repeatability using highly accurate positioning at tolerances within one millimeter. Automated laser cleaning technology has been thoroughly tested, proven effective and is in use today at multiple manufacturers and suppliers. Laser mold cleaning using automation overcomes the concerns with time consuming, labor intensive hand cleaning options while also eliminating the risks of damage to critical surfaces and high-value parts.

cleanLASER can provide automated systems that combine mold cleaning with the application of solvent-free release agents as well. Laser cleaning can also be integrated with existing automation systems. Automated laser cleaning offers significant time and money saving benefits for aerospace manufacturers with technically advanced solutions for their mold cleaning requirements.

Typical Laser Cleaning Rates - Manual & Automated - Relative to Laser Power:

(Rates for the removal of dark mold release agent residues after thermal processing)

	manual	automated
CL 150	1-3 m²/h	2-5 m²/h
CL 300	2-5 m²/h	4-10 m²/h
CL 500	3-8 m²/h	6-15 m²/h
CL 600	4-10 m²/h	7-18 m²/h

APPLICATION CONSIDERATIONS

What can be cleaned?

- Complete release agent removal after processing
- Removal of adhesive tapes & adhesive residues
- Other dark process residues (<100µm)

Where is it applicable?

- Flat & 3D shaped molds & tools without undercuts
- Metal based molds for CFRP production, especially those made of nickel, aluminum, or steel
- Molds sizes from 0.1 to 100m² of surface area

What are the limitations?

- Plastics or CFRP based mold substrates
- Holes, undercuts or deep and narrow groves
- Transparent or unprocessed release agents
- ATEX / Explosive atmosphere areas

Tested, Proven, Reliable & Cost-Effective

Leading European aerospace manufacturers have thoroughly tested laser cleaning for use on large CFRP and GFRP molds. This method has been proven highly effective, reliable, and a damage-free process for use on nickel, steel, aluminum and stainless steel molds. cleanLASER technology is fast, quiet, effective, and designed for safety. It eliminates the use of consumable cleaning media as well as concerns with traditional labor intensive hand cleaning methods. Laser cleaning saves time and reduces manufacturing costs in CFRP and GRP aerospace component production.

cleanLASER offers turnkey solutions for manual and fully automated laser cleaning systems world-wide through its global partner network.

Cleaning with laser light – environmentally friendly, precise & profitable.

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