

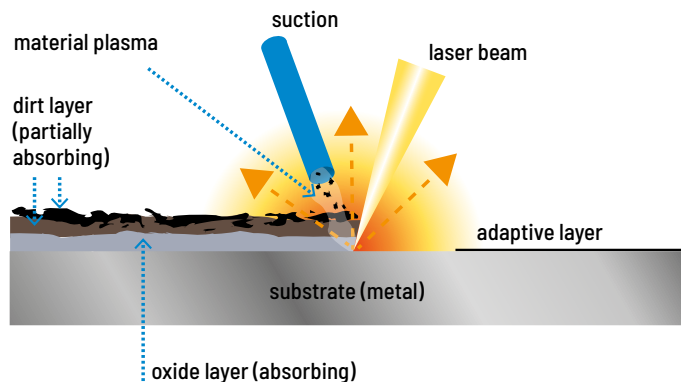
## WELDING PRE- AND POST-TREATMENT

### Laser pre-treatment for soldering and welding



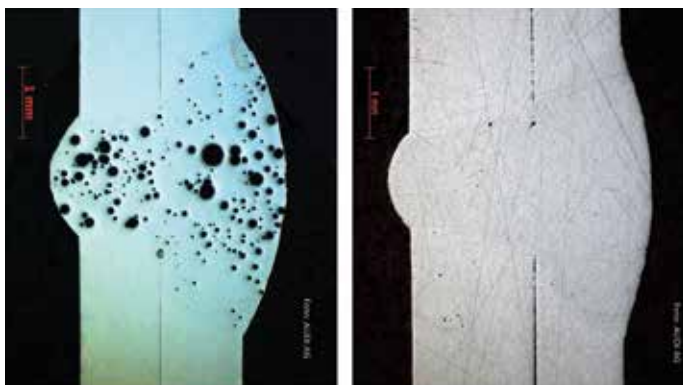
Laser cleaning allows oils, greases or conservation layers resulting from preceding processes to be removed evenly and residue-free. The non-abrasive process replaces wet chemical washing processes and is therefore particularly material- and eco-friendly. The cleaning process proceeds with high precision both selectively and locally. Thanks to its compact design, the laser system, including the processing optics, can be directly integrated into the production chain.

When removing an uneven, grown oxide layer, a uniform, surface-near remelting of boundary layer can be achieved. The then „compacted“ or microcrystalline and amorphous transition zone is less susceptible to elemental corrosion.



The very thin and homogeneous new oxide layer formed on this conditioned surface as a direct result of the laser process provides the optimum basis for a steady welding process. This results in joint qualities with minimal porosity in the seam area.

Laser cleaning is particularly effective with oily or greasy contamination, primarily in the oxide layer between the metal and the dirt. Transparent residues, e.g. from dry lubricants and emulsions, are also reliably removed. Due to the residue-free removal of organic material, evaporation of contaminants during the thermal welding process is excluded. Weld seam defects are effectively prevented, thus maximizing the cleaning quality.



uncleaned

cleanLASER

The porosity of the weld seam treated with cleanLASER is proven to decrease to less than 1%

# WELDING PRE-TREATMENT

## GALVANIZED STEEL COMPONENTS

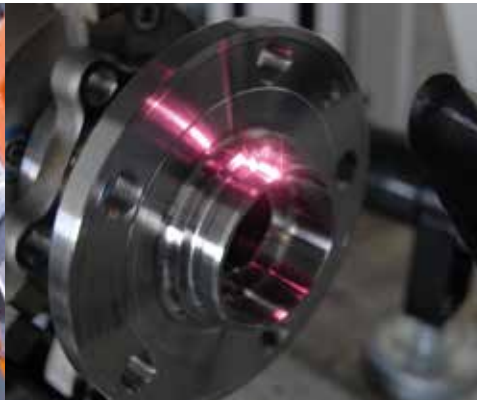
**If required, zink coatings remain damage-free due to the homogenized beam of the cleanLASER and the very uniform and gentle cleaning performance. The galvanized components remain corrosion-resistant even after laser treatment.**

The gentle cleaning of galvanized steel sheets is well applicable in case of electrogalvanizing as in case of hot-dip galvanizing. The removal of close-to-surface zinc hydrates and a possible – precisely adjustable – reduction of the zinc layer thickness allow the weld seam quality to be significantly improved thanks to the calmer molten bath. The process is suitable for thin sheet up to solid components.

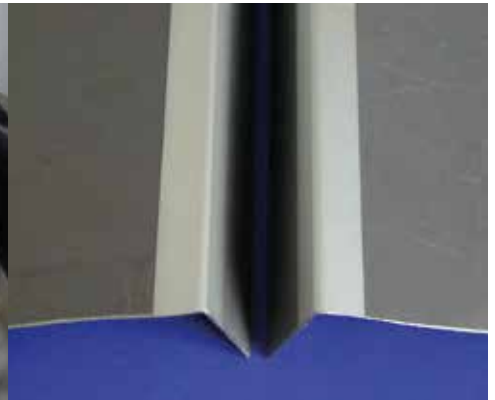
## DECOATING



cleanLASER during welding pre-treatment in body-in-white production



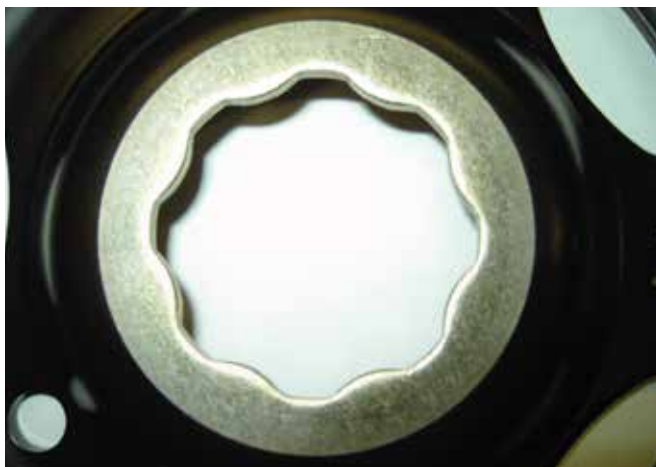
Degreasing and cleaning of steel components in the drive train



Steel sheet decimated at the edges for soldering pre-treatment

The laser light removes protective coatings, primers or organic coatings of any kind and is therefore also suitable for the preparation of phosphated or anodized components.

The base material can then be joined in high quality. Metallic coatings, such as aluminum-iron-based coatings (AlFe) on hot-formable, high-strength steels, can be removed and prepared for the welding process in both the untempered and tempered state.



Precise and chemical-free decimating with laser light

## ADVANTAGES TO CONVENTIONAL TECHNIQUES

- No media and abrasive consumption
- Easy to automate and integrate
- High reproducibility
- Low running costs (mostly < 1 €/hour)
- Typical speeds for 20 mm track width:
  - Aluminium sheet up to 15 m/min.
  - Removal of shop-primer approx. 20 m/min.
  - Oil removal and cleaning of steel approx. 10-20 m/min.
- Low space requirement
- Local cleaning of the joining zone = saving of cleaning effort
- Environmentally friendly process with energy savings of up to 87 %, awarded the German Environmental Prize by the German Federal Environmental Foundation (DBU)

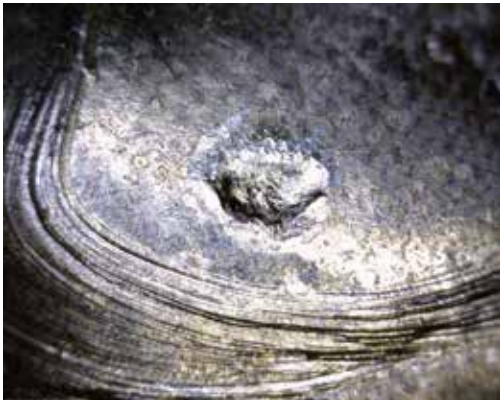
## WELDING POST-TREATMENT



**Even in case of good pre-treatment, oxidation and contamination phenomena can still occur in the weld seam area during the welding process. Oxides and/or organic residues can be removed excellently by means of the laser beam.**

Limitations may arise in the case of weld spatters or glassy silicates.

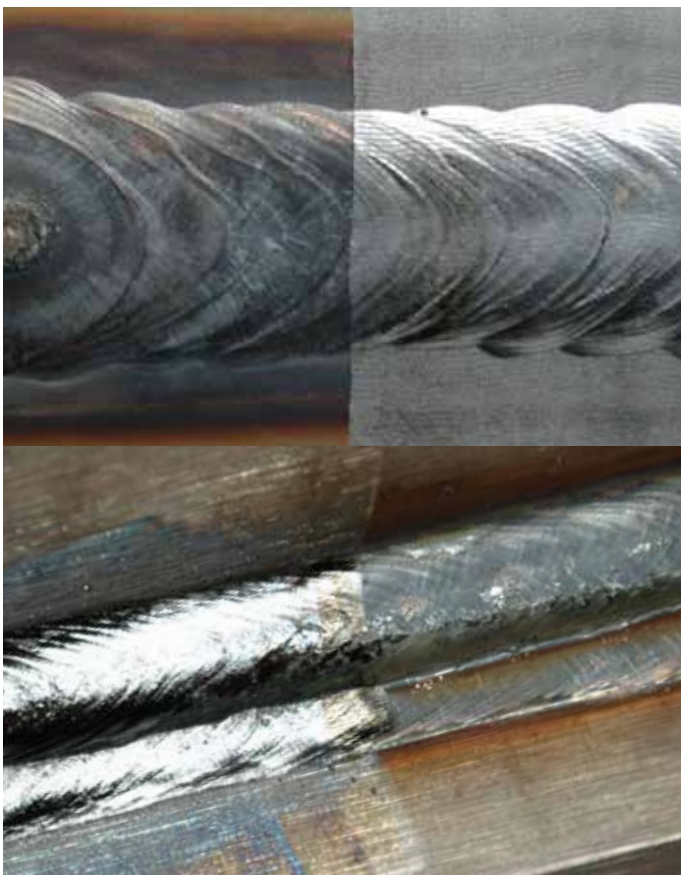
The slag produced during the MIG welding process can be blasted off by the laser beam when high intensity is used. This prevents any loosely adhering slag fragments from creating localized corrosion spots that would promote subsequent corrosive infiltration after coating.



Microscope view of a part before laser processing  
(Image above)

Part after welding post-treatment with cleanLASER;  
silicate residues completely removed

Images below: Laser cleaning of a stainless steel seam (top)  
and carbon steel (bottom)



### ADVANTAGES OF LASER POST-TREATMENT

- Optimal pre-treatment for subsequent coating
- Passivation of stainless steel welds
- No coating delamination or corrosion effects due to slag residues
- Customer approved corrosion stability of laser-treated and subsequently coated welded seam zones
- Substitution of e.g. brushing or abrasive sandblasting processes
- No carryover of particles
- Damage-free cleaning of galvanized steel sheets possible without impairing corrosion protection due to particularly gentle beam shaping

# DEVICE TECHNOLOGY AND PROCESS MONITORING

COMPLETE SOLUTIONS FROM A SINGLE SUPPLIER



Low Power Laser CL 100 in the switch cabinet



Mid Power CL 600 in the switch cabinet

## LASER SYSTEMS

The modular design of the 20 to 2000 Watt laser systems offers the maximum flexibility. Depending on customer specifications, optics for welding pre-treatment and post-treatment are available as well as fully automated production cells or in-line integration as complete solutions.

## PROCESS MONITORING

cleanLASER offers a wide range of measurement technology for process safety. In addition to performance and beam diagnostics, systems for camera and contrast-based result monitoring of the material surface are also available.

By using a plasma sensor, which detects the effects of the laser beam on the surface, the function of the cleaning process can be directly retraced and thus a 100 %, inline-based quality assurance can be achieved without interfering into the cleaning process.

**Pre- and post-treatment with laser light  
- precise, environmentally friendly and long-term stable**



Optics OS A 70 for automated processing



Optics OS A 70 V for cleaning with limited accessibility

PLEASE CONTACT US - WE ARE HAPPY TO ADVISE!

 **cleanLASER**  
cleaning with light