

# How does laser cleaning work?

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A physical reaction called laser ablation is responsible for the cleaning effect on metal surfaces. It can remove contaminants, impurities, coatings and debris (e.g., rust, paint, oxide, dust). Because it is efficient and eco-friendly, it is used in an increasing number of applications. The SLCR developed many different cleaning applications with pulsed fiber lasers and Co2 lasers.

## 1. All Materials have an ablation threshold

Laser ablation occurs when a material layer or a coating is removed with a laser beam. This is the process behind all laser cleaning applications. Take laser rust removal on steel. When the beam hits the surface, molecular bonds in the dust or rust layer are broken and ejected from the substrate. In less technical terms, you can imagine that the layer to be removed is simply vaporized by the laser beam.

Every material has different properties and thus different molecular bonds. In other words, each material has a specific ablation threshold. To successfully remove a layer from a given material, the energy transferred by the laser beam must be above the ablation threshold of that particular material.

## 2. Is it possible to remove a material in a highly selective and sensitive way?

Since there is an ablation threshold for each material, laser cleaning can discriminate between two or more materials when trying to remove an undesired layer from an object. Given a sufficiently large ablation threshold difference between the materials, it is possible to select a material to be removed (i.e., the one with the lower ablation threshold) while leaving the other material untouched.

SLCR has built up a wealth of experience over the last 20 years and develops the customer-specific laser process tailored to the respective application.

The short laser pulses clean surfaces fast and also ensure that the underlying material does not heat up too much.

### 3. Consumable-free and environmentally Friendly

As this cleaning method only uses a laser beam to vaporize the layer to be removed, there are literally no consumables with it. This is the beauty of lasers, which only need a power plug to be set and ready to go.

On top of this, lasers use no chemical products or solvents. This makes laser surface cleaning one of the safest solutions when it comes to coating and impurities removal.

Not only is there no chemical waste to take care of, but employees are totally safe when working near laser cleaning machines. Our machines are designed to meet international laser safety standards (Laser Class I). Employees won't need personal protective equipment and won't have to handle those pesky chemicals.

#### **In Summary**

The focus of our laser process development is on the gentle action of the laser light on the base material. The metal reflects the laser beam almost completely and thus causes the removal of paint, plastics, rubber and a large number of other materials.