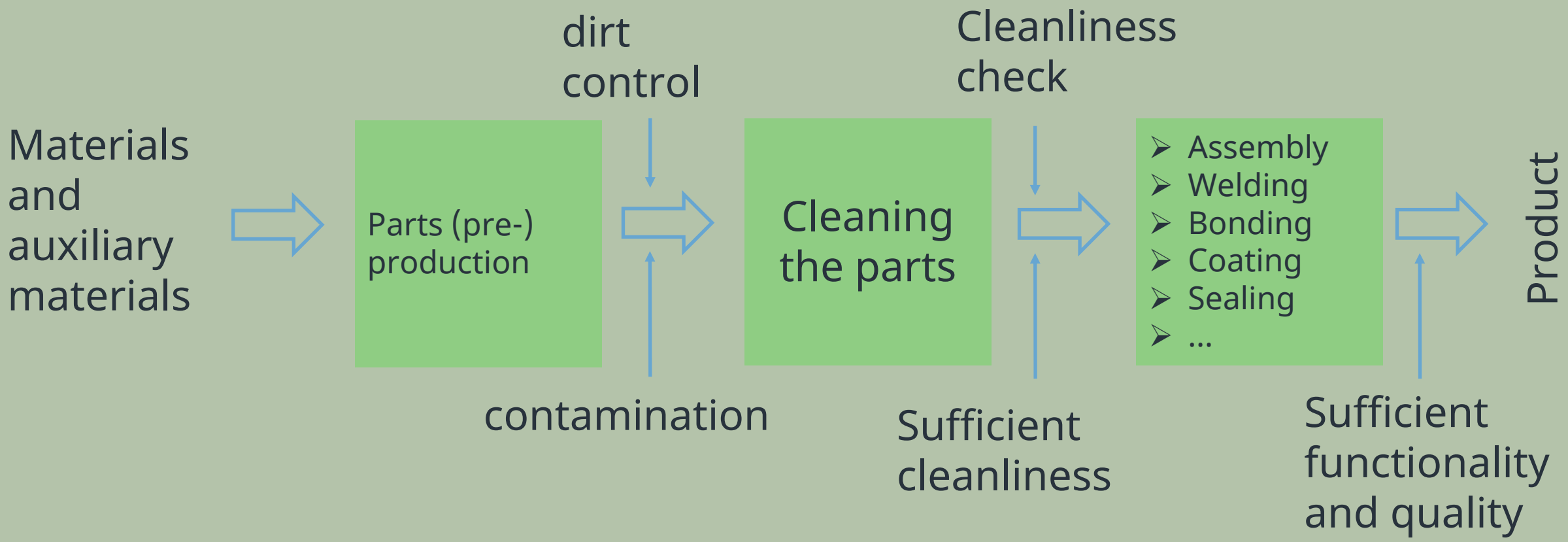
Acerios Hot Active Plasma Technology

Why Cleanliness?

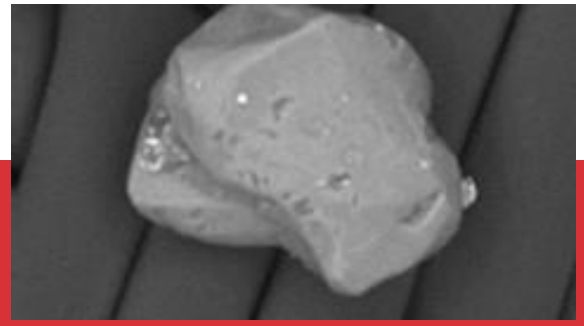
- **Cleanliness cannot be measured; only the amount of contamination can be measured**
- **Part of the value chain**
- **An essential quality criterion for modern production and lightweight construction technologies**
- **Necessary to ensure that subsequent production steps (e.g. joining) can be carried out to a sufficient standard of quality**

AS CLEAN AS NECESSARY INSTEAD OF AS CLEAN AS POSSIBLE

Sauberkeit von Bauteilen



Contaminations



Particulate contamination

Film-like contamination

Possible sources of contamination in industrial environments

Cleaning by definition

- **Definition of terms (DIN 8592:2003-9)**
  - ‘Removal of unwanted substances (contaminants) from the surface of workpieces to a required, agreed or possible degree (...)’

- **Cleaning is:**
  - A secondary process – a process that supports/improves the main process (e.g. joining)
  - Integrated into the manufacturing process as a pre-treatment, intermediate treatment or final treatment
  - Part of the value chain

- **The quality of the cleaning :**
  - The cleaning quality is always determined by the main process

Cleaning processes

Wet cleaning processes

- Water-based or chemical-based
- Immersion baths
- Ultrasonic baths
- (High-pressure) jet cleaning

Dry cleaning processes

- Brushing/mechanical removal
- Laser beam cleaning
- Dry ice/CO2 snow blasting
- **Plasma cleaning in atmosphere**

Partial Cleaning

Definition and selection of areas to be cleaned, including cleanliness levels

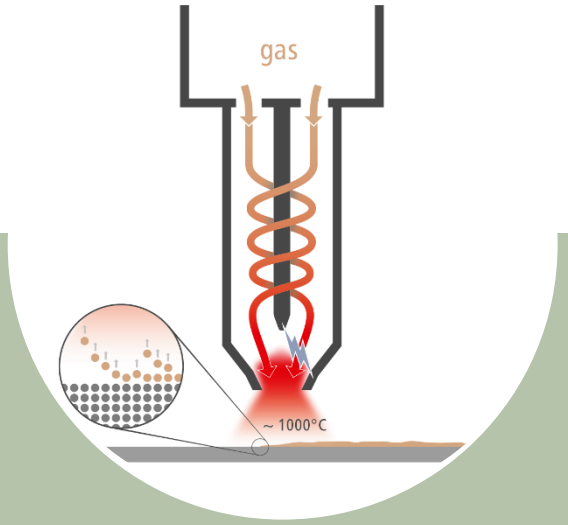
Fast and efficient cleaning of areas

The necessary cleanliness in the right place

Optimised processes

Component cleaning only where value is added

Acerios - Hot-Active-Plasma



Hot & energetic

Gaseous mixture of atoms, molecules, ions and free electrons

Plasma flame (plasma jet)

Arc inside nozzle

Even non-conductive materials (glass, ceramics, etc.)

Plasma temperature ~1000°C

Working distance

5 - 25 mm

Cleaning speed

of e.g. 6m/min

Processing procedures

Component-guided systems

The component is guided by the robot, the plasma torch is fixed

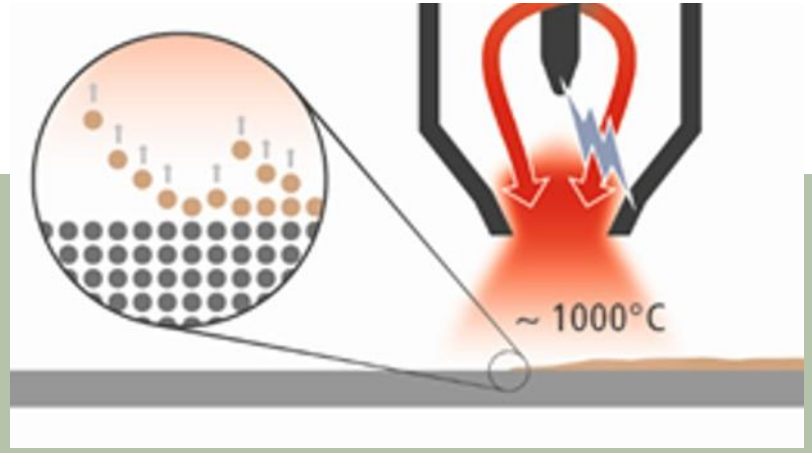
Torch-guided systems

Plasma torch is moved, component is fixed

Inline implementation

The system is directly integrated into the production line

Effects and mode of action



Processes

Thermal process
Mechanical process
Chemical process
Comparable to pyrolysis

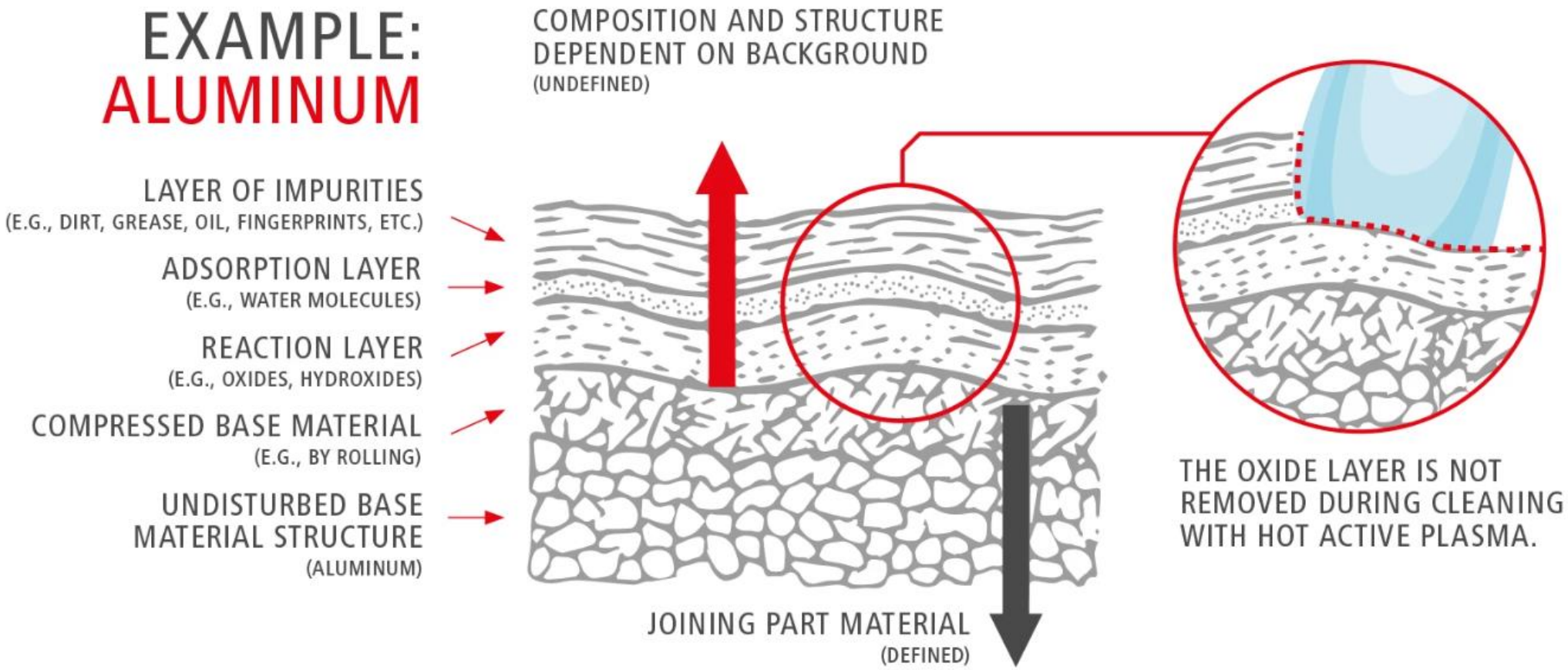
Achieved effects

Microcleaning and activation of the surface

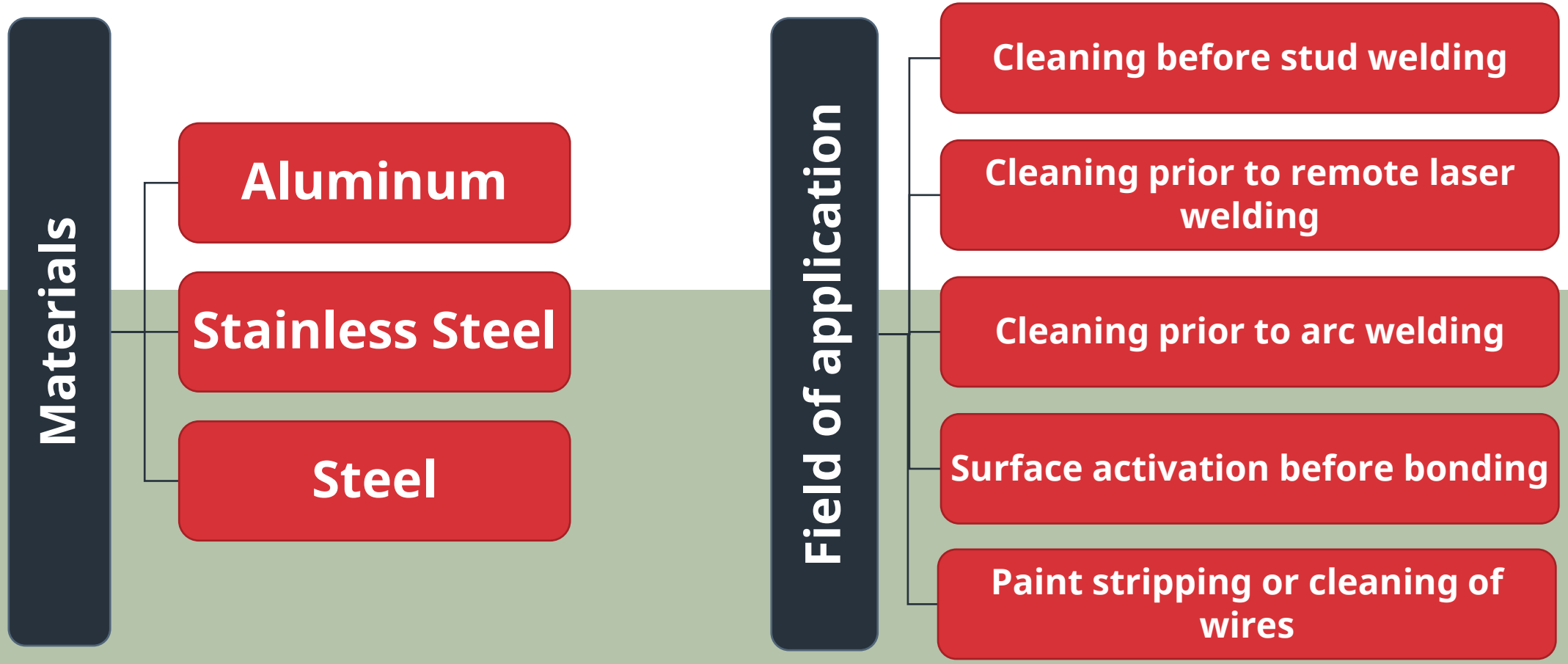
Cleaning of oils, lubricants Cleaning/removal of liquids, fibres...

Removal of thin coatings

Effects and mode of action

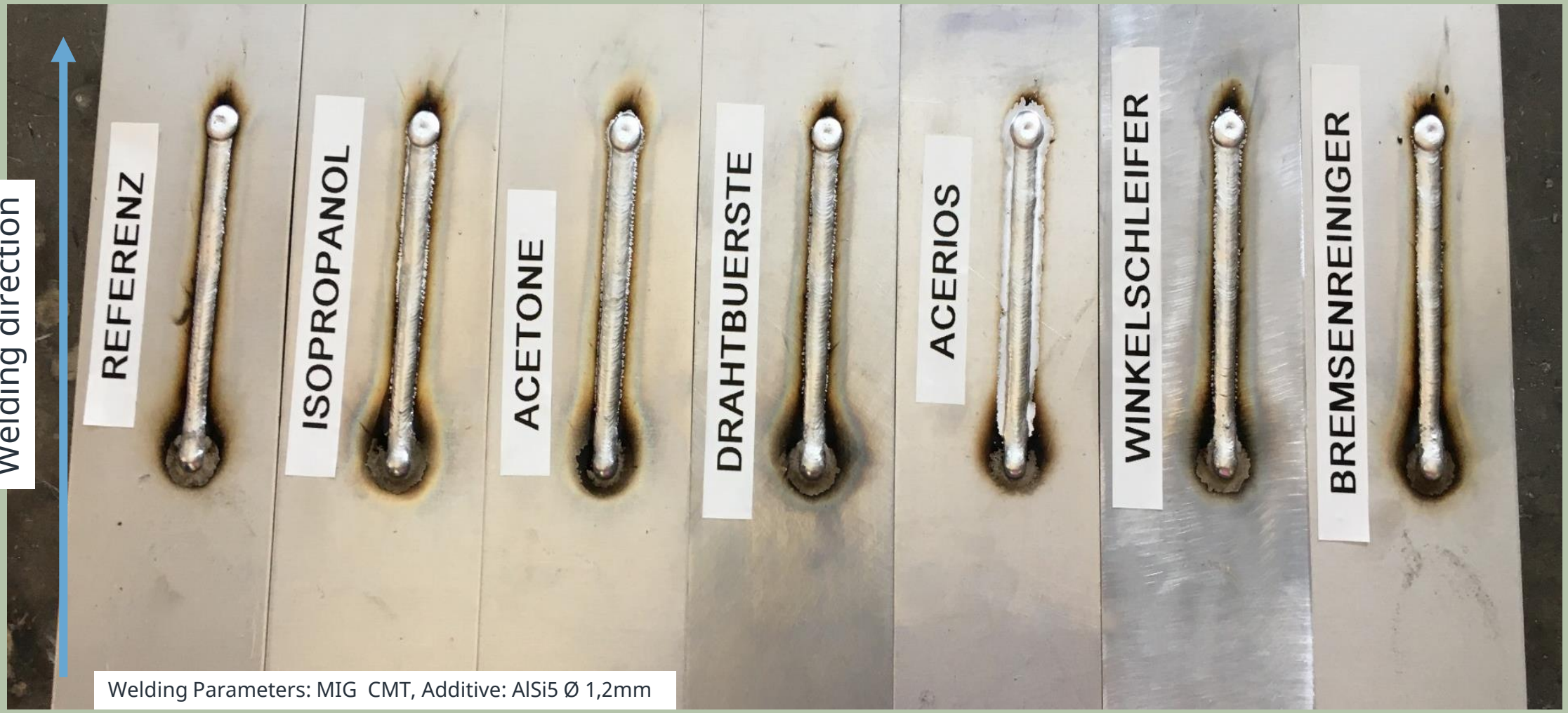


Field of application Acerios / HAP



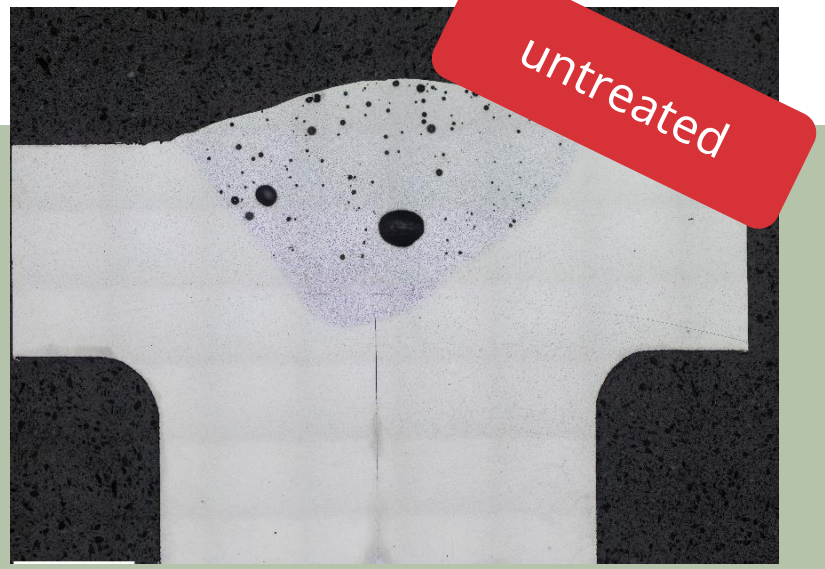
Aluminum with dry lubricant

Comparison of different surface pretreatments



Cleaning effect through Acerios / HAP

Porosity of an aluminium weld seam



/ Porosity of 5,02 %

/ „Aqua-Slide“ cooling lubricant

/ Porosity of 0,01 %

Configuration:

- **Power source:** TPS 500i Pulse
- **Wire feed:** WV25i REEL
- **Torch:** WF60i Robacta Drive CMT
- **Gas nozzle:** Ø 15 mm (42,0001,4496,5)
- **Contact tube:** Ø 1.2 mm (42,0001,4751,10)
- **Software version:** 3.5.0
- **Characteristic curve:** PMC 3529 universal
- **Cooling:** water-cooled
- **Core:** combination core
- **Welding filler:** 1.2 mm AlSi5

Application: Welding

with HAP | throat seam | without HAP

Application: Sealing surface

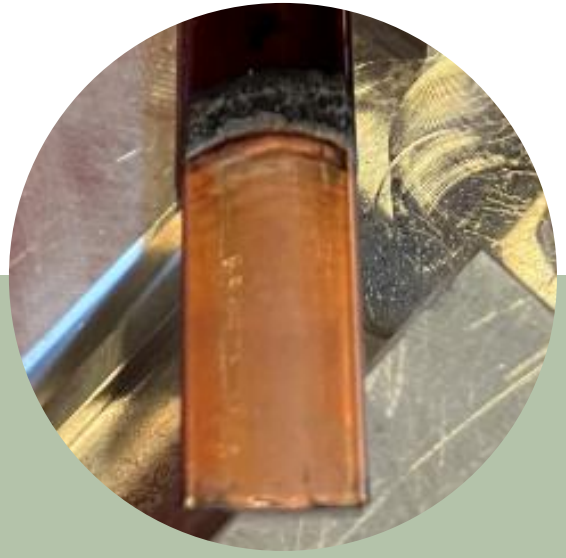
Application examples

Automotive

Cleaning prior to various joining processes

Commercial Transportation

Cleaning before welding aluminum side panels on trains

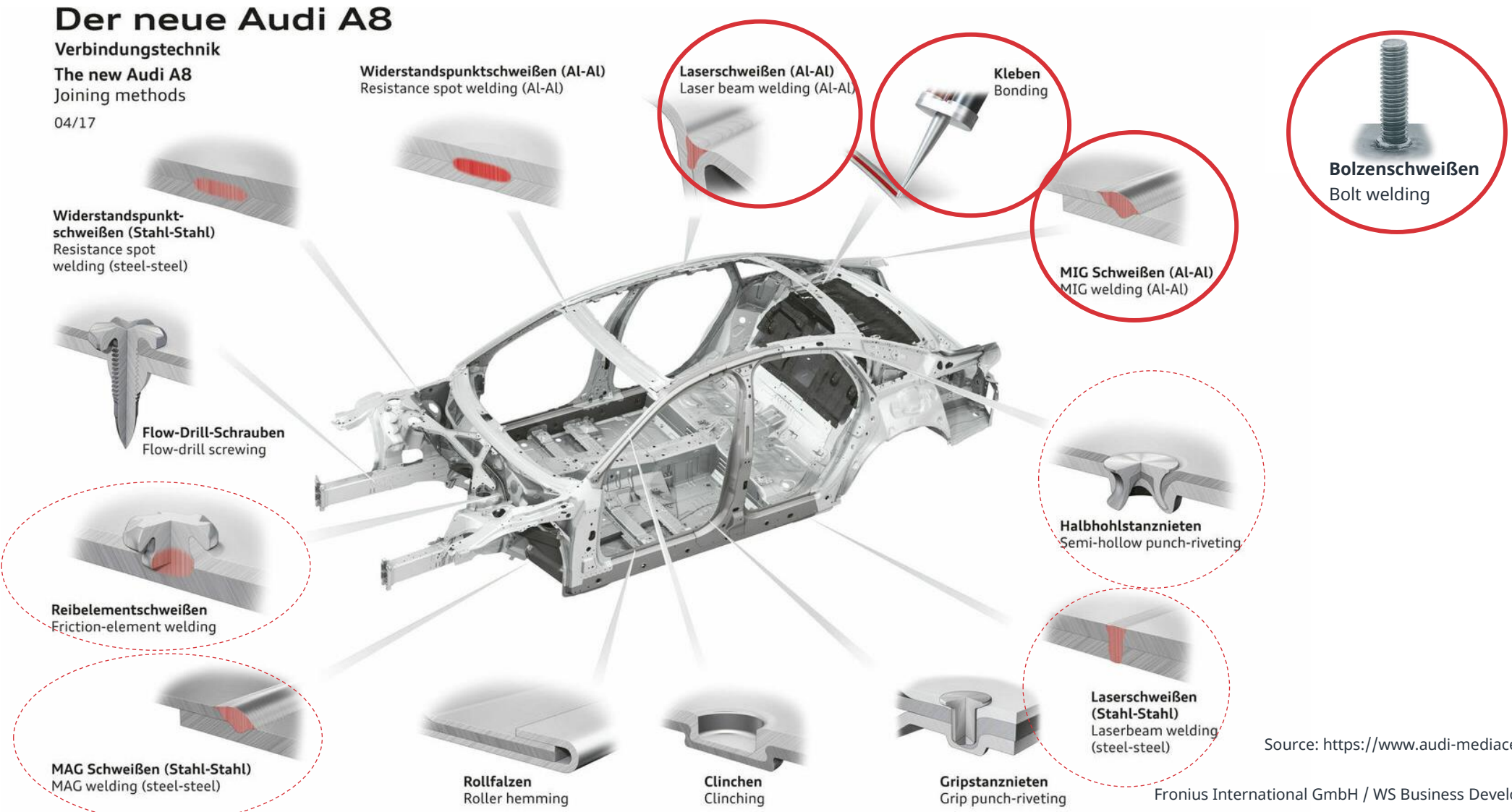


General Industries

Removal of the insulating varnish layer from wires, coils and relays

Automotive

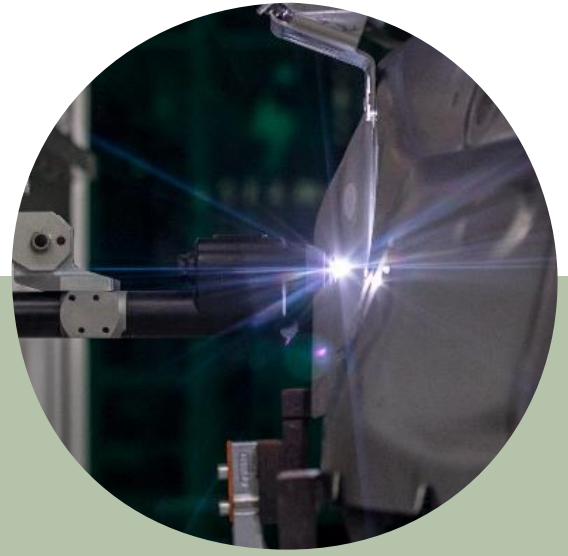
Overview of joining processes



Source: https://www.audi-mediacenter.com/de/fotos/detail/der-neue-audi-a8-43909

Application example: Stud welding

Stud welding



Hot-active plasma treatment

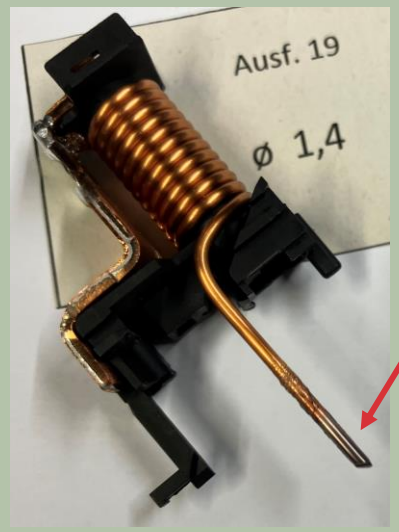
of aluminium before stud welding

Savings

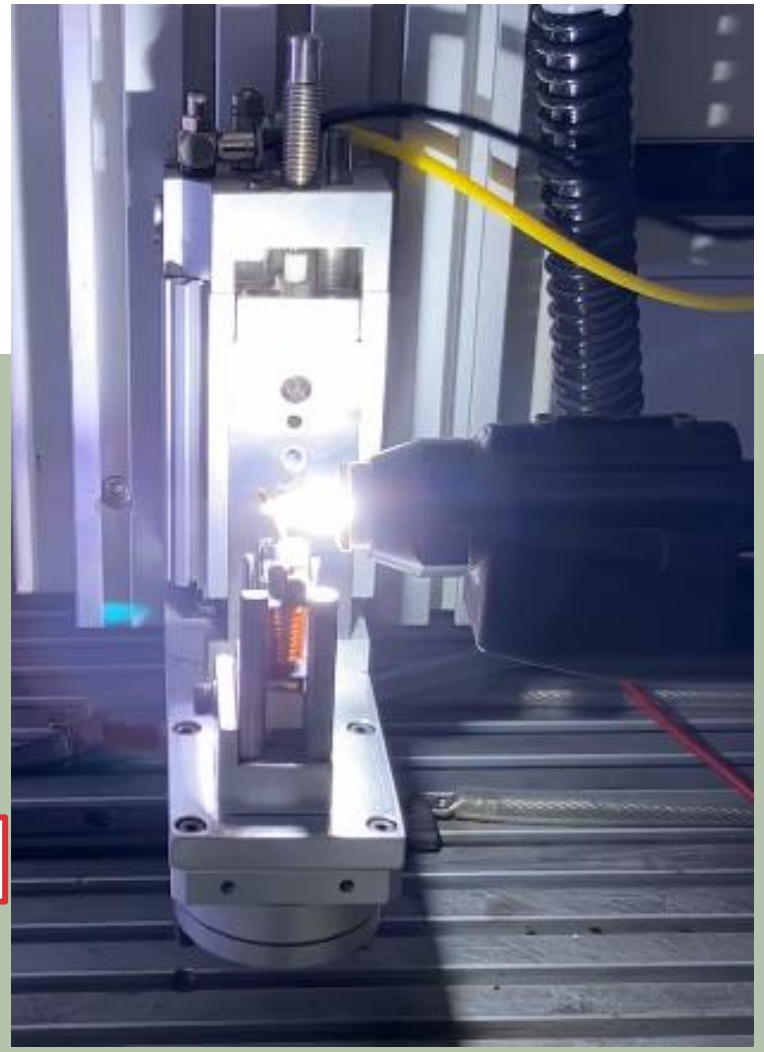
in the single-digit euro range per component

Application example: Wire stripping

- Stripping paint from wires before welding
- Component: Coils for relays
- Acerios replaces cleaning with a hydrogen flame
- Wire diameters from 0.2 to 2.4 mm are stripped



Cleaned/stripped area



Acerios is not used to…

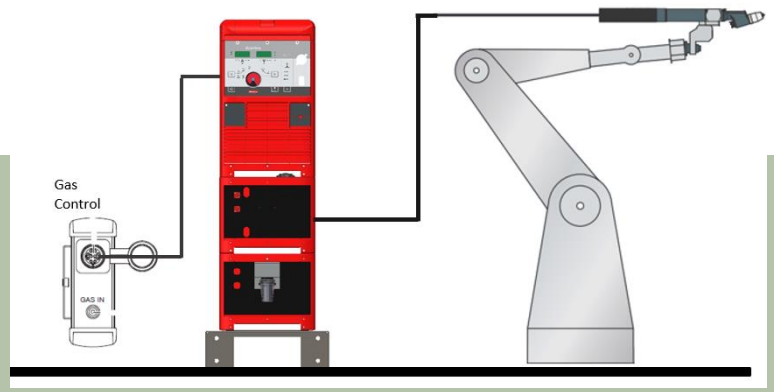
- Removal of oxide layers
- Removal of zinc layers (Zinc layer surfaces can be cleaned of lubricants without removing the zinc layer)
- Removing thick layers of paint
- Cleaning large areas
- Removing primer coatings from e.g. ship frames
- Removing coatings such as Usibor or ceramics (However, the surfaces can be cleaned without damaging the coating)
- Removing scale and annealing colours after welding
- Removing rust from components

Acerios Configurations

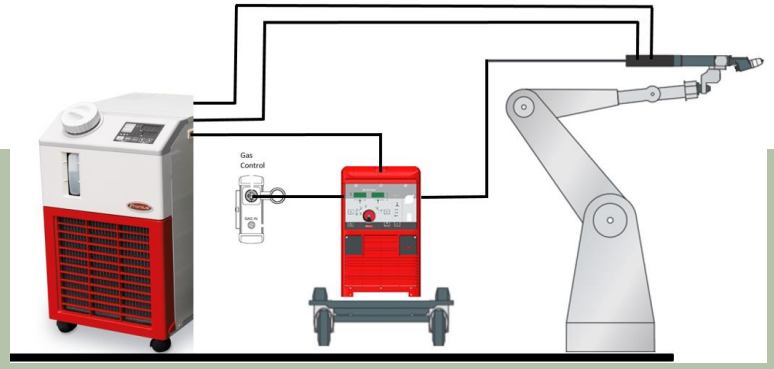
System configuration

- For automated applications
- Power, distance from the surface, speed and gas as the main parameters
- Simple design: one basic system and one torch
  - Acerios System: 35-200A
  - Torch (Plasma Clean Torch) PCT 2000 – 200A, 6m or 15m hosepack
- Cooling options for spot operation, long duty cycles and continuous operation
- Process gas control is necessary
- Required robot interfaces can be configured as an option
- A protective enclosure and extraction system, as used in arc welding, are necessary

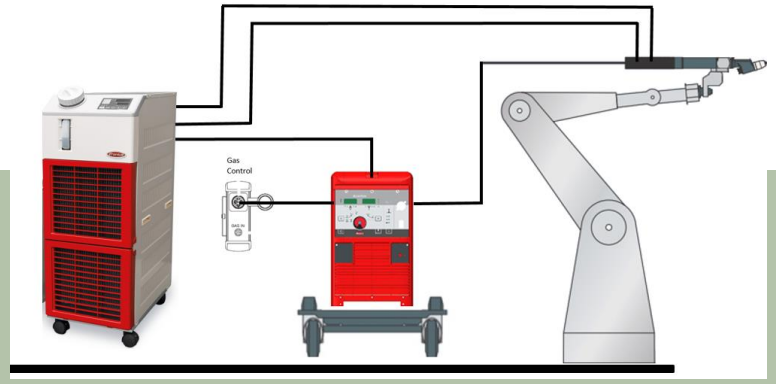
Overview Acerios system configuration



Configuration for short duty cycles and spot-on operation (FK9000R)



Configuration for medium duty cycles(CU1800)



Configuration for continuous operation (CU4700)

Fully automated and precise in-line cleaning with hot active plasma

Save time, money and resources

Cleanliness where cleanliness is needed

Many interfaces, easy operation, predefined parameters

In-line capable, high stability and speeds, easy parameterisation

No liquids, no chemicals, energy efficient

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