

# Advantages Offered by Electrochemical Weld Cleaning

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## WHAT IS PICKLING AND PASSIVATION?

Pickling is the removal of any high temperature scale, Oxidation, Heat affected zone and any adjacent low chromium layer of metal from the surface of stainless steel.

Passivation is the treatment of the surface of stainless steels to remove contaminants and promote the formation of the passive film on a stainless steel surface. (Chromium oxide layer to prevent it from corrosion)

## WHY IS PICKLING AND PASSIVATION NEEDED?

Where the steel has been heated by welding, heat treatments or other means, to the point where a coloured oxide layer can be seen, there is a chromium depleted layer on the surface of the steel underneath the oxide layer. The lower chromium content gives lower corrosion resistance. To restore the best corrosion resistant performance, the damaged metal layer must be removed & this can be achieved with one of the latest technology of electrochemical stainless steel weld cleaning machines.

## THIS IS WHAT THE LATEST TECHNOLOGY OFFERS:

- Electrochemical/ Electrolytic weld cleaning machines are the latest trend in weld cleaning process with assurance of a safer, quicker and better alternative to conventional pickling.
- A rising concern on health and safety has made stainless steel fabricators look for alternative stainless steel weld cleaners to make the aggressive pickling paste a thing of the past.
- The method: The treatment, based on an electrochemical principle, uses specific electrolytes and patented electrodes: the advantage is to increase the corrosion resistance, working speed (instant process) and surface appearance on stainless steel, avoiding the traditional pickling solutions (which usually contain high concentrations of strong and toxic acids).
- It uses an automatic pump for dosing the liquid; saves water; environment friendly weld cleaning methods no use of water to rinse the hazardous chemicals in environment; polishing to improve the aesthetics.; very easy and safer neutralization/passivation; marking/engraving of logos, barcodes, product names and numbers, No formation of oxide on the surface in future.
- The research methodology: (Carried out by Nitty Gritty Srl. Italy) Different solutions were prepared using low concentrations of weak organic acids, to obtain a neutral solution used to clean/gain high passivation on stainless steel surfaces. This aspect is very important to reduce the hazardousness of the solution compared to the pure phosphoric acid (standard solution) and moreover to the traditional pickling acids.
- The best solutions in terms of aesthetic results were tested in terms of corrosion resistance XPS analysis, on TIG and MIG samples.
- An S.E.M. analysis is used to show the influence of the carbon fibre effect depending on the technology used (transformer vs inverter) and electrolyte. Several real field applications are presented. The aim of the work is to study the electrochemical marking process that allows to obtain technical and decorative graphical effects on stainless steel by the controlled growth of protective oxides and to develop new electrolytes able to increase even more the technical and aesthetic results on different stainless steels series.