



# Derusting and descaling with simultaneously degreasing?

Petrofer Chemie H.R. Fischer GmbH + Co. KG  
Dr. Florian Treptow, Ph.D., Dipl.- Ing. (FH) Chemie  
Römerring 12-16  
Germany, 31137 Hildesheim  
Phone +49 5121 7627 371



# Schedule

- Introduction PETROFER
- State of the art
- Advantages for customers
- General product properties
- Application examples – Laboratory
- Derusting vs. concentration and time
- Bath control
- Application example



Source: meinefototapeten.de



# Introduction PETROFER

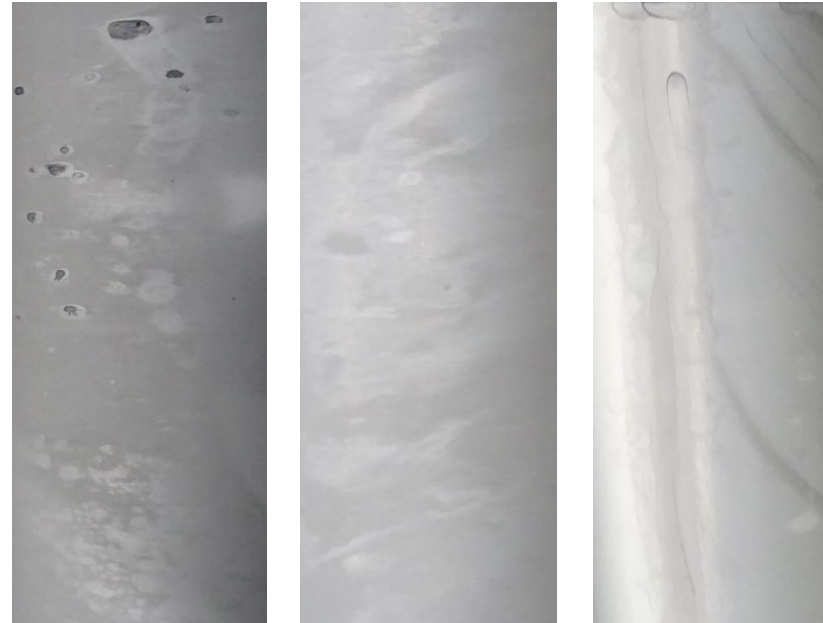
- Since 1948 serving the metalworking, automotive and many other technical markets with industrial oils, lubricants and specialty chemicals
- Chemicals for the papier industry
- Full-range-trader, development and production of industrial oils, lubricants and special chemicals
- Petrofer is a privately held company, headquartered in Hildesheim, Northern Germany
- We are a leading company in terms of industrial lubricants, special liquids and process engineering
- Employees in 2016: 987 in 12 countries (BRD: 283, PRC: 504)
- Sales activities in 42 countries
- Number of direct customers in 12 countries: > 5.550





# State of the art

- Actual water based cleaning systems are most times not proper enough to remove persistent contaminations like oxide- and scale layers and rust
- Neutral pickling agents that are in the market for quite a few years are only partly capable to do so. Oily layers like corrosion protection or metal working oils could mostly not be removed.
- Resulting problems:
  - Stain
  - Streak
  - Traces
  - Only partly derusted parts
  - Problems in the next steps





# New developed product FEROCLEAN S 660

- Combination of neutral pickling agent and neutral cleaner
- Usable for iron, steel and aluminum parts
- Contaminations, resulting for example from thermal deburring, but also rust and scale, are quick and residue-free removed with low concentrations at typical temperatures
- The part is simultaneously degreased
- Operates as machine descaling
- New scale is not be built, existing scale are dissolved through out the time
- Is also to be used instead of alkaline cleaners before iron- or zinc-phosphating respectively before so called thin-layer-applications

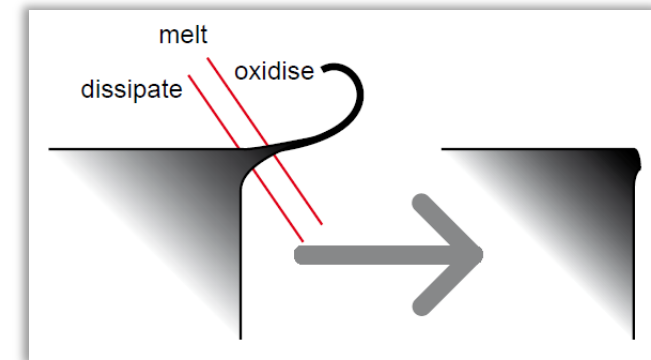
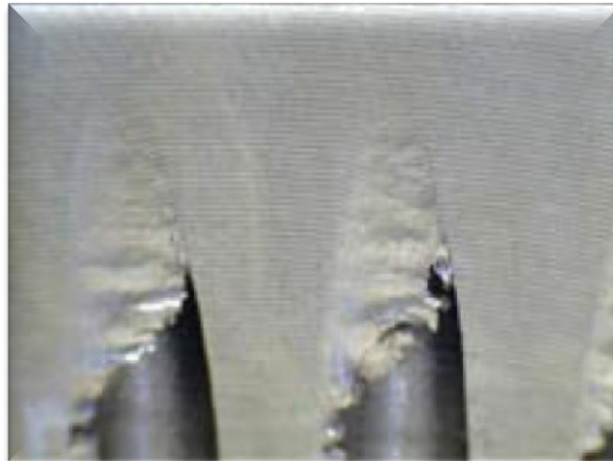
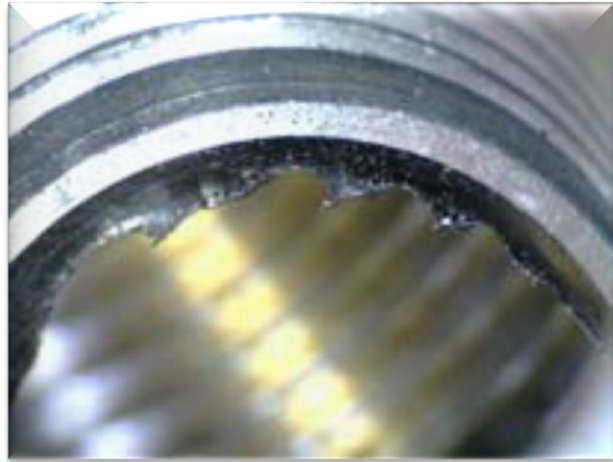


# Advantages for the customer

- Derusting and descaling with a label-free product
- pH-neutral solution
- Application
  - Spraying
  - Dipping
  - Flooding
  - Ultrasonic
- Appropriate for rust and scale removal, i.e. after
  - Electrochemical deburring (ECM)
  - Thermal deburring (TEM)
  - Laser welding
  - Laser cutting
- No pickling attack on base metal or on line construction material
- Dissolves and/or avoids plant incrustations
- Bath control / operation and definition of bath dump intervals with method developed by Petrofer Chemie



# Thermal Deburring (TEM)





# Product Properties and Application Parameters

- Concentrate
- Basis: neutralized phosphonic acids  
surfactants
- pH:  $6,6 \pm 0,4$
- Appearance: colorless
- Labelling: no label
  
- Bath solution
- Concentration: 3...10...15 %
- Temperature: 20...50...70 °C
- pH range: 5,0...6,5...7,0
- Time: 1...5...30 min
- Application: spray, dip, flooding, ultrasonic
- Materials: iron and steel, aluminum
- Bath control: conductivity, Fe content





# Application Examples on Steel plates



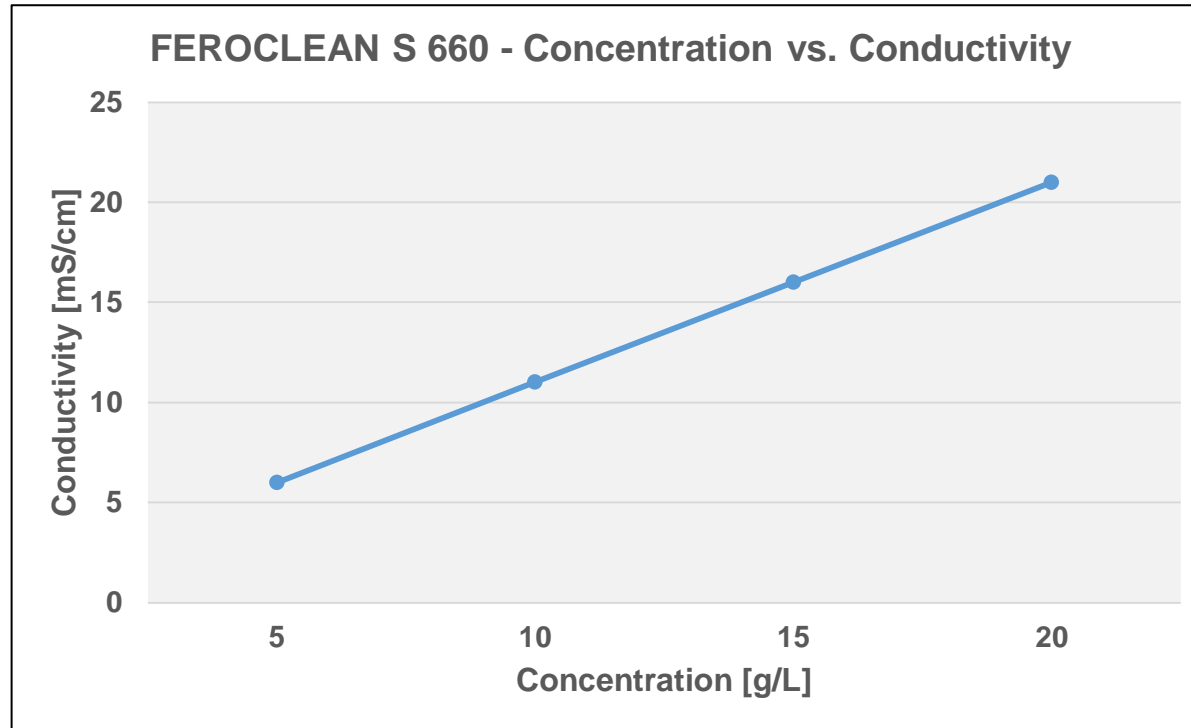
Scale removal  
1 min, 10%, 45°C



Rust removal  
3 min, 10%, 45°C



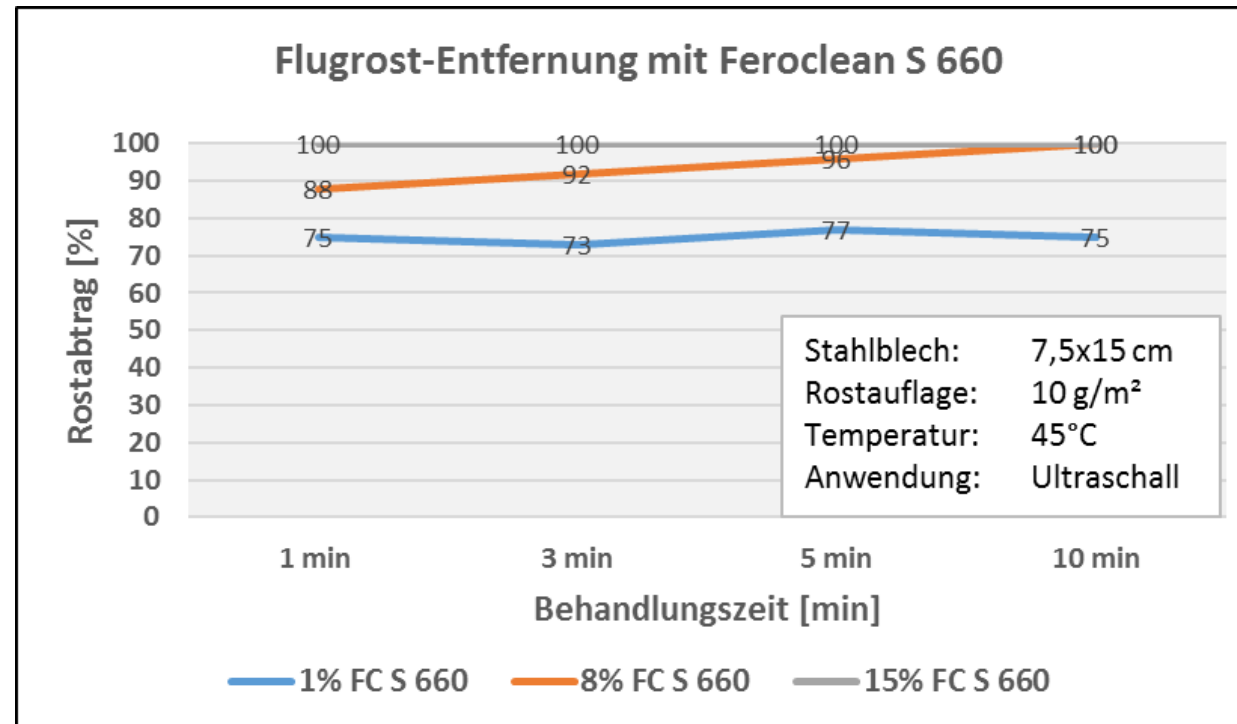
# Concentration vs. Conductivity



Conductivity of FEROCLEAN S 660 in Hildesheim city water (3,5°dH)



# Derusting effect vs. Concentration/Time



Rust removal with FEROCLEAN S 660 for various concentrations and times at 45°C



# Bath Control

- Bath control is accomplished via conductivity (+ pH adjustment)
- Bath lifetime and dump frequency determined by Fe content
- Determination of the Fe content via
  - Instrumental analysis (AAS or ICP)
- Neutral derusting bath must be renewed when the Fe content exceeds approx. 300 ppm per percent point of FEROCLEAN S 660 (approximate value; must be verified with bath samples and may vary for different applications)

## Remark

- Bath control via conductivity applicable for all applications where contamination of the neutral derusting agent with electrolytes does not take place. Not applicable after ECM processes without / with intermediate rinsing step.



# Application Example

- A lot of motor- and gear parts for the automotive industry are produced externally
- Requirements regarding technical cleanliness most times allow only amine based corrosion protection
- If delays or displacements in the supply chain happen, parts frequently start to rust
- The manual derusting is often time- and cost intensive and could direct to surface damages
- Since the development of FEROCLEAN S 660, this product is used more and more for these applications



# Thank You for Your attention

Petrofer Chemie H.R. Fischer GmbH + Co. KG  
Dr. Florian Treptow, Ph.D., Dipl.- Ing. (FH) Chemie  
Römerring 12-16  
Germany, 31137 Hildesheim  
Phone +49 5121 7627 371