



# **CLEANING PRIOR TO FINISHING & POLLUTION PREVENTION**

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- A properly cleaned and prepared surface will make a marginal coating work much easier than if a poorly cleaned and prepared surface was to be followed by an excellent final coating.



## TYPES OF CLEANERS

- Acid based cleaners
- Alkaline based cleaners – electro cleaners
- Neutral cleaners
- Vapor degreasers, ultrasonic, biological



# CLEANERS

- Acid cleaners
  - Cleaner for build up of iron, scale, calcium deposits, rust
- Alkaline cleaners
  - Oils, greases, rust preventatives
- Neutral cleaners
  - Oils, greases, rust preventatives



# ALKALINE CLEANER MAKE UP

- What do they do?
  - Base – NaOH, KOH, silicate phosphate
  - Surfactant – many to consider
  - Sequestrant – gluconate, EDTA, NTA
  - Rust Preventative – silicate, other blends
  - Couplers



## FORMULATION ASSEMBLED

- Caustic Soda – alkalinity
- Caustic Potash – alkalinity
- Sodium Silicate – corrosion protection, detergency
- Sodium Gluconate – sequester soils, condition water
- N.Mol Surfactant – oil emulsifier
- Butyl Cellosolve or other solvents



## WHAT GOES WRONG?

- Plating blames cleaning
- Cleaning blames plating
- Purchasing blames the substrate supplier
- Substrate supplier blames the rust preventative supplier



# FUNDAMENTALS OF CLEANING

- Are these compromised?
  - Time
  - Temperature
  - Agitation
  - Concentration
  - Proper Current (electro cleaners)





## CLEANER BREAKDOWN PROBLEMS

- What goes wrong?
  - Base – loss of alkalinity
  - Surfactant – loss of ability to emulsify oil, reduce surface tension
  - Sequestrant – chelant is spent



## IS THE CLEANER STILL GOOD?

- Alkalinity free/total
  - Free ÷ Total – Rule of Thumb: 2.5 to 3.0 is dump time
- Soil split out
  - Track amount of oil separating to surface
    - 90 ml cleaner 10 ml sulfuric acid
    - Have control of fresh cleaner to determine false positives
    - Put cleaner in beaker and stir first before putting it in graduated cylinder
    - Failure rule of thumb: 8 ml



## IS THE CLEANER STILL GOOD?

- Make up of cleaner
  - Once you have added back the pounds/gallons of what it took to make fresh cleaner – it's time to dump...
- Conductivity of bath
  - Increase in conductivity means more contaminants



# RINSE

- You are only as clean as your final rinse
  - Temperature of rinse
  - Ability of rinse to shed water, residual cleaner, residual soils
  - Do you need to add conditioner in rinse stage?



## CLEANING VERIFICATION

- Particle counting
- Surface tension measurement
- Contact angle measurement
- Tape test for adhesion



# WATER USE IN INDUSTRY

- Minimize solution drag out
  - Plating solutions
  - Post plating seals
  - Cleaners



## WATER USE IN INDUSTRY

- New engineered plating barrels needed
- Rack configuration
- Racking of parts
- Air knives



## WATER USE IN INDUSTRY

- Maximize time over the process tank
- Use drip shields





## WATER USE IN INDUSTRY

- Rinse tank design
  - Water should enter through pipe six inches from bottom
  - Agitation is very important



## WATER USE IN INDUSTRY

- Air agitation is easy – dead zones occur
- Recirculation pump – lot of energy
- Prop mixers – lot of energy
- Eductors – a combination of recirculating pump and a manifold of eductors



## WATER USE IN INDUSTRY

- Counter flow rinsing
- Stagnant tank rinsing



## WATER USE IN INDUSTRY

- Conductivity control meters
  - Establish maximum level
  - Signal pump to add water
  - Can be automated or manual



## WATER USE IN INDUSTRY

- Spray rinses use less water than emersion rinses



# QUESTIONS?

