Reduce Downtime, Cut Costs in Aqueous Surface Prep Lines

We will begin soon…

product quality cleaning workshops

7/15/2020
PQCWebinar with Hubbard-Hall
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"Reduce Downtime, Cut Costs in Aqueous Surface Prep Lines"

product quality cleaning workshops

Ask your questions using the **Q&A** button

Q&A

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Reduce Downtime, Cut Costs in Aqueous Surface Prep Lines
Featuring Hubbard Hall

product quality cleaning workshops

The PQCW offers practical, hands-on and independent, training in cleaning.

More Info
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Mike Valenti
Hubbard-Hall
mvalenti@hubbardhall.com

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Webinar Hosts
The PQCW Team

Barbara and Ed Kanegsberg – "The Cleaning Lady and the Rocket Scientist"
- BFK Solutions - Consultants in Critical Cleaning
- Authors and Editors of the two-volume CRC Handbook for Critical Cleaning
- Independent evaluations and recommendations
- Co-chairs of the Product Quality Cleaning Workshops
- barbara@bfksolutions.com and ed@bfksolutions.com

Darren Williams – "The Professor"
- Professor of Physical Chemistry at Sam Houston State University
- Leader of the Cleaning Research Group
- Co-chair of the Product Quality Cleaning Workshops
- Performs cleaning trials and formulates cleaning chemistries
- williams@shsu.edu

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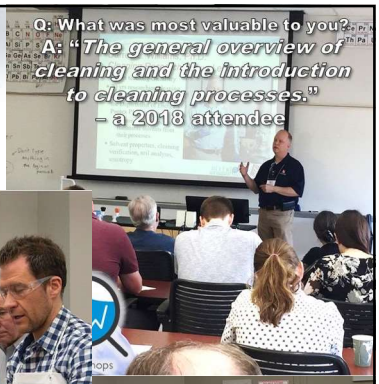
Product Quality Cleaning Workshops

- Workshops
- Webinars
- Resources for more effective cleaning processes
- More information
  - shsu.edu/pqcw
  - bfksolutions.com/manufacturing-minds-pqcw/



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Our Speaker

Mike Valenti – Product Manager - Cleaners

- A graduate of the University of Georgia
- 25 years of experience in specialty chemical development and product management
- Involved in the development and sales of specialty chemicals, detergents and cleaners, and metal finishing products.
- First with Milliken Chemical, and then with Hubbard-Hall, his experience has included recommending cleaners – both aqueous and solvent cleaning processes – non-ferrous surface preparation, equipment, and testing protocols for a wide range of the requirements for critical metal finishing operations.

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What if you could reclaim 95% of your production line cleaner?
Advances in Aqueous Cleaner Process Remediation
Presented by: Mike Valenti
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Chemistry & Expertise for Manufacturing's Toughest Problems.
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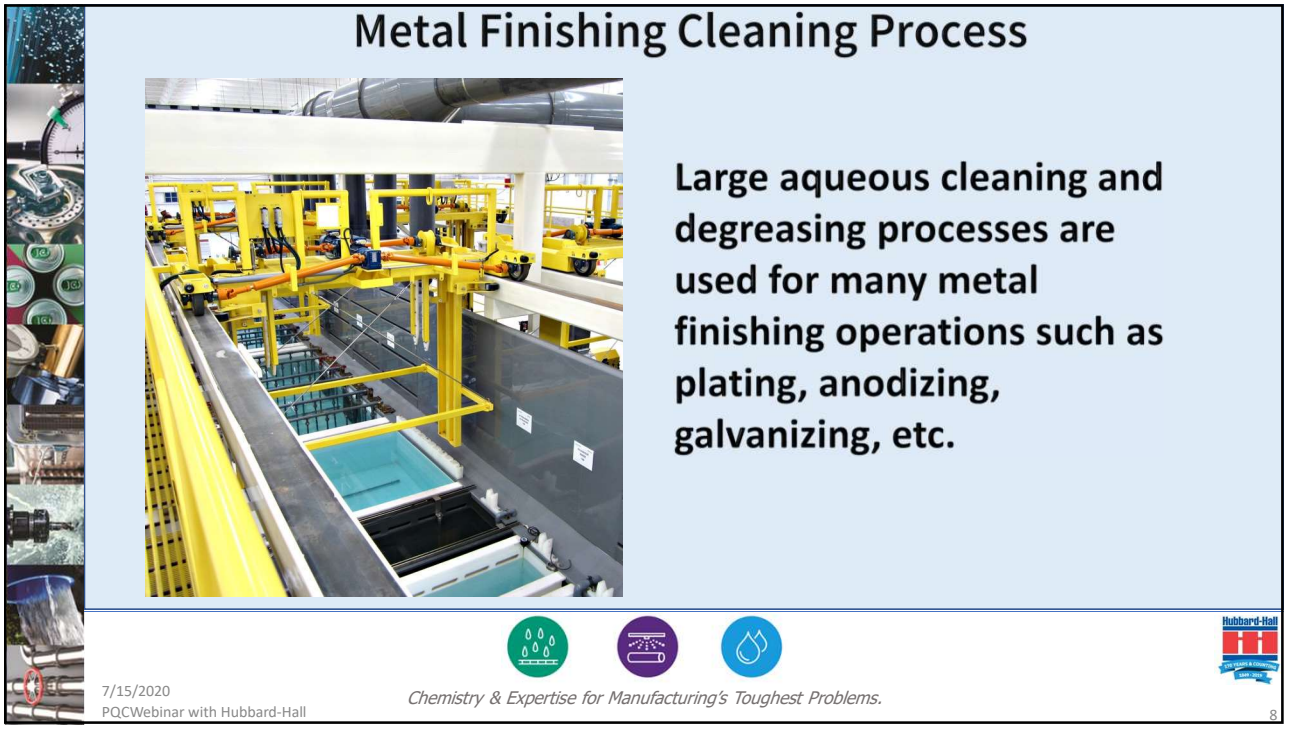
Metal Finishing Cleaning Process
Large aqueous cleaning and degreasing processes are used for many metal finishing operations such as plating, anodizing, galvanizing, etc.
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Aqueous Cleaning Processes
The #1 Problem
THE DIRTY BATH!
All oils, lubes, greases and other soils removed will contaminate the bath
Results in.....
1. Waste – includes higher water usage
2. Increased cost
3. Poor quality
4. Reduced Productivity
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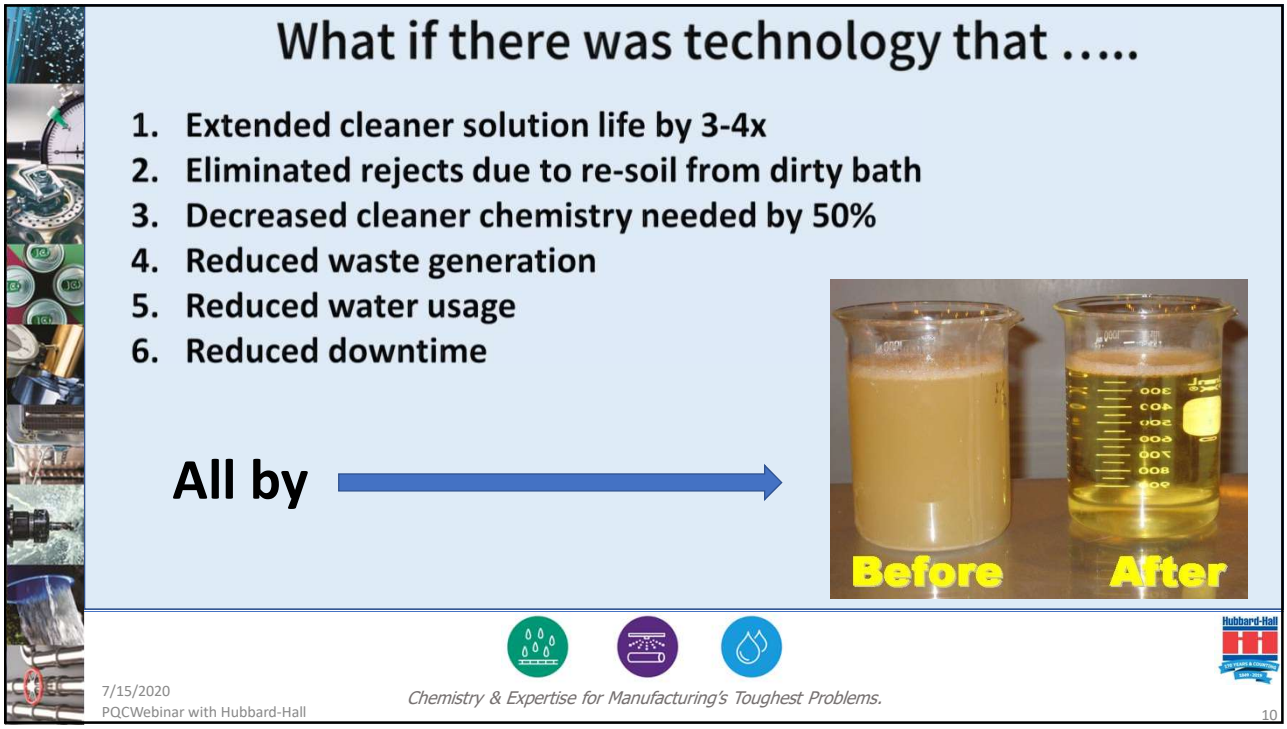
What if there was technology that .....
1. Extended cleaner solution life by 3-4x
2. Eliminated rejects due to re-soil from dirty bath
3. Decreased cleaner chemistry needed by 50%
4. Reduced waste generation
5. Reduced water usage
6. Reduced downtime
All by
Before
After
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Session Topics

1. Aqueous Cleaning Fundamentals
2. Traditional Aqueous Process Challenges
3. Traditional Aqueous Cleaner Remediation Methods
4. Advances in Aqueous Cleaner Remediation
5. Industry Example
6. Q&A

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Aqueous Cleaning Fundamentals - Soils

Soils are the materials left on the metal's surface from the previous operation(s) or the surface condition of incoming metal stock. Soils can be **organic** or inorganic in nature

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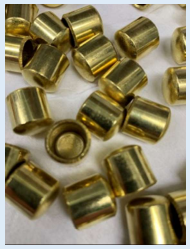
Aqueous Cleaning Fundamentals – Organic Soils

- Drawing compounds
- Machining oils
- Stamping oils
- Spinning lubricants
- Fingerprints
- Buffing compounds
- Polishing compounds
- Corrosion-preventive compounds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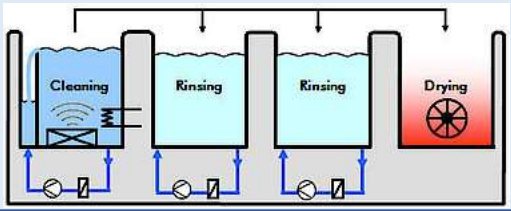
Aqueous Cleaning Fundamentals – Immersion Cleaning

Immersion (Rack or Barrel)

Rack immersion, may utilize air agitation or work agitation to improve or shorten the cleaning time.

In barrel lines, the movement of the barrel will provide the necessary agitation to flush cleaner solution through the parts.



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Aqueous Cleaning Fundamentals – Impingement Cleaning

Power, Spray Cleaning

Spray washers (spiral spray, belt washer, spray strip line, cabinet, and monorail-type washer) provide reduced cleaning time by utilizing impingement to clean parts that may not respond to conventional soak cleaning.

Spray pressures may range from 14-200 psi, depending upon the type of machine used. Some continuous strip spray washers may also utilize rotating brushes along with the spray cleaning solution.

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Aqueous Cleaning Fundamentals – Cleaning Mechanisms

Solubilization - Cleaning method in which surface contaminants become soluble in the cleaning solution. Examples are the dissolution of iron oxide in acids or acrylic coatings in alkaline aqueous solutions.

Emulsification - Process by which a normally insoluble soil becomes uniformly dispersed in an incompatible solvent. The most common emulsion encountered by people is milk, in which insoluble fats and proteins are dispersed in water. Emulsification is accomplished by a combination of proper **surfactants**, co-solvents, and **coupling agents**.

Saponification - Reaction of oils containing reactive fatty acids with alkali to yield soluble soaps. An example of this mechanism would be the cleaning of a lard oil lubricant from stamped steel by the use of an aqueous cleaning solution containing significant amounts of sodium or potassium hydroxide.

Wetting - Method by which a soil is displaced from the substrate surface by the use of wetting agents that have a greater affinity for the substrate surface than for the soils present. The wetting agent can work by having the same action on the soil particles present. In both cases, the attraction between soil and substrate surface is eliminated and soils are removed.

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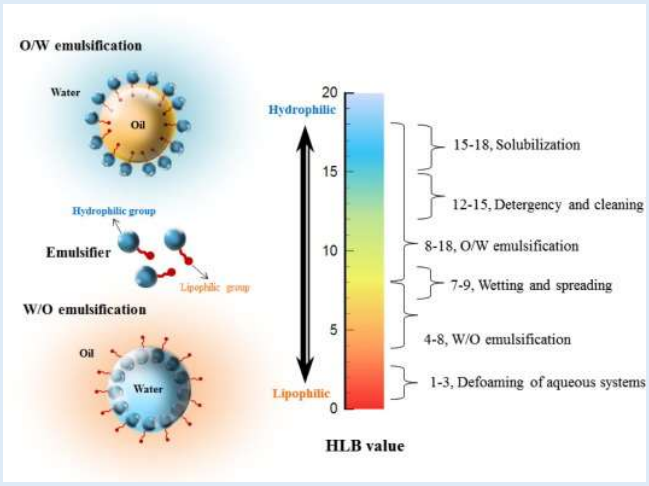
Aqueous Cleaning Fundamentals – Emulsification



Emulsification analysis of bio-oil and diesel under various combinations of emulsifiers; Applied Energy Volume 178, 15 September 2016, Pages 746-757

Emulsification is a mechanical process

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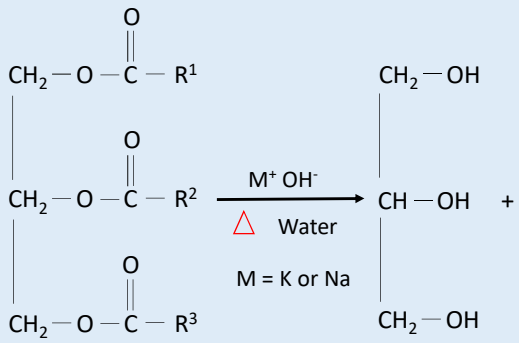
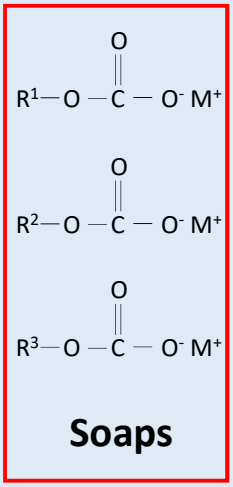
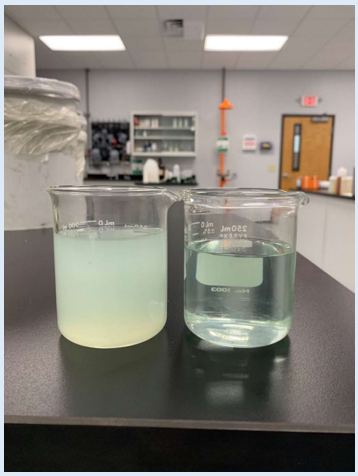
Aqueous Cleaning Fundamentals – Saponification



Fats **Glycerol**



Soaps



Saponification is a chemical reaction

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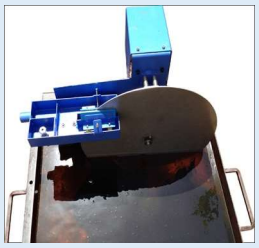
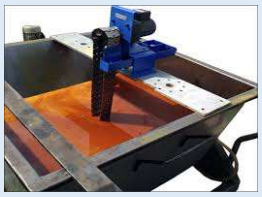
Bath Remediation – How do we remove these soils?
Non Emulsifying Cleaners – Oil Splitters

Oil Separation Tank

Oil Coalescer



Oil Skimmers



Use various mechanical methods to remove oils from the surface

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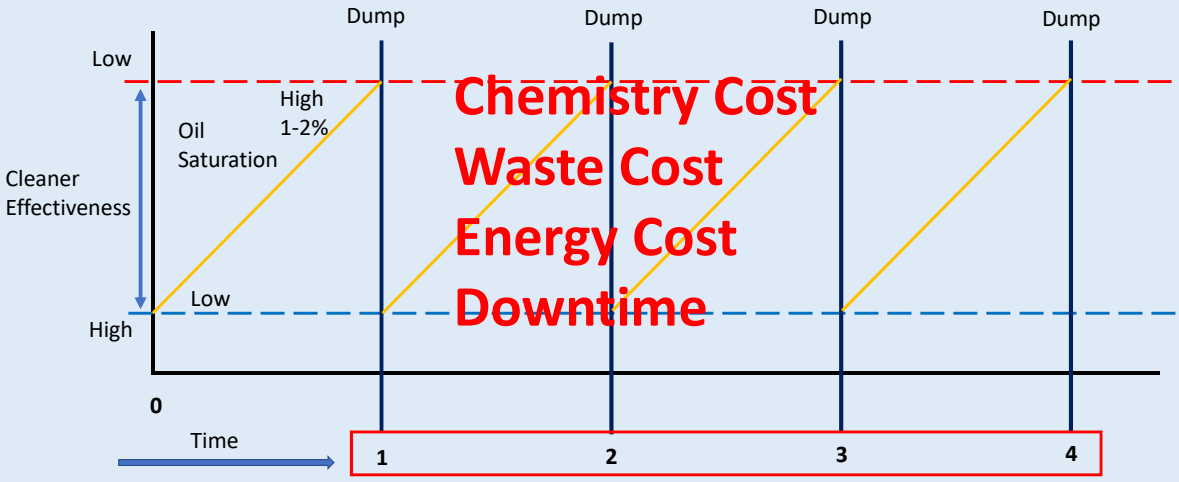
Bath Remediation – How do we remove these soils?
Emulsifying Cleaners – Replace(Dump) the Bath



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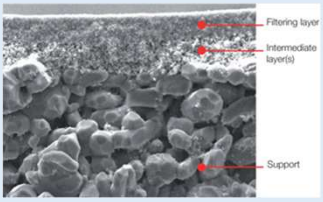
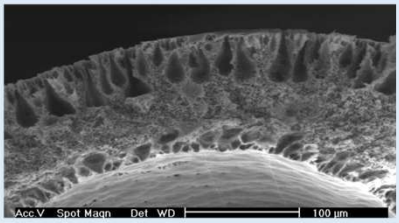
Bath Remediation – How do we remove these soils?
Emulsifying Cleaners – Filtration

Ceramics (C)



Polymerics (P)



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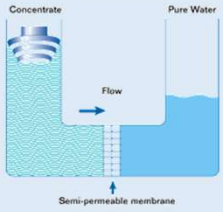
Bath Remediation – How do we remove these soils?
Emulsifying Cleaners – Membrane Filtration

Ultrafiltration
Reverse Osmosis

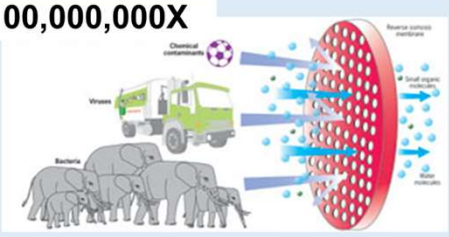
Works via Molecular Weight Rejection

Strips Surfactants



A.K.A.
"RO"

Magnified 100,000,000X



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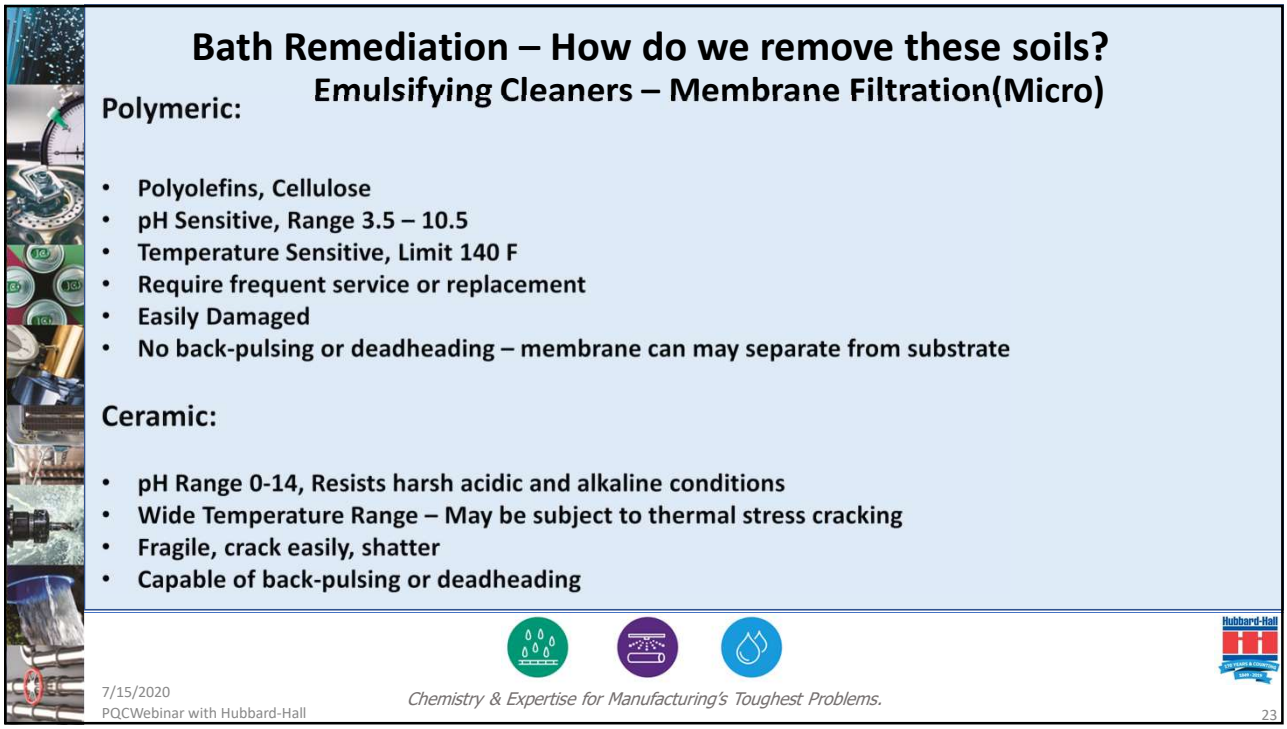
Bath Remediation – How do we remove these soils?
Emulsifying Cleaners – Membrane Filtration(Micro)
Polymeric:
• Polyolefins, Cellulose
• pH Sensitive, Range 3.5 – 10.5
• Temperature Sensitive, Limit 140 F
• Require frequent service or replacement
• Easily Damaged
• No back-pulsing or deadheading – membrane can may separate from substrate
Ceramic:
• pH Range 0-14, Resists harsh acidic and alkaline conditions
• Wide Temperature Range – May be subject to thermal stress cracking
• Fragile, crack easily, shatter
• Capable of back-pulsing or deadheading
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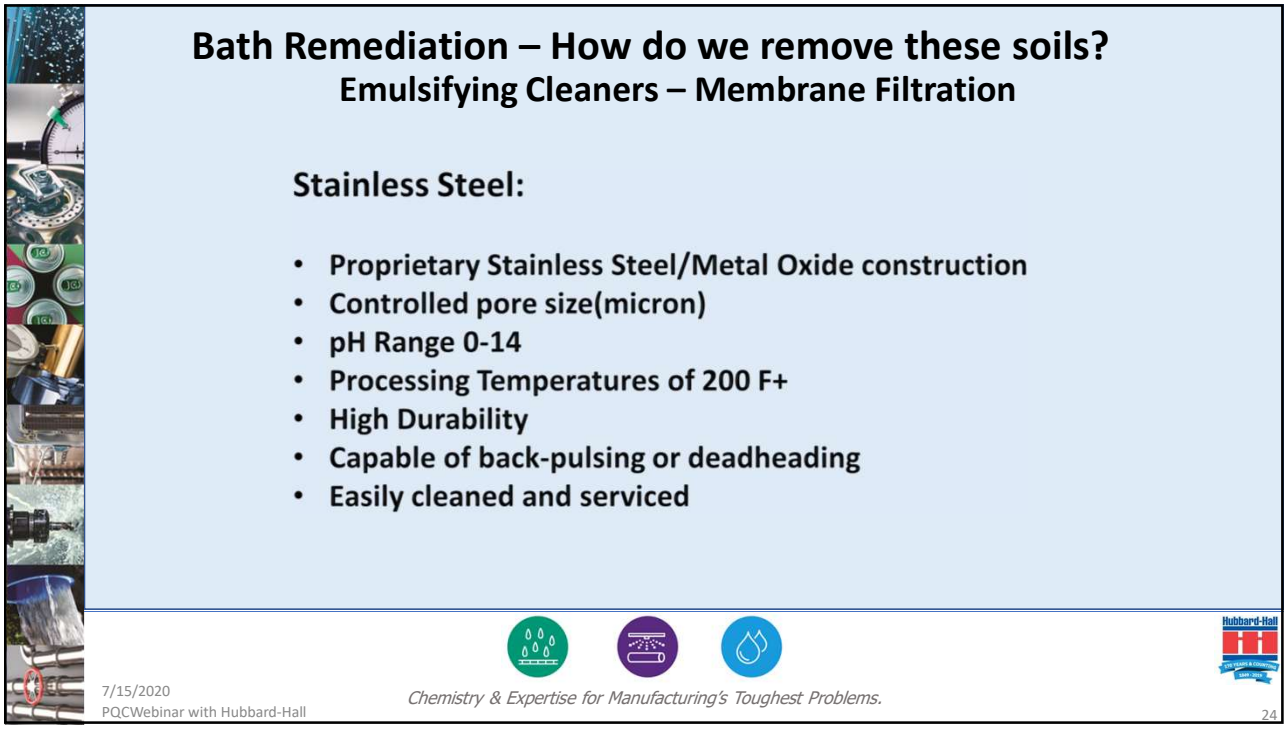
Bath Remediation – How do we remove these soils?
Emulsifying Cleaners – Membrane Filtration
Stainless Steel:
• Proprietary Stainless Steel/Metal Oxide construction
• Controlled pore size(micron)
• pH Range 0-14
• Processing Temperatures of 200 F+
• High Durability
• Capable of back-pulsing or deadheading
• Easily cleaned and serviced
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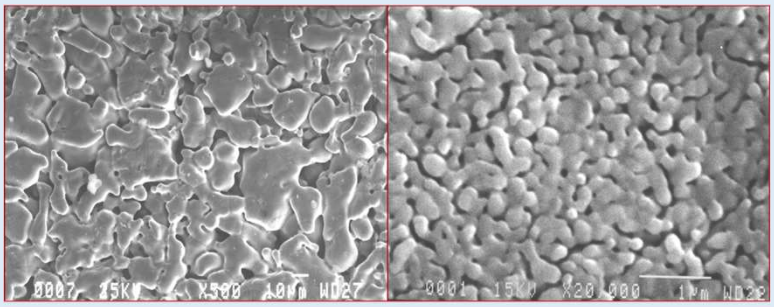
Stainless Steel/Metal Oxide Membranes



316L SS Substrate (500X) | Metal Oxide Membrane (20,000X)

(…abbreviation = MOM)

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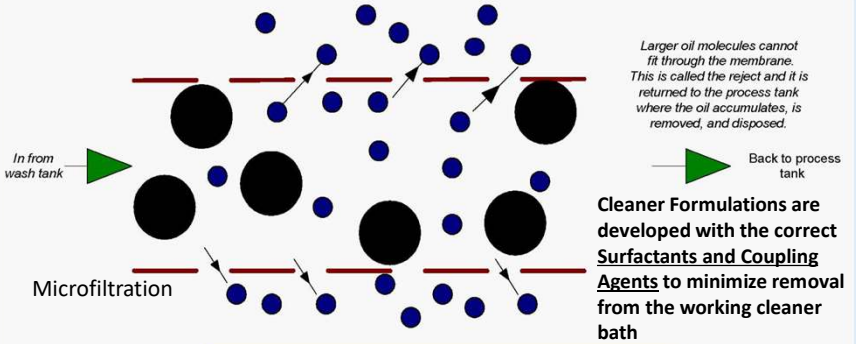
How Does It Work?



Cleaner Formulations are developed with the correct Surfactants and Coupling Agents to minimize removal from the working cleaner bath

Surfactant and Coupler Selection Is Critical

1. HLB Value
2. Cloud Point
3. Charge
4. Hydrophobe
5. Hydrophile
6. Micelle Formation

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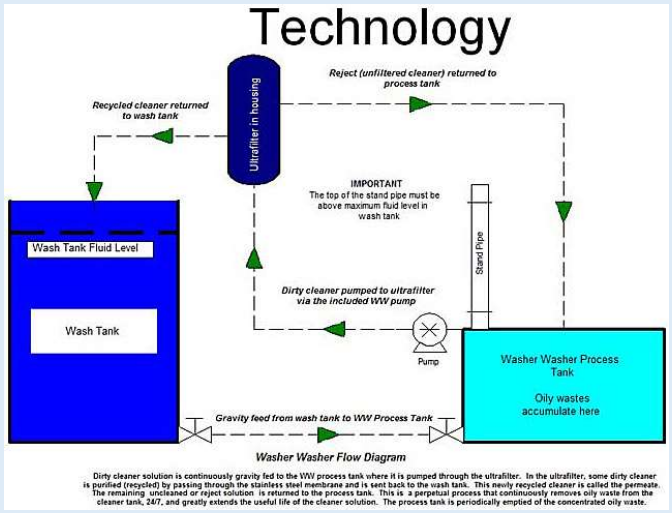
How Does It Work?



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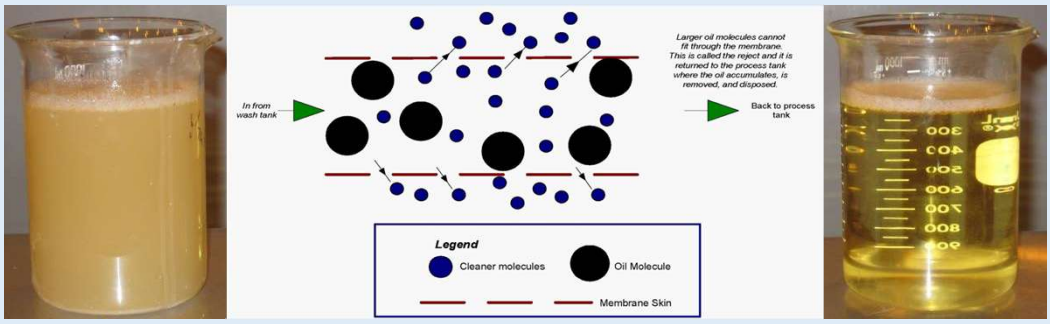
What Are The Results?



Before **After**

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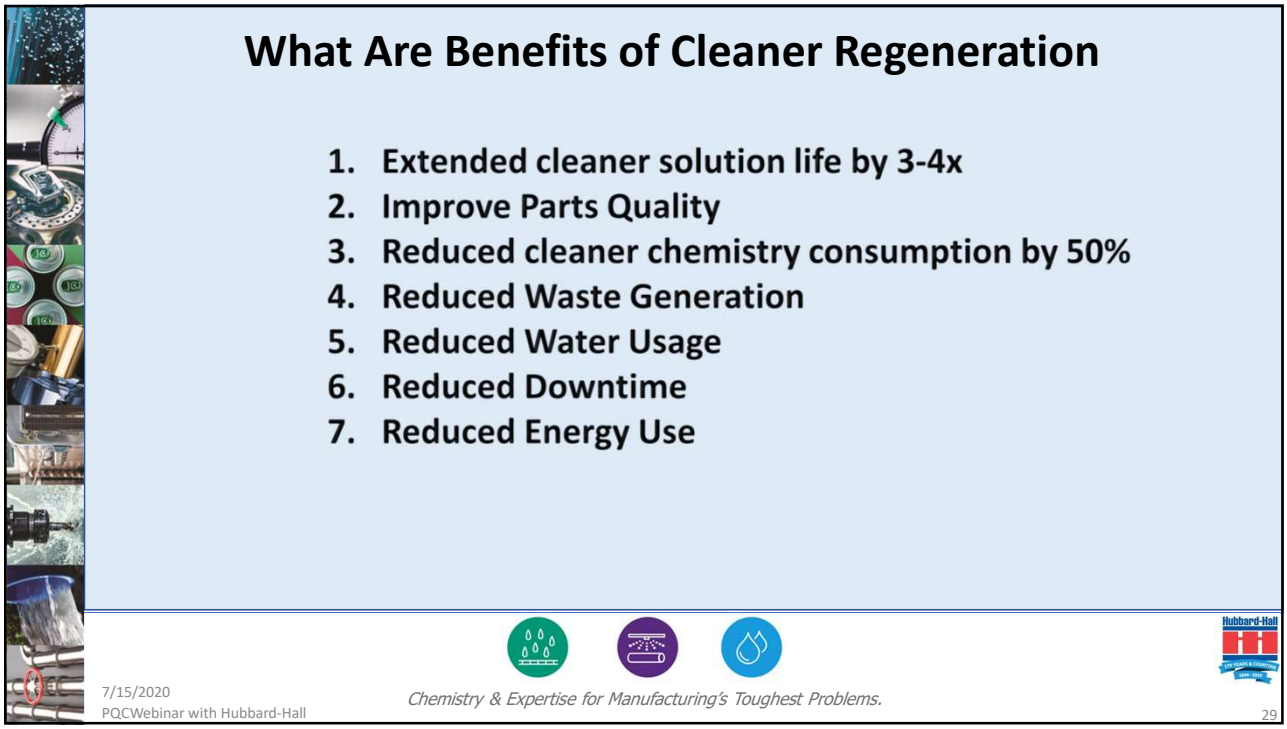
What Are Benefits of Cleaner Regeneration
1. Extended cleaner solution life by 3-4x
2. Improve Parts Quality
3. Reduced cleaner chemistry consumption by 50%
4. Reduced Waste Generation
5. Reduced Water Usage
6. Reduced Downtime
7. Reduced Energy Use
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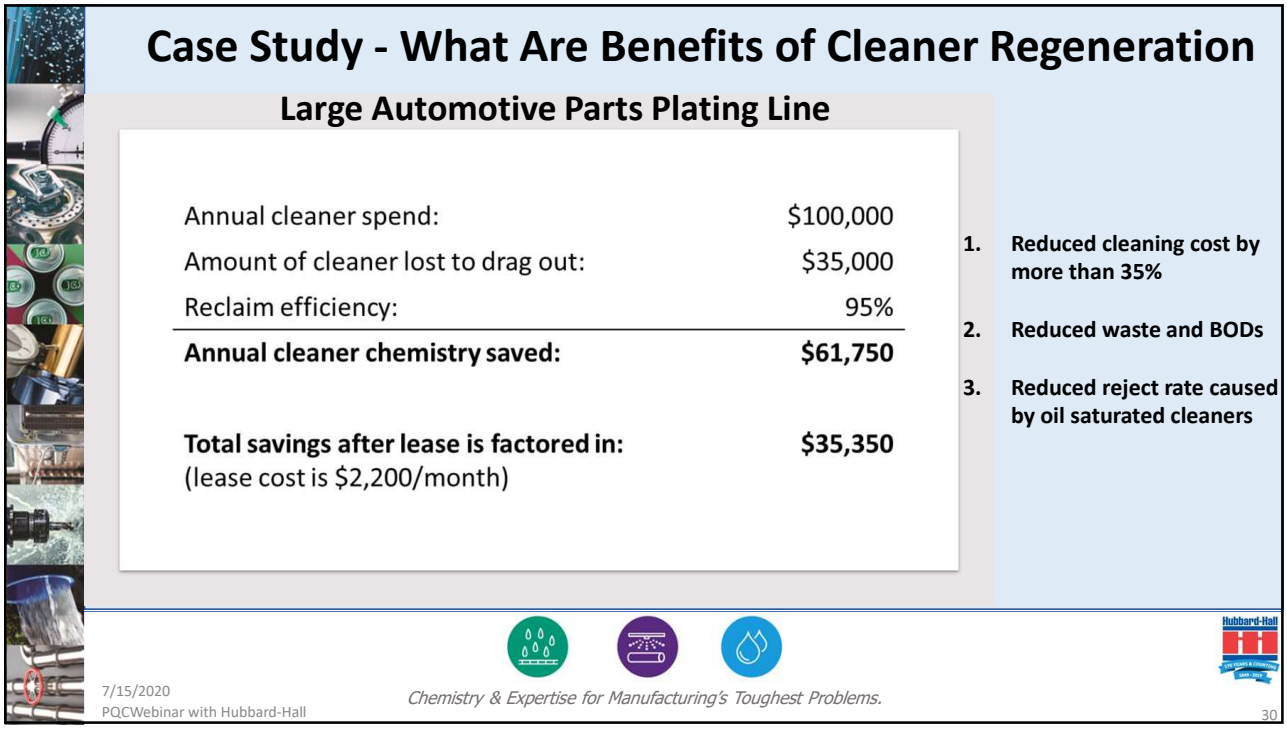
Case Study - What Are Benefits of Cleaner Regeneration
Large Automotive Parts Plating Line
Annual cleaner spend: $100,000
Amount of cleaner lost to drag out: $35,000
Reclaim efficiency: 95%
Annual cleaner chemistry saved: $61,750
Total savings after lease is factored in: $35,350
(lease cost is $2,200/month)
1. Reduced cleaning cost by more than 35%
2. Reduced waste and BODs
3. Reduced reject rate caused by oil saturated cleaners
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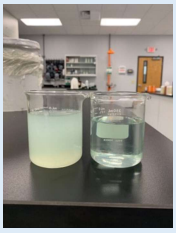
Case Study – What are the Limitations?

Example – Large Continuous Spray Washer



1. Part Dimension(deep draw) – Cleaner drag-out can exceed recycle capacity
2. Smaller tanks in spray washers turn over faster, negate cleaner savings
3. High Line Speeds – Large amounts of lube introduced can exceed ability to remove
4. Saponified stearate lubes are easily removed but can reduce membrane efficiency

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What Are Steps To Implement

1. Bench test: The Hubbard-Hall lab confirms the ability to separate your process oil from Aquaease Infinity cleaner.

2. Demo Unit: We deliver a demo unit and calibrate the process to optimize cleaner, unit efficiency, and membrane porosity.

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Thank You!
Questions?
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Product Manager – Cleaners
Hubbard Hall Inc.
Desk: 800-442-5573, Ext. 2238
Cell: 864-310-0698
Email: mvalenti@hubbardhall.com
https://www.hubbardhall.com/applications/surface-cleaning/aquaease-infinity/
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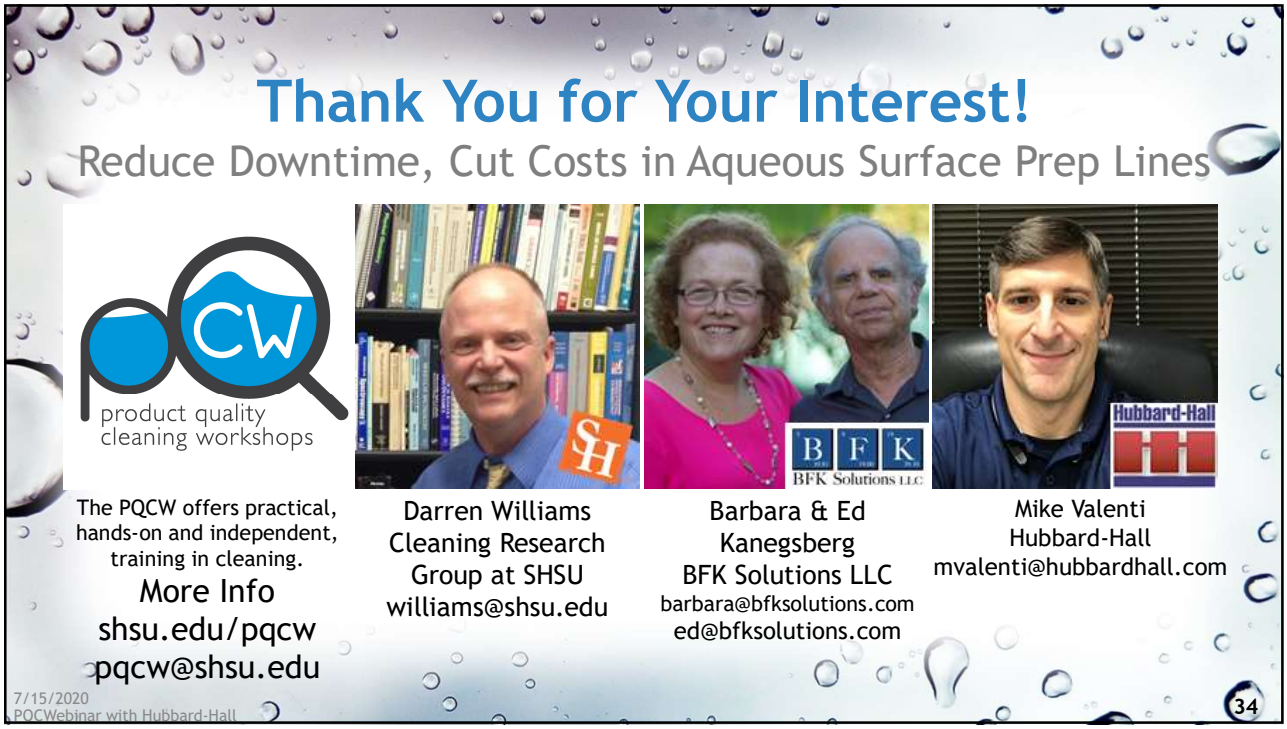
Thank You for Your Interest!
Reduce Downtime, Cut Costs in Aqueous Surface Prep Lines
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The PQCW offers practical, hands-on and independent, training in cleaning.
More Info
shsu.edu/pqcw
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Mike Valenti
Hubbard-Hall
mvalenti@hubbardhall.com
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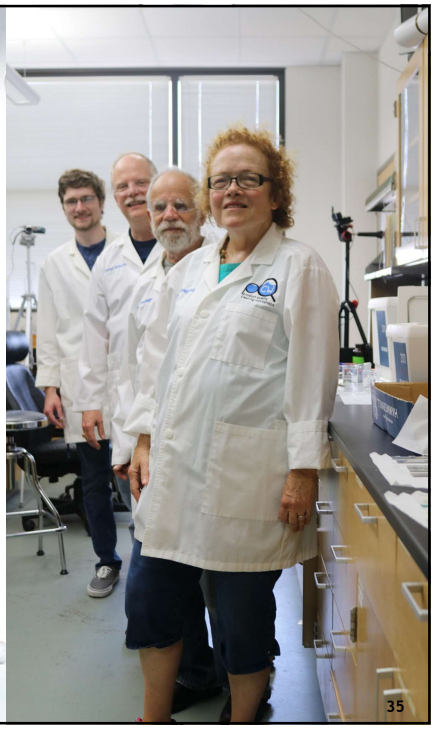
COME TO THE PQCW

- **When?** To Be Announced
- **Where?** Sam Houston St. Univ., Huntsville TX
- **More Info?** Visit http://shsu.edu/pqcw



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Have a great rest of your day

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