



Cleaning Ferrous and Aluminum Products and Controlling Aqueous Process Baths

with Northern Technologies International Corporation (NTIC)



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Hosts: The Product Quality Cleaning Workshop 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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Our Speakers



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Tom White - Marketing Manager

- Marketing degree from St. Cloud State University
- Broad experience in technical marketing in the cleaning industry
- Well versed in the benefits of merging corrosion inhibition within a cleaning process.



ZERUST EXCOR

Joseph Beckley - Senior Formulations Chemist

- Chemistry degree from Indiana University Bloomington
- Over 20 years experience in formulations in metal finishing
 - metal cleaners, rust inhibitors, rust removal, pretreatment
 - aluminum brazing and powder coating processes
- Over 15 years of field support experience

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Cleaning Ferrous and Aluminum Products - Controlling Aqueous Process Baths

Presented by: Joseph Beckley & Tom White

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Introduction



For nearly 50 years, ZERUST® has been a leader in VCI by delivering safe and effective corrosion solutions across the globe.

ZERUST® offers a wide range of products and solutions to solve corrosion issues:

- VCI Packaging Films (Rolls, Sheeting, & Bags)
- VCI Kraft Packaging Paper (Rolls & Sheeting)
- VCI Emitters & Diffusers
- Rust Inhibitors, Preventatives and Coatings (Oil, Solvent, and Water-based)
- Industrial Rust Removers

The ZERUST® Approach

- We identify and resolve corrosion causes in processes.
- We eliminate unnecessary customer packaging and materials handling processes.
- We design optimal customer corrosion-inhibiting solutions.
- Lastly, we provide point-to-point customer service in over 70 countries.



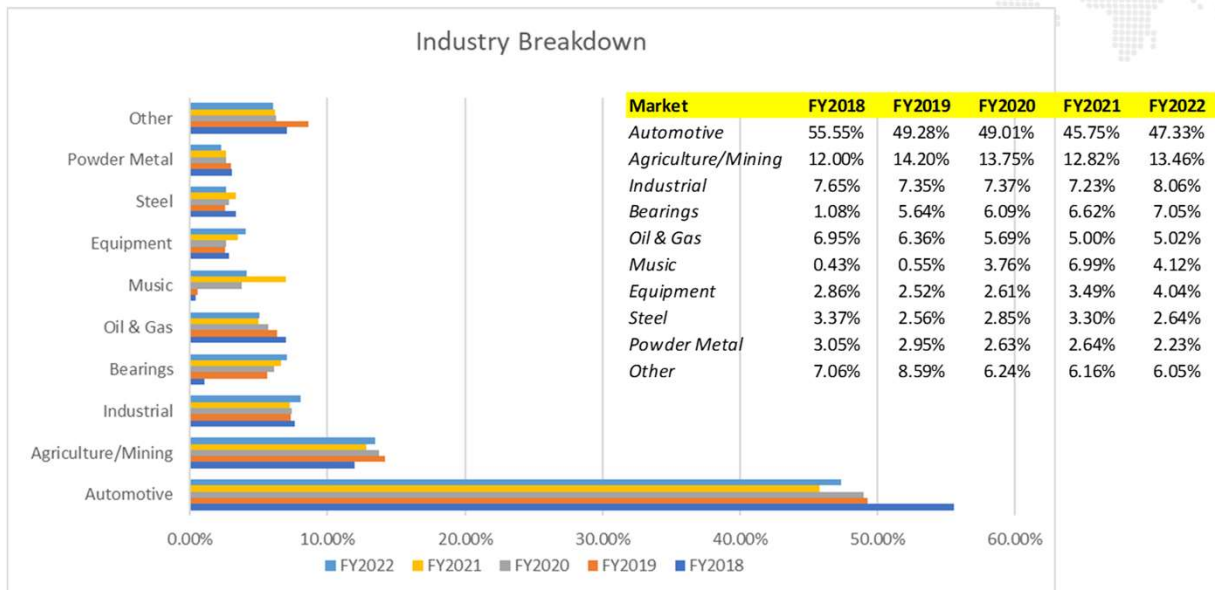
During our process audits we typically found that improper wash systems and wash chemistries were leading to corrosion issues. Which lead to us introducing our AxxaWash™ Industrial Cleaners & Degreasers product line.

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Markets



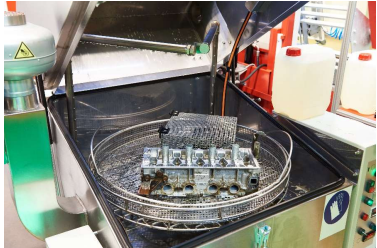


Industry Breakdown



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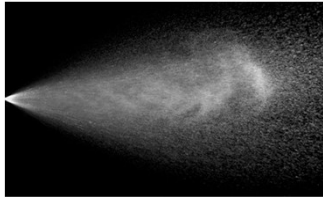


Matching Equipment, Substrates and Chemistry



- Cleaner selection is based upon many inputs

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Equipment



- Water Quality
- Tank
- Nozzles
- Filters
- Heating Elements/Burner Tubes
- Water and chemical feed systems


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Equipment – Water Quality

- Purified water preferred
 - DI, RO, Softened water
 - Longer Bath life
 - Less maintenance issues
- Scale build-up
 - Heating element/Burner Tubes
- Corrosion Issues


40.078 20
4s²
Ca
Melting point: 839°C
Boiling point: 1487°C
CALCIUM



24.3050 12
3s²
Mg
Melting point: 648.8°C
Boiling point: 1107°C
MAGNESIUM



017
Cl
CHLORINE
35.45



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Equipment – Tank Cleanliness

- Hard water deposits
- Scale build up on burner tubes or heating elements
- Metal chips and fines
- Oil and grease residue
- Oil skimmer









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Equipment - Nozzles

- Nozzles should be in good working order
- Not Clogged
- Aligned properly



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Equipment – System Filters

- Filters should be sized properly
- Frequency of filter changes
- Clogged nozzle/Reduced pressure



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Equipment – Chemical and Water Feed Systems

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- Chemical feed pumps properly primed
- Chemical drums/Totes not empty
- Float Valves stuck open or closed
 - Dilution of product
 - Tank empties, pump cavitation
- SMALL ISSUES = BIG IMPACT!

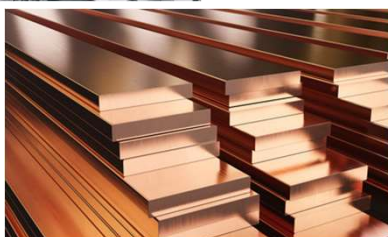


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Substrates and Soils

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- Aluminum
- Steel
- Copper
- Brass
- Mixed Metals



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Substrates and Soils

- Water Soluble lubricant
- Oils
- Metal chips/fines
- Greases/Waxy paraffin
- Laser/Welding scale & slag, metal oxides



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Matching Equipment, Substrates and Soils

- Matching equipment, substrates, soils and cleaner chemistry is important
- The wrong chemical cleaner can
 - Cause excessive foaming
 - Damage parts
 - Cause galvanic corrosion
 - Damage the washer system



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Matching Equipment, Substrates and Soils



- Aluminum = susceptible to attack from alkaline cleaners
- Weld/laser scale, metal oxides generally require acidic chemistry...increase flash corrosion potential
- Waxy Paraffin = high temperatures & high alkalinity
- Hard Water = chelating chemistry, acid burnouts, increased cleanout costs

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Testing Baths – Brix, Conductivity & Titrations



- Brix, Conductivity, and Titrations the most commonly used field techniques
- No method is perfect, but some better than others
- The simplest methods may lead cleaning and/or corrosion issues

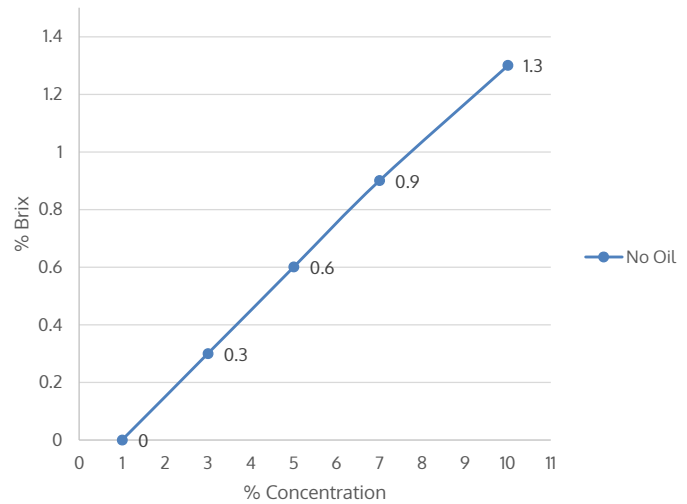
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Brix

- Brix measures refractive index (light bending) and turns the number into percent solid value
- Temperature Dependent (68°F to 104°F shows a 34% increase in Brix)
- Incoming lubricants typically have much higher brix readings than cleaners



Brix Calibration Curve



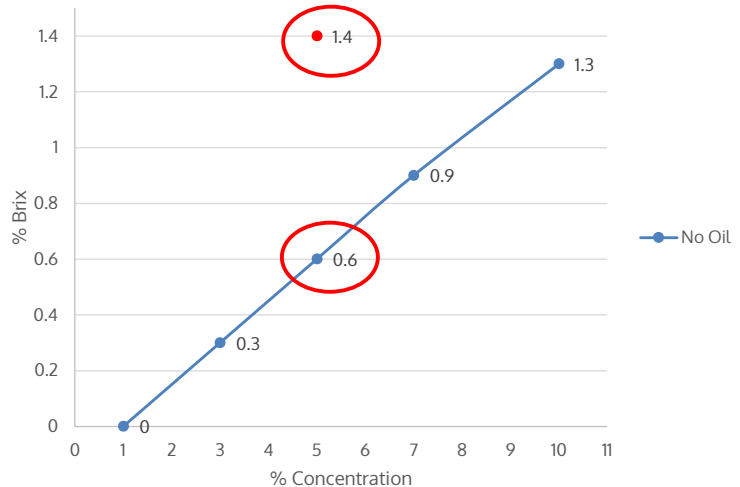
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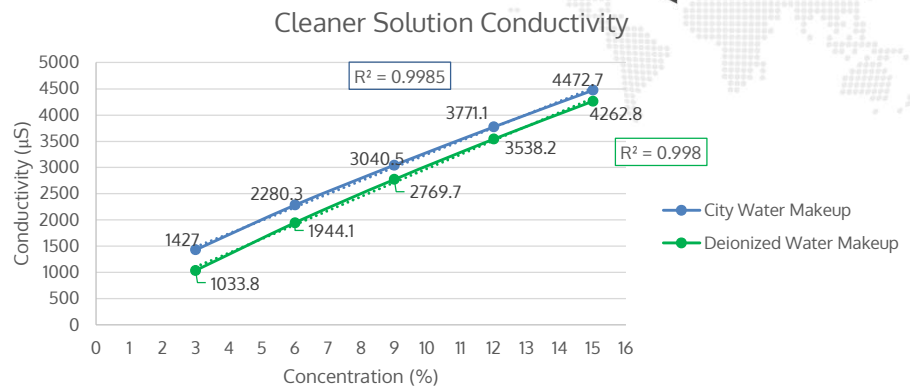
Brix influence of adding 1% Honing oil to 5% cleaner bath



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Conductivity

- Conductivity measures a solutions ability to conduct electricity
- Temperature Dependent (77°F to 122°F shows a 83% increase in Conductivity)
- Water quality can greatly impact conductivity readings
- Lubricant contamination can impact conductivity without significantly changing cleaner concentrations



Oil Addition/Loading (by volume)	Conductivity (µS)	Concentration (Titration)
0%	9600	10.3%
5%	9400	10.3%
10%	8700	10.2%

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Titrations

- Measures at least active component of the cleaner
 - Most common method
- Typically, a simple acid-base color-based titration
- Chemical is added to the sample until a color change or certain pH value is reached



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Information Gathering

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- Does your supplier just supply you a product or do they help find the best solution?
- When working with a supplier, are they asking you the right questions?
 - What metals go through the process?
 - What is being cleaned?
 - What are your cleaning specifications?
 - What is banned or restricted in your facility?
 - How many stages is your system?

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Information Gathering

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- Customers and Suppliers should work together to gather the information to find the right solution.
 - Site Surveys
 - What metals are cleaned?
 - What finishes are required?
 - What are your cleaning specifications?
 - Is end product being cleaned?
 - What are your cleaning specifications?



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sting supplier

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Do you have support?

- When you have issues:
 - Do you know who to call?
 - Do you know the name of the technical service rep?
 - Do they come to your facility to help solve problems?
 - Are you a sales account or technical account?
 - Do you have partnership with your suppliers?
- Your problems are our problems, and we will work together to solve them



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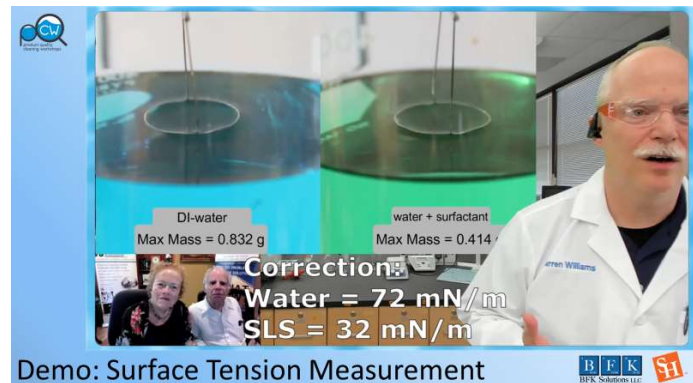


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PQCW - Workshops for Terrific Products

- “While I would prefer to have been at in-person laboratories so I could have hands-on experiences with cleaning processes, I really liked the two-week virtual PQCW.”
- “People with different functions within our company, including Strategic Sourcing, Project Management, and Manufacturing Engineering, attended.”
- “We learned a lot; and we have made changes. We are refining our own cleaning requirements and putting together training programs.”
- “For example, we used the workshop to develop black light testing and fixtures; and we have already set up a one-hour “Parts Washing 101” training course.”
- “The section about EPA amended TSCA had useful, timely information.”
- Christian Johnson, Engineer, Yaskawa, participant, PQCW21




Demo: Surface Tension Measurement

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PQCW On-Demand Workshop on Aqueous Cleaning



- Half day on-line program
- Includes 30 minutes individualized live consulting with a PQCW Instructor
- Convenient training modules
- Continuing education credit / certificate
- The Product Quality Cleaning Workshop Team
 - Barbara Kanegsberg, BFK Solutions
 - Ed Kanegsberg, PhD, BFK Solutions
 - Professor Darren Williams, Sam Houston State U.

Go to www.shsu.edu/pqcw
to sign up for the course!

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Thank you for attending

We welcome your questions



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