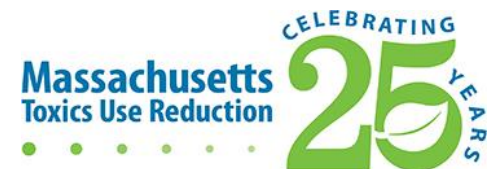




Making the Switch to Aqueous Cleaning:

Identifying, Performance Testing, Implementation

Alicia McCarthy
Session C
CE Conference Fall 2019



TURA Structure: Implementing Agencies



Massachusetts Department of Environmental Protection (MassDEP): planner certification, filings, enforcement, data analysis



Massachusetts Office of Technical Assistance and Technology (OTA): On-site, confidential technical assistance



Massachusetts Toxics Use Reduction Institute (TURI): Training, Grants, Research, Alternatives Assessment, Policy Analysis, Technical Support, Laboratory, Library

Office of Technical Assistance

- The Office of Technical Assistance (OTA)
 - Non-regulatory agency within EOEEA
 - Provides confidential, onsite technical and compliance assistance to manufacturers, businesses, and institutions
 - All OTA services are available free of charge to any Massachusetts toxics user



OTA Assistance

- OTA's assistance can help companies to:
 - Manage and reduce air releases, water discharges, hazardous waste generation, and toxic chemical use and waste.
 - Comply with environmental regulations.
 - Prevent accidents and spills.
 - Reduce costs by improving manufacturing processes and identifying alternative materials.
 - Reduce energy and water bills.

Surface Cleaning

- What “clean” means
 - Free from dirt, stain, or impurities
 - More simply, unsoiled
- Soils can be defined as
 - Extraneous or unwanted material deposited and/or attached to a surface
- Cleaning is the process of getting rid of these impurities

Why Clean?

- May be required to prepare the surfaces of parts prior to other manufacturing processes
 - Welding, plating or painting
- May be performed for aesthetic reasons as an aid for marketing and sales
- Or it may be necessary to ensure that the finished product will perform without failure caused by contamination

With What Shall I Clean It...

- Solvency can be defined as the ability to dissolve.
 - Water is considered to be the ‘universal solvent’
 - Capable of dissolving many inorganic and some organic contaminants or soils
 - But not all soils readily dissolve in water alone,
 - Which is why additives were included to make the first soaps

Types of Aqueous Cleaners

- Alkaline liquid aqueous
- Acidic liquid aqueous
- Neutral liquid aqueous
- Powdered Detergents



Pros of Aqueous Cleaners

- Typically non-flammable
- Contain little to no VOCs
 - Always check
- Flexibility with dilutions
 - Save on chemistry
- Can be safer for workers to use compared to most solvent options

Case Study – Copper Fin and Tubing

- Looking for an aqueous/ enzymatic option
 - Willing to do a rinse/dry step
- Clean fin and tubing parts within 30 minutes or less
- Must be able to remove Oak 15A expanding, bending and forming metalworking oil
- Looking to buy new equipment



Case Study – Current Findings

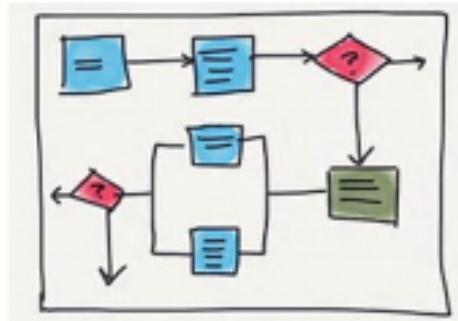
- Three aqueous options were effective
 - Emerald HD 2 (15%)
 - Aquavantage 1400 GD (5%)
 - United Smart Solve 605 (5%)
 - Heated ultrasonics (130 F) for 30 minutes
 - Added rinse step for Aquavantage 1400 GD
- Verification of cleanliness
 - Contact angle and visual for fin parts
 - White glove test and visual for tubing

Helpful Upkeep Tips for Aqueous Cleaners

- Use microbe technology for sink-top units.
 - Ozzy Juice
 - Uses microbes to eat the contaminants
- Discoloration doesn't mean dirty
 - Change cleaner only once cleaning effectiveness declines
- Skimming oils or use microfiltration recycling service
 - Could go from hazardous waste to non-hazardous waste
 - Removes contaminants from cleaner
- Maintain solution concentration
 - Measure the concentration of your cleaner and only add more when necessary

Process Characterization

How do
you go
about it?



How Do You Do Process Characterization?

Do some pre-site visit research – read, website, industry search, image search, materials from the plant.

Have an opening meeting with Plant Manager/
Production Manager/Ops Manager/Maintenance
Mgr/EHS Mgr

Ask for a verbal description of the process – and ask
some basic questions: what is the product?
Write things down, draw pictures, write down
questions. Try to get a basic block sketch of the
process.

Berkshire Environmental Consultants, Inc.

Maura Hawkins

1450 East Street • Suite 6-H • Pittsfield, MA 01201 • (413) 443-0030 • Fax (413) 443-0007

Cleaning Process

Example:

Step 1: Sheet cutting or part forming

- Contaminated with oils and greases

Step 2: nPB (180 F) for 20 minutes

- vapor cleaning – no immersion

Step 3: Parts move onto coating



Initial Cleaning Questions to Ask

- Why are you cleaning?
- How clean is clean?
 - How is cleanliness determined?
- Why is that certain cleaner being used?
 - “We’ve just always used it?”
- How does your workers determine cleanliness?
 - Visual, contact angle, gravimetric, in-house method

CleanerSolutions.org

- What are you trying to clean?
 - Aluminum, Copper, Nickel, Stainless Steel, Steel, Alloys, and Titanium Parts
 - Complex and Simple
 - Range in Small to Large Parts
- What are you trying to remove?
 - Oils, Lubricating Oils, Greases

“Find A Cleaner” Search Results

Company	Cleaner	Category	Contaminant	Substrate	Method
Gemtek	SC Aircraft and Metal Cleaner	Alkaline Aqueous	Oil	Aluminum	Low Spray Wash
SWR Corp	SWR One	Alkaline Aqueous	Oil	Alloys; Nickel; Aluminum	Ultrasonics; Immersion/Soak
Today & Beyond	Beyond 2005	Alkaline Aqueous	Oil; Greases	Brass; Stainless Steel; Aluminum	Immersion/Soak
Alconox	Liquinox	Alkaline Aqueous	Oil	Stainless Steel	Ultrasonics
Westford Chemical Corp.	Biosolve	Neutral Aqueous	Oil, Lubricating oils; Greases	Aluminum; Copper; Brass; Stainless Steel	Immersion/Soak

P2OASys.turi.org

Category	n Propyl Bromide (SG)	SC Aircraft and Metal Cleaner	SWR One	Beyond 2005 Industrial	Liquinox	BioSolve Clear
Acute Human Effects	9	6	8	6	8	5
Chronic Human Effects	9	5	2	2	2	2
Ecological Hazards	8	4	6	4	8	7
Environmental Fate & Transport	10	3	7	4	5	5
Atmospheric Hazard	10	2	2	2	2	2
Physical Properties	10	7	9	9	5	5
Process Factors	9	4	6	6	5	5
Life Cycle Factors	10	2	6	6	7	4
Weighted Average	9.4	4.1	5.8	4.9	5.3	4.4



Other Things to Consider

- Think about rust inhibitors for certain substrates?
 - Evaluate for EHS
- Availability of Water
 - Wastewater treatment?
 - Deionized water or tap?
 - Case Study: MnTap rainwater/stormwater collection/use
- What is the local laws on wastewater disposal?
 - Contact the municipal wastewater utility

Types of Equipment

- Immersion
 - Always start testing here
- Ultrasonic
 - Low and High frequencies
- Spray Cabinet (High and Low Pressure)
 - Great for heavy soils
 - CD Aero
 - Went from nPB to an aqueous cleaner
- Aqueous Vacuum Degreasers

Small Spaces – Equipment Ideas



TURI DOES NOT ENDORSE ANY VENDOR

Large Spaces – Equipment Ideas



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Toxics Use Reduction Institute

www.turi.org

978-934-3275

The Offices at Boott Mills West
126 John Street, Suite 14
Lowell, MA 01852

Questions?



**Alicia McCarthy,
Laboratory Specialist**

**Alicia_McCarthy@uml.edu
978-934-3889**

James Cain

OTA Senior Engineer

**james.cain@state.ma.us
(617) 626-1081**

