


Lytron's Road to TCE Reduction

A large, abstract graphic composed of overlapping, wavy bands of color. The colors transition from light blue and white on the left to green, yellow, and orange in the middle, and finally to dark brown and black on the right. The bands have a semi-transparent, layered appearance.

Alan Smith

Continuous Improvement Manager

April 26, 2018

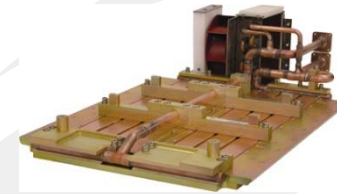
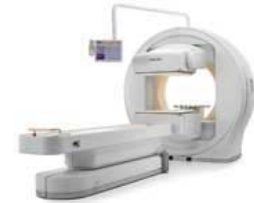
Setting the Stage



Located in Woburn MA since 1968
340 Employees
Privately Held Corporation

Markets Serviced

- Medical
- Semiconductor
- Military
- Aerospace
- Industrial Electronics



Manufacturing in Woburn MA



Citizens Advisory Committee members skeptical
EPA says benzene may have caused Woburn leukemias

Interviews Mayor Robitelli
'60 Minutes' investigates Woburn water woes

DAILY TIMES CHRONICLE - FRIDAY, JUNE 29, 1985
Fish death mystery prompted Aberjona study



Early Toxic Use Reduction

1994 -1999

- Increased freeboard ratio to > 1.0
- Added freeboard refrigeration
- Automated part handling ($< 11\text{ft/sec}$)
- Added degreaser covers
- Temperature monitoring of boiling sumps & cold traps (Degreaser #1 & #2)
- Added 3rd party stabilizer package
- Added vacuum filtering of aluminum chips (Degreaser #3)
- Installed containment curtains (Degreaser #2)
- Started off loading parts to vacuum cleaning supplier

These changes reduced our use of TCE to below reportable levels until the limit was changed in 2008.



Toxic Waste Alternatives



1999 - 2009

- Removed Degreaser #1
- Optimized Recycling Still with temperature control and free board improvements
- Added aqueous degreasing process

Since 2010

- Outsourced more production degreasing to nPb vacuum process.
- Phased in evaporative oils on copper parts
- Transitioned welded parts from TCE cleaning to aqueous cleaning
- Conducted vacuum cleaning feasibility study

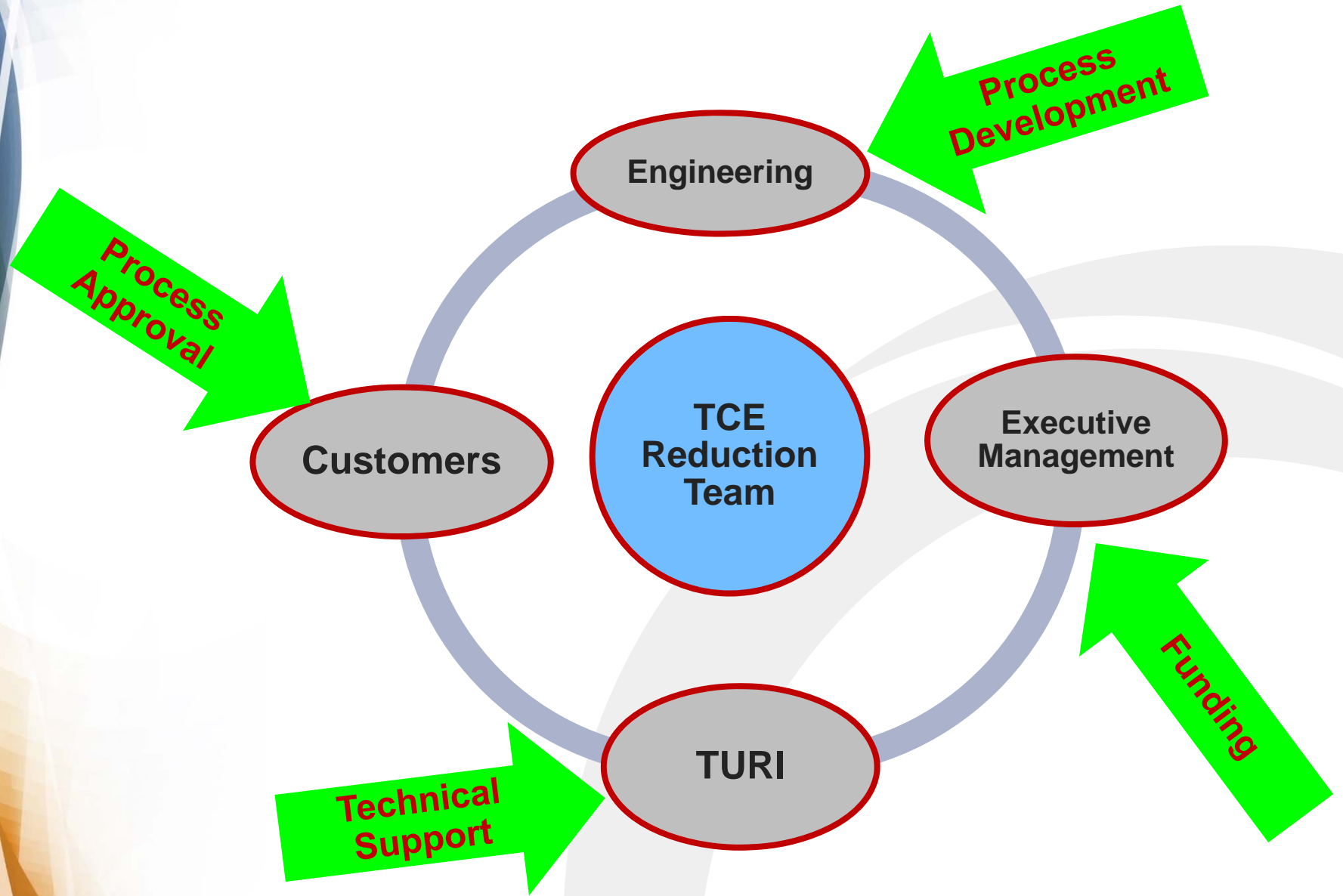
Even with these changes, the increase in production levels increased our emissions to a reportable level.

Why Eliminate TCE now?

- Tightening domestic & international regulations
- Projected increase in TCE emissions
- Equipment reaching end of life
- TURI Lab solvent selection support
- State industrial grants available
- Customer contractual requirements

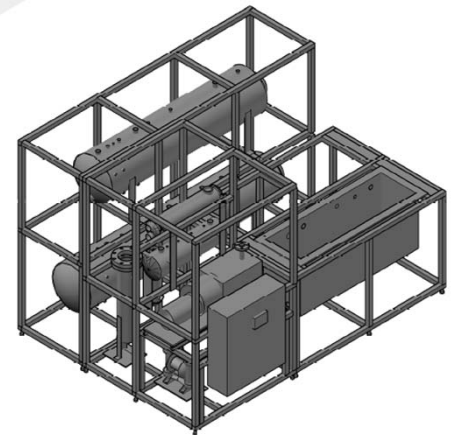


Who Needed to be Involved?



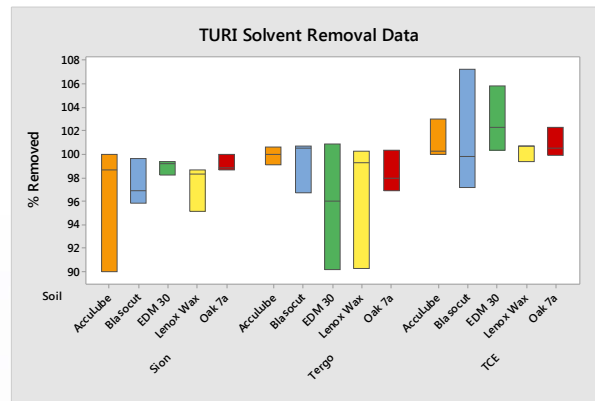
Why Vacuum Cleaning?

- 80% of the parts immersion cleaned
- Workspace emissions reduced by 5000 lbs /year
- No solvent stabilizers needed
- Adaptability for new solvents
- PLC controlled process
- Reduced cycle time
- Larger loads increase throughput



How did the TURI Lab help?

- Performed contaminants removal tests
- Made solvent recommendations
- Performed contact angle analysis
- Participated in validation testing of the new vacuum clean system



We are not done yet.

Next Step:








Eliminate the last TCE degreaser that is used in the copper products production cell.

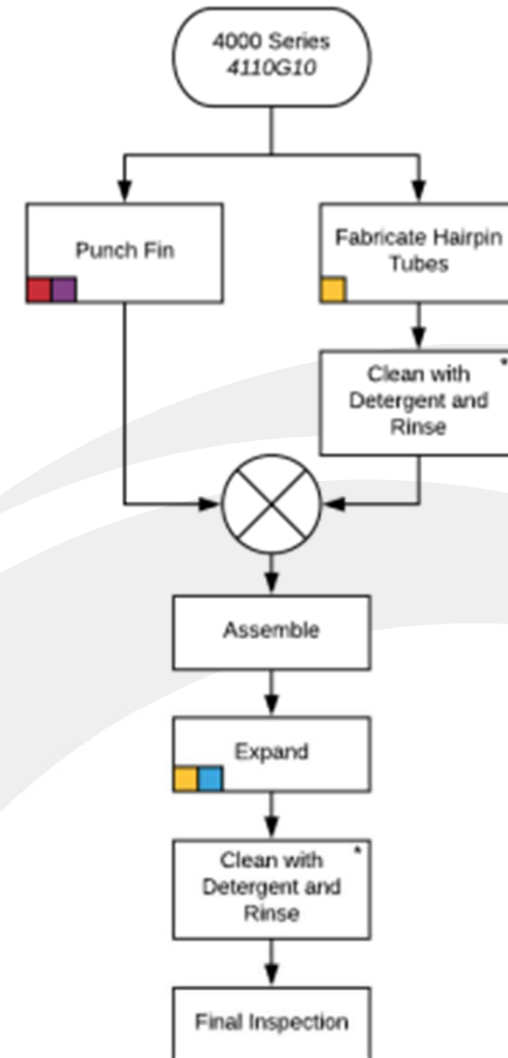


What will it take?

Current State Map

Legend (Oil Types)

Copper/Aluminum	Fin Punch	Oak 529	
	Expansion	Oak 15A	
	Hairpin	Oak 15C	
Hasteloy	Fin Punch	Oak 941A	
Stainless Steel	Expansion	Oak 740/ M4	 
	Hairpin	Oak 740	
	Machine	Fin Punch Die	DTE Light



Looking at alternatives?

- Expansion bullet dry coatings
- Electro-deposition of forming oil
- More soluble oils
- Pneumatic expansion
- New cleaners and equipment

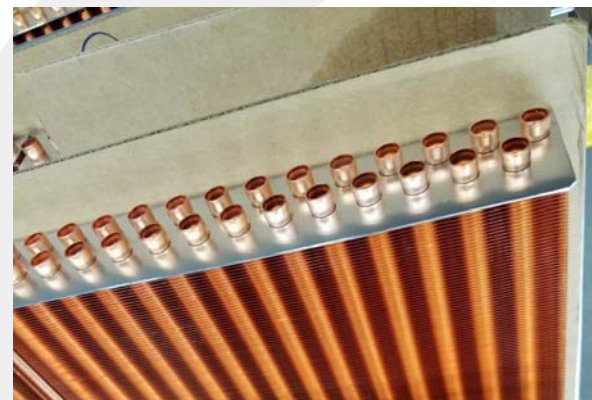


Designed Experiments

We will need to get answers to a lot of questions in order to put the best process in place.



- How long do dry expansion bullets last?
- Does this cleaner remove all the forming oils?
- How much oil is enough?



Solubility Experiments

TURI is already helping out with solubility testing on the oils that are currently being used.

- Continue evaluation of oils with all alternatives.



TURI
TOXICS USE REDUCTION INSTITUTE
University of Massachusetts Lowell

Equipment selection

Dry Expander vs. Aqueous Cleaning System?

- How much does it cost?
- What is the waste stream?
- How many parts can it process /hr?
- Will it fit in the factory?



Applying for an Industrial Grant

Three simple steps:

1. Download from TURI website
https://www.turi.org/Our_Work/Apply_for_a_Grant
2. Fill out request
3. Submit by June 22, 2018



Contact Information



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