

## Successful Cleaning Processes without Heavily Regulated Solvents - Act now before it's too late

Featuring JCOM



Practical, hands-on and  
independent, training in  
cleaning.

More Info

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CEO JCOM  
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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](mailto:barbara@bfksolutions.com) and [ed@bfksolutions.com](mailto: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](mailto:williams@shsu.edu)



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## Our Speaker



**Olaf Tessarzyk**  
**Chief Executive Officer - JCOM**

- CEO of JCOM - a company he started in 2008.
- JCOM distributes Aqueous and Solvent standard and custom degreasers in North America.
- 30 years of experience in financial management, private equity, operations, leadership in start-up, growth and restructuring of technology-focused companies.
- Masters Degree in Mechanical Engineering and a Bachelor in Economics.
- Living in Carlsbad, CA, he flies on weekends as a SAR pilot, serving his community with the experience from his early career as a military test pilot and Squadron Commander in the German Army.
- Phone: +1 317 730 0478
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## Content

1. Vitae & JCOM
2. What are Hazardous Solvents?
3. Cleanliness Specifications
4. How do I clean my parts best?
5. The "modern" solvent cleaning process
6. Environment
7. Cost Comparison / Amortization
8. Application examples
9. Questions and Answers

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# Hazardous Solvents

- PFAS (per- and polyfluoroalkyl substances):
  - PCE (perchlorethylene)
  - TCE (trichlorethylene)
  - nPB (n-propyl bromide)
  - MC (methylene Chloride)
  - HFE (hydrofluether)
  - HFO (hydrofluoroolefin)
  - HFCO (hydrochlorofluoroolefin)


✓ EPA amended exposure limits



**“Exit all PFAS manufacturing by the end of 2025:**  
 3M will discontinue manufacturing all fluoropolymers, fluorinated fluids, and PFAS-based additive products. We will help facilitate an orderly transition for customers. 3M intends to fulfill customer contractual obligations during the transition period.”

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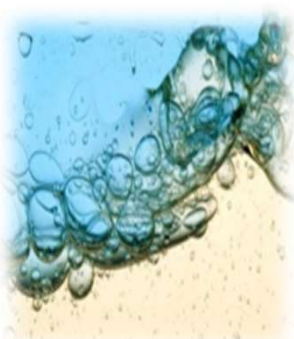
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# Basics

✓ **Polar** substances such as salt as well as polar organic compounds are soluble in strongly polar solvents such as water.  
 Hydrophilic: "loving the water"

✓ **Nonpolar** (paraffins) or slightly polar substances (grease) are present in nonpolar or slightly polar organic solvents such as modified alcohol or non halogenated hydrocarbons  
 Hydrophobic: "fearing the water"



Oil and water don't mix!

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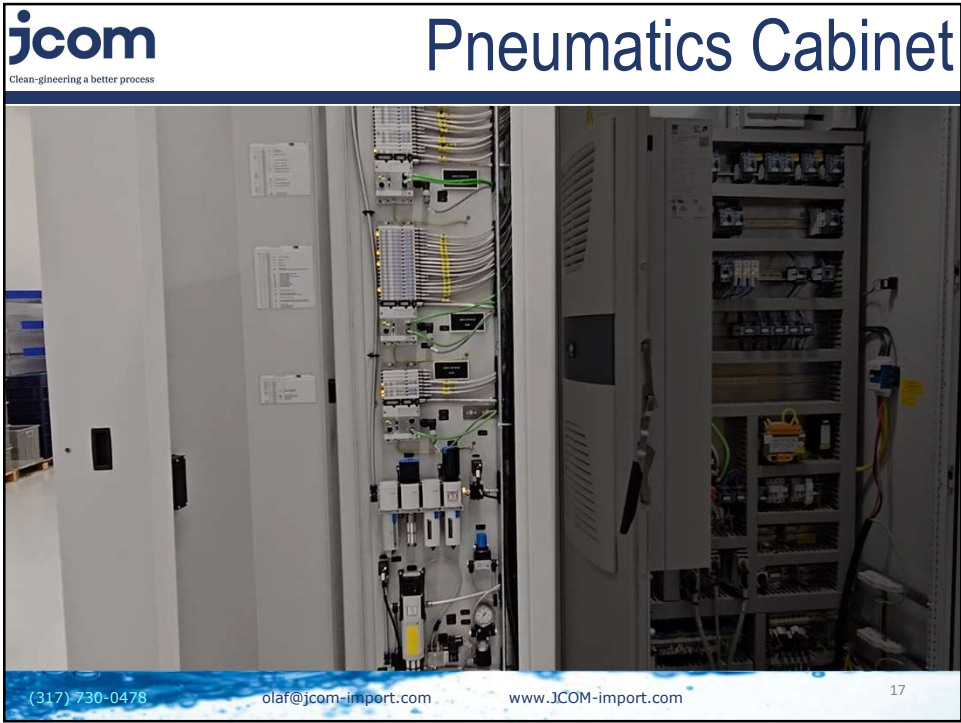
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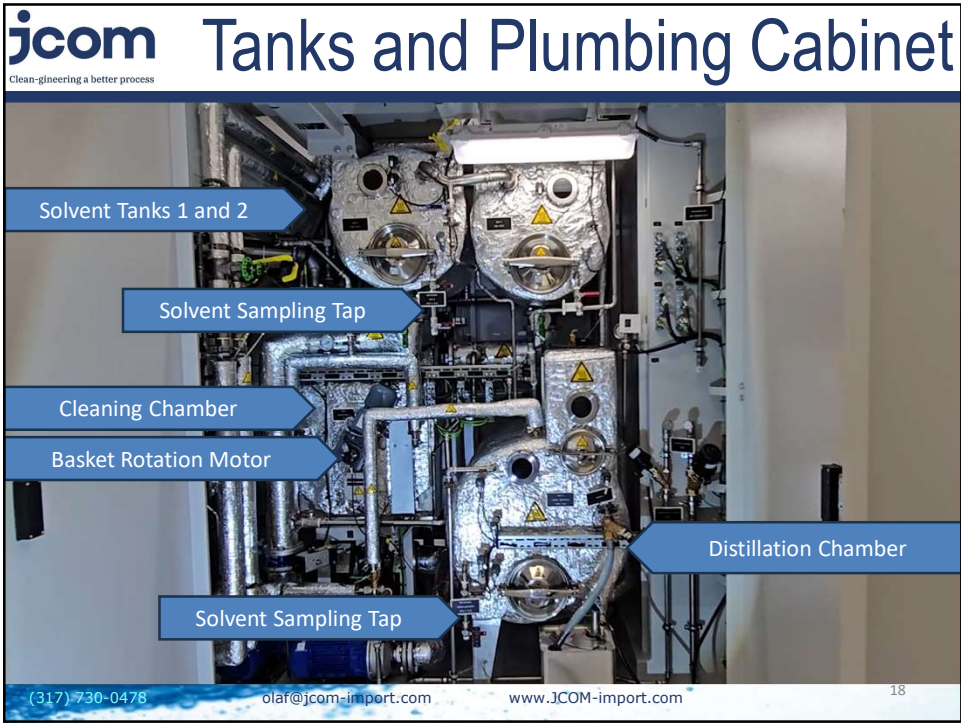
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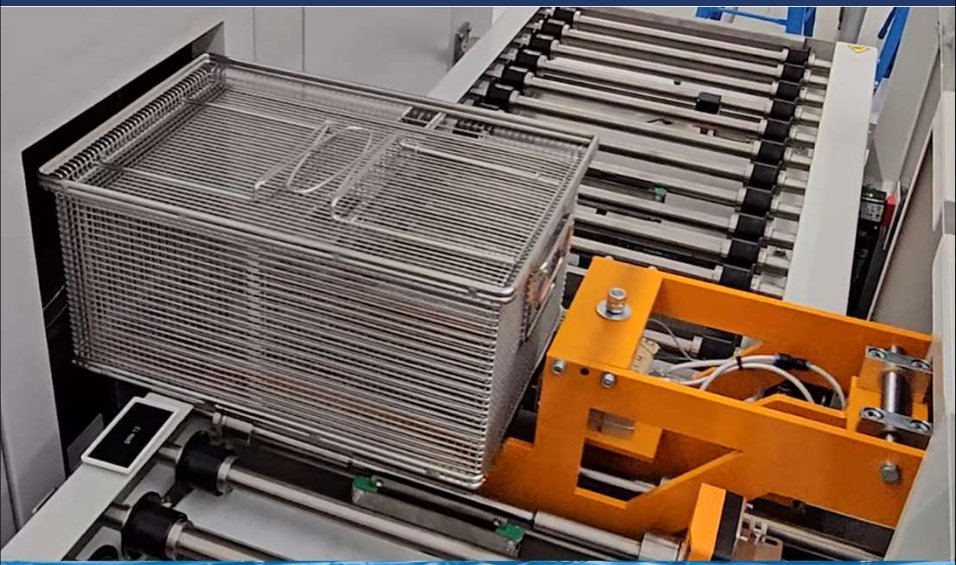
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Robotic Sample Insertion



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Customer - before



✓ Contract Cleaner using

- TCE (trichlorethylene)
- Open Top degreaser
- Use of several drums of solvents per month

✓ Cleaning requirements:

- ✓ Up to DYNE 44
- ✓ 200 micron on particle size



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# Customer - now

"A big leap forward towards sustainability, technology, and automation.

We're launching cutting edge modified alcohols and vacuum technology to yield high tolerance, reputable and reliable results. "



John Clark, owner E&J Parts Cleaning Connecticut

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# Solvent Single Chamber



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Solvent & Demagnetization



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Solvent EURO pallet



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Solvent Vac Through-feed



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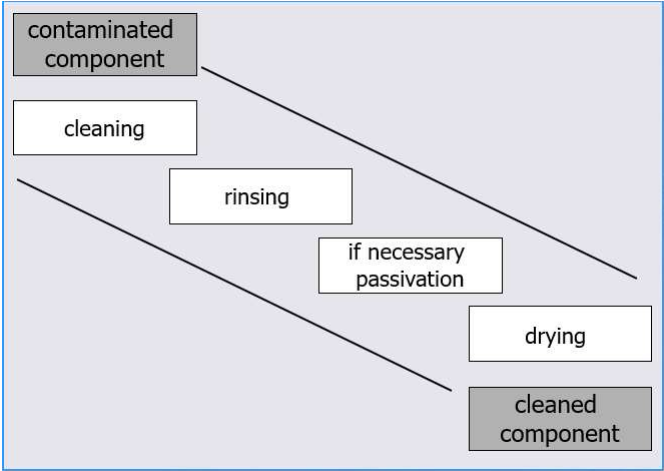
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Steps of the Aqueous Cleaning Process



```
graph TD; A[contaminated component] --> B[cleaning]; B --> C[rinsing]; C --> D[if necessary passivation]; D --> E[drying]; E --> F[cleaned component];
```

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alkaline / neutral / acid aqueous cleaning media

immersion

flooding

spraying

single-chamber

multi-chamber

single-chamber

single-chamber

pass-through

Principles of the Aqueous Cleaning Process

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storage tank cleaning

pressure liquid circulation device

filter

oil separator

oil

storage tank rinsing 1

storage tank rinsing 2

working chamber

heating register

fan

ultrasonic device

vacuum drying

filter

Process scheme

Single-Chamber Flooding Plant

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Customer - before

✓ Medical Device Mfr

➤ High Alkaline aqueous

➤ Citric Acid passivation

➤ Vacuum Drying

➤ Low boiling oils

✓ Cleaning requirements:

✓ 100 micron on particle size



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Customer - now

"A painless automated transition form lots of maintenance and operational issues.

JCOM provide us an engineered solution that exceeded the expectations and allowed us to grow in this area without hiring more personnel"



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# Aqueous Amortization

AQUEOUS SYSTEM				
Flow (consumption) (gpm)	6.50	Filter Bath 1	0.70000 / Day	
Hours / Day	24	Filter Bath 2	0.80000 / Day	
Cycle / week	5	Cost Bath	20	
Weeks / year	48			
Annual Hours	1440			
Purchasing Cost	\$ 432,000			
Compressed Air	0.0			
Steam/Water consumption (Turbid)	0.00000			
Flow (gpm)	0.00000			
Cost (per hour)	\$ 1.30			
Cost (per year)	\$ 1,728			
TOTAL ANNUAL COST				
Item	Cost per year	Annual Cost	Cost per hour	Annual Cost
Filter Bath				
Filter Bath 1 consumption (gpm)	6.50	\$ 24	\$ 1.50	\$ 1,728
Filter Bath 2 consumption (gpm)	8.00	\$ -	\$ -	\$ -
Cost (per year)	0.00	\$ -	\$ -	\$ -
Cost (per hour)	0.00	\$ 2.40	\$ 15.00	\$ 1,728
Compressed Air				
Compressed Air	0.0	\$ 0.00	\$ 0.00	\$ 0.00
Steam/Water consumption (Turbid)	0.00000	\$ 0.00	\$ 0.00	\$ 0.00
Flow (gpm)	0.00000	\$ 0.00	\$ 0.00	\$ 0.00
Cost (per hour)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Cost (per year)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Filter Bath				
Filter Bath 1 consumption (gpm)	6.50	\$ 24	\$ 1.50	\$ 1,728
Filter Bath 2 consumption (gpm)	8.00	\$ -	\$ -	\$ -
Cost (per year)	0.00	\$ -	\$ -	\$ -
Cost (per hour)	0.00	\$ 2.40	\$ 15.00	\$ 1,728
Compressed Air				
Compressed Air	0.0	\$ 0.00	\$ 0.00	\$ 0.00
Steam/Water consumption (Turbid)	0.00000	\$ 0.00	\$ 0.00	\$ 0.00
Flow (gpm)	0.00000	\$ 0.00	\$ 0.00	\$ 0.00
Cost (per hour)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Cost (per year)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Filter Bath				
Filter Bath 1 consumption (gpm)	6.50	\$ 24	\$ 1.50	\$ 1,728
Filter Bath 2 consumption (gpm)	8.00	\$ -	\$ -	\$ -
Cost (per year)	0.00	\$ -	\$ -	\$ -
Cost (per hour)	0.00	\$ 2.40	\$ 15.00	\$ 1,728
Compressed Air				
Compressed Air	0.0	\$ 0.00	\$ 0.00	\$ 0.00
Steam/Water consumption (Turbid)	0.00000	\$ 0.00	\$ 0.00	\$ 0.00
Flow (gpm)	0.00000	\$ 0.00	\$ 0.00	\$ 0.00
Cost (per hour)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Cost (per year)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Filter Bath				
Filter Bath 1 consumption (gpm)	6.50	\$ 24	\$ 1.50	\$ 1,728
Filter Bath 2 consumption (gpm)	8.00	\$ -	\$ -	\$ -
Cost (per year)	0.00	\$ -	\$ -	\$ -
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Compressed Air	0.0	\$ 0.00	\$ 0.00	\$ 0.00
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Cost (per hour)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Cost (per year)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
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Cost (per hour)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Cost (per year)	0.00	\$ 0.00	\$ 0.00	\$ 0.00
Filter Bath				
Filter Bath 1 consumption (gpm)	6.50	\$ 24	\$ 1.50	\$ 1,728
Filter Bath 2 consumption (gpm)				

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# Solvent Amortization

SOLVENT SYSTEM			
PWR consumption (90%)	8.23	Filter Bath 1	0.79000 / Day
Hours / Day	24	Filter Bath 2	0.30000 / Day
Days / week	5	Cost Filters	\$ 25
Weeks / year	48		
Annual hours	6552		
Purchasing cost	\$ 483.000		
Compressed Air	m <sup>3</sup> /h 0.6	Air/m <sup>3</sup>	\$ 1.30
Warm-up PWR consumption Tue-Fri	KWh 0.00 030		
PWR charge 1x per year	KWh 20.33 050		
Cookbook PWR / Day	KWh 3.00 030		

Day/Week	Week	Cost per week	Annual Operation Cost
Maintenance Consumables			
Warm-up PWR consumption Mon	KWh 0.01 010	\$ 0	\$ 590
Warm-up PWR consumption Tue-Fri	KWh 0.01 010	\$ 0	\$ -
Cookbook PWR / Day	KWh 3.00 030	\$ 3.90	\$ 186.60
PWR 1x / year	2033 KWh	\$ 630	\$ 26,010
PWR cost / year			\$ 26,601
Big Filter Change			
Bath 1 (Filter per week)	4	\$ 70	\$ 3,220
Bath 2 (Filter per week)	2	\$ 30	\$ 1,380
Costs of Filters / year			\$ 4,600
Maintenance Cost			
Spares Parts		\$ 2,000	
Utilities for demineralized water		\$ 1,500	
Maintenance from JCOM		\$ 1,000	
Travel Cost		\$ 4,000.00	
TOTAL Maintenance cost annually			\$ 8,500
Annual cost			
Solvent in the unit (l)	300	\$ 5	\$ 1,500
Annual usage (l)	12	\$ 4	\$ 48
Solvent usage / year	1080 liter	\$ 5	\$ 5,400
Replacement cost (l) every two years	400	\$ 5	\$ 2,000
Solvent cost annually			\$ 7,900
Oil change of vacuum pump after 500 hrs		\$ 750	
Oil change of vacuum pump after 2000-2000 hrs	cost oil change/year		\$ 2,070
Oil filters (changed 1x per year)			\$ 1,600
Oil change Cost annually			\$ 3,670
Compressed Air	m <sup>3</sup> /year	3312	\$ 4,306
Other Maintenance Cost	2000-4000		\$ 3,000
Depreciation		10	\$ 45,000
Power			\$ 29,670
Filters			\$ 4,600
Maintenance & Spare Parts			\$ 4,000
Solvent			\$ 7,900
Oil Change			\$ 3,670
Air			\$ 4,306
Other			\$ 3,000
Depreciation			\$ 45,000
<b>TOTAL ANNUAL COST</b>			<b>\$ 102,946</b>
<b>COST PER OPERATION HOUR</b>	<b>Annual Hours 5520</b>	<b>Cost per hour</b>	<b>\$ 18,65</b>

Longevity of the unit 20 years

Solvent cost annually			\$ 8,700
Oil change of vacuum pump after 500 hrs		\$ 750	\$ 750
Oil change of vacuum pump after 2000-2000 hrs	cost oil change/year		\$ 2,070
Oil filters (changed 1x per year)			\$ 1,600
Oil change Cost annually			\$ 3,670
Compressed Air	m <sup>3</sup> /year	3312	\$ 4,306
Other Maintenance Cost	2000-4000		\$ 3,000
Depreciation		10	\$ 45,000
Power			\$ 29,670
Filters			\$ 4,600
Maintenance & Spare Parts			\$ 4,000
Solvent			\$ 7,900
Oil Change			\$ 3,670
Air			\$ 4,306
Other			\$ 3,000
Depreciation			\$ 45,000
<b>TOTAL ANNUAL COST</b>			<b>\$ 102,946</b>
<b>COST PER OPERATION HOUR</b>	<b>Annual Hours 5520</b>	<b>Cost per hour</b>	<b>\$ 18,65</b>
Longevity of the unit			20 years


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Comparison

TOTAL ANNUAL COST			\$ 102.946
COST PER OPERATION HOUR	Annual Hours 5520	Cost per hour	\$ 18,65

Solvent

V

S

Aqueous

TOTAL ANNUAL COST			\$ 195.630
COST PER OPERATION HOUR	Annual Hours 5520	Cost per hour	\$ 35,44


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Summary

- ↗ All conditions on the cleaning process and cleaning requirements need to be considered
- ↗ A single solution is not available. Each project is individual and needs to be researched separately
- ↗ Trials are the best way to find the best solution and to fit the requirements

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Our Showroom



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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](http://www.shsu.edu/pqcw) to sign up for the course!



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### Successful Cleaning Processes without Heavily Regulated Solvents - Act now before it's too late

Thank you for attending!



Practical, hands-on and independent, training in cleaning.  
**More Info**  
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