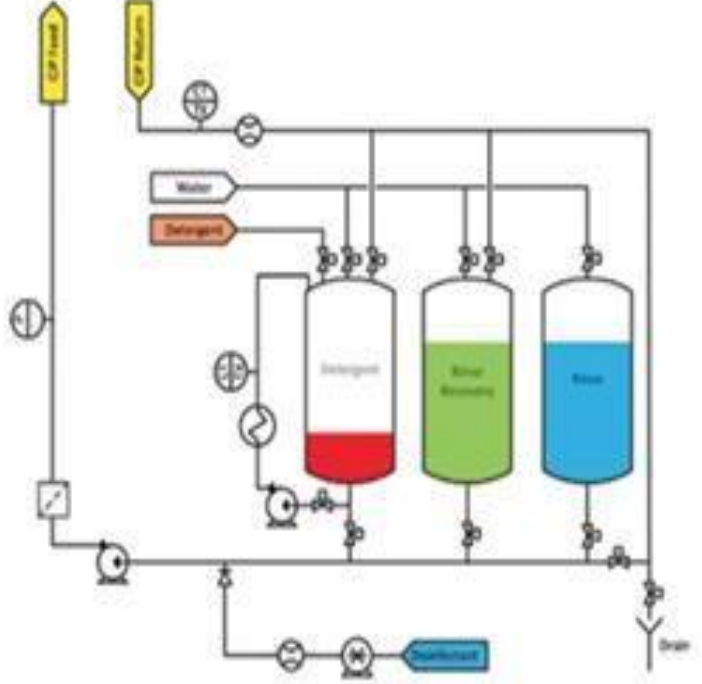
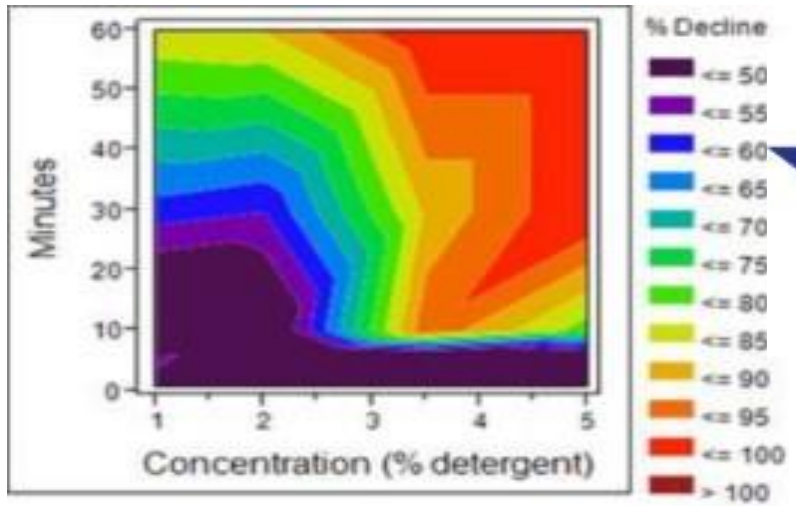


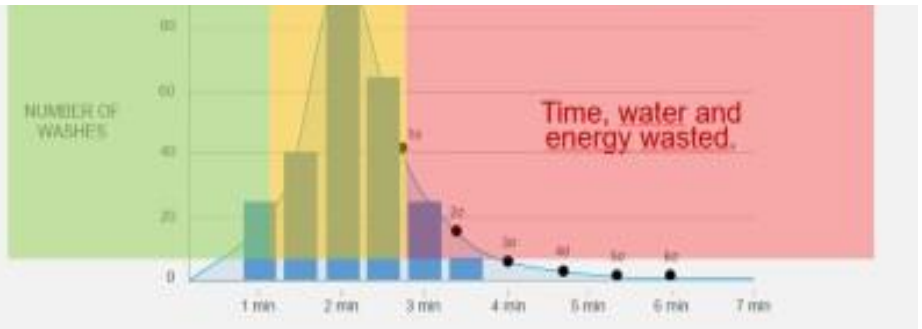


NORTHSTAR
TRAINING AND ADVISORY

The challenges facing Dairy industry Cip

Annual SDT Conference Penrith 2023

Optimising CIP to reduce energy costs



NORTHSTAR
TRAINING AND ADVISORY

Nial Mullane is a UCC graduate of Dairy Science and has 35 years' experience across a number of blue chip companies in both the UK and Ireland in soft drinks manufacture with Coca Cola, Aseptic packaging of juices, milk and sauces with Tetra Pak and both liquid UHT and powdered infant formula manufacture with Wyeth Nutrition.

He has held project management, validation, and senior operation management roles in these companies. Nial has been a CIP champion for many years and frequently lectures in University College Cork. Nial is a director of NorthStar, a training and advisory company to food and beverage companies in Ireland and the UK. Nial is a fellow of the IFST and a member and contributor to the EHEDG (European hygienic engineering design group) and a member of the SOFHT

The Society of Food Hygiene and Technology

EHEDG

Institute of Food Science + Technology ifst

087 6803423
northstartraining@gmail.com
Rockfield, Ballymacelligott, Tralee, Co Kerry
Bank AIB 66 south Mall Cork

Cip : The backstory :

What is Clean ?

Plant Cleaning

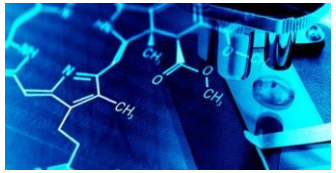
Process of removing unwanted soil from equipment and /or manufacturing facilities by the application of an effective procedure either manual or automated.

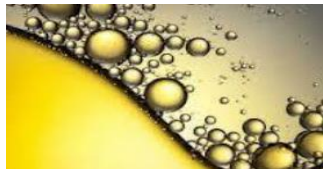
Sanitisation

Process of reducing microbiological contamination on effectively cleaned surfaces by means of a bactericidal treatment such as heat or chemicals, to a level acceptable to local health regulations or market requirements.

For effectiveness this must be preceded by cleaning.





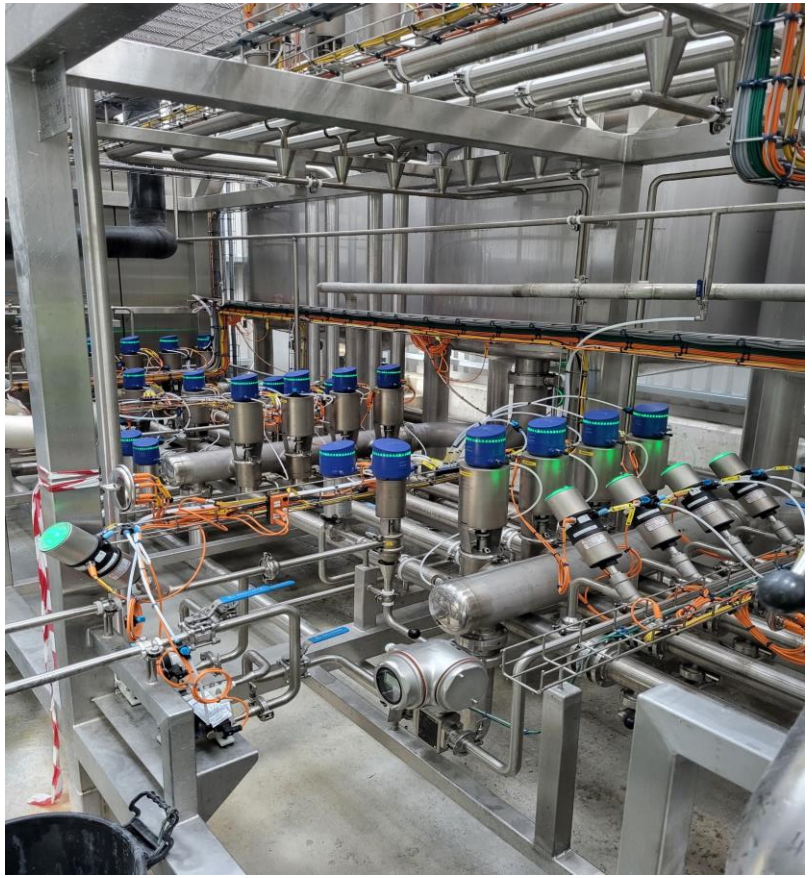
NORTHSTAR TRAINING AND ADVISORY

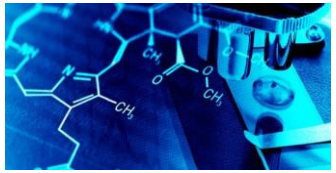
Time Temperature Titration Turbulence Technology Training

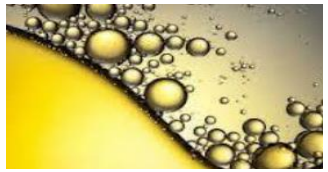
Cip : The backstory :

What is Cip ?

- CIP stands for Cleaning-In-Place
- Cleaning the production lines without dismantling the installation
- Cleaning effect obtained by circulation of liquids during a certain time, with a combination of thermal, mechanical and chemical energies





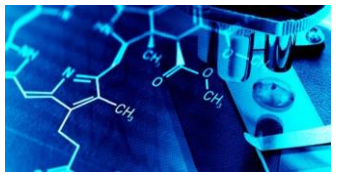


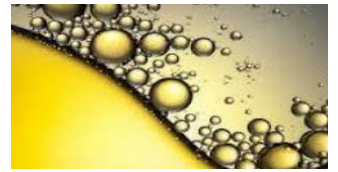
Cip : The backstory :

What is the expectation ?

- **Increased plant utilisation:** downtime is minimised – as long as CIP remains effective
- **Minimal manual work:** No or little need to dismantle plant, no or little risks of human error and recontamination of clean plant is minimised
- **Greater safety for personnel:** protection from heat and chemicals (as long as chemicals are automatically dosed) and no necessity to enter into vessels
- **More consistent results:** capable of being accurately and rapidly monitored
- **Improved protection of the environment :** Reduction of hydraulic load and smarter chemicals
- **Cost savings:** optimum use of water, chemicals,heat and technology



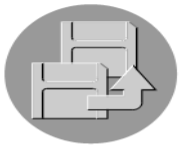



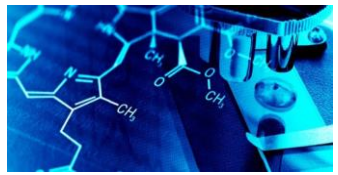


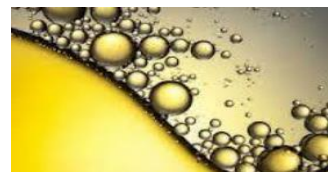
Cip : The backstory :

What are the outputs ?

- Quality Improvement
- Reproducible Results
- Documentation
- Economical process
- Time managed
- Safe system







NORTHSTAR TRAINING AND ADVISORY

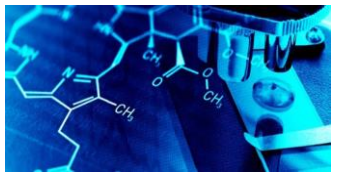
Time Temperature Titration Turbulence Technology Training

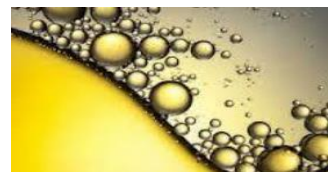
Cip : The backstory :

What makes it work ?

- Technology: discipline that requires detailed engineering
- Turbulence: 1.5 to 2m/s
- Titration : not too high/ not too low
- Temperature: adapted to process
- Time: depends on the circuit
- Training: everybody needs the same understanding

Six T's





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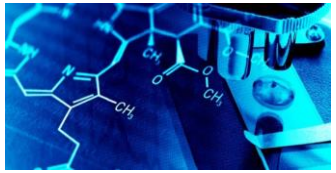
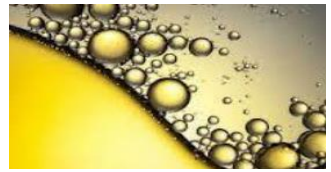
Time Temperature Titration Turbulence Technology Training

Cip : The baseline :

What makes it work ?



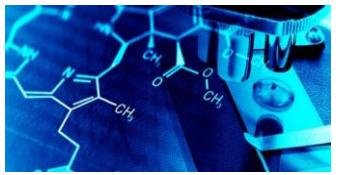


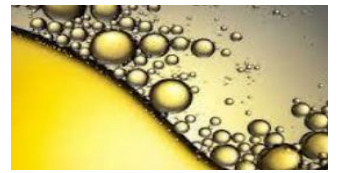
NORTHSTAR TRAINING AND ADVISORY

Time Temperature Titration Turbulence Technology Training

Cip : The baseline :
Current challenges ?

- Design and layout poor outdated
- Scheduled cleaning regime not in place
- Correct chemicals available/ overreliance on chemical suppliers
- Data acquisition systems not in place-no visuality.
- Cip not a KPI –poor management commitment.
- No Cip Champion.
- Training
- No cip policy - site wide/company wide





NORTHSTAR TRAINING AND ADVISORY

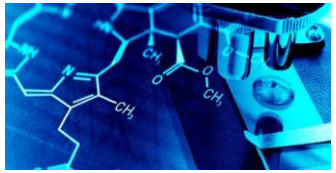
Time Temperature Titration Turbulence Technology Training

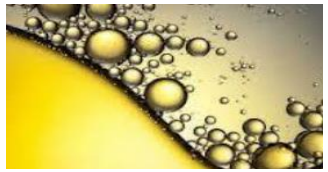
Cip : Optimisation : Where to start ?

A food or beverage plant has 4 key objectives

You seek to produce products for your consumers:

1	2	3	4
SAFELY	EFFICIENTLY	PROFITABLY	RESPONSIBLY
No bad batches, no worker accidents	Maximum utilization, minimum downtime	Lowest total cost	Least use of water, energy, effluent
Quality & Consistency	Productivity	Cost	Sustainability





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Time Temperature Titration Turbulence Technology Training

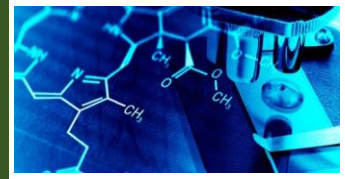
Cip : Optimisation : Where to start ?

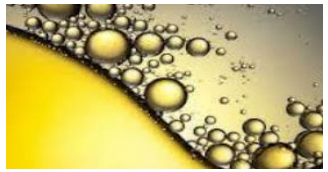
Optimisation resolves challenges in CIP

By improving cleaning quality while reducing CIP time and utility costs

Eliminating over-cleaning without risking food safety

Identifying previously unforeseen issues





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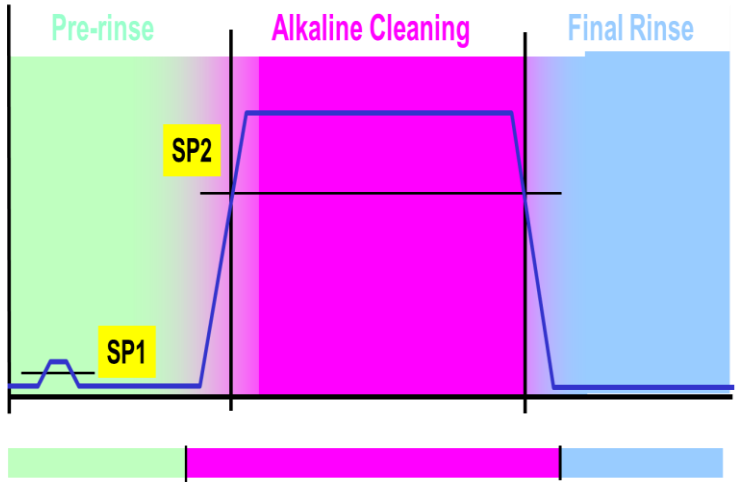
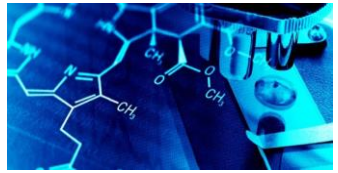
Time Temperature Titration Turbulence Technology Training

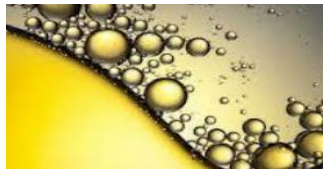
Cip : Optimisation : Prerequisites ?

Using too much water/Chemicals/Energy due

- Plant not achieving the 4 T's
- Unverified rinse times
- Poor water/chemical interphases
- Lack of monitoring data
- Poor calibrations
- Incorrect spec of tank cleaning equipment
- CIP frequency - too often
- Poor commitment to Cip as a critical process.
- Optimisation team with good inter-department relations







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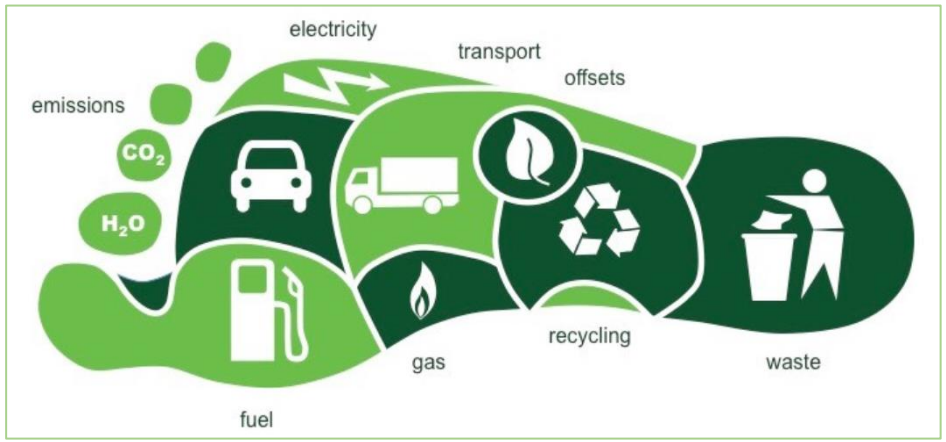
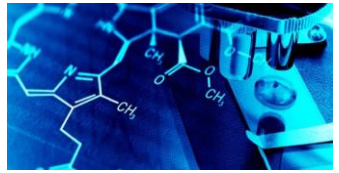
Time Temperature Titration Turbulence Technology Training

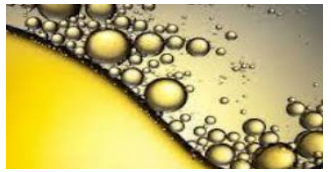
Cip : Optimisation :

Targets ?

- Water – Rinse times (Pre, Mid and Final)
  - Over rinsing
  - Poor rinse/chemical interphase
  - Hot or cold prerinse – removal + Thermal
- Chemical (caustic and acid)
  - Sharpening of interphases
  - Correct chemicals
- Data, spray device and instrumentation upgrades
  - Statistical analysis
  - Spray ball to spinner to turbine
  - Turbidity measurement to change phase
- Question Cip Frequencies
  - Do we need to do a full wash?
  - Do we need to wash at all now?
- Re-using chemical / water
  - Do we capture our final rinse
  - How often do we drop our chemical tanks
  - Do we desludge







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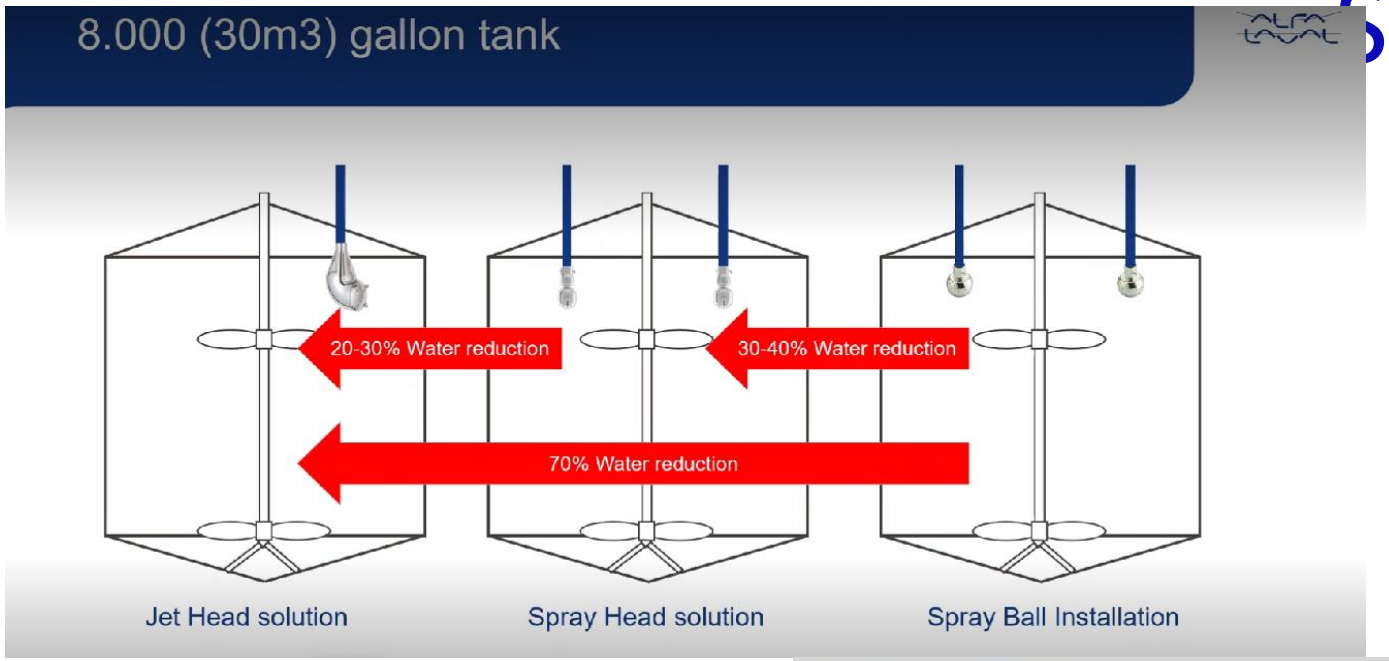
Time Temperature Titration Turbulence Technology Training

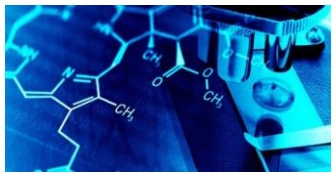
Cip : Optimisation : Solutions ?

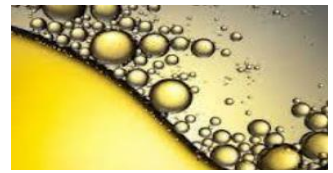


CLEANING CIP ANALYSIS

Below you see the comparison between the equipment profiles

	SPRAY BALL D94 180U LKRK-3T			SANIMEGA SB 270U CLIP-ON		
	STEP VOLUME		STEP COST	STEP VOLUME		STEP COST
1 Pre-rinse Water	3.6667 m3	5min	€11,00	1.1250 m3	3min	€3,38
2 Caustic	0.7333 m3	10min	€2,93	0.2250 m3	6min	€0,90
3 Intermediate rinse Water	1.1000 m3	3min	€3,30	0.5625 m3	3min	€1,69
4 Acid	0.7333 m3	10min	€2,93	0.2250 m3	6min	€0,90
5 Final rinse Water	0.0000 m3	5min	€0,00	0.0000 m3	4min	€0,00
Total per CIP	6.23 m3		€20,17	2.14 m3		€6,86





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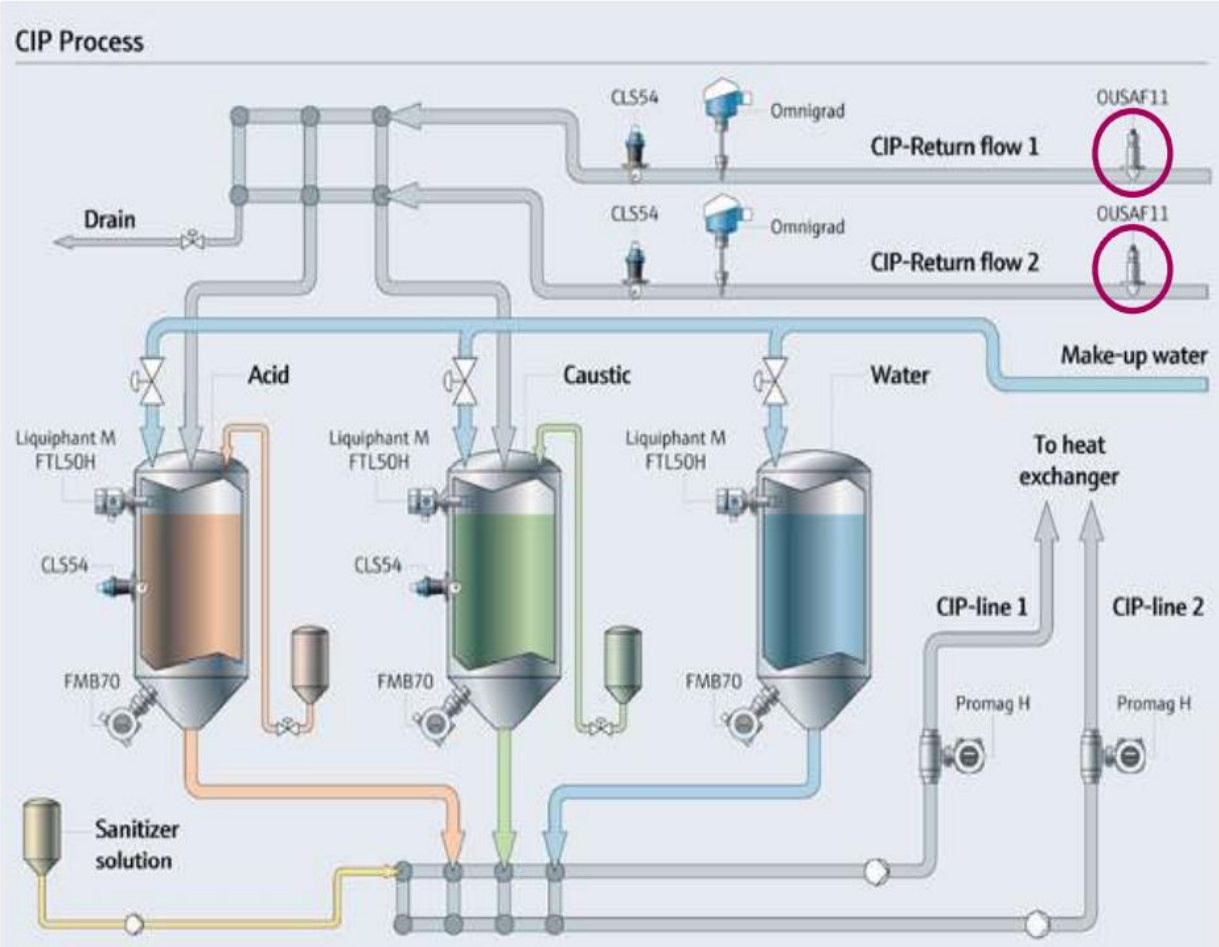
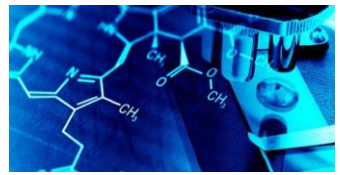
Time Temperature Titration Turbulence Technology Training

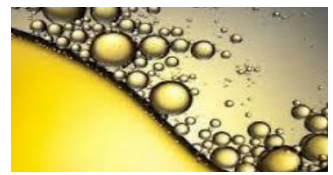
Cip : Optimisation :



: Solutions ?

- Detect when the alkaline or acid wash solution has achieved ideal concentration (conductivity)
- Detect and adjust for fluctuations in the concentration of the wash solution due to soiling (conductivity)
- Confirm the flow of soil in the waste return (optical)
- Confirm the end of the wash cycle by detecting no further soil (optical) and normal chemical concentration (conductivity)
- Confirm the end of a rinse cycle when all chemicals have been flushed (conductivity)





Endress+Hauser
People for Process Automation

NORTHSTAR TRAINING AND ADVISORY

Time Temperature Titration Turbulence Technology Training

Cip : Optimisation :

Solutions ?

Batch Information:

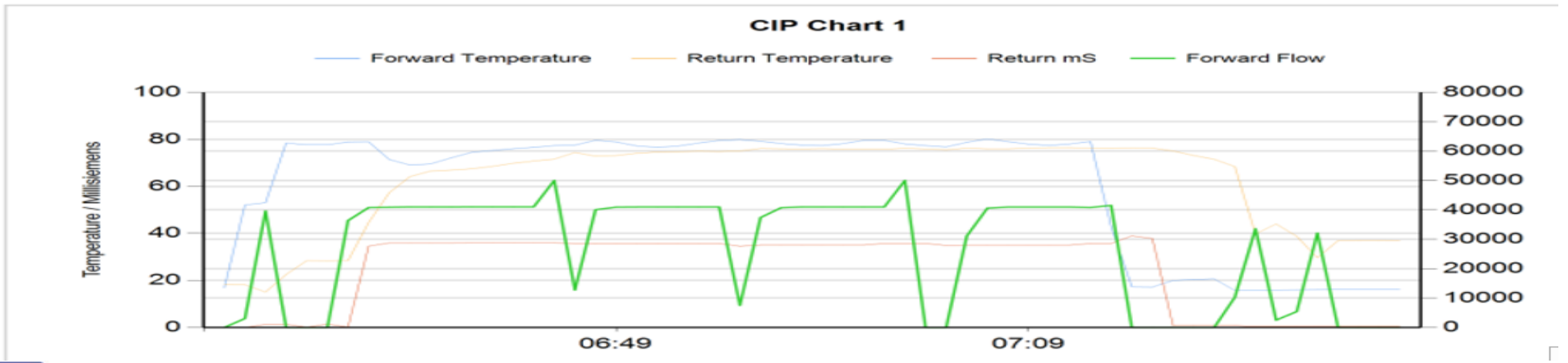
BatchID:	22355005	**Recipe:**	1 - SILO CAUSTIC
Start:	02-09-2022 06:30:24	**Route:**	Cream tank 03
Stop:	02-09-2022 07:26:36	**End state:**	Finished correctly
Duration:	00:56:12		

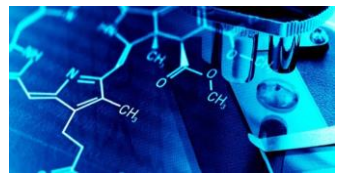
CIP Step (Chart):

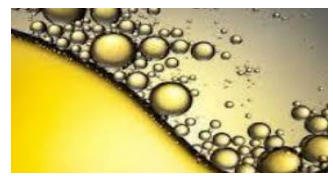
					Return		Forward		
Start	**Stop**	**Duration**	**Step**	**Time**	**Temp.**	**Cond.**	**Temp.**	**Speed**	**Flo**
02-09-2022 06:30:24	06:32:29	00:02:05	2 - Recovered water	120 sek	0.0 °C	0 mS	75.0 °C	0 %	410
02-09-2022 06:32:29	07:18:24	00:45:55	3 - Caustic	1800 sek	60.0 °C	25 mS	75.0 °C	0 %	410
02-09-2022 07:18:24	07:23:25	00:05:01	1 - Water	120 sek	0.0 °C	0 mS	0.0 °C	0 %	410
02-09-2022 07:23:25	07:26:25	00:03:00	7 - Drain	120 sek	0.0 °C	0 mS	0.0 °C	0 %	410

CIP Hold:

Step	No.	Start	Stop	Duration	Step



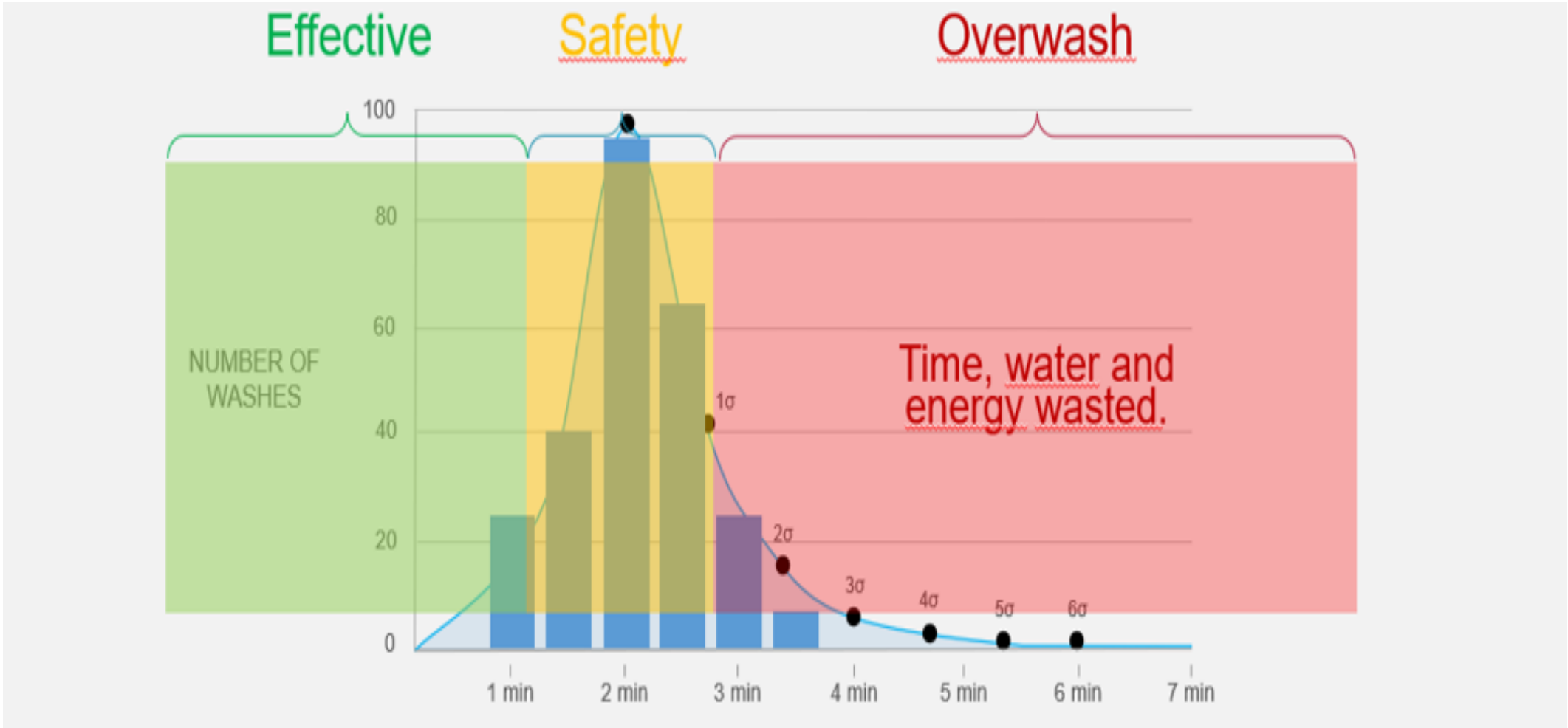


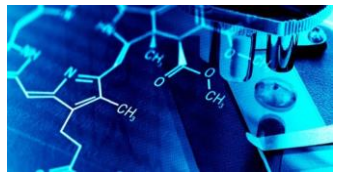


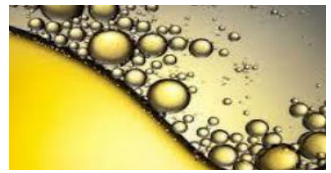
NORTHSTAR TRAINING AND ADVISORY

Time Temperature Titration Turbulence Technology Training

Cip : Optimisation : Solutions ?





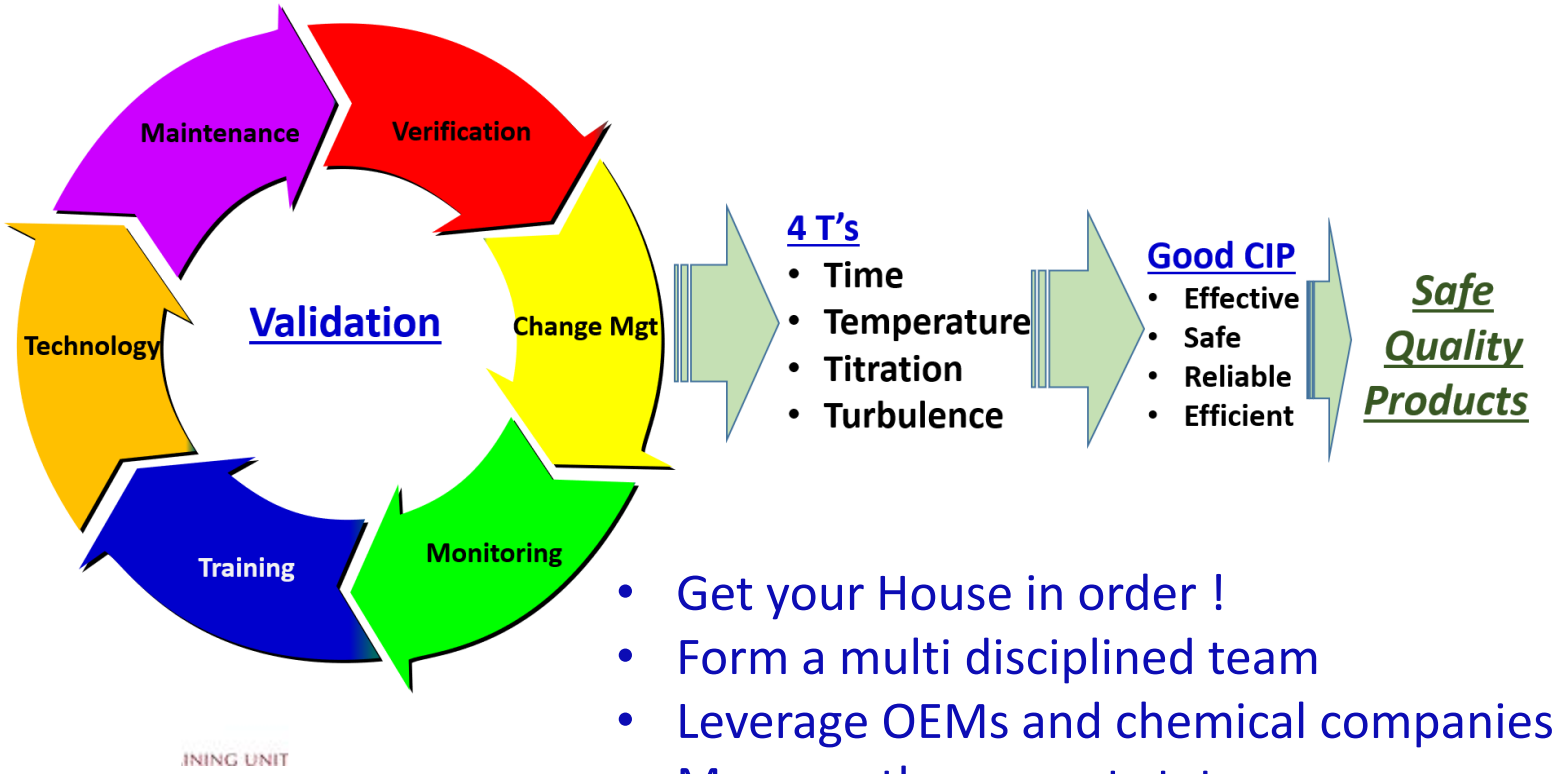


NORTHSTAR TRAINING AND ADVISORY

Time Temperature Titration Turbulence Technology Training

Cip : Optimisation :

Sum Up !

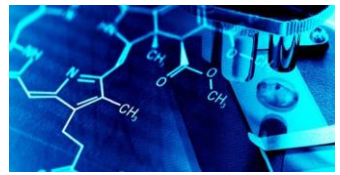


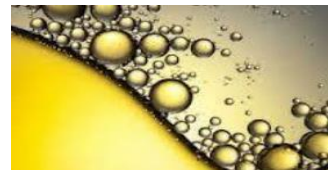
4 T's
- Time
- Temperature
- Titration
- Turbulence

Good CIP
- Effective
- Safe
- Reliable
- Efficient

Safe Quality Products

- Get your House in order !
- Form a multi disciplined team
- Leverage OEMs and chemical companies
- Measure the current state
- Target water first!
- Timely and meaningful – Don't Box tick!!!





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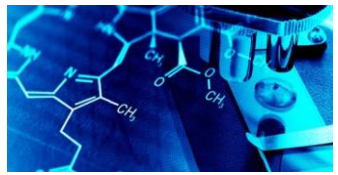
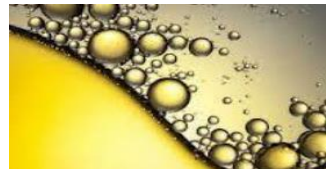
Sources + Contributors

Thank you!





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