



مجموعة التحالف العصري  
Modern Alliance Group

PAA-System

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Finntreat Oy



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**Modern Alliance Group is a Saudi company co-operating in alliances with foreign specialist companies. MAG in co-operation with Vodaflo and Finttreat conducted a toxic, odorous and corrosive gas removal pilot at Manfouha STP between 6.1.2015 – 25.1.2015. PAA-system was applied to the sludge handling part of the Manfouha process. The target of the system verification process was to eliminate H<sub>2</sub>S emissions from the sludge to be dewatered. By eliminating the H<sub>2</sub>S emissions the odor, toxicity and corrosion are also remarkably reduced.**



**Vodaflo Ltd. is a company specialized on water treatment. We offer with our partners a wide range of products to our clients. Vodaflo was established in 2013 and the key personnel have experience on water treatment for over ten years. Projects related to water treatment issues and challenging microbiological problems have been executed in Finland, Russia, Brazil, South Africa, Saudi Arabia, East Timor and on the cruise liners at Mediterranean and Atlantic. Vodaflo is also specialized in training of WWTP operators and offers a training platform. The deep knowledge of peroxides has been acquired by research and training. Peroxides combined with clever automation provide cost effective treatment solutions.**



**Finttreat Oy**

**Finttreat Oy is a process and project management adviser company founded 1982. FTOY has since then worked in KSA in various STP projects including Jubail Industrial City STP Phase 1 and WWTP Phase 1, Arana 1 of Makkah and Khumrah 4 of Jeddah. In Vietnam FTOY was involved in Hanoi water project. In EAR FTOY was advisor in Beni Suef Governorate water and wastewater project. In Finland FTOY has been involved in tens of STP and WWTP projects.**

## PAA-System utilization in Primary treatment

The primary treatment consisting of inlet PS, screening, grit and grease removal and primary clarification causes odor, corrosion and occupational health problems by  $H_2S$  in all STP due to warm septic influent. PAA-System is used by dosing PAA to influent at PS or into nearest manhole to mitigate the problems. The process control developed by VodaFlo ensures the elimination of  $H_2S$  in all the primary treatment unit operations and controls the dose to those, only.

## Sludge treatment using PAA-System

PAA-System is used to control  $H_2S$  in especially anaerobically digested sludge to eliminate odor, corrosion and occupational health problems in effective way. The  $H_2S$  is oxidized to S and the anaerobic bacteria producing hydrogen sulphide eliminated. This is why there is not any more  $H_2S$  in gaseous phase causing the problems. The pilot run at Manfouha STP proved the process to work in excellent way. The process helps in smelly partially aerobically stabilized sludge, too.

## Replacement of chlorine in disinfection

Chlorine is an old disinfection chemical for effluent. Anyway it causes harmful bi-products especially in treated sewage effluent disinfection. And as an old chemical warfare agent chlorine is dangerous if ending in wrong hands. Tens of ton containers are stored in STPs close to or even inside the cities. Tests were conducted at Manfouha STP to prove the feasibility of using PAA in disinfection of effluents of N/E and S plants.

Other disinfection methods UV and  $O_3$  are effective but act at the spot of treatment as the effect is not available outside UV unit and due to the instant reaction rate of ozone. PAA has been used for effluent disinfection in Finland during several years. A globally common strategy is to replace chlorine in disinfection of effluents that is in plans of NWC of KSA, too.



## Sludge treatment pilot at Manfouha STP

The largest waste water treatment plant in Riyadh with a daily capacity of 700000m<sup>3</sup> municipal waste water

### Problem:

- Really high  $H_2S$  levels and corrosion problems → MAG PAA peroxide system to treat raw sludge
- Raw sludge flow circa 4000m<sup>3</sup>/d (2/3 digested sludge and 1/3 thickened sludge)

### Solution: MAG peroxide system

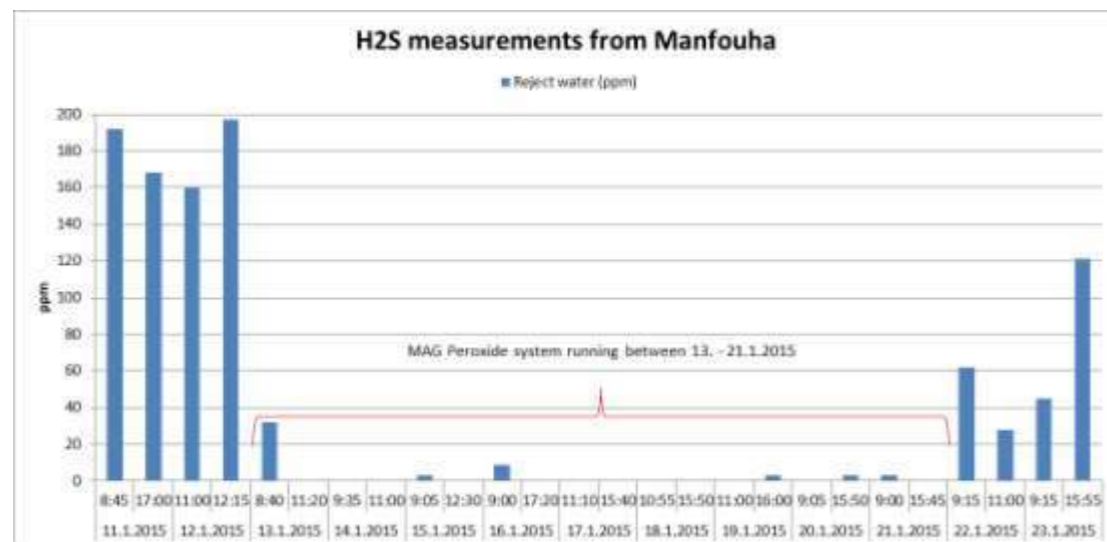
- Chemical feed to a balancing tank (V=500m<sup>3</sup>)
- Measurements after centrifuges from reject water and sludge cake

### Results:

- Almost immediate effect on  $H_2S$  levels at balance tank and after centrifuges
- 24h from the start of the chemical feed the target level max 10ppm achieved
- Operators noticed and stopped wearing gas masks
- Sulfide reduction from 24mg/l to 8mg/l



## Measurement results during the pilot at Manfouha STP



## Pilot equipment installed at Manfouha STP to treat sludge



Present us your toxic gas, odor and corrosion problem and we will propose a solution.

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## VodaFlo – peroxide system

### General Description:

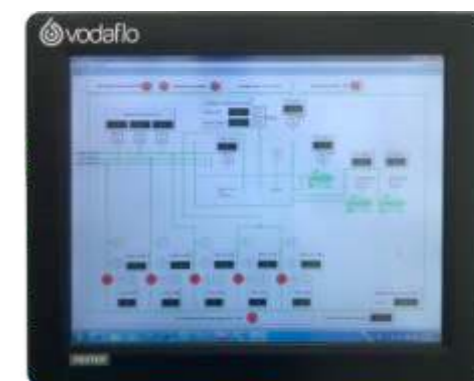
VodaFlo peroxide system is an automated system for water quality measurements and chemical feeding. Combined with latest industrial automation and network connection the system can be remotely controlled and online data stored to a cloud service. The peroxide system can be used to a wide variety of applications from disinfection to toxic gas removal. The system is suitable for potable and waste water processes and is easy and fast to apply to a working process. Only a small footprint is needed. Equipment can be delivered as a skid mount, separate units or for outside use in an isolated container.

### Applicable to:

- A new or a working process
- Potable and waste water treatment processes
- Pipelines and open channels
- Pressurized system

### Qualities:

- Toxic gas removal
  - Effective against sulfur and nitrogen compounds
  - Reduces bacteria which produces sulfur and nitrogen compounds
  - Prevents anaerobic states
  - A safe working environment – H<sub>2</sub>S is a deadly gas
  - VodaFlo peroxide system not only removes H<sub>2</sub>S but prevents it from forming
- Corrosion removal
  - Combined corrosion speed reduces
  - Corrosion in pipelines is usually from microbes called as biocorrosion (Microbially Influenced Corrosion, MIB)
  - Removes biofilm and prevents new growth
- Disinfection
  - Effective on Legionella and other difficultly removable bacteria
  - Effective on coliphages
- Automated feeding
  - To minimize the chemical consumption
  - Based on applicable measurements such as flow, ORP, H<sub>2</sub>S, sulfide, turbidity, Suspended solids
- Remote control
  - Software updates
  - Process control
  - SMS and E-mail alarms



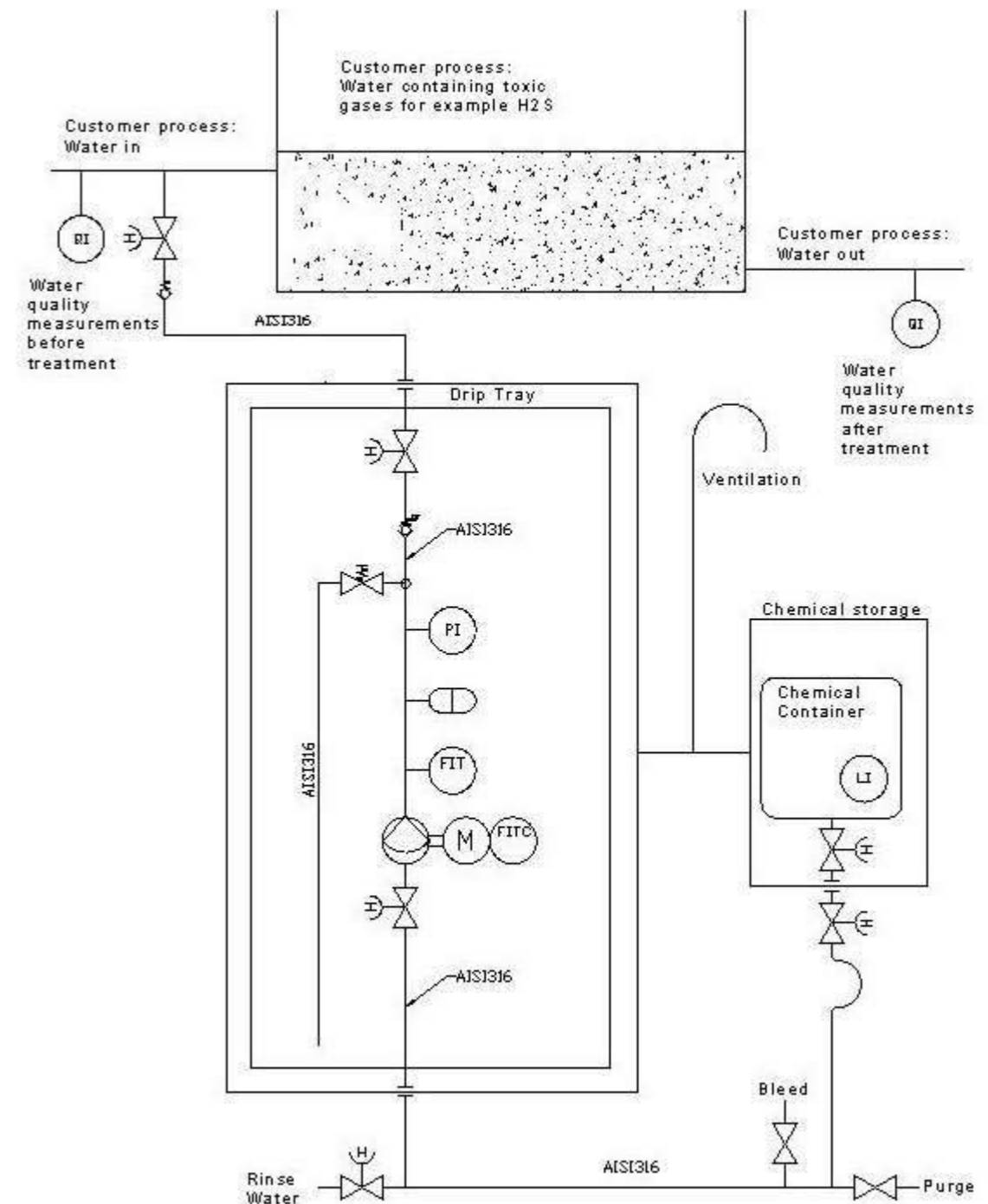


Feeding equipment installed in a container for three different feeding locations in one system

#### Technical Specifications

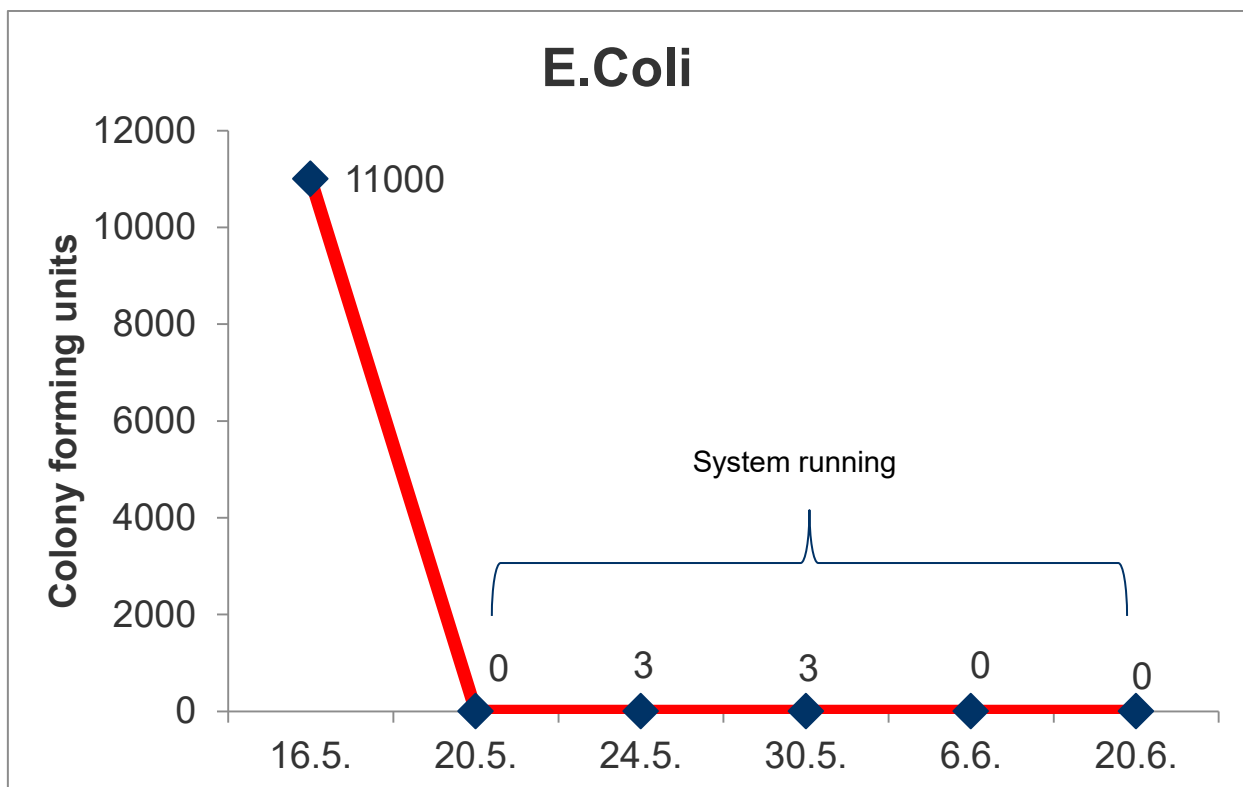
- Supply voltage: 230V, 50 Hz (others on request)
- Current consumption: circa 2kW,  
(Automation and one feeding point and installed inside, no heating needed)
- Main dimensions (LxWxD): Automation 800x600x400mm  
Pump set-up 800x500x500mm (for one feeding point)
- Weight: 200kg  
(Automation and pump set-up for one feeding point)
- Data transfer: 4G/3G/GPRS/EDGE/450
- Chemical: A peroxide depending on application
- Chemical storage: Storage size depending on usage
  - ISO-container, V 15-20m<sup>3</sup>
  - IBC-container, Material HDPE, V=1000l,
  - Offshore IBC-container, Material Stainless Steel, V=1000l, (Designed and manufactured in accordance with DNV 2.7-1 / EN12079 certification)
  - Plastic Drum, V=200l
  - Plastic canister, V=25l
- Chemical consumption: Depending on used applications  
Feeding ratio from 1:5000 – 1:250000
- Suitable materials: For feeding lines AISI316 Stainless Steel, Ø6-12mm  
For gaskets Viton, Teflon

#### A Principal drawing of the peroxide system for one feeding point



## Disinfection with PAA-system

Results of disinfection of a Finnish Waste Water Treatment plant effluent with PAA-system. Chemical feeding controlled by automation to reduce the chemical consumption. Injection rate of used chemical really low giving the system a low operation cost.



The PAA-system has high reduction rates to most bacteria and viruses. The system is effective on e-coli, choliphages, legionella, enterococcus faecalis, enterococci, etc.

### Used Chemical:

- Available as stabilized equilibrium solution
  - At the end the chemical breaks down to water and carbon dioxide
- Widely used by food industry, paper mills and medical facilities as a disinfectant. FDA and EPA approved in the USA.
- Disinfection efficiency depends on water characteristics, dose, and contact time.
- No (harmful) disinfection by-products
- Can also oxidize DPB-type (disinfection by-product) compounds and several other odor compounds (like mercaptanes), drug residues etc.
- No re-activation of microbes after treatment

