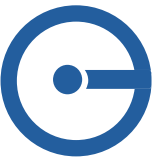


Appendix 2A: Examples of IFAS Installations



ELIQUO | HYDROK

IFAS



Integrated Fixed-Film Activated Sludge



IFAS

THE ELIQUO HYDROK IFAS (INTEGRATED FIXED-FILM ACTIVATED SLUDGE) SYSTEM HAS BEEN DEVELOPED UTILISING THE BIOTEXTIL CLEARTEC® MEDIA FOR WHICH ELIQUO HYDROK ARE THE APPOINTED SOLE UK DISTRIBUTOR. WHEN USED IN CONJUNCTION WITH THE AQUACONSULT AEROSTRIP® DIFFUSERS THIS SYSTEM OFFERS EVEN FURTHER EFFICIENCIES WITHIN THE TREATMENT PROCESS.

ELIQUO HYDROK, sole UK distributor for





ENHANCED BIOMASS FIXED BED SYSTEM

Biotextil Cleartec® is a textile product made of 100% polypropylene which by the nature of its construction creates a large specific surface area on which biomass can grow. The construction of the material permits good oxygen supply and prevents excessive growth of thick layers of biomass thus maintaining the optimum efficiency of the process. The **Biotextil Cleartec**® curtains are positioned directly above the diffusers, housed in a removable frame, set parallel to the flow. The configuration of the material allows for flexibility and movement within the flow of the tank, leading to an enhanced performance, this in turn increases the capacity of the waste water treatment plant.

A PERFECT PARTNERSHIP

In order to maximise the volume capacity of the treatment tank, diffusers should be as close to the base as possible with the **Biotextil Cleartec**® curtains positioned ideally between 40 cm and 60 cm above the diffusers. The best possible scenario is the combination of the Aquaconsult **AEROSTRIP**® diffusers and the **Biotextil Cleartec**® media. The curtains are set to allow the flow to pass between them horizontally, with the diffusers creating a vertical flow. As a result the curtains are in constant motion and if thicker active sludge layers should attempt to settle on the material these are shaken off and removed as a result of the movement. This 'shedding' process prevents blockages and maintains optimum efficiencies and minimum energy requirements. A bespoke cage system which incorporates both elements is constructed, this allows them to be lifted for routine maintenance without interfering with the operational activity of the plant.

KEY ADVANTAGES

Increased performance

Excellent nitrogen elimination

Reduction of surplus sludge

Reduced energy requirement

No textile curtain blockages



Biotextil Cleartec® facts

The purification of effluent within a waste water treatment plant using encouraged biomass growth is common practice but it is not always as efficient as it could be. Many fixed bed systems have poor attached biomass to surface area ratios, which means a low biologically active surface. To achieve a good fixed bed operation the following essential attributes should be exhibited:

A large specific surface area on which the biomass can adhere

A surface area that guarantees a good supply of oxygen, which prevents development of anaerobic areas

Optimisation of fixed bed biomass activity by utilising available maximum depth within the treatment tank

The objective is to increase the concentration of biomass activity within the aeration tank by maximising the correct type of biomass growth. This greatly enhances the tank performance and increases the purification capabilities and capacity.

The **Biotextil Cleartec®** is a submersed polypropylene fixed bed which when installed with the **Aquaconsult AEROSTRIP®** diffusers creates a combined process with both fixed film biomass and suspended activated sludge, creating an even better purification performance.

BIOTEXTIL CLEARTEC® PROPERTIES

The basic property of the **Biotextil Cleartec®** growth surfaces are loop tapes. These loop tapes are manufactured into a textile material which is flexible because of the mesh design, and creates a large surface area for the active biomass to form on and adhere to.

EXCEPTIONAL OPERATING ADVANTAGES

Enhanced performance with reduced operating costs

Increase of solid matter content within the tank without additional load to the final sedimentation

Reduction of surplus sludge

Excellent nitrogen elimination

Blockages eliminated due to the flexible nature of the Biotextil Cleartec® curtains




APPLICATIONS

New plants

Retrofit

Systems for heavily loaded industrial waste water

Compact waste water treatment systems



A highly efficient partnership between fixed bed
media and diffusers.

Version 001

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MEMBER OF **ELIQUO WATER GROUP**

Deephams

Deephams STW is a ~1m P.E ASP plant in Thames Water, and is now the largest IFAS (Integrated Fixed-film Activated Sludge) plant in the world, and also the largest Mecana PCMF (Pile Cloth Media Filter) installation in the world.

Deephams comprises of three treatment streams (A,B,C), each with rectangular PSTs, a (nominal) 100m x 100m x 3.5m ASP divided into 4 lanes each, and 16 FSTs per stream. A and B streams are highly plug flow, 4-pass lanes, whereas C stream is single pass with approximately 4:1 L:W ratio.



Figure 1- aerial view of Deephams STW before IFAS and Mecana

A conventional ASP extension and renovation programme was discounted as a viable option, given the severe shortage of space on site, and the impact this would have had on build programme. IFAS was installed retrofitted to provide sufficient additional capacity to enable A stream to be isolated in its entirety, whilst also meeting a tightening consent from 3mg/l to 1mg/l Ammonia (95%ile) in March 2017. The required upgrade was significant, as not only to account for the additional load to B and C streams, but also the necessary reduction in MLSS required to facilitate FFT to be handled with A Stream's FST's also out of service.

Eliquo Hydrok also provided the Mecana PCMF stage, installed to provide safety on the 8mg/l 95%ile effluent TSS target.

Additional measures undertaken by AMK (Aecom Murphy Kier Jv) by design included increased primary and pre-ASP dosing for load removal, maintenance of FST distribution arrangements, and air header modifications to ensure full available air capacity could be supplied to the remaining B and C streams.

The Eliquo Hydrok IFAS system is a pure integration of suspended and sessile biology, with the textile media enabling the ASP to perform as if it were operated at much higher MLSS, but without requiring additional settlement capacity from the FST's.

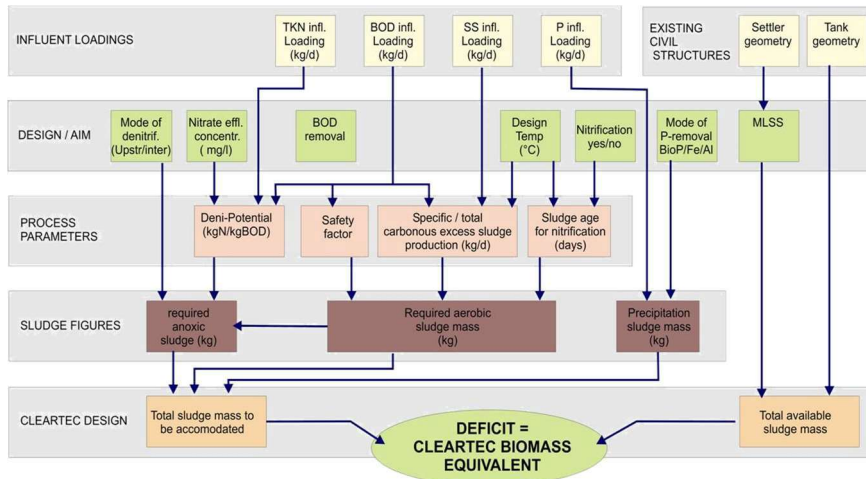


Figure 2 IFAS calculation approach

The Eliquo Hydrok IFAS system was manufactured off-site and delivered for rapid build and installation into live aeration lanes to minimise both site working and process disruption. The textile media is supported with stainless steel cages, and as such needs no baffles or sieves to retain its position within the ASP, and hence no additional requirements of the inlet works, nor of the hydraulic profile through the plant.



Figure 3 modular cages being assembled and installed

Beyond providing the temporary process enhancement to facilitate the demolition and rebuild of the principle process units at Deephams, the IFAS system has been designed in close collaboration between Eliquo Hydrok and Aecom Murphy Kier, such that the IFAS cages are able to be transplanted from the old 3.5m deep B and C stream ASPs into the new 7m deep A stream, and latterly ½ B stream ASPs.



Figure 4 Aerial view showing core scheme features



Figure 5 New A Stream 7m deep ASP, complete with transplanted cages from the old B Stream

Aeration and IFAS

Finham STW - Coventry



Scope of services

- Replace FBDA and install IFAS system
- Design
- Manufacture
- Installation
- Commission

Scope of delivery

- Remove existing FBDA
- Replace air header pipework, associated valves and droppers
- Install 8,712 Jetflex® tube diffusers - 726 per lane
- On-site erection of 'flat-packed' IFAS cages
- Install IFAS cage guides and cages

Specifics

- All IFAS cages and pipework of Grade 304 stainless steel
- 3 x ASPs, 4 x lanes per ASP, 12 lanes in total - 14 cages per lane - total 168 cages
- 197,000 sq. metres of Biotextil curtains
- Increases biomass under aeration by 33%

Technical data

- Up-rating of existing activated-sludge plant to treat a greater load to a higher standard
- Discharge permit 3 mg/l Ammonia (from March 2020)
- Population Equivalent 490,000 (2028 Design Horizon)
- Maximum flow of 266,087 cubic metres/d

Client

CiM6 on behalf of
Severn Trent Water

Completion

July 2019

Aeration and IFAS

Goscote STW



Scope of services

- Replace FBDA and install IFAS system
- Design
- Manufacture
- Installation
- Commission
- Process Support

Scope of delivery

- Remove existing FBDA
- Replace air header pipework, associated valves and droppers
- Install 3,792 Jetflex® tube diffusers - 632 per lane
- On-site erection of 'flat-packed' IFAS cages
- Install IFAS cage guides and cages

Specifics

- All IFAS cages and pipework of Grade 304 stainless steel
- 6 x ASP lanes - 17 cages per lane - total 102 cages
- 74,000 sq. metres of Biotextil curtains
- Increases biomass under aeration by 50%

Technical data

- Upgrading of existing activated-sludge plant to treat a greater load to a higher standard
- Discharge permit 1.3 mg/l Ammonia (from March 2020)
- Population Equivalent 133,553 (2028 Design Horizon)
- Maximum flow of 62,127 cubic metres/d

Client

MMB on behalf of Severn Trent

Completion

September 2019

Case Example - Goscote WwTW (Severn Trent)

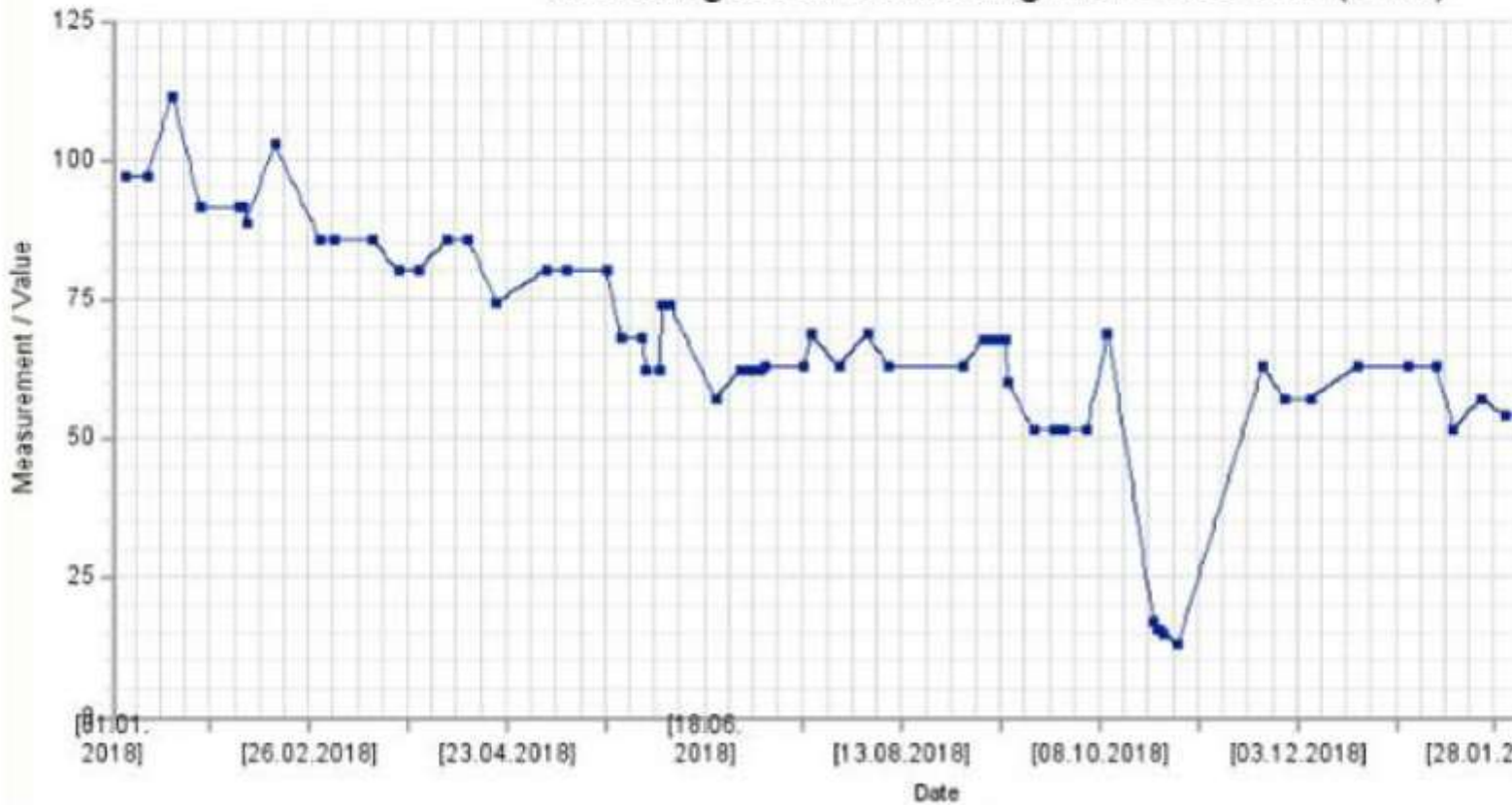
IFAS is installed in the at Goscote WwTW to upgrade an existing ASP to treat (to population increase) and a tightening of the Ammonia consent to 1.3 mg/l. successfully completed its Performance Test in December 2019.

The graph below (provided by the Main Contractor, Mott MacDonald Bentley) during and after the installation of IFAS into all six lanes of the ASP. The key

- IFAS installation commenced: January 2018
- IFAS installation completed: July 2018

Note how before the IFAS installation commenced the SSVI was around 100 during, and after, the installation of the IFAS it improved significantly and is no. The sub-contract with Eliquo Hydrok guaranteed a maximum SSVI of 100 ml/

Measuring document readings for GOSCOTE (STW)



Aeration and IFAS

Seaton Carew STW - Hartlepool



Scope of services

- Replace FBDA and install IFAS system
- Design
- Manufacture
- Installation
- Commission

Scope of delivery

- Remove existing FBDA
- Replace air header pipework, associated valves and droppers
- Install 135 Aquaconsult Aerostrip Q3.5-EU and 5 Q1.5-EU diffusers into each of the 4 x ASP lanes
- On-site erection of 'flat-packed' IFAS cages
- Install IFAS cage guides and cages

Specifics

- All IFAS cages and pipework of Grade 304 stainless steel
- 4 x ASP lanes - 4 cages per lane - total 16 cages
- 11,280 sq. metres of Biotextil curtains
- Increases biomass under aeration by 23%

Technical data

- Uprating of existing activated-sludge plant to treat a greater load
- Population Equivalent 250,000
- Maximum flow of 82,080 cubic metres per day

Client

Interserve on behalf of Northumbrian Water

Completion

April 2016
