



INTELLIGENT HIGH RATE FLOTATION UNIT

AN EFFICIENT PRE-TREATMENT SOLUTION IN CONCRETE



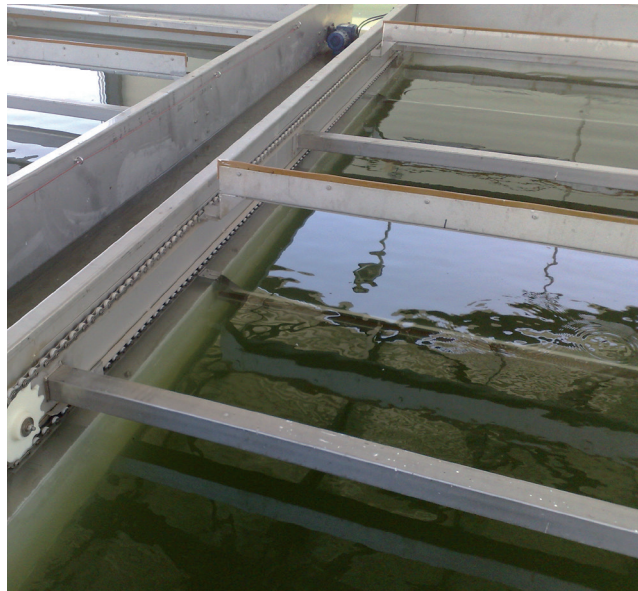
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TAKING PRE-TREATMENT TO THE NEXT LEVEL

Currently, efficient pre-treatment solutions for sea, surface, and wastewater are a major theme in the industrial and municipal water treatment markets. The rise of membrane filtration technology applications has presented companies with new challenges: to minimize costs (membranes and energy) and system failures. **The “Intelligent High Rate Flotation Unit” is a SMART solution** that guarantees maximum and efficient solids removal, taking pre-treatment technology to the next level. Especially for the purification of sea and surface water, pre-treatment solutions have to be compact, robust, stable and modular at the same time.

Our clients benefit from three major improvements compared to conventional DAF and alternative pre-treatment :

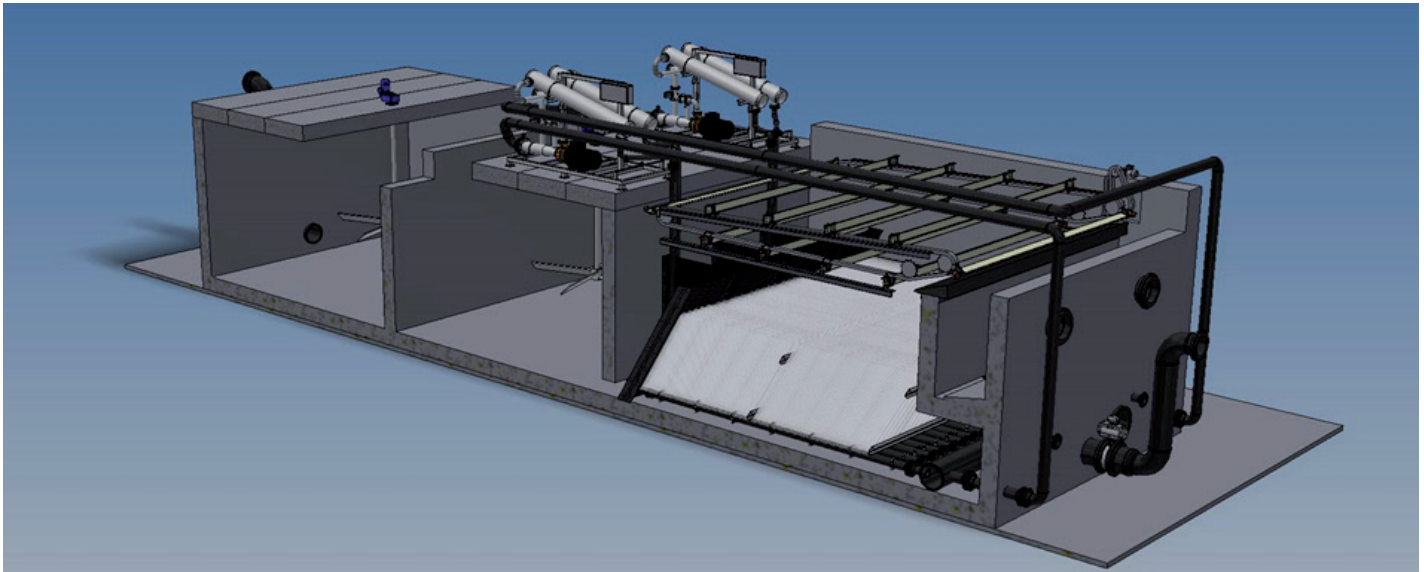
1. High quality membrane feed water due to robust and reliable removal of solids.
2. Low CAPEX, thanks to
 - Low civil cost due to compact and small footprint.
 - Standardized production.
3. Low OPEX, thanks to
 - Low energy consumption.
 - Low sludge treatment cost by enhanced sludge thickening.



The Dissolved Air Flotation technology (DAF) has proven to be very successful as a pre-treatment step. Nijhuis flotation systems have been developed since the 1970s and our pre-fabricated stainless steel units stand out as the best in its field. However, above 1,500 m³/h and by extreme wastewater conditions concrete solutions are more economical. Our experience tells us that the expenses for transport and the application of appropriate stainless steel are often too significant above this capacity.

The next generation of flotation units is developed by a multidisciplinary team at Nijhuis Industries, combining the civil and hydraulic engineering of NH₂O_K and innovative wastewater technology from Nijhuis Water Technology. It is with pride that we present the Intelligent High Rate Flotation Unit (IHRFU), a concrete based high rate flotation unit, corrosion resistant, built with proven Nijhuis technologies. The Intelligent High Rate Flotation Units are typically applied at large scale water production facilities to remove solids from surface and seawater. Medium and large scale municipal and industrial wastewater treatment facilities apply our technology as pre-treatment prior to subsequent biological treatment. The solution is based on smart modular sections of 1,500 m³/h, each incorporating innovative and efficient coagulation, flocculation and flotation functionality ensuring a compact design and lowering the environmental footprint.

Application :	Surface water	Sea water	Sewage water	Industrial water
Coagulant dosing	+	+	+ / -	+
Flocculant dosing	+ / -	-	+	+
Bottom scraper	+ / -	-	+	+
	+ required	+/- optional depending on ingoing water quality		- not required



To meet quality requirements, **the Intelligent High Rate Flotation Unit can provide a NTU of < 1** depending on water source characteristics. Unique integrated aspects are the specially designed Nijhuis plate packs and optional Nijhuis bottom scrapers which allow for higher capacity and solid loading. The Nijhuis plate packs **reduce footprint requirements by 50 – 75%** compared to a conventional DAF without plate pack. The fine Nijhuis bubble aeration system guarantees **lower energy consumption up to 30% per m³ water**. The Nijhuis smart level control reduces sludge disposal costs by ensuring high and stable dry solids content. Furthermore, the level control offers operational flexibility by anticipating on fluctuating flows without loss of solid removal efficiency. These useful features significantly reduce operations time and maintenance costs.

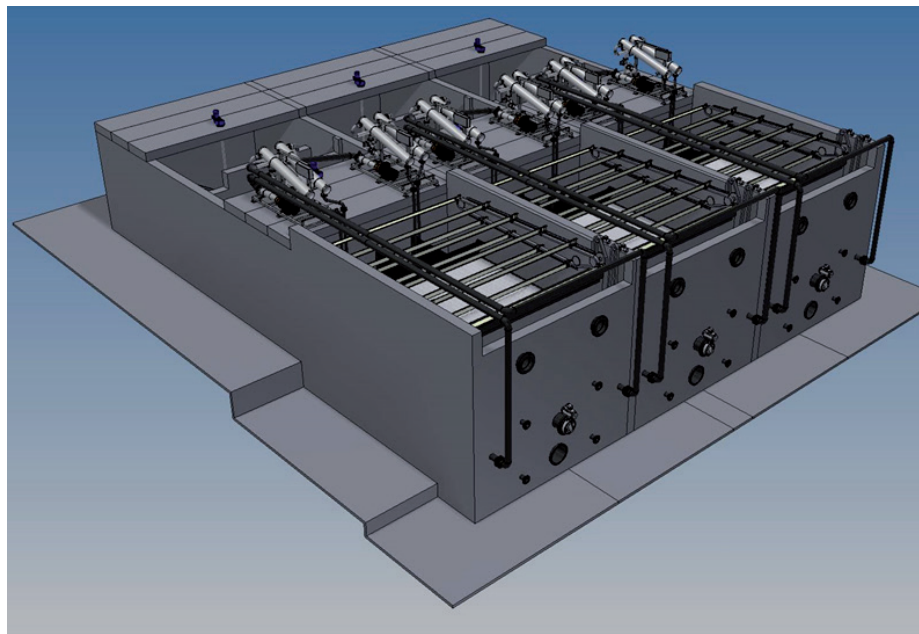
In comparison to conventional sedimentation technology, **the Intelligent High Rate Flotation Unit is able to remove over 99% of algae and over 95% of oil and grease** ensuring maximum protection of any post-treatment technology. It is a great example of the synergy between the different Nijhuis Industries companies and their expertise. Nijhuis developed the next level of pre-treatment technology by using intelligent and smart features to manage large water capacities and reduce our clients' total cost of ownership. Our smart techniques for large water flows have been combined with the company's long term DAF experience.

Parameter	Unit	Intelligent High Rate Flotation Unit	Sedimentation
Design parameters:			
• Surface load	m/h	40	1 - 2
• DM primary sludge	% dm	3 - 5	0,5 - 1
Operational parameters:			
• COD and TSS removal efficiencies		+	0
• Robustness		+	+
• Algae removal		+	-
• Footprint		+	0
• Effect of hydraulic variations on effluent quality		+	0
• Effect of variations in TSS loads on effluent quality		+	0
• Possibility for higher removal efficiencies with additional chemical dosing		+	0
• Energy consumption		0	+



BASIC SCOPE OF DELIVERY

- Civil design package.
- Technological design.
- Control design package.
- Supervision during assembly on site.
- Supervision of start-up & commissioning.
- Intelligent process control.
- Equipment package containing:
 - Nijhuis injection device for coagulation and flocculation.
 - Wall ducts and interconnecting piping.
 - Top entry mixers for coagulation flocculation chambers.
 - Nijhuis aeration skids.
 - Nijhuis top scraper.
 - Nijhuis plate packs.
 - Effluent discharge piping including control valve.



REFERENCES

Industry : Midstream Oil & Gas
Country : Netherlands
Water : Wastewater



Industry : Intake water
Country : Portugal
Water : Surface water



Industry : Adhesives chemicals
Country : Netherlands
Water : Wastewater



Industry : Poultry slaughterhouse
Country : Sweden
Water : Wastewater