

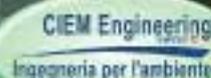
ADVANCED TREATMENT OF SPECIAL WASTE WATER & LEACHATES

MBEOX



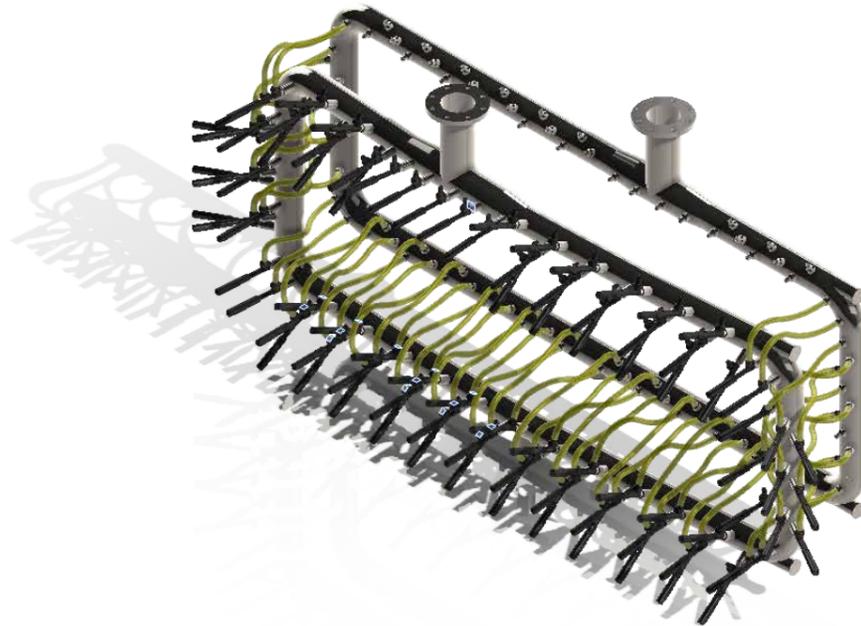
WATER IS PRECIOUS WE KNOW HOW TO LOOK AFTER IT
WE OFFER INNOVATIVE WATER TREATMENT SOLUTIONS

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 **CIEM Engineering**
Ingegneria per l'ambiente

Our expertise...

...benefiting your process.



About us

HISTORY

CIEM IMPIANTI Srl was founded in 2007 with the aim of creating innovative, custom-made solutions for issues related to polluted water and its treatment. These solutions are possible because of our continuous research and the experience our technicians have accrued over time. Since 1990, they have been dealing with wastewater treatment in partnership with Engineer Odobez, the owner of an original patented oxygenation system, Bioflotation. Bioflotation is suitable for treating mixed or industrial wastewater, which is especially resistant to approaches that use traditional bio-oxidation methods.

PATENTS AND TECHNOLOGIES

Following decades of experience and experimentation during which we have consistently applied our solutions to problematic situations, CIEM IMPIANTI Srl has gained the expertise needed to secure new patents* based on the Microbioflotation technique, an engineering development of the Bioflotation system. Used in various environments where advanced treatment of industrial wastewater takes place, the patents are applied to different European and non-European installations and prestigious multinational groups.

* BI Patent No. 0001385009
EP Patent No. 2294018
BI Patent No. 001387366
BI Patent No. 102016000054765

CIEM IMPIANTI SRL

Timeline

1978

First studies and experiments with “the Venturi advanced oxidation system” for Varese Lake.

1986

First installation of a wastewater treatment plant for the textile industry in the Biella area.

1996

Industrial Patent No. 92929 for sewage treatment in Taiwan-China.

1997

European Patent No. 0907615f for a wastewater treatment process.

2007

Founding of CIEM IMPIANTI Srl

2008

Joint Venture with ORZone Ltd



Designing and implementing large plants for industrial estates (Taiwan-China).

2009

Joint Venture with Protecmed Sl



Joint implementation of industrial and landfill leachate treatment plants (Spain).

2010

Italian Patent No. 001385009 for the cylindrical lamella separator.

2011

Italian Patent No. 0001387366 for a process and plant to purify polluted water.

2013

European Patent No. 2294018 for a process and plant to treat polluted water.

2014

takeover of STEA Engineering Srl specialising in physiochemical treatment systems.

2015

Joint Venture with NETS Group Srl



Implementation of advanced automation systems for the complete control of existing plants (Italy-Qatar).

2016

Italian Patent No. 1020000054765 for External self-priming air dissolution mixing unit.

2018

Joint Venture with TEXO Ltd



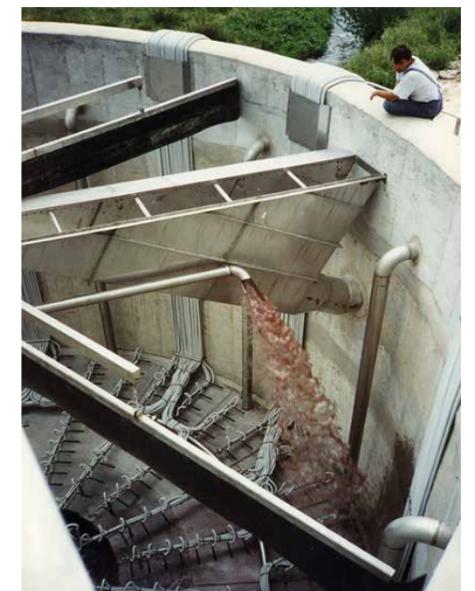
Joint implementation of industrial and treatment plants for the textile industry (Bangladesh).

2020

Founding of CIEM Engineering Swiss Sagl



New subsidiary for significant public procurements (Switzerland).



AREAS WHERE WE HAVE IMPLEMENTED SYSTEMS

Examples of our installations

Landfill leachate

Plant for treating landfill leachate through installing a biological process that uses the EOX system to reduce the organic load and nitrogen. The wastewater is then sent to a MBR + RO system.



Advanced biological system

Advanced biological oxidation to reduce the organic load and ammoniacal nitrogen. The high pressure used allows the sludge to become stable and settle easily by means of clari-flocculation.



Chemical and pharmaceutical

Wastewater from the chemical or pharmaceutical industry that can be treated with the addition of molecular oxygen or ozone, reducing highly refractory molecules.



Textile industry

Combined physiochemical and biological treatment equipped with EOX to reduce pollutants from the dyeing/processing of textiles, normally with permission to discharge into the river.



Advanced biological system

After the primary clarification, the wastewater is sent inside the bioreactor for the biological removal of the organic portion and of the ammoniacal nitrogen by means of advanced, high-pressure oxidation that uses patented^{2,3,4} EOX technology.



Third-party waste

For pre-treating wastewater, to enhance existing plants, or as a new dedicated treatment line with patented^{2,3,4} EOX technology.



Livestock manure and digestate

Process for removing the settleable and floating portion via a patented¹ SLC model circular lamella separator, for targeted wastewater treatment.



Aggre

For pre-treating wastewater, to enhance existing plants, or as a new dedicated treatment line with patented^{2,3,4} EOX technology.



Paper mill

Combining it with the EOX system enables advanced biological processes, especially for treating high-load and nitrogenous wastewater and for reducing micropollutants.



Food industry

For targeted treatments, advanced oxidation systems with EOX + O₃, filtration that uses reverse osmosis or other customised filtration systems can be applied.

1: BI Patent No. 0001385009
2: EP Patent No. 2294018
3: BI Patent No. 001387366
4: BI Patent No. 102016000054765

EOX SYSTEM

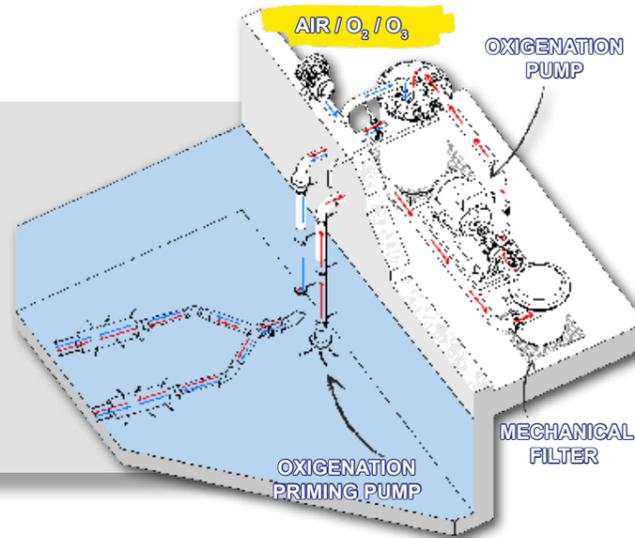


Advanced oxidation of wastewater

EOX_e

ADVANCED OXIDATION WITH EXTERNAL REACTOR

- Modular
- Can be disassembled
- Self-priming
- Atmospheric air, Pure oxygen, Ozone
- Automatic backwashing
- STAINLESS STEEL and Duplex



Efficient

- High oxygen and wastewater contact times in turbulent conditions
- High oxygen transfer efficiency

Powerful

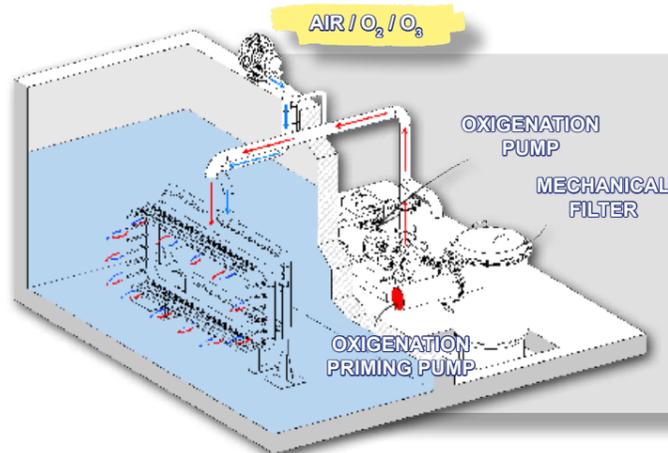
- Targeted treatment on biorefractory substances and wastewater with a high nitrogen load
- Highly active and stabilised biomass
- Reduced production of excess sludge
- Reduction of odorous emissions

Simple

- No more downtime
- Rapid maintenance without interrupting the process
- Automated with CIP systems

Durable

- The oxygenation system is external to the treatment tank and takes up less surface area
- Life span > 20 years due to the materials used



EOX_i

ADVANCED OXIDATION WITH INTERNAL REACTOR

- Modular
- Removable
- Self-priming
- Atmospheric air, Pure oxygen, Ozone
- Automatic backwashing
- STAINLESS STEEL and Duplex

EXAMPLES OF IMPLEMENTATIONS

EOX + O₂

AOP OXIDATIVE TREATMENT

EOX system with O₂ applied to the buffer/homogenisation wastewater tank. This wastewater derives from the liquid waste, leachate and sludge disposal platform. The result is increased daily quantities and loads.

3 in 1 self-priming system

- Atmospheric air
- Pure low-pressure oxygen
- Recirculation only (alternating denitrification)



EOX + MBR

ADVANCED BIOLOGICAL TREATMENT

Complete overhaul with EOX - MBR system. Objectives: discharge wastewater from the third-party wastewater disposal platform into the sewers within the limit values.

Membrane Units

- Submerged
- External cross-flow
- Containerized

EOX + SISTEMA ESISTENTE

ENHANCING EXISTING TANKS

Installation with EOX system to support existing biological treatment, treating industrial wastewater and discharging into surface water. Objectives: reduction in COD, surfactants and colour (in compliance with limitations) with a reduction in sludge production.

New customised physical, chemical and biological installations

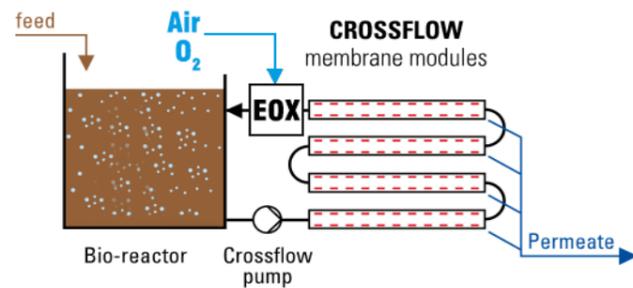
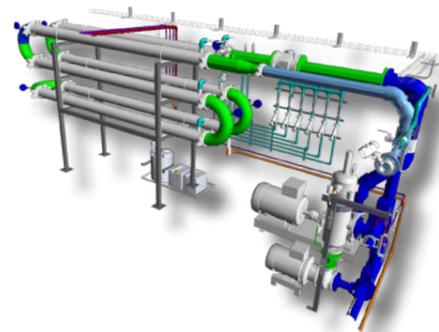


MBEOX

EOX + MBR System

ALL THE NECESSARY TREATMENT FUNCTIONALITIES IN ONE SYSTEM.

- Oxygenation
- Pre-denitro mixed liquor recirculation
- Alternating stages with post-denitro function
- Secondary sludge separation with cross-flow ultra-filtration
- Microbiological flocculation of sludge
- Significant removal on the colloidal portions
- Low levels of membrane blocking
- Energy recovery from cross-flow systems



- Large reduction in BOD and COD content; Oxidation of reducing and biotoxic agents; Removal of the ammoniacal nitrogen;
- No solids suspended at the treatment outlet;
- Removal of biorefractory components;
- Stable and high-performing** biological processes;
- Lower sludge production

REVERSE OSMOSIS

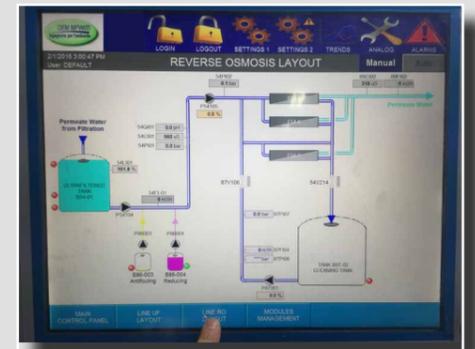
Customised configurations

Following the advanced biological MBEOX and MBR treatment, an osmosis treatment can be added.

The wastewater, previously depleted of its biodegradable component (COD, nitrogen), is forced to pass through an osmosis membrane, causing a flow of clean water (permeate) and one in which all the dissolved pollutants accumulate (concentrate).

Our technology is backed up by many years of experience in leachate treatment. This experience allows us to supply fully automated units, complete with measuring systems, pre-filtration, a washing circuit, and a ready-to-use high pressure stage equipped with pipes, accessories and valves.

The different module series allow for flexibility in sizing during the design and construction of the plant.



Systems that can be containerised



OTHER TECHNOLOGIES

WASTE-LESS System

ELECTROFLOCCULATION

Using ionic strength to destabilise colloid loads, you can achieve flocculation with immersed electrolytes that are powered by a direct current. The electrical field shatters the large organic molecules into fractions of lower molecular weight, leading to a reduction in soluble COD and facilitating coagulation. This process reduces salinity and heavy metal content.



Treatment of OI concentrates
Harmful leachates

Flotation unit

System for removing suspended solids, fats, oils and surfactants by injecting dissolved air into a tank to facilitate flotation. The material trapped in the air travels up the tank's water column and is then collected by a surface skimmer and removed from the process.

SLE lamella separator

The circular lamella separators allow you to use the whole available surface area of even existing cylindrical tanks, increasing separation capacity. In fact, the circular lamella pack makes it possible to use all the available surface area, increasing the cylindrical tank's surface area up to 10 times. This is also due to the option to modify the space between the lamellas in accordance with the specific load.



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