



Case | C-deg environmental engineering GmbH

Robust, reliable and energy-efficient pressure boosting for the harsh environment of landfill leachate water treatment

C-deg environmental engineering GmbH (C-deg), a company based in Melsdorf near Kiel, Germany, provides consulting, planning and the production of individual solutions within combustion chambers, flaring and water technology. For their containerised water treatment plants, they turned to Grundfos to supply robust, reliable and energy-efficient pumping, pressure boosting and dosing solutions for treating landfill leachate.

“We are specifically focused on treating water from landfills and addressing the challenges associated with it,” says Dr. Niels Ruhe, Managing Director and Head of Process Engineering, C-deg Germany.

“This niche area of water treatment forms the core of our water division and we are the technology leader in this field.”

GRUNDFOS 

Possibility in every drop

The situation

The C-deg subsidiary company in Colombia operates containerised water treatment plants, where water from a landfill and sourced from a storage lagoon is treated using reverse osmosis. These containerised system solutions are designed and produced at the C-deg factory in Kiel, and they are then shipped to customers worldwide.

“C-deg’s innovative containerised water treatment solutions use Grundfos pumps for water supply to the container, various water treatment steps including recirculation at high pressure in the container as well as dosing and discharge,” says Sven Schmidt, Senior Key Account Manager, OEM - DACH, Grundfos.

“Our pumps meet the specific and demanding requirements of their high-level engineering solutions, where robust, reliable and energy-efficient pressure boosting is required for their water treatment processes.”

Sven Schmidt,
Senior Key Account Manager,
OEM - DACH, Grundfos.





The critical nature of operations in Colombia means that containers are in operation 365 days a year and 24 hours a day with hardly any downtime. To ensure this, C-deg Colombia has staff locally, 15 of them are working directly in operating the plants, so there is always someone onsite with immediate support and to carry out regular cleaning and replacement of the membranes. In addition, and to provide the best possible support, the C-deg team is able to remotely connect to and fully control the SCADA system at any time.

Landfill leachate is caused in particular by the infiltration of rainwater or surface water, by the inherent moisture of the stored waste or by the infiltration of groundwater due to inadequate sealing of the landfill. This has consequences for the environment if left untreated, as an onsite C-deg employee explains:

“If untreated leachate enters rivers, lakes or the sea, this poses a notable threat to the environment. Furthermore, a high leachate level in the landfill body effects the stability of the landfill,” explains Dr. Lina Garcia, Head of operations, C-deg Colombia.

“In Bogotá we operate two plants of the latest generation. The water contains a mixture of iron salts, amino acids and other substances from the landfill, which gives it a dark colour. After treatment of the landfill leachate in one of our containerised treatment plants the water for discharge is actually cleaner than the water in the local rivers and is of drinking water quality.”

C-deg started their involvement in landfill in Colombia with combustion chamber and flaring technology.

When they saw the need for treating the landfill leachate, they supplied that as well.

“We are market leaders in delivering and operating individual solutions for treating landfill leachate and, although the initial purchase price is high, we have a proven track record delivering the lowest OPEX to customers with our solutions,” says Erika Mazo, Managing director, C-deg Colombia.

“Our business model requires that we maintain membrane performance, as our revenue is dependent on the pricing of the treated water. We also consider the high discharge water quality as our positive contribution to the environment.”

Erika Mazo, Managing director, C-deg Colombia.

The solution

Adjacent to the landfill, there is a large artificial lake lined with plastic foil. This lake receives all the landfill water, which undergoes some pre-filtration. However, the water still contains particles and other impurities. Grundfos submersible SP pumps are used for intake from the landfill lake to the treatment container. The SP pump is positioned under a floating device, to prevent contact with sludge at the bottom of the lake. Due to the harsh conditions, spare SP pumps and parts are kept on hand, although the pumps have proven to be even more durable than expected.

Once inside the container, there is a membrane filtration system with a CIP tank for cleaning, as well as dosing pumps. The containers are divided into two rooms, with one dedicated to the electronic components and the other for water treatment. The water treatment room is separated into a low- and a high-pressure area and contains the pumps, membranes and pre-filtration equipment.

For the treatment of landfill leachate, up to 60 bar pressure is required. C-deg uses Grundfos BM pressure boosting pumps for recirculation to enhance the membrane flow. The company highly appreciates the design of the BM pumps, as they can be easily installed together with the membranes. The BM pumps control the pressure and can switch between the pressure vessels to determine the volume of water to be treated.

Other Grundfos solutions installed include compact CME pumps for pre-pressurising, powerful high-pressure CRNE water transfer pumps and UNILIFT pumps for emergency drainage.

The variable frequency drive built into the CME and CRNE pump motors can be seamlessly integrated into the bus system for digital communication using the Grundfos Communication Interface Modules (CIM) and MP204 motor protection.

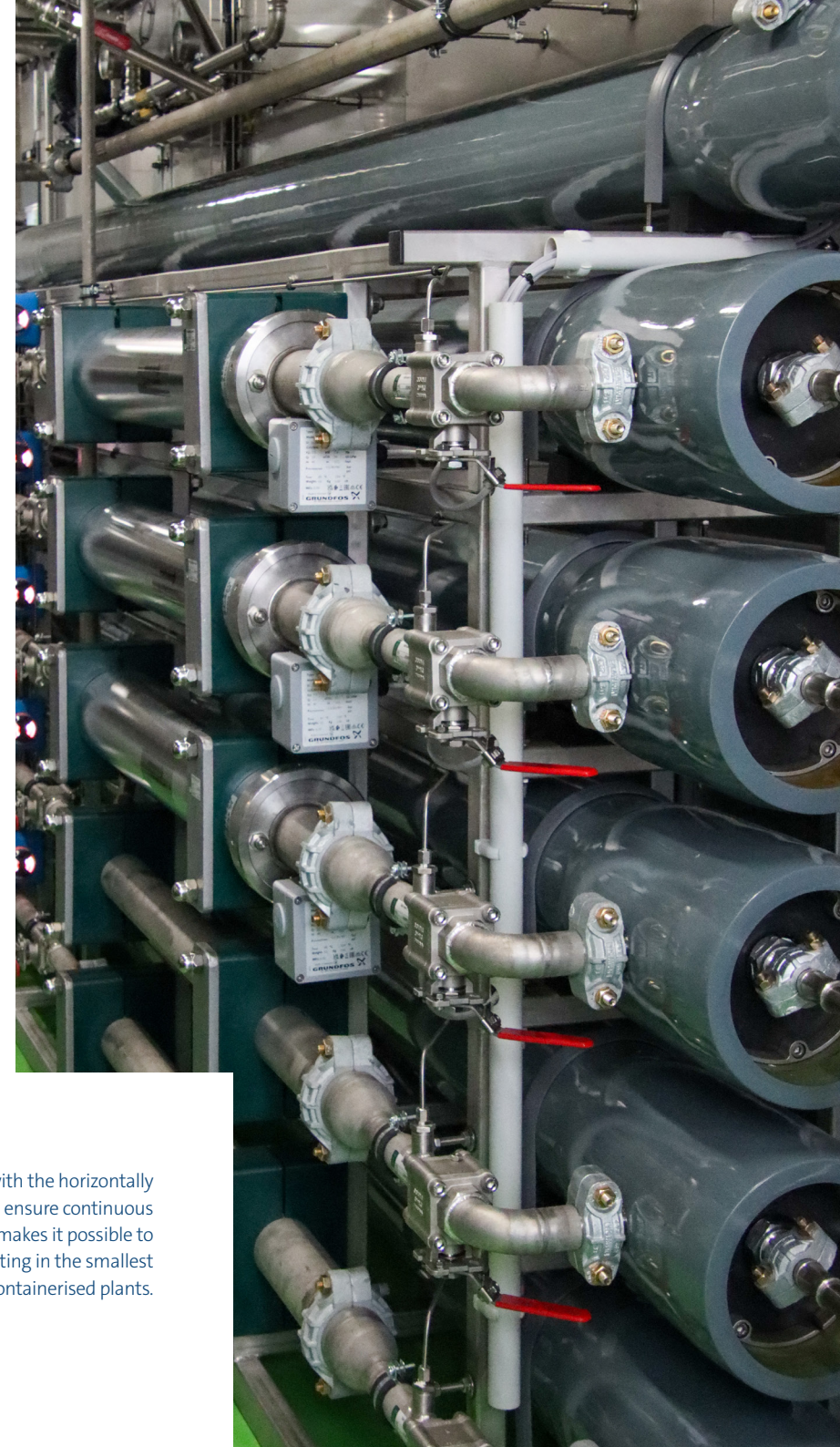
“We use specialised membranes, and we are experts in programming and optimising the process technology,” says Burkhard Maack, Senior Programmer, C-deg.

“We get the best possible performance data supplied by the Grundfos CIM modules and fieldbus solution, and this means we can monitor our installations at great distances; we can provide immediate support to our teams in Colombia and keep downtime to an absolute minimum.”

“Keeping our units running 24/7 and being able to handle breakdowns quickly is essential, as the lagoons can overflow especially during rainy season, leading to water contamination if not properly treated,” concludes Johnatan Vargas, C-deg Colombia.

“Although the membranes in the lagoons prevent exposing contaminated particles to the environment, we consider the reliable and efficient pumps from Grundfos as critical to prevent contamination exposure.”

Membrane treatment by reverse osmosis equipped with the horizontally installed BM pumps to maintain stable pressure and ensure continuous flow over the membranes. The horizontal installation makes it possible to use the same rack for membranes and pumps, resulting in the smallest possible footprint, which is a requirement for containerised plants.



The outcome

C-deg considers the Grundfos product portfolio to be the best solution package available on the market; they have not found anything better elsewhere. The 40 ft containerised water treatment plants used in Colombia can treat up to 650 cubic meters per day. C-deg currently owns and operates seven plants in Colombia and treats over 1.5 million cubic meters leachate per year.

“We are not just the supplier of technology, we are also the operator,” says Dr. Niels Ruhe, Managing Director and Head of Process Engineering, C-deg Germany.

“We are our own customer and therefore expect the best and most efficient solutions. High availability and low operational costs are the keys to our success. Furthermore, we need partners like Grundfos who have service partners all over the world. Even the best technology needs maintenance or replacement from time to time. In our business it is essential to avoid

long downtimes, and we consider the solutions from Grundfos to be the best available on the market.”

Sven Schmidt from Grundfos agrees that C-deg’s success in Colombia lies in recognising the necessity of a strong partnership to tackle the complex high-level engineering challenges for each installation.

“The way C-deg has integrated our products and data communication into their systems shows that with high-level engineering, even the most critical landfill wastewaters can be handled and reused,” says Sven Schmidt, Grundfos.

“Our products not only exemplify the best possible engineering for the most critical wastewater; our solutions also provide the operating expenditure and energy-saving benefits that we know are important to partners like C-deg building customised solutions.”



CRNE pumps for high-pressure water transfer



Compact CME pumps are used for pre-pressurising

Benefits from working with Grundfos

- Robust, reliable and energy-efficient pumps that match requirements of C-deg’s high-level engineering solutions
- Quality solutions that ensure minimum downtime and lowest OPEX over time in critical installations
- A partnership that ensures continued R&D for handling and reusing the most critical landfill wastewaters



Grundfos products used by C-deg – and the reasons why

- **SP 18-3 NE submersible intake pumps**
Robust and efficient pump that is able to withstand the difficult intake conditions in the lake.
- **BM 18-5 NE pressure boosters:**
An unrivalled design that enables the high power density of the C-deg containers up to 650 m³/d landfill leachate in a one-container design.
- **CRNE 15 high pressure transfer pumps:**
Very good pump performance in the standard versions and unrivalled in the SF series with pump pressures up to 50 bar. The built-in frequency converters can be seamlessly integrated into their bus system.
- **CME15-3 compact pumps for initial pressure:**
Ideal pump with a compact design and integrated variable frequency drive that offers flexibility for installation in containers.
- **DDA SMART Digital dosing:**
Compact dosing pumps with flexible adaptation of the display and control elements to C-deg's systems design.
- **UNILIFT AP lifting stations:**
Robust lifting stations that can be quickly replaced if necessary.
- **CIM500 communication interface and MP204 motor protection:**
Best possible performance data enables remote monitoring and immediate action, integrating seamlessly with the CRNE and CME E-pumps.

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