

HOW IRELAND'S TRINITY COLLEGE IS USING CLOUD TECHNOLOGY FOR DESIGN OF WATER TREATMENT PROCESSES DURING COVID-19

Does the design of water and wastewater treatment plants in your business still rely on manual, repetitive and linear approaches? If yes, then, chances are that your designs are being delivered inefficiently.

According to a recent Frost & Sullivan Report on Environmental Intelligence, “inadequacy of the current environmental analytical tools” is one of the main challenges faced by the water/wastewater sector. This trend extends to the initial design of an efficient wastewater treatment plant.

Whereas most industries are thriving with the use of technology, the water

sector still falls under the “laggard” or “late majority” categories for adopting new technologies. At the same time, competition continues to increase, and it has become important for water and wastewater engineering businesses to find new ways to work efficiently and effectively. Water design engineers and consultants know that there is a massive potential for cost saving and efficiency gains but putting changes into practice is difficult.

For many years, the availability of integrated design and process simulation packages has not serviced industrial, reuse and drinking water plant designs

as well as it has for biological treatment plants. Engineers and designers in many cases still rely on manual, repetitive spreadsheet-based processes. Design packages, when available are based on mathematical simulation products that have been repurposed from other industries and difficult to learn and based on desktop pcs that are limited in terms of processing power, data storage and tools for collaboration. Emerging technologies for industrial water treatment and drinking water are often not covered at all.

Cloud-based products have the potential to deliver significant innovations to treatment plant design packages by lev-



Design of water infrastructure and wastewater treatment still relies on manual, repetitive and linear approaches. Optimisation of designs is slow and inefficient and multiple tools are needed to deliver engineering projects. During COVID-19 Pandemic, Ireland's Trinity College, one of the world's most renowned universities and has been teaching engineering since 1841, began using EVS Water Plant Designer to simulate landfill leachate processes.

🔧 CHAIM KOLOMINSKAS, GLOBAL HEAD – WATER AND WASTE - 🔧 DARREN SZCZEPANSKI, PRODUCT MANAGER – SMART WATER

eraging on-demand increases in processing power and storage as well as the ability to work simultaneously on designs, work remotely and integrate workflow and audit trail capabilities that are critical in delivering effective designs.

Identifying the opportunity in drinking water and industrial water treatment design, Envirosuite, with a long history of delivering complex modelling solutions through cloud-based platforms, recently integrated an emerging and innovative technology in the process design market into its EVS Water Portfolio through an acquisition of AqMB, an emerging provider of design and digital twin solutions for the water industry.

“We recognised that there was a real need for better products in the industrial and drinking water design space. AqMB had embedded strong and deep

technical knowledge in a product that serviced a clear gap in the market for engineers and designers of water and wastewater treatment plants and Envirosuite has demonstrated success in delivering complex environmental modelling solutions that leverage the power of cloud computing around the world. We look forward to delivering this product to engineers and designers around the world over the coming years”, says Global Head for Water and Waste at Envirosuite, Chaim Kolominskas.

Cloud-based technology has allowed:

- ★ More rapid integration of emerging models for water and wastewater treatment. Plant Designer covers nearly all current drinking water and industrial water treatment technologies and has recently integrated key treatment models for biological treatment. It is unique

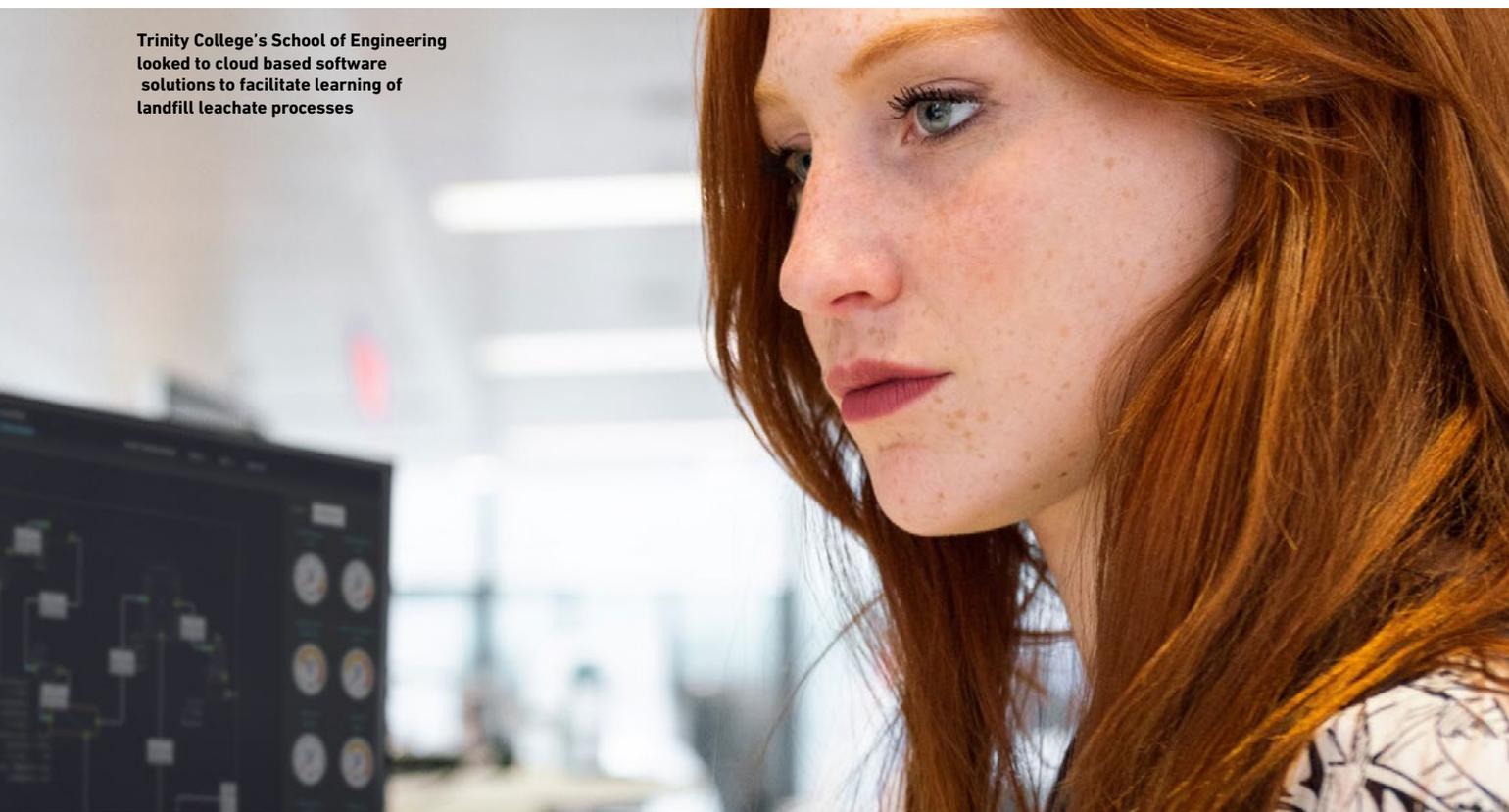
to see such broad coverage of treatment processes in the one product.

- ★ The ability to simulate many models simultaneously. This has led to an innovative capability of ‘automated optimisation’ where 1000s of model scenarios are generated before the best fit for target performance is recommended. This leads to significant savings in design times.

- ★ Easier integration and export of engineering deliverables such as equipment

Cloud-based products deliver significant innovations to treatment plant design by leveraging on-demand increases in processing power

Trinity College's School of Engineering looked to cloud based software solutions to facilitate learning of landfill leachate processes





sizing, lifecycle costs, material and energy balances and stream properties leading to further design savings.

★ Simultaneous design, review and audit trail capabilities facilitating much easier remote working and true collaborative process design.

Importantly, the cloud also makes integration of these deterministic models much easier into broader digital twin applications with the ability to process large volumes of real-time information and couple with powerful data science and machine learning capabilities to deliver real-time and predictive management to water and wastewater treatment plants once they have been built.

“The cloud allows us to integrate deterministic models and machine learning approaches, which significantly improves forecast accuracy and speeds up implementation time compared to machine learning only approaches. Having a deterministic model baseline also ensures that the model doesn’t drift, giving our customers better confidence in the recommendations for optimisation. Having spent 20 years in the water sector, we recognised the caution that the water industry has for artificial intelligence only approaches and wanted to make sure that our products are always grounded in strong, leading science and we think we’ve struck the right balance with this approach. The emergence of cloud computing has made that all possible”, says Darren Szczepanski, founder of the product.

Ireland’s Trinity College is now using EVS Water Plant Designer to learn

The cloud allows us to integrate deterministic models and machine learning approaches, which significantly improves forecast accuracy

'tricks of the trade' for water treatment processes during COVID-19

When teaching design of water treatment processes, engineering schools are looking for ways to communicate complex science efficiently and effectively. Benchtop or theoretical exercises can be slow and remote learning can be difficult.

Ireland’s Trinity College is one of the world’s most renowned universities and has been teaching engineering since 1841. The School of Engineering has a strong focus on quantitative and analytical methods, the application of innovation and the use of new technology to solve problems in the natural and built environments.

The Challenge: COVID-19 hindering collaboration and practical research outcomes

As the COVID-19 pandemic emerged, the University faced a number of challenges in teaching wastewater treatment process design effectively. In-person collaboration was restricted, and benchtop studies became impractical to deliver.

The University was conducting research on landfill leachate treatment and needed a new solution to simulate the treatment processes, understand the implications of different treatment options while still being able to effectively teach the principles of the treatment processes and technologies involved.

The Solution: Learning industrial and biological modelling processes using a single, cloud-based platform

To facilitate a number of higher research projects, Trinity College began using EVS Water Plant Designer to simulate landfill leachate processes. The platform is cloud based and designed for collaborative, remote learning. Multiple users can work on the same design simultaneously and comprehensive audit trail and review functionality makes the teaching and review process much more efficient than traditional methods.

Envirosuite integrated an emerging technology in the process design market into its EVS Water Portfolio through an acquisition of AqMB

The platform also provides an automatic calibration function and is supported by excellent-practice models. Thousands of model configuration scenarios can be simultaneously compared and evaluated to provide accurate and reliable calibrated model configurations for the target design, significantly speeding up the calibration and optimisation process.

EVS Water Plant Designer was also able take data directly from the EPA in Ireland to understand excellent-practice models and how they impact process de-

Trinity College’s School of Engineering looked to cloud based software solutions to facilitate learning of landfill leachate processes

sign, facilitating the research and learning of wastewater treatment process design in a collaborate and cost-effective manner.

“Using the technology, the students are able to efficiently design water treatment plants and simulate a variety of treatment processes. EVS Water Plant Designer has been very helpful for teaching the principles of water and wastewater treatment.” – Dr David O’Connel, Assistant Professor, Contaminant Hydrology and Hydrogeology (Trinity College, Dublin).



EVS Water Plant Designer was also able take data directly from the EPA in Ireland to understand excellent-practice models



The University was conducting research on landfill leachate treatment and needed a new solution to simulate the treatment processes

A chance to see it yourself

Design of water infrastructure and wastewater treatment still relies on manual, repetitive and linear approaches. Optimisation of designs is slow and inefficient and multiple tools are needed to deliver engineering projects. In Envirosuite’s website you can find a free 30 day trial

of EVS Water Plant Designer to significantly reduce the time it takes to design water processes.

EVS Water Plant Designer is a digital plant design platform for drinking water, industrial and biological drinking water treatment processes used by the world’s leading engineers and consultants.

