



## Project Summary

### Organization

Hidroing d.o.o.

### Solution

Water Networks

### Location

Varaždin, Varaždin County, Croatia

### Project Objectives

- Develop an accurate hydraulic model for a 1,262-square-kilometer section of a water network.
- Assess the network performance, recommend improvements, and propose future development measures for Varkom's water network.

### Products Used

WaterCAD<sup>®</sup>

## Fast Facts

- Varkom D.D. provides water and wastewater utility services to 175,000 people in Varaždin County, Croatia.
- Hidroing created a GIS database for the water network to allocate accurate water demands and elevations in the model for the EUR 500,000 project.
- By directly connecting the WaterCAD model with the GIS database, spreadsheets, and background maps, users could quickly and precisely load data into the model.

## ROI

- Using WaterCAD's sub-modeling capabilities enabled the project team to deliver the project three months ahead of schedule.
- The project team reduced the time needed to complete the project by 600 resource days.
- An estimated 70 percent of time was saved in model preparation and more than 70 percent in model management and preliminary designs.

# Hidroing d.o.o. Reduces Water Loss for Croatian Water Supply Network

WaterCAD's Modeling Capabilities Produce Accurate Hydraulic Model in 70 Percent Less Time

## Developing a Hydraulic Model

Varkom D.D. (Varkom) brings water and wastewater utility services to 175,000 people across seven townships and 20 municipalities in Varaždin County, Croatia. The organization wanted a feasibility study completed to help better manage its assets spanning the 1,650-kilometer supply network, which included 23 water tanks and 36 pressure stations.

As an organization specializing in preparing and supervising hydraulic structure construction, Hidroing d.o.o. (Hidroing), in partnership with three other companies, undertook the EUR 500,000 feasibility study to develop a precise hydraulic model for Varkom. The goal of the model was to assess network performance, recommend improvements, and propose future development measures.

Hidroing was responsible for 1,262 square kilometers of the network and needed to complete a hydraulic model within a year. The project consisted of water loss analysis, field measurement, district metered areas (DMAs) zoning, and pressure management. The biggest challenge, however, was phasing the development of the hydraulic model, as the field data came in eight phases during the project's timeframe.

## Providing Accurate Model Data

To develop a model that reflects reality, Hidroing integrated the WaterCAD model directly to the GIS database, obtaining background maps, a 3D terrain model, and meter data that included meters for every commercial, residential, and institutional building. Using WaterCAD as the main modeling platform, the team could connect the model to the different data assets, reducing the time needed for model preparation and alterations. This connectivity allowed users to quickly and precisely input data into the model, swiftly providing an accurate representation of the site.

The project team connected a detailed database with 41,000 water meters to the model to incorporate the most accurate water demands in the model. Information included the owner name, address, yearly consumption, and type of user, making it easy to switch between season consumption periods and enabling direct demand allocation. Additionally, the project team added sub-models, which allowed team members to work on almost every main task simultaneously, saving three months on delivery.

For the 3D terrain model, WaterCAD's TRex functionality allowed the team to allocate accurate elevations for the entire area, avoiding possible problems during pipe calibration based on pressure. The final model was Hidroing's most precise model to date.

## Improving Decision Making

The main benefit seen by the project team was improved calculation accuracy for better decision making, with all information in one easily accessible location. Using the LoadBuilder capability within WaterCAD, the team applied water loss per DMA, enabling a direct connection of real losses to pipeline length inside the DMA selection set. In the next phase, the team calculated water loss using the Fixed and Variable Area Discharges (FAVAD) method, correlating pressure and water loss by implementing WaterCAD's flow emitter capability to simulate leaks. These capabilities allowed Hidroing's team to identify the best scenario for pressure management with calculation of financial benefits due to water loss reduction.

The improved accuracy of this model was an important capability for the system owner. Hidroing used various WaterCAD capabilities for energy calculation, leakage reduction, demand allocation, and other important data. The owner felt secure when making decisions based on the model as the data was accurate and up-to-date. The model allowed the owner to have a new view of the water network because all the vital information was located in one place.



*The WaterCAD model was integrated with GIS and other data sources to ensure accurate model data and a reflection of reality.*

*“Bentley’s WaterCAD capabilities, combined with different database formats, enabled us to make a precise hydraulic model with accurate results, thus enabling the final beneficiary to bring valid decisions for their water supply network development.”*

*– Igor Dundovic,  
Project Manager, Hidroing d.o.o.*

### **Reducing Water Loss, Achieving Significant Savings**

Hidroing helped the system owner reduce water loss by 2 million cubic feet per year by using various capabilities in WaterCAD. These savings will help the owner accumulate funds for future network development as well as increase service quality for the entire county. The savings also positively affect the surrounding environment, as the water is pumped from underground wells. Since the pumps are not using as much energy as they were previously, the network now reduces carbon dioxide emissions in addition to water and energy usage.

By implementing WaterCAD during the modeling process, the project team saw significant savings for its own work. For instance, Hidroing needed less experts to help with the model development, which saved the organization money.

The team also estimated that 70 percent of time was saved directly in model preparation and an additional 70 percent of time was saved in model management and preliminary design. Overall, the project team conserved 600 resource days by using WaterCAD and completed the project within the required 12-month deadline.

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