Drinking Water Distribution System (DWDS) Digital Twin (DT)

gqc
HydroTrek

- SCADA
- IoT
- Assets

Real-time Data Ingestion

- Hydraulics Model
- Multi-parameter Water Quality Model

Real-time Simulation Engine

Optimization of Operations

- Pumping Energy Reduction
- Water Quality Improvements
- Leak Detection
- Reduction of main breaks

Advanced 2D and 3D Visualization

- 2D GIS
- SCADA HMI
- Cesium 3D
- Google 3D

Overview

- Proven technology tested across multiple utilities to reduce pumping costs, improve water quality, and minimize main breaks.
- Real-time model calibration using data from SCADA and IoT systems for accurate system pressure predictions.
- Tools to detect leaks, identify contaminated areas, and prevent system-wide boil-water advisories.
- Continuous simulation of hydraulic and water quality parameters under normal and emergency conditions.

Features

- Changes the demand values to reflect the actual flows from the pumps and tanks, which then calculates the systemwide pressures with the improved representation.
- Leverages SCADA data and IoT telemetry to change settings in the models. For example, the DT changes a PRV downstream pressure setting or a valve setting to match the SCADA values.
- Shows the impacts of leaks and breaks to improve the determination of resiliency
- Calculates the concentration of multiple water quality parameters at each time step.

Figure 1. An Elevated Tank and Its Model in 3D

Figure 2. Advanced Real-time Charts with AI prediction

Advantages

- Provides insights into the complex interrelationships between the pressures, the flows, the water quality and the incidents such as leaks and breaks.
- The 3D visualization improves the spatial understanding and highlights the any asset geographic data discrepancies compared to the ground truth.
- Lowers operations energy costs and shows opportunities for improving water quality
- Increases the resilience through the modeling of the impact of what-if catastrophic events