



Modeling Gas Utility Systems with Precision: How Magnolia River Uses GASWorkS to Replace Reactive Operations with Engineering Confidence

AT A GLANCE



Customer: Magnolia River

Product Used: GASWorkS™

THE CHALLENGE

For decades, gas utility teams have managed multi-million-dollar distribution networks with a patchwork of disconnected tools - Excel for pressure and flow math, AutoCAD for design drawings, ArcGIS for asset records, and aging proprietary software nobody fully understood anymore. Institutional knowledge sat in retired superintendents' notebooks. Problems got found in the field, not in the planning phase.

For Allen Hughes - who spent 19 years at Sheffield Utilities in Alabama before joining Magnolia River - the question wasn't whether modeling mattered. It was whether the modeling could be trusted to make defensible decisions about what to replace, where to expand, and how to serve new customers without guessing.

"WE NEEDED A WAY TO MAKE DEFENSIBLE DECISIONS ABOUT WHAT TO REPLACE, WHERE TO EXPAND, AND HOW TO SERVE NEW CUSTOMERS, WITHOUT GUESSING."

- ALLEN HUGHES, SENIOR TECHNICAL LEAD



The pressure on small and mid-sized utilities to do more with the same crew has only grown. Cast iron replacement programs run on tight regulatory timelines. New commercial and industrial customers - asphalt plants, data centers, schools - want hard answers on capacity in days, not months. And every utility runs the risk of finding a low-pressure pocket the hard way: on the first cold snap of the year, with a hospital or school on the receiving end.

Iterative modeling of an entire gas network without dedicated software would take weeks - if not months - to complete and troubleshoot. Without a model, most system planning is forced into smaller, semi-linear analyses that can be solved with a flow equation and a few iterations - but never give the full picture of what's happening across the network.



THE SOLUTION: GASWORKS

GASWorkS™ is a steady-state network modeling platform built specifically for natural gas pipeline systems. In continuous development since 1991, it scales from small-town distribution networks to massive regional transmission systems with unlimited nodes. Under the hood, a Newton-Raphson nodal iterative solver calculates exactly what's happening at every point in the network - pressure, flow, velocity, and velocity violations, and contrary conditions - and surfaces problems through a map-style, color-coded visual interface.

At Magnolia River, GASWorkS is the modeling foundation behind decades of utility consulting work. The team uses it across new-system planning, long-range growth forecasting, capital project optimization, critical-valve outage analysis, regulator throughput verification, and DIMP program support.

"MODELING GIVES YOU PEACE OF MIND. YOU CAN RUN MANY SCENARIOS AND SEE EXACTLY WHAT HAPPENS WHEN YOU SHUT A REGULATOR OFF, SHUT IN A SECTION OF MAIN, OR A COLD SNAP COMES THROUGH."

- AUSTIN GAY, DIRECTOR OF ENGINEERING

The platform's flexibility lets engineers match the physics to the system. Magnolia River typically uses IGT Improved for distribution modeling and Panhandle A for higher-pressure transmission systems - and can mix equations within the same model when a network spans multiple operating conditions. Combined with native import from AutoCAD (DXF) and ArcGIS shape files, the team can stand up a working model from a utility's existing infrastructure documentation without re-keying data.





WHAT SETS GASWORKS APART

Magnolia River has worked with multiple modeling platforms over the years. Two differentiators consistently bring them back to GASWorkS. First, the total cost to purchase and maintain a GASWorkS license is meaningfully lower than comparable platforms while delivering similar output. Second, GASWorkS arrives as a single, integrated package. Competing platforms typically require multiple add-on modules to deliver the full functionality GASWorkS offers out of the box – a difference that compounds over the lifetime of a license.

THE RESULTS

A 4.6-mile cast iron replacement that saved over \$100,000 – and paid for the software

When Sheffield Utilities embarked on a 10-year cast iron replacement plan presented to the Alabama Public Service Commission, the GASWorkS model drove every sizing decision. Along the riverfront – where six-inch cast iron had served the heavy iron-and-steel industry of the 1950s, but the area had since converted to high-end residential – the model showed that two-inch polyethylene was more than sufficient.

By modeling the system with GASWorkS, Sheffield Utilities determined that 4.6 miles of their cast iron replacement plan could be downsized from six-inch to two-inch polyethylene. The material savings alone exceeded \$100,000 - enough to offset the cost of the GASWorkS software and the time invested in building the model.

"THE MODEL TOLD US WE COULD REPLACE SIX-INCH CAST IRON WITH TWO-INCH POLYETHYLENE. THE SAVINGS ON JUST THAT 4.6 MILES WAS ENOUGH TO PAY FOR THE GASWORKS SOFTWARE OUTRIGHT."

- ALLEN HUGHES

Half-a-PSI accuracy on a 25-PSI system

Sheffield's model started within ± 3 PSI of real-world pressures. With a few months of tuning - aided by hourly temperature, pressure, and volume data from electronic correctors at commercial and industrial customers - that improved to within ± 1 PSI. Within two years, it was within ± 0.5 PSI.

"WITHIN TWO YEARS OF CREATING THE MODEL, WE HAD IT WITHIN HALF A POUND OF ACCURACY ON A 25-POUND SYSTEM. THAT CHANGED EVERY CONVERSATION WE HAD ABOUT CAPACITY. WHEN THREE ASPHALT PLANTS CAME IN ASKING FOR 40 PSI, WE COULD CONFIDENTLY TELL THEM WHAT THEIR REGULATORS ACTUALLY NEEDED - ABOUT 10 PSI - AND SERVE THEM WITH THE SYSTEM WE ALREADY HAD."

— ALLEN HUGHES





170 feet of new main instead of three blocks

On the first morning back from Christmas break, a high school fired up a new furnace installed over the holidays and immediately ran short on pressure. Students were sent home. The gas superintendent's first instinct was to run three blocks of new main to the nearest two-inch line. The engineering team consulted the model first.

"THE GASWORKS MODEL SAID NO - YOU NEED TO RUN 170 FEET TO THE BACK SIDE OF THE SCHOOL. THEY HAD IT UP AND RUNNING WITHIN A FEW HOURS. THE KIDS WERE BACK IN CLASS THE NEXT MORNING."

- ALLEN HUGHES

A 2 PSI pocket pushed back to 20

On a recent project for a mid-sized Southeastern utility, Magnolia River built a system model and quickly identified a section where pressure dropped from over 30 PSI on one side to roughly 2 PSI on the other - in an area serving a hospital and several large commercial customers. The utility confirmed they'd noticed it the previous winter during a cold snap. Magnolia River modeled a 700-foot, two-inch polyethylene tie between two points on the same MAOP where pressures differed by nearly 20 PSI.

"WE MADE THE TIE, RERAN THE MODEL, AND THAT SOUTH SIDE OF THE SYSTEM WENT FROM TWO POUNDS UP TO TWENTY. THOSE ARE THE KINDS OF PROBLEMS YOU MAY NOT SEE IN DAY-TO-DAY OPERATIONS - IT'S AN INVISIBLE THREAT FROM A PRESSURE PERSPECTIVE. WITH THE MODEL, YOU IDENTIFY THOSE AREAS BEFORE THEY BECOME A PROBLEM ON CHRISTMAS DAY OR THANKSGIVING, INSTEAD OF MOBILIZING CREWS IN THE MIDDLE OF THE NIGHT."

— AUSTIN GAY

500 Mcf customer scenarios in under an hour

For a smaller municipal gas operator in the Southeast - serving 8,800 customers across roughly 325 miles of main on a 300-pound system - Magnolia River used GASWorkS to evaluate three different main sizes (four-inch, six-inch, and eight-inch steel) feeding a new 500 Mcf customer, weighing each option against future expansion potential in the area.

"ONCE THE MODEL IS BUILT OUT, IT'S AN HOUR OR LESS OF WORK TIME TO LOOK THROUGH A BUNCH OF DIFFERENT OPTIONS AND SEE WHAT'S ACTUALLY GOING TO WORK. YOU CAN SOLVE TODAY'S PROBLEM AND ANTICIPATE THE CUSTOMERS THAT MAY POP UP ALONG THAT ROUTE IN THE FUTURE."

— AUSTIN GAY



FINAL THOUGHTS

For Magnolia River, GASWorkS is the difference between gas modeling as a one-time deliverable and modeling as a living asset that prevents the next operational headache before it starts. The team treats the model as a working tool: one calibrated to the utility's actual peak-day conditions, paired with a growth model for system planning, that can be re-run every time a customer addition, capital project, or operational scenario needs a defensible answer.

"THE BEAUTY OF IT IS IT ALLOWS YOU TO REALLY LOOK INTO THINGS, ANTICIPATE THINGS, AND ACTUALLY FIGURE OUT WHAT'S REALLY HAPPENING WITHIN YOUR SYSTEM - AND WHAT'S GOING TO HAPPEN IN YOUR SYSTEM IN THE FUTURE. SO YOU CAN BETTER PREPARE FOR THE LONG-RANGE OPERATIONS OF THE SYSTEM AND NOT JUST PATCHWORK THINGS TOGETHER TO MAKE IT WORK FOR THE TIME BEING."

— AUSTIN GAY

Magnolia River continues to recommend GASWorkS to operators who want a model they can stake regulatory plans, capital budgets, and 11 PM emergency calls on - and trust to be right.



ABOUT MAGNOLIA RIVER

The industry leader in utility and pipeline services. With over 25 years of experience, Magnolia River offers a comprehensive range of services including engineering, inspection, and GIS, powered by innovative software solutions. The company has been delivering natural gas system modeling for approximately 15 years and currently supports around 40 utility modeling clients across 15 states with a dedicated team of five modeling engineers.

WANT TO LEARN HOW GASWORKS CAN POWER YOUR GAS DISTRIBUTION NETWORK WITH THE SAME CONFIDENCE?

GASWorkS gives utility engineers a steady-state modeling platform built specifically for natural gas systems - 35 years of development, 19 flow equations, native CAD/GIS import, and a Newton-Raphson nodal solver that scales to networks of any size. Whether you're planning replacement programs, evaluating new commercial loads, or pressure-testing your DIMP program, GASWorkS helps you make defensible decisions before the field calls come in.

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