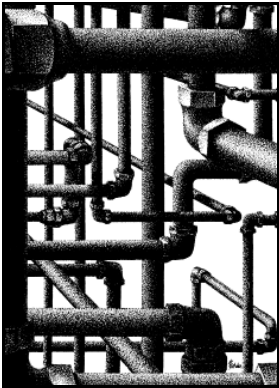


GASWorks™ *Product Description*



GASWorks has continued to evolve since our first quite simple but effective version of the software was released in 1991. Our latest release supports a very sophisticated map style graphical data interface, a quick solution routine, and provides support for a number of different model elements, including support for individual customer features. GASWorks provides an extensive set of network modeling tools designed to assist the User analyze and design distribution, transmission, gathering, and plant piping systems conveying natural gas or other compressible fluids.

GASWorks may be used to create steady-state models of systems containing not only standard pipe type elements, but also supports regulator, compressor, valve, well, and fitting type elements. GASWorks calculates the estimated valve coefficient for regulators, and the estimated power and fuel requirements for compressors. A pipe sizing function is provided to assist in determining the required size for selected pipes in the model.

The SOLUTION METHOD...

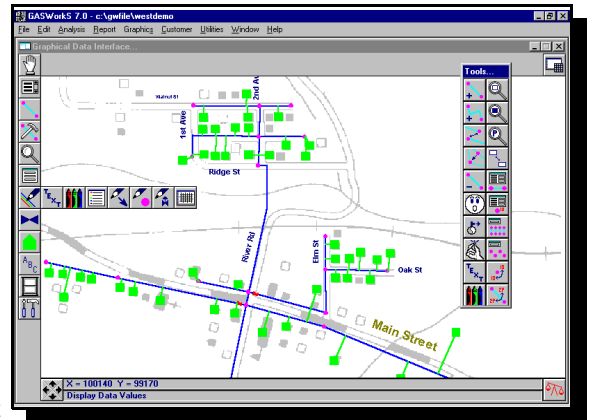
GASWorks uses a Newton-Nodal, iterative method of solution. It supports a number of flow equations including the AGA-Turbulent, Colebrook, IGT-Improved, Mueller High and Low-Pressure, Oliphant, Panhandle-A, Panhandle-B, Pole Low-Pressure, Spitzglass High and Low-Pressure, and Weymouth equations.

The solution routine allows the flowing temperature to be calculated based on environmental heat loss and gain. Gas properties at a specific location, including specific gravity, viscosity, ratio of specific heats, and heating value, can be calculated based on the gas composition. Mixed gas properties through out the system can be calculated based on the flow distribution. Compressibility can be calculated using one of several methods, including the latest revision of AGA 8.

The GRAPHICAL DATA INTERFACE (GDI) ...

The Graphical Data Interface (GDI) provides map style graphical access to the model data, and also allows the inclusion of bitmap (BMP) or Drawing Interchange File (DXF) images as a reference background. Using the GDI, the User can draw the model schematic using point-and-click mouse entry, coordinate value entry, or relative distance and angle entry. The GDI provides pop-up data screens for editing and viewing of the various pipe, node and customer data and analysis results.

The GDI includes a wide variety of tools for modifying the pipe, node, and customer model features including routines for adding, deleting and moving features. Various zoom commands including the ability to zoom in by a User specified window, zoom by a User specified scale, and zoom to a previous view allow the User to easily move around the model image. A robust set of color coding and tracing routines enhance the User's ability to graphically review the analysis results and the system's performance. The trace routines are complimented by the inclusion of what we refer to as "attribute" valves. The attribute valve feature was developed to assist in the design and layout of emergency isolation areas. A complete set of annotation routines allows the User to include notes and references in the model graphics.



The GDI display can include: Two-point, polyline, and arc style pipe symbols • Node, customer, and pseudo service line symbols • Pipe, node, and customer data values as text • Piping symbols for non-pipe type elements • User defined annotation • Attribute (isolation) style valves • Flow direction arrows • And multiple background reference images. The User may customize the GDI's display properties by setting display colors, line and symbol types, and display size and width.

The GDI tools are accessed through descriptive tool icons contained on function based "fly-out" tool bars, through a command line and list interface, and through a floating tool palette which can be arranged, sized, and placed to meet the User's preference.

The REPORT ROUTINES...

The report routines provide spreadsheet style reporting of the analysis results - including the ability to edit model data directly from within the report by simply selecting the cell you wish to edit and making the desired change. The User may select the items to be included in the report by collapsing the columns associated with the unwanted items.

The pipe report provides a comprehensive collection of information including reporting of both size/type and internal diameter values, reporting of pipe inlet, outlet and average pressures, flow rates, velocities and volumes, and simultaneous reporting of linear and pressure drop per User specified length. Selection sets may be created from within the standard reports, allowing unique reporting of User specified data groups. Hierarchical queries allow the creation of sub-sets from a previously created selection set.

Rec	From Node	To Node	Flow Rate (l/s)	Velocity	Volume	Inlet P.	Outlet P.	Press Drop	Drop Par.
80	SHOE2400	SHOE2405	1.854 Mch	12.679 Feet/sec	0.006 Mcf	15.53	15.58	0.04	0.03
81	SHOE2460	SHOE2410	1.279 Mch	8.708 Feet/sec	0.007 Mcf	15.53	15.51	0.03	0.01
82	FLTN1930	FLTN1905	2.270 Mch	12.873 Feet/sec	0.005 Mcf	15.46	15.49	0.02	-0.03
83	FE315	FE400	7.167 Mch	37.957 Feet/sec	0.004 Mcf	17.93	17.65	0.15	-0.19
84	5900	WW-PLANT	0.193 Mch	0.477 Feet/sec	0.288 Mcf	58.85	58.85	0.00	0.00
85	5905	5900	-206.831 Mch	56.687 Feet/sec	0.040 Mcf	58.77	58.85	0.08	-0.21
86	5900	1185-59	-207.210 Mch	56.703 Feet/sec	0.071 Mcf	58.85	58.00	-0.15	-0.21
87	5925	5930	7.962 Mch	18.997 Feet/sec	0.163 Mcf	57.19	55.73	1.46	0.10
88	FLTN670	FLTN700	-1.650 Mch	18.815 Feet/sec	0.002 Mcf	24.10	24.59	-0.49	-0.74
88	FE60	R-5-DUT	-7.526 Mch	37.127 Feet/sec	0.004 Mcf	19.85	20.00	-0.15	-0.19
90	FW115	FW110	-3.647 Mch	21.748 Feet/sec	0.001 Mcf	15.94	15.96	-0.02	-0.07
91	FE200	FE210	-4.797 Mch	28.092 Feet/sec	0.006 Mcf	16.42	16.57	-0.15	-0.11
92	FE210	FE300	-6.740 Mch	39.194 Feet/sec	0.009 Mcf	16.57	16.93	-0.36	-0.21
93	HILN890	HILN900	-0.185 Mch	2.160 Feet/sec	0.007 Mcf	18.00	18.62	-0.83	-0.01
94	POWERPLANT	5990	-68.011 Mch	66.610 Feet/sec	0.205 Mcf	30.00	32.26	-2.26	-0.31
95	5990	5995	-76.817 Mch	71.212 Feet/sec	0.233 Mcf	32.26	35.12	-2.86	-0.37
96	STN1160	STN1170	0.169 Mch	1.842 Feet/sec	0.002 Mcf	19.78	19.77	0.00	0.01
97	5985	R-19-IN	11.048 Mch	37.816 Feet/sec	0.006 Mcf	35.12	34.93	0.20	0.27
98	5960	5965	145.641 Mch	56.948 Feet/sec	0.811 Mcf	37.86	36.02	1.84	0.16
99	5965	5960	154.426 Mch	111.722 Feet/sec	0.675 Mcf	55.70	37.86	17.85	1.02

Reports may be printed onto any Windows supported device, allowing the selection of paper orientation, and font size and type. Three printed report styles are supported, including a standard spreadsheet style format with grid lines, a columnar style form without grid lines, and a record (document) style form.

Other Features...

Import And Export Routines: GASWorkS includes an extensive set of import and export routines allowing data to be exchanged between a variety of applications. Support is provided for ASCII and DBF data files, GasTool and Stoner model data files, Arc/Info shape files, and a robust DXF translator allowing both import and export of graphical data.

The DXF import routine allows the automated creation of a GASWorkS model from a CAD drawing - the export routine allows creation of a CAD drawing from User specified GASWorkS model data.

Customer Features: Diversified load values for antenna or skeleton type network configurations can be automatically distributed using the Diversity routine - based on the British IGE calculation standards. An external customer database may be attached to the GASWorkS data features, or the supplemental GASBase program provides a "pre-built" data base for maintaining various non-model customer information including meter, regulator, and service line information.

Main Attribute Features: The GASBase supplement also provides a mechanism for maintaining pipe attribute information such as pipe specification, test pressure and MAOP values. GASBase can be used to identify mains where their MAOP value has been exceeded.

User Interface: Each of the GASWorkS routines are accessed through its friendly and efficient point-and-click User interface. GASWorkS is fully menu-driven and provides logical data entry screens and dialog boxes which guide the User through the required entry. On-line help, including an extensive collection of how-to topics is just a click away.

GASWorkS will run on any personal computer configured to run the Windows 95, or Windows NT 4.0 operating environment. Affordably priced and easy to learn and use - call, write, fax, or e-mail today to receive additional information, or to receive a free demonstration copy of the GASWorkS software...

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