
APPENDIX E9

PIPING-RELATED COMPUTER PROGRAMS AND THEIR CAPABILITIES

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Computer technology and world standards for the conduct of engineering practice continue to evolve at a rapid pace. In this appendix, over 40 piping-related programs are listed, together with several that relate to machinery and equipment closely associated with piping. It is beyond the scope of this handbook to identify those programs that are compliant to the codes and standards mentioned in Chap. A4, or to ISO-9000, or other standards. It is customary for software users to ascertain the state of compliance to the relevant codes of the programs they use. This is done in contract negotiations with the software vendors.

The trend today is toward more integrated systems of management, design, manufacturing, and construction. Some of the software listed in this appendix is suitable for use in some integrated systems, and some is incapable of such use at present. It is beyond the scope of this handbook to address integrated systems that include CAD/CAM modules such as FORAN, HICADEC, ISDP, NAPA, and TRIBON. Similarly, software that primarily supports management and nontechnical functions is mentioned only if it has some technical value for the piping designer.

Changing codes, hardware, operating systems, computer languages, rapid evolution of the Internet, and improvements in integrating systems necessitate continuing review of software capabilities.

Programs for use in the piping and pressure-vessel areas are described in this appendix. The information was provided by courtesy of the software vendors.

The programs listed in Tables E9.1 through E9.14 may undergo considerable changes in the future. The user is cautioned to check and verify applicability of the computer program and its version prior to using.

TABLE E9.1 Pipe Stress Analysis Programs

Program title	Applications/capabilities	Contact
ADL Pipe	Windows 95 GUI version of well-respected software program. Nuclear Class 1 Piping Analysis, extensive piping code library and features.	Research Engineers 714-974-2500 <i>info@reiusa.com</i>
AutoPipe	Windows 95 GUI version with graphical model building, including options cut, copy and paste, multiple loadings, wave loads, and nonlinear pipe/soil interaction. 2-way interface with PlantFLO, PULS, AutoPLANT Designer, PDS, and PASCE.	Rebis 510-933-2525 <i>info@rebis.com</i>
CAESAR II	Established Windows-based program for the design and analysis of above and below ground piping and pipe and structure systems. Windows-based, with CADWorx bidirectional link.	COADE, Inc. 281-890-4566 <i>query@coade.com</i>
PipePak	Easy-to-use, quick static and dynamic analysis of complex piping networks.	Algor, Inc. 412-967-2700 <i>info@algor.com</i>
Simflex	Nonnuclear piping applications for weight, pressure, thermal, occasional, and dynamic loads. Established, thorough program using keyword input for simplified piping modeling.	Peng Engineering 713-462-7390 <i>lcpeng@aol.com</i>
Triflex	Piping stress, design, and analysis. Includes code compliance reports for many international piping codes. Linear and nonlinear modeling of pipe, structure, equipment and soils.	AAA Technology & Specialties Co., Inc. 713-849-3366 <i>info@aaatech.com</i>
CAEPipe	Windows 95, NT/DOS version, performs static and dynamic analyses and checks for code compliance (ASME, B31, British, Canadian, Swedish). (WRC, NEMA, API, etc.) Year 2K compliant. Versions available for nuclear applications.	SST Systems, Inc. 408-452-8111 <i>info@sstusa.com</i>
Pipestress (DOS/Unix)	Performs static & dynamic analysis of nuclear and nonnuclear piping systems. Can be provided with data translators. For advanced Nuclear Piping Stress Analysis (including, Nuclear QA, class 1/2/3).	SST Systems, Inc. 408-452-8111 <i>info@sstusa.com</i>
NuPipe	For nuclear as well as nonnuclear applications for weight, pressure, thermal, occasional, and dynamic loads.	Nuclear Services Corp. Campbell, CA
ME 101	For nuclear as well as nonnuclear applications for weight, pressure, thermal, occasional, and dynamic loads.	Bechtel Software, Inc. 50 Beale Street San Francisco, CA 94105-1595 415-768-8947 <i>bsi@bechtel.com</i>
T Pipe	For nuclear as well as nonnuclear applications for weight, pressure, thermal, occasional, and dynamic loads.	PMB Systems Engineering, Inc. 500 Sansome Street San Francisco, CA 94111 415-986-4166
Super Pipe	For nuclear as well as nonnuclear applications for weight, pressure, thermal, occasional, and dynamic loads.	EDS Nuclear, Inc. San Francisco, CA

TABLE E9.2 Computer-Aided Design and Drafting

Program title	Applications/capabilities	Contact
AutoPLANT 97	3D CAD plant design and modeling software. Object-oriented technology with external database links, spec-driven fitting-to-fitting polyline routing and component placement.	Rebis 510-933-2525 <i>info@rebis.com</i>
AutoSTAAD/Pro	Model generation, verification drafting, and detailing within AutoCAD.	Research Engineers 714-974-2500 <i>info@reiusa.com</i>
CADWorx/Pipe	AutoCAD-based, intuitive piping CAD package with bidirectional transfer link to CAESAR II. Operates in 2d, 3d, ortho, iso, or solid modes. Auto-routing, BOM's.	COADE, Inc. 281-890-4566 <i>query@coade.com</i>
Intergraph Plant Design System 6.3 (PDS[tm])	Market-leading interactive piping design, specification, P&ID, clash-detection and ISO-creation software. (1997–54.3% market share according to Daratech, Inc.) PDS Runs on Windows NT Operating System.	Intergraph Corporation 800-260-0245 <i>Fjoop@ingr.com</i>
MiniCAD	General purpose 2D and 3D CAD program that includes a complete library of piping and process–design symbols.	Diehl Graphsoft, Inc. 410-290-5114 <i>marketing@diehlgraphsoft.com</i>
Multi-Steel	Structural steel–drafting and modeling application. 2D frames can be combined into 3D models, and contains seven steel-section libraries. Links for stress analysis and for CAD imports to AutoPLANT.	Rebis 510-933-2525 <i>info@rebis.com</i>
PPP-Pro Bundle	Complete piping and structural–design and drafting programs and symbol libraries for use with AutoCAD.	CAD Technology Corp. 704-369-3979
Solid Pipe Designer	AutoCAD-based 3D solid modeling of process piping systems designed specifically for sanitary, high purity, HVAC and general piping systems used in the semiconductor, pharmaceutical, biotechnology, food, beverage, and dairy industries.	UHP Process Piping, Inc. 972-247-8530 <i>gary.greer@uhppp.com</i>
Vessel Drafting Program	Automatically generates fabrication/as-built drawings of pressure vessels and heat exchangers.	Codeware 281-497-5705 <i>john@codeware.com</i>
Multi-Frame	3D structural analysis and design software system.	Formation Design Systems, Inc. 408-440-0702 <i>info@formsys.com</i>
PlantSpace	Object-oriented software. 3D CAD Software.	Jacobus 800-724-8741 <i>info@jacobus.com</i>

TABLE E9.3 Heat-Exchanger Programs

Program title	Applications/capabilities	Contact
Iris* Exchanger	Interactive and graphical design & analysis of TEMA shell and tube heat exchangers.	EDAC, Inc. 281-437-1155 <i>iris@edacsoft.com</i>
B-Jac Hetran	Thermal design of shell & tube heat exchangers, single phase, condensers, vaporizers, falling film evaporators, and thermosiphons supported.	Aspen Tech 804-897-4150 <i>info@aspentech.com</i>
B-Jac Teams	Mechanical design of shell & tube heat exchangers. ASME, Codap, ADM Codes. Detailed cost estimating and drawings.	Aspen Tech 804-897-4150 <i>info@aspentech.com</i>
HTRI Programs	Eleven programs for the rating and simulating of air- and liquid-cooled exchangers, condensers, reboilers & fire heaters. Single- and two-phase applications and tube-bundle vibrations.	Heat Transfer Research, Inc. 409-260-6200 <i>htri@htri-net.com</i>
TRI*Therm	Performs thermodynamic design and rerating of shell and tube heat exchangers. Handles 2-phase fluids with integral VLE module. Has built-in fluid property database.	AAA Technology & Specialties Co., Inc. 713-849-3366 <i>info@aaatech.com</i>
TRI*AC	Performs forced air-cooled heat exchanger design & analysis with built-in fluid property & VLE.	AAA Technology & Specialties. Co., Inc. 713-849-3366 <i>info@aaatech.com</i>
Compress 6.0	Windows 95 NT version for design, rating, cost analysis, drafting of ASME Section VIII pressure vessels and heat exchangers.	Codeware 281-497-5705 <i>john@codeware.com</i>

TABLE E9.4 Network Fluid Flow Programs

Program title	Applications/capabilities	Contact
AFT Impulse 1.0.	Windows-based, transient fluid-flow analysis. Drag & drop model construction, cavitation, and multipipe interaction.	Applied Flow Technology 719-686-1000 <i>info@aft.com.</i>
AFT Fathom 3.0	Windows-based, steady-state incompressible flow analysis. Drag & drop model construction with integrated heat-transfer analysis.	Applied Flow Technology 719-686-1000 <i>info@aft.com</i>
BOS Fluids	Steady-state and transient liquid and gas simulator for 3D piping geometries. Computes unbalanced forces due to valve closure and acoustic frequencies.	Paulin Research Group 281-363-3790 <i>info@paulin.com.</i>
Pipe-Flo	Windows-based. Unlimited size version of Pipe-Flo Lite. Performs steady-state line sizing, pump selection, etc. Interacts with orifice- and compressor-sizing programs.	Engineered Software, Inc. 800-786-8545 <i>Sales@eng-software.com</i>
PlantFLOW	Steady-state piping flow analysis in 3D for gas or liquid systems; includes heat transfer, gas equations of state, and graphical model building.	Rebis 510-933-2525 <i>info@rebis.com.</i>
AFT Arrow	Windows-based. Steady-state compressible fluid-flow analysis. Drag & drop model construction. Models complex gas networks.	Applied Flow Technology 719-686-1000 <i>info@aft.com</i>

TABLE E9.5 Pressure-Vessel Design Programs

Program title	Applications/capabilities	Contact
Advanced Pressure Vessel	ASME Section VIII Div. 1 pressure-vessel calculations. Ability to perform nozzle-loading calculations per WRC-107.	Computer Engineering, Inc. 800-473-1976 <i>Sales@computereng.com</i>
CodeCalc	ASME Section VIII, Div. 1 vessel and heat-exchanger component analysis and design. TEMA, WRC 107, and some piping components. Windows-based.	COADE, Inc. 281-890-4566 <i>Query@coade.com</i>
Compress	32 bit Windows, 3D graphic ASME Section VIII Div. 1 and TEMA designs for vertical and horizontal pressure vessels. Produces hypertext-linked output reports.	Codeware 281-497-5705 <i>john@codeware.com.</i>
Iris*Calc	ASME Section VIII, Div. 1 Interactive design and analysis of pressure-vessel and heat-exchanger components.	EDAC, Inc. 281-437-1155 <i>iris@edacsoft.com.</i>
Iris*Vessel	ASME Section VIII, Div. 1 Interactive and graphical design of vertical and horizontal pressure vessels.	EDAC, Inc. 281-437-1155 <i>iris@edacsoft.com</i>
PV Elite	Designs and rates multicomponent vertical and horizontal vessels subject to a variety of loadings. Designs per ASME Section VIII, Div. 1 and 2, and BS 5500. Windows-based.	COADE, Inc. 281-890-4566 <i>query@coade.com.</i>
Vessel Coster	Estimates material and labor for pressure-vessel fabrication. Includes complete design ability and is written in Visual Basic for Windows.	Codeware 281-497-5705 <i>john@codeware.com</i>

TABLE E9.6 Specialty Finite Element Analysis Program

Program title	Applications/capabilities	Contact
FE/Pipe	Specialty brick, shell, beam, and axisymmetric finite element program specializing in ASME Code output reports, automatic input, stress intensification, flexibility, and allowable load computation for nozzles and supports on pressure vessels and piping.	Paulin Research Group 281-363-3790 <i>info@paulin.com.</i>

TABLE E9.7 Structural Steel Evaluation Programs

Program title	Applications/capabilities	Contact
FrameWorks Plus	Design steel structures in both 2D and 3D. Provides integration with 3rd-party analysis tools, including GTSTRUDL and STAAD. Runs on Windows NT operating system.	Intergraph Corporation 800-260-0245 <i>fjooop@ingr.com</i>
QSE	Imported from Europe, provides analysis and design modules for frame structures. Incorporates many European and American codes for both steel and concrete.	Research Engineers 714-974-2500 <i>info@reiusa.com</i>
STAAD-III	Multimedia version allows audio-visual clips and walk-thrus, analysis, design, and verification, taking full advantage of Windows functionality. Full AISC code checking.	Research Engineers 714-974-2500 <i>info@reiusa.com</i>
STAAD/Pro	Next level of STAAD-III. Model development, analysis, design, drafting, & component design.	Research Engineers 714-974-2500 <i>info@reiusa.com</i>

TABLE E9.8 Flow Analysis Tools Programs

Program title	Applications/capabilities	Contact
C-Max	32-bit Windows-based software for flow-system analysis. Includes compressor, pump, pipe, fan, blower, and energy-conservation modules. Windows-based calculation includes evaluation of energy costs.	Unicade, Inc. 425-747-0353 <i>unicade@unicade.com</i>
Con-Flow	Selects, evaluates, and analyzes control valves using catalogs available on disk. Windows-based.	Engineered Software, Inc. 800-786-8545 <i>Sales@eng-software.com</i>
Crane Companion	Windows version of Crane Technical Paper 410.	Crane Valve Group 630-226-4900 <i>www.cranvalve.com</i>
Ori-Flow	Sizes and analyzes flat-plate orifices, nozzles-and venturi tubes for fluid-metering applications. Windows-based.	Engineered Software, Inc. 800-786-8545 <i>sales@eng-software.com</i>
PETS	Process engineering tools—Single- and two-phase pressure drops, orifice sizing, RV sizing, tray hydraulics, and more. Windows-based, and automates many repetitive flow-related calculations.	Stratus Engineering 281-335-7138 <i>dfsstratus@aol.com</i>
Pipe-Flo Lite	For small systems, up to 25 pipelines. Steady-state flow analysis and sizing of pumps and connected piping. Windows interface.	Engineered Software, Inc. 800-786-8545 <i>Sales@eng-software.com</i>
Pipe-Flow-Stock	Provides balanced pressure and flow calculations for piping systems used in the pulp and paper industry. Uses TAPPI method for pressure drop calculation. Windows-based.	Engineered Software, Inc. 800-786-8545 <i>Sales@eng-software.com</i>
Pump-Flow	Selects, evaluates, and analyzes centrifugal pumps using manufacturers' pump catalogs available on disk. Over 40 manufacturers to choose from. Windows-based.	Engineered Software, Inc. 800-786-8545 <i>Sales@eng-software.com</i>
BOS Fluids	2d CFD applications for horizontal vessels, tanks, and slug loads. Developed slug-velocity diagrams.	Paulin Research Group 281-363-3790 <i>info@paulin.com</i>

TABLE E9.9 Tank Programs

Program title	Applications/capabilities	Contact
E-Tank	Designs API 650 & 620 tanks, UL 142 tanks, and rates per API 653. Comprehensive reports are generated.	Techdata 281-497-5705 <i>www.techdat.com</i>
Tank	Designs or rerates API 650/653 storage tanks. Addresses wind girders, conical roofs, stainless-steel materials, allowed fluid heights, and remaining corrosion allowance.	COADE, Inc. 281-890-4566 <i>query@coade.com</i>

TABLE E9.10 Computational Fluid Dynamics Programs

Program title	Applications/capabilities	Contact
CFD-ACE+	Advanced computing environment for modeling flow, turbulence, conjugate heat transfer, and associated physics. Highly automated parametric geometry and grid generation with high accuracy numerics.	CFD Research Corp. 205-726-4800 <i>info@cfsrc.com</i>
COMIG	Detailed blade-geometry design for centrifugal impellers and rotors. Allows fluid-dynamic designer to produce highly efficient blade shapes.	Northern Research & Engineering Corporation 781-935-9050 <i>sales@nrec.com</i>
Phoenix	Simulates laminar, turbulent, thermal- and chemically reactive flows. Includes particle tracking, multiphase flow, non-Newtonian fluids, and user programmability.	Phoenics North America 770-996-8656 <i>adamgreen@sprynet.com</i>
PREDIG	Performance prediction of centrifugal compressors. Produces performance maps based on overall geometry and fluid characteristics.	Northern Research & Engineering Corporation 781-935-9050 <i>sales@nrec.com</i>
VISIUN	Computational Fluid Dynamics analysis tool for turbomachinery. Specialized, full 3D, Navier-Stokes analysis of internal flows, including two frame-of-reference analyses of rotating-stationary interactions.	Northern Research & Engineering Corporation 781-935-9050 <i>sales@nrec.com</i>
BOS Fluids	Simplified 2d models for horizontal vessels, tanks, and some slug applications.	Paulin Research Group 281-363-3790 <i>info@paulin.com</i>

TABLE E9.11 Thermal and Power System Process Programs

Program title	Applications/capabilities	Contact
QTPro ²	General-purpose “handbook” for thermodynamics and heat-transfer calculations related to the power and cogeneration industries.	Thermoflow, Inc. 978-579-7999 <i>info@thermoflow.com</i>
Thermoflex	General-purpose modeling of thermal and power-system processes for both the power and cogeneration industries.	Thermoflow, Inc. 978-579-7999 <i>info@thermoflow.com.</i>

TABLE E9.12 Maintenance Programs

Program title	Applications/capabilities	Contact
Avert	Designed to manage maintenance, repair, inspection, and testing data for pressure safety–relief valves. Includes Process Safety Management requirements of OSHA 1910.119.	Avert Systems 403-261-3931 <i>avert@telusplanet.net</i>

TABLE E9.13 Welding Programs

Program title	Applications/capabilities	Contact
Welding Pro-Write	Creates and maintains WPS, PQR, and WPQ in accordance with ASME Section IX. Welder management included. Also includes ASME Code checking.	Computer Engineering, Inc. 800-473-1976 <i>sales@computereng.com.</i>

TABLE E9.14 Measurement Programs

Program title	Applications/capabilities	Contact
Conduit Corrosion Monitor	Integrates with Krautkramer Branson Pipe+ database, and has direct integration with a number of KB instruments. Provides access to many standard databases and is ANSI SQL–compliant. Windows design.	Conduit Limited Inc. 713-447-8290 <i>conduit@iapc.net</i>