COMPARISON BETWEEN *PIPING SYSTEMS FLUIDFLOW* AND *FLUIDFLOW3*

	PIPING SYSTEMS FLUIDFLOW	FLUIDFLOW3	REMARKS
DATABASE			
FLUIDS DATABASE	Approx 200 fluids with properties limited to density, viscosity and vapour pressure.	Approx 950 fluids with full thermo-physical properties. Water/steam properties according to IAWPS standard.	The *FluidFlow3* fluids database is the kernel of this program. The fluid data is fundamental to the calculation capabilities of *FluidFlow3*, namely heat change and combining fluid streams in the one network. Fluids' thermophysical properties are used for 2-phase liquid/gas calculations.
EQUIPMENT DATABASES	Relatively restricted range of equipment items available. Pumps are limited to end-suction centrifugal.	Equipment items include: end-suction centrifugal and PD pumps; control valves, vessels with multiple connections; manual valves including 3-way, needle etc; filters and packed beds; shell and tube and plate heat exchangers.	Each component in FluidFlow3 is represented by a unique icon on the flowsheet and has an underlying database containing manufacturer, material, application and hydraulic data details. Default values for every component can be specified by the user.
ADDITIONAL DATABASES	None	Manufacturers; pipe and equipment materials; pipe roughness and pipe scaling. Solids properties for the Slurry module.	The additional pipe characteristic databases allow for conditions to be pre-set, viz: roughness values can be set to represent, say a 10 year deterioration of the pipe; scaling can be set to reduce all pipe internal diameters by a fixed % to simulate sliming.
CALCULATION CAPABILITIES			
FLOWS AND PRESSURES	Calculation of flows and pressures throughout complex pipe networks. Separate modules for liquid and gas.	Solves for flows and pressures around complex pipe networks, simulating the performance of almost any type of line equipment. The compressible flow algorithm is very advanced taking into account the expansion of the gas and properly handling choked conditions. Also, there is no differentiation between liquid, gas and 2-phase networks; the phase state of the fluid is determined solely on the basis of temperature and pressure within the network.	With *FluidFlow3* fluid temperature and pressure are specified only at the boundary conditions and the temperature propagates throughout the network unless a heat change calculation is included. For temperature changes within the network the user must specify a heat loss model if applicable. With *Piping Systems FluidFlow* every component requires its temperature to be set, with *FluidFlow3* this is not the case. 2-phase conditions require the 2-phase module.
HEAT CHANGE	No calculation.	Heat loss/gain through pipes walls taking into account temperature difference, lagging, surface emissivity and wind speed. Heat/temperature change at equipment items.	Shell and tube and plate heat exchangers are solved for both pressure loss and heat change. With multiple fluids allowed within the one network and multiple networks allowed on the same flowsheet, this means that both the process and cooling sides of a system can be modelled simultaneously. (Note, the software does not calculate surface areas necessary for the heat transfer)
COMBINING FLUIDS	One fluid only within the network.	Different fluids may be specified at boundary locations.	*FluidFlow3* will estimate the thermophysical properties of the mixture at the point in the network where the fluid streams join. Data in the fluids database is fundamental to this process. "Mixtures" of fluids can also be developed and saved within the database, say a mixture of pure gases making a natural gas.

PIPING SYSTEMS FLUIDFLOW MODELS AND DATABASE CAN BE IMPORTED INTO FLUIDFLOW3

	PIPING SYSTEMS FLUIDFLOW	FLUIDFLOW3	REMARKS
FLOWSHEET			
LAYOUT	Orthogonal view only. Very limited amount of data can be displayed on the flowsheet. No free text allowed. One only pipe line thickness.	Orthogonal and isometric view. Any entered or calculated data can be displayed on the flowsheet – specified by the user. Free text allowed. Choice of pipeline thicknesses and wider range of colours allows a more informative schematic to be drawn. Multiple flowsheets can be opened at the same time.	The printed flowsheet in *FluidFlow3* becomes a powerful communication medium for the simulation, the flowsheet displaying user-selected entered data, calculated results, free text and the pipe layout.
RESULTS VISIBILITY			
DATA PALETTE	The data palette displays entered and calculated results commensurate with *Piping Systems FluidFlow's* more restricted fluids and pipe data, calculations etc	Data palette is totally under the control of the user. All data can be displayed or hidden at the command of the user.	*FluidFlow3* displays the pipe network in flowsheet or schematic format with the tables of entered data and calculated results synchronised with the flowsheet. *FluidFlow3* allows for a wide range of warnings to be displayed if an equipment item operates outside a user-defined range. Any equipment item with an associated waring is flagged red on the flowsheet. Flowsheet display immediately updates after, say a units change or re-calculation..
REPORTS			
REPORT DESIGNER	Internal report designer allows printing only from within *Piping Systems FluidFlow* itself.	Internal report designer allows printing from *FluidFlow3* but also export of the report in PDF, Word and HTML format.	
EXCEL	Export any input or calculated data to Excel	Export any input or calculated data to Excel	The export to Excel in *FluidFlow3* is a considerable advance on that in *Piping Systems FluidFlow*. The layout is considerably improved and the export of the flowsheet is of print quality. This together with the capability in F3 of displaying any entered or calculated data on the flowsheet makes for an excellent communicating medium with colleagues and clients who do not run *FluidFlow3*itself.
OPTIONAL MODULES			
SCRIPTING	Not available	Optional module. Scripting allows sequential calculations to user-programmed thus enabling "what-if?" calculations or the simulation of real-time operations.	A scripting example might be: Calculate the fall in head in a tank as fluid is abstracted (via a sequence of incremental calculations) and then activate a pump at a set level. Or calculated the time taken for a gas pipe network to reduce in pressure to a safe level via a pressure relief valve.
NON-NEWTONIAN / SETTLING SLURRY		This module is divided into two parts: non-Newtonian/non-settling (typically Power Law/Bingham plastic/pseudoplastic) fluids and settling slurries with a Newtonian carrier fluid – based on Wilson Addie Cliff, Durand or WASP.	The database includes physical properties of suspended solids, viz density, particle size distribution and shape factor.
2-PHASE		2-phase liquid-gas simulation	Multiple 2-phase equations available.