

Pump ED 101

Free (and Nearly Free) Modeling & Design Software

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<http://www.pumped101.com>

If you work for an engineering firm, manufacturer or the government you probably have access to software that assists you during the design of pumping and piping systems. Programs such as AutoCad, Solid Works and other Computer Aided Design (CAD) systems are indispensable when designing mechanical equipment and packaged systems. My company uses Solid Works. Hydraulic design programs such as Pipe-Flo and AFT Fathom are also extremely useful especially when working with more complex pumping applications. Unfortunately many of us are unable to take advantage of these tools simply because we cannot justify the licensing fee. Fortunately, there are free and nearly free versions of these tools and some are actually provided by the companies that make their living selling them. They are often a limited or less sophisticated version than the ones for sale but, they can still meet many of our design requirements. I will briefly review several with which I am familiar and provide you with web links for further investigation. If you have experience with these or others please send us your comments at the "Reader's Respond" section.

CAD Programs

One of the newer programs to hit the web is Google Sketchup. It is a somewhat limited version of Sketchup Pro and is available as a free download. It has an intuitive interface and offers amazing drawing features. The list of plugins and add-ons is growing daily and the library of 3D objects is huge. Visit <http://sketchup.google.com> for an overview of its features.

Another that has received good reviews is progeCAD 2009 Smart. It is described as an AutoCad clone and the free version offers most of the features of the progeCAD Pro version. It supports both 2D and 3D drawing and has over 11,000 pre-drawn blocks and symbols. If you have any problems you can join an online user forum. The only negative is that there have been no .DXF file (AutoCad compatible) revisions since 2009. For more information and usage restrictions visit <http://www.progesoft.us/index.pl?id=3985> .

There are literally dozens more. Visit the following links for reviews and downloads.

<http://freecad.com/>

<http://www.freebyte.com/cad/cad.htm>

<http://www.cadazz.com/free-cad-software.htm>

Hydraulic Design Programs

Engineered Software in Olympia Washington sells Pipe-Flo, a piping system design program that is very popular. They also host online catalogs and provide pump selection software for over 100 manufacturers in the US and worldwide. The online version does a simple design point search and allows for the calculation of TDH at the design point. You can select pipe diameter, material, length and flow rate plus elevations, fittings and valves. Once all are selected, TDH is calculated. This free version models just a single piping element but it can meet your needs for many simple piping applications. Visit <http://www.eng-software.com/pml/default.aspx> to see if your pump manufacturer's catalog is part of their on line pump selection system and download the program. Some of the subscribing manufacturers offer a CD version so you do not have to perform the download. One of my former employers offers it on their site. Visit Hydromatic Pumps at http://www.hydromatic.com/EngineeredResourcePage_ENG_SoftwareUpdates.aspx to order the CD version of H2O Optimize 9.0.

EPANET is a public domain program developed by the EPA to help water utilities maintain and improve their water quality and distribution systems. It tracks the flow and pressure in both simple and complex piping systems and is not limited to a fixed number of pipes, branches and nodes. It uses the Hazen-Williams, Darcy-Weisbach or Chez-Manning equations for head loss calculations and also includes minor losses for bends and fittings. It models constant or variable speed pumps, various valve types and storage tanks. It will also assist with pipe, pump and valve placement and sizing. It uses a dynamic link library (DLL) that allows users to customize it to meet their individual needs. It runs on Windows 95, 98, NT and XP. Several of my associates at PumpTech use EPANET and give it a good grade. For more information visit <http://www.epa.gov/nrmrl/wswrd/dw/epanet.html> .

PSIM (Pump System Improvement Modeling) was developed by Applied Flow Technology (AFT) as a Pump Systems Matter educational tool. It is built on AFT Fathom which is a well accepted pipe flow analysis program. PSIM does both centrifugal and positive displacement pump modeling that includes sizing, variable speed, viscosity correction, power calculations and energy usage. It also has the ability to model different types of fluids other than water and can model piping networks with up to twelve pipe elements. For more information visit <http://www.aft.com/products/PSIM.php> . I have spoken with several individuals who have used PSIM and they give it very good marks.

Joe Evans is responsible for customer and employee education at PumpTech Inc, a pumps & packaged systems manufacturer & distributor with branches throughout the Pacific Northwest. He can be reached via his website www.pumped101.com. If there are topics that you would like to see discussed in future columns, drop him an email.