**HSYM OVERVIEW**

The Elite Software HSYM program analyzes centralized HVAC piping systems that use chilled and/or hot water. In the simulation of HVAC water piping systems, HSYM can determine pressure losses, actual operating pressures, temperatures of air and water, flow rates, and obtainable unit loads throughout the system. Complex systems containing all types and sizes of pipe, insulation, boilers, chillers, pumps, coils, exchangers, and radiators, and insulation can be defined. HSYM can also size pipe and help select equipment. But more than just pipe sizing, HSYM is designed to simulate the operation of an HVAC water system as a whole. HSYM provides a cost effective way to obtain a steady state analysis of an existing or a proposed system. With HSYM a designer can investigate a myriad of design alternatives in search of an optimal design that provides low cost and reliable performance. Besides sophisticated simulation techniques, HSYM also provides many mundane, but useful features such as automatic adjustment of coil cfm values for altitude, calculation of effective coil UA values direct from manufacturer's catalog data, and the ability to automatically "look up" the equivalent length of all types of fittings. HSYM provides both comprehensive input and output reports. Output reports show not only calculated results, but also all input data used in the results computations. HSYM calculates extremely fast and performs extensive error checking of the pipe network system. HSYM is also available as a hydraulic only analysis program for a significant discount.

**DEMONSTRATION VERSION**

If you would like to evaluate HSYM in further detail, you can order a demonstration CDROM for only $35 plus shipping. This evaluation version is a full version of the program, including the complete manual, but with limitations. Demonstration versions can be "unlocked" into full versions by typing in a password you’ll receive upon purchase. $35 of the demo price can be credited to the full purchase price. A demonstration version of HSYM (without manual) may also be downloaded free of charge from Elite’s internet site, www.elitesoft.com

**HSYM FEATURES**

- Analyzes Hot and Chilled Water HVAC Piping
- Calculates Pipe Sizes, Flows, Velocities, and Pressures
- Calculates Both Water and Air Temperatures
- Hydraulic Only Analysis Version Also Available
- Allows Up to 3000 Pipe Sections and 2,999 Nodes
- Allows Up to 20 Chillers & Boilers
- Allows Up to 150 Coils, Exchangers, & Radiators
- Allows Up to 150 Valves of All Types
- Allows Up to 50 Constant and Variable Speed Pumps
- Considers Pipe Insulation Effects in Hot Water Piping
- Allows Both Constant and Variable Speed Pumps
- Cooling Coils Can Be Wild, 2-Way, or 3-Way
- Instantaneous Input Error Checking
- Provides Comprehensive and Concise Reports

**CALCULATION METHOD**

HSYM uses a unique sparse matrix technique for solving pipe network simulation problems. Most of the modeling algorithms used in HSYM are based on ASHRAE sponsored research work performed by the University of Illinois. HSYM can be obtained with or without thermal analysis features enabled. Many designers only want to evaluate and flow and pressure conditions in a piping system without having to consider water and air temperature conditions. If a thermal analysis is not desired, HSYM can be purchased for less with hydraulic only features.

**PROGRAM INPUT**

HSYM is a true Windows program that uses all the latest data entry techniques such as toolbars, hyper linked help, and form tabs. All input data is checked at the time of entry so that no improper data can be entered. If you have a question about what the program is requesting, you can press the F1 key to obtain additional help explanations. Three major types of data are requested: General Project Data, Detailed Pipe Data, and Equipment Data. The general project data includes the date, project location, client, designer, and project names, the altitude, pipe material data, and more. The detailed pipe data includes the pipe beginning and ending node numbers, pipe material, diameters, lengths, fitting information, insulation values if any, and indication of what equipment the pipes connect to. The equipment data involves the entry of any boilers, chillers, pumps, coils, heat exchangers, radiators, loop valves, water temperature control valves, and other valves. Wide open CV values for valves are required. Each equipment item also has certain details that must be entered. Boilers and chillers require temperature set points and capacity ratings. Pumps require that at least four data points from the pump performance curve be entered. Valves and coils require manufacturer design data to be entered concerning design water and air flow, and entering and leaving water temperatures. Load data must also be entered for coils, radiators, and heat exchangers.

**SYSTEM REQUIREMENTS**

HSYM is a Windows program and will run on any computer with Windows 2000 or higher including Windows 7.
The HSYM program provides four basic output reports: pipe input data, equipment input data, pipe output data, and equipment output data. The pipe input data report lists all the detailed pipe data (material type, diameter, length, fittings, etc.) entered for the pipe network. The equipment input data report lists all the detailed information concerning each equipment item (chillers, boilers, coils, radiators, heat exchangers, pumps, etc.) specified in the system. The pipe output data report lists the flow, velocity, inlet water temperature, inlet and outlet water pressures, pressure losses, and any equipment for each pipe section. The equipment output data report lists all operating conditions for each equipment item. Chillers and boilers are shown with setpoints and design capacity versus actual load. Cooling coils and radiators are shown with water flow, air flow quantities, entering and leaving air temperatures, actual load, and check valve flow quantities. The user can specify desired reports and all reports can be printed to the screen or printer.

Sample Reports

Program Output

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Lakeside Office Complex

Pipe Output Data

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<th>Section</th>
<th>End</th>
<th>Pipe Diameter</th>
<th>Length</th>
<th>Equivalent Length</th>
<th>Flow</th>
<th>GPM</th>
<th>Pressure FTIA</th>
<th>Data Out</th>
<th>Equipment Description</th>
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</thead>
<tbody>
<tr>
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<td>14.0</td>
<td>14.0</td>
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<td>5.3</td>
<td>80.0</td>
<td>0.4</td>
<td>Pipe</td>
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<tr>
<td>MVWP105</td>
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</table>

Equipment Output Data

Chiller Data

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Cooling Coil/Heat Exchanger Data

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