

## Piping System Model as a Life Cycle Document

White Paper by Ray Hardee, P.E., Chief Engineer for Engineered Software, Inc.

**1<sup>st</sup> Page PREVIEW ONLY. Click here to read the full article.**  
**Introduction** **Example Life Cycle Documents**

When designing piping systems, a variety of documents are created providing the details necessary to design, purchase, build, and test the piping system. After the system is completed these design documents are turned over to the client for use in operating and maintaining the system.

During the life cycle of a plant, modifications are made to the system to meet the changing process needs. As these changes are proposed, engineered, and implemented they must be added to the original design documents. By keeping these documents up-to-date, everyone involved has a current and accurate picture of the piping system.

Design documents fall into the following categories: drawings, calculation spreadsheets, specification documents, purchase orders, vendor supplied manuals, and test and operating procedures.

These documents are often created using commercially available software such as Computer Aided Design (CAD) software, electronic spreadsheets and word processors. Plant owners are now requiring design engineering firms to include the program files used to create these design documents in the project turnover package. For example if the owner has a copy of the drawing file along with the CAD software used to create the drawing, they can keep the drawing current during the life of the plant.

This article describes how fluid flow software and their computerized piping system models are rapidly being recognized as valuable life cycle documents by the owners and operators of the piping systems.

Now that we have discussed the various types of design documents available, let's see how these documents are used. For example when working on a pump in a plant the following documents are used:

- The Piping & Instrumentation Drawing (P&ID) shows where the pump is located in the system. In addition, the pump's unique equipment identifier is listed on the piping schematic.
- The original purchase specification document provides the pump's initial requirements including its performance and test requirements.
- The purchase order provides the details on what the pump manufacturer supplied along with any contract modifications.
- The manufacturers test package provides the pump performance data and test documentation that is used to compare the pump's current performance to the pump's performance when installed.
- The manufacturer's equipment and maintenance manual provides troubleshooting instructions along with recommended maintenance procedures.
- The startup test documentation includes the pump's baseline performance when operating in the system.
- Plant operating procedures provide the information needed to properly operate the pump in the piping system.
- A review of the system modification documents provides a history of plant modifications that may have adversely affected the pump.

**1<sup>st</sup> Page PREVIEW ONLY. Click here to read the full article.**