



**Ray T. Hardee, P.E.**

*Chief Engineer / Co-Founder of Engineered Software Products PIPE-FLO® and PUMP-FLO™*



A recognized leader with 44 years of experience in pump system analysis and software development for leading private and government sectors. Experience developing and marketing products, engineering consulting and multi-national educator in a broad range of markets spanning the globe.

Management experience includes serving as Division Officer in the U.S. Navy, Chief Engineer for Engineered Software, Inc., Publisher for Optimizing Pumping Systems Guidebook and the standard ASME, EA-2-2009 Energy Assessment for Pumping Systems and Co-creator for the award winning software products, PIPE-FLO® and PUMP-FLO™. Ray is available for on-site instructor-led training.

***Areas of Expertise***

Pumping System Analysis • Pump System Optimization • Strategic Technology Planning • Pump System Instruction • Operations Improvement • Pump System Cost Control  
• Process Efficiency • Asset Management

***Summary of Qualification***

Ray Hardee is one of the principal founders of Engineered Software, Inc. and a co-creator of PIPE-FLO® and PUMP-FLO™ software. Hardee, who graduated with honors from the United States Merchant Marine Academy in Kings Point, NY, spent several years as an officer in the U.S. Naval Nuclear Power program. He served in the U.S. Navy and worked as a Division Officer on a Nuclear Submarine.

After his service, Hardee's career spanned over 13 years in the power generation industry where he worked for EBASCO Services – a company focused on commercial nuclear power plants. There, he was involved in the start-up and test group where he would perform the preoperative tests for both nuclear and fossil power plants.

Recently, Hardee is a contributing member on several committees that were responsible for authoring the Optimizing Pumping Systems Guidebook and the standard ASME, EA-2-2009 Energy Assessment for Pumping Systems. Ray has written notable publications such as Optimizing Pipe Systems, Pump Life Cycle Costs and ESI's popular Piping System Fundamentals Course. He also has a monthly column in Pumps and Systems Magazine on Pump Systems.

During his time at Engineered Software, Hardee acts as the lead presenter and instructor for training courses. He has assumed thousands of presentations and is actively teaching in the hydraulic world.

***Education and  
Leadership***

**EDUCATION:**

- **US Merchant Marine Academy**, Kings Point, New York, 1971
  - BS Marine Engineering with a Sea Year on the NS Savannah, 1969-1970
- **Naval Nuclear Power School**, Vallejo, California, 1971-1972
  - Qualified for Naval Officer Watch Standard, 1971-1972
- **Naval Submarine School**, Groton, Connecticut, 1972
- **Registered Professional Engineer Washington 21654, Pennsylvania PE031076E**

***Work Experience***

*United States Navy:*

- USS JACK (SSN605) Nuclear powered fast attack US submarine 1972-1975
  - **Mechanical Division Officer:** Responsible for the reactor, boiler, steam generator, turbine condenser, and machinery room mechanical equipment.
  - **Weapons Officer:** Responsible for the torpedo, sonar and missile divisions.

*EBASCO Engineering Consulting and Construction Services: (1975 – 1982). Supervised plant start up and test for Nuclear Steam Supply Systems (NSSS) and Balance of Plant systems (BOP). Involved in Startup and Test at the following plants:*

- Florida Power & Light: St. Lucie, Unit 1 (Port St. Lucie, FL): Pressurized Water Reactor
- Taipower: Chin Shan Units 1, 2 (Shimen, New Taipei, Taiwan): Boiling Water Reactor
- Louisiana Power & Light: Waterford, Unit 3 (Killona, Louisiana): Pressurized Water Reactor
- WA Public Power Supply: Satsop, Unit 3 Pressurized Water Reactor

*Engineered Software, Inc. (1982-Present)*

- **Co-Founder and Chief Engineer:** Engineered Software, Inc.
  - Co-developed PIPE-FLO Professional, Compressible, Stock and Overtime; 1982 - present
  - Co-developed PUMP-FLO Connect, Desktop, Premium; 1986 - present
  - Co-developed and instructor for ESI Training Courses, 2008 - present: Piping System Fundamentals, Pump System Assessment and Optimization, Centrifugal Pump Webinar, Process Measurement and Control Webinar, FLO-Master

### **Instruction**

- **Chief Engineer & Head Instructor:** Piping System Fundamentals, Piping System Assessment & Optimization, Pumped System Optimization Seminar, Centrifugal Pump Webinar, and FLO-Master
- **Speaker:** “Piping System Fundamentals,” Jacobs Engineering (Morocco, Sofia, Bulgaria), Stantec, Texas Instruments, Honeywell, Bahrain Petroleum Company (BAPCO), Crane Co (Germany, UK, Wales), STAT Oil and the Yokohama Naval Base (Japan).
- **Educator:** Hydraulic Institute Certified Pump System Optimization Course Instructor. Taught nationally at companies such as ECOVA and ABB/Baldor.
- **Speaker:** ASME EA-2 Energy Assessment for Pumping Systems Standard
- **Speaker:** ISO ASME Pump System Energy System
- **Seminar Presenter:** “Pump System Assessment and Optimization,” Tappi Peers, Portland, OR
- **Speaker:** “Understanding Piping System Controls,” Pump & Systems
- **Speaker:** Software in Industrial Applications, University of Washington, Seattle, WA

### **Industry Standards**

- **ASME EA-2-2009** Energy Assessment for Pumping Systems
- **ISO/ASME 14414 (2015)** Pump System Energy Assessment
- **ANSI/HI 9.6.1-2012** Rotodynamic Pumps Guideline for NPSH Margin
- **ANSI/HI 9.6.7-2010** Effects of Liquid Viscosity on Rotodynamic Pump Performance
- **ANSI/HI 9.6.3** Rotodynamic Pumps – Operating Regions
- **HI 50.7-2010:** Electronic Data Exchange for Pumping Equipment (2010)

### **Publications**

- **Author:** Hardee, Ray T. *Piping System Fundamentals: The Complete Guide to Gaining a Clear Picture of Your Piping System.* U.S. ed. 2009. Print.
- **Author:** Hardee, Ray T. “Using a Piping System Model for Process Safety Management.” *ChemShow.*
- **Contributor:** Hardee, Ray T. *Optimizing Pumping Systems: A Guide for Improved Energy Efficiency, Reliability & Profitability.* 2008. Print.
- **Contributor:** Hardee, Ray T. *Pump Life Cycle Costs: A Guide to LCC Analytics for Pumping Systems.* 2001. Print.
- **Contributor:** Hydraulic Institute, and Ray T. Hardee. *Variable Frequency Drives: Guidelines for Application, Installation and Troubleshooting.* 2nd ed. Print. (coming soon)
- **Author:** *Pumps and Systems Magazine* articles
  - 2015: “Piping System Controls,” “Understand How Valves & Fittings Affect Head Loss,” “Calculating Head Loss in a Pipeline,” “How an Oversized Pump Can Harm



the Motor & Increase Operational Costs,” “The Total System Starts with the Pump,”  
“Assessing a System with Multiple Loads,” “Pre-Screening Unlocks Savings  
Potential in Large Pump Systems.”

- 2014: “Completing the No-Control System Assessment,” “Assessing a System with  
No Control,” “System Validation & Troubleshooting,” “Calculate the Costs of Piping  
Systems,” “Assess Pump System Operation & Improvement Options,” “A Financial  
Justification for Pump Systems Improvements,” “Finally Justifying Improvements,”  
“Solution for Pump Discharge Pipe Cracking.”