Pumps: Design, Performance, and Commissioning Issues
Fall 2011

These links are provided as information only and are not in any way to be considered a comprehensive listing or as an endorsement by PG&E. All links were current at time of list creation. An electronic version of this list is available at www.pge.com/energyclasses/

Related Online Resources:

**Air-Conditioning and Refrigeration Institute (ARI)**
ARI is a national trade association representing manufacturers of air-conditioning and commercial refrigeration equipment. It develops and publishes technical standards; supports and assists training; and certifies performance ratings of products. Many of its guidelines and standards for systems and equipment are available for download.
http://www.ahrinet.org/

**American Society of Heating Refrigerating and Air-Conditioning Engineers (ASHRAE)**
ASHRAE is a professional organization dedicated to the creation and promotion of quality-based standard practices in the HVAC&R industry. Members have access to ASHRAE technical articles and conference papers. Anyone can browse abstracts of ASHRAE’s numerous books, journal articles and other technical publications that are available for purchase.
http://www.ashrae.org

**Building Commissioning Association (BCA)**
The Building Commissioning Association is a professional organization dedicated to “promoting building commissioning practices that maintain high professional standards”. Case studies, information about commissioning-related events, membership information, the BCA newsletter and other publications can be accessed from this site.
http://www.bcxa.org

**California Commissioning Collaborative**
The California Commissioning Collaborative is a group of government, utility, and building service professionals organized to develop and promote commissioning practices in the California. The CCC site includes over 40 case studies, and a great Library under its Resources heading that contains articles, white papers, guides, and sample commissioning documents.
http://www.cacx.org

**California Energy Commission. Title 24 Energy Efficiency Standards**
The CEC’s web site provides access to the *Title 24 Standards*, the *Residential and Nonresidential Compliance Manuals*, compliance forms, new outdoor lighting zones, other related documents, and information about energy analysis software programs.
http://www.energy.ca.gov/title24/
Consortium for Energy Efficiency (CEE).  Commercial HVAC Installation Guidelines
Both the Guidelines for Energy-Efficient Commercial Unitary HVAC Systems and the accompanying White Paper can be downloaded from CEE’s site. The Guidelines provide best practices, selection criteria, and details of components and systems. HVAC commissioning is also outlined and discussed.
http://www.cee1.org/com/hecac/hecac-spec.php3

Continuous Performance Monitoring Systems
This Lawrence Berkeley National Laboratory project to improve performance monitoring systems in large commercial buildings produced the specifications paper, Specifications Guide for Performance Monitoring Systems. The document can be viewed and downloaded from this site.
http://cbs.lbl.gov/performance-monitoring/specifications/

DDC Online.  Iowa Energy Center
The Iowa Energy Center provides unbiased information on Direct Digital Controls. This site includes a guide to controls manufacturers and their products, an introduction to Direct Digital Controls, and an Input/Output Tutorial.
http://www.ddc-online.org

Energy Design Resources.  HVAC Design
EDR provides access to resources to facilitate and educate building professionals in the design and operation of energy efficient buildings. The HVAC Design category includes design briefs, guidelines, and design software tools that cover a variety of efficient HVAC design techniques and technologies.

Functional Testing and Design Guides
http://www.peci.org/ftguide/

Industrial Energy Analysis.  Lawrence Berkeley National Laboratory.
This system optimization site provides links to several useful publications on pump performance.
http://industrial-energy.lbl.gov/node/171

Motors, Pumps and Fans.  Industrial Technologies Program.
The sourcebook Improving Pumping System Performance can be downloaded from the Department of Energy’s ITP Best Practices site. Fact sheets and handbooks on pumps are also available.
http://www1.eere.energy.gov/industry/bestpractices/techpubs_motors.html

MotorMaster
MotorMaster+ 4.0.6 is a software tool that analyzes motors and motor system efficiency for thousands of AC motors. It can be downloaded from the Industrial Technologies Program’s Software Tools site.
http://www1.eere.energy.gov/industry/bestpractices/software.html

National Building Controls Information Program (NBCIP)
NBCIP was established by the Iowa Energy Center and provides unbiased information on building control system products and strategies, including reports that describe the actual performance of products tested by the program. All publications on the site can be downloaded free of charge.
http://www.buildingcontrols.org

New Buildings Institute
New Buildings Institute is a nonprofit corporation that promotes energy efficient building design and operations. This site includes several useful publications under their Technologies category. These include Lighting, HVAC, and other mechanical systems. NBI also has a searchable database of high performance buildings. A link to NBI’s Advanced Buildings suite of building design and operation resources is under the Advanced Design tab.
http://www.newbuildings.org/
Pumping System Assessment Tool
This free software tool from the DOE’s Industrial Technologies Program helps users assess the efficiency of pumping systems operations. A fact sheet and User Manual is included.  
http://www1.eere.energy.gov/industry/bestpractices/software_psat.html

Pumps Systems Matter™
This pump system site contains a variety of useful tools for optimizing pumping systems and achieving better energy efficiency. Among the available resources are energy saving presentations, an assessment guide, case studies, white papers, and modeling tools.  
http://www.pumpsystemsmatter.org/default.aspx

Tool Lending Library at the Pacific Energy Center
The Tool Lending Library (TLL) site contains images and descriptions for each of its data collecting devices from over 100 vendors. Application Notes describe measurement techniques and provide step-by-step instructions for using specific tools. The TLL has a search feature to help you select the right tools for your project. A Tool Request Form and contact information is also provided.  
http://www.pge.com/pec/tll/

Whole Building Design Guide. High-Performance HVAC
This recently updated section of the WBDG presents a comprehensive overview of high performance HVAC equipment and systems. It also describes practices for reducing HVAC energy use, emissions, and costs.  
http://www.wbdg.org/resources/hvac.php?r=minimize_consumption

Print Resources Available in the PEC’s Resource Center:


Journals:

- ASHRAE Journal  
- HPAC Engineering

Other Print Resources: