

ARMSTRONG

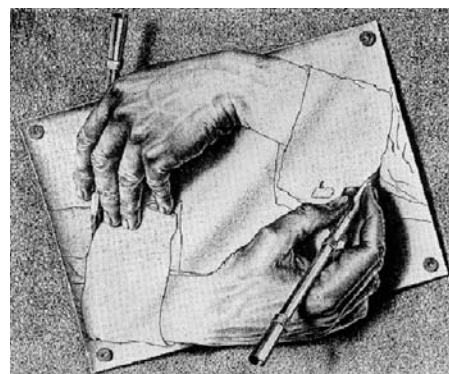


Armstrong Learning Sessions 2nd Quarter 2008

Reducing Carbon Footprint and Developing your Capabilities
Through an Integrated Design Approach

▶ CPD Seminars and Training - Enhancing your Capabilities

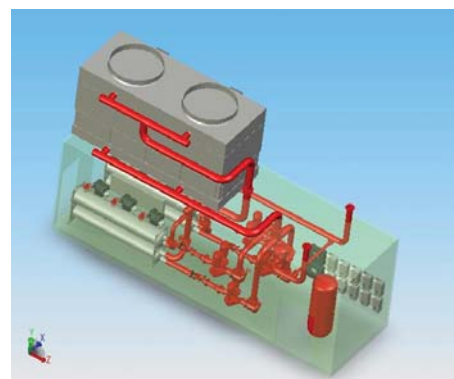
Armstrong recognizes the need for your business to meet and exceed the expectations of your clients through continuous improvement. Adding value, performance and efficiency to your projects in the face of increasing financial and legislative pressures has never been more important than it is today. It is for this reason that Armstrong has developed to this series of training courses aimed at enhancing your capabilities.



▶ Focused, Usable Information

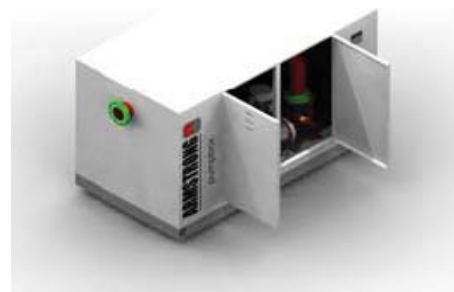
Armstrong has developed CPD certified seminars covering all aspects of HVAC fluid systems with a heavy emphasis on sustainability and design concepts from basics to fully integrated approaches. Courses currently available include:

- ▶ Energy Solutions to Reduce Carbon Footprint and Exceed the Requirements of Part L.
- ▶ Value Engineering Opportunities in HVAC Systems.
- ▶ Variable Speed Pumping Solutions.
- ▶ Integrated Pumping Systems for Multi-Pump Multi-Zone Control.
- ▶ Ultra-efficient Chilled Water Plants Using Demand-based Control.
- ▶ Integrated Heating Systems to Exceed Part L Efficiency Levels.



▶ Variable Delivery Formats

CPD Seminars can be held at the client's premises and include lunch if required. Training can also be organized and any of Armstrong's UK facilities or add third party venues as appropriate. All courses are free of charge subjects can be grouped together to provide longer sessions on request.



▶ Customized Course Material

Working within an established framework, Armstrong can tailor the course material to meet your requirements regards industry focus and knowledge levels. Modules are suitable for engineers of all disciplines.



To book courses please contact your local Armstrong representative or Wayne Rose, UK Marketing Manager,
T: 0161 2232223 E: wrose@armlink.com

▶ Energy Solutions to Reduce Carbon Foot-print and Exceed the Requirements of Part L

▶ Overview

This training session focuses on how the latest HVAC technologies and design approaches can exceed the requirements of Building Regulations Part L. Engineers will learn how fully integrative design concepts can help them exceed the requirements of the latest building regulations while improving system efficiencies, and reducing carbon footprint. The module lasts 4 hours including breaks and discussion. However the course material can be split into two 2-hour sessions where necessary.



▶ Agenda

Introduction	-	How Armstrong can Help you Exceed the Needs of your Clients Through Collaboration and an Integrated Design Approach
Overview of Part L and EPBD	-	The Energy White Paper 2007
	-	The Energy Performance in Buildings Directive
	-	Overview of Regulations L2A and L2B
How a Integrated Packaged Approach to Heating System Components can exceed Part L Boiler Efficiency Levels	-	Considering Key Areas of Design for Systems
	-	Achieving Overall Efficiencies of 94%
	-	Reducing Installation Cost by 25%
	-	Achieving Space Reduction with Integrated Systems
Best Practice Pump Selection and Control	-	How Pipeline Mounting Pumps can Reduce Installation cost by 30%
	-	Using Trimmed Impellers for Energy Savings of 16%
	-	How Parallel Pumping can Reduce Installed kW by 25%
Integrated Plant Control of Chilled Water Systems and How to Exceed Today's Best In Class Operating Efficiencies	-	Demand Based Control of all Variable Speed Plant
	-	Reducing Chiller Plant Operating Energy by 30%
	-	Utilising Technology for COP's of Greater than 7.0
	-	Mechanical Equipment Optimisation Solutions
Discussion and Questions	-	A Review of Discussions and Opportunities

▶ Key Learning Outcomes Include:

- ▶ How to exceed current best-practice performance levels and reduce carbon footprint.
- ▶ Adopting new design approaches to improve competitiveness.
- ▶ Reducing whole-life cost in a profitable way.
- ▶ How to reduce both installed cost and life cycle costs while providing building owners with sustainable heating and chilled water systems that exceed Part L requirements.

▶ Value Engineering Opportunities in HVAC Pumped Systems



▶ Overview

This training session explores how the latest pump technologies can improve the economics of sustainable HVAC systems. The module addresses questions such as: How can I reduce carbon footprint and at the same time reduce my install cost? How can I optimize plan room space without compromising on system design? How can I add value for my client by reducing pump maintenance requirements? This module requires one hour including time for questions and discussion.



* Content from this module is included in the 'Energy Solutions' training on page 3

▶ Agenda

Value Engineering	-	Definition
	-	Objectives
Centrifugal Pump Basics	-	Principles
	-	Characteristics
	-	Pump Construction
	-	Evolution of Pumps
Lowest Installed Cost	-	Typical Installation Elements
	-	Vibration Concerns
	-	Pipeline Mounting of Pumps
	-	Suction Diffusers and Triple Duty Valves
	-	Cost Comparisons
Optimal Use of Floor Space	-	Comparative Space Envelope
	-	Dual Level Plant Rooms
Improved Maintainability of Plant	-	Split Coupled Vertical Inline Pumps
	-	Mechanical Seal Issues
Best Reliability of Plant	-	Modes of Failure
	-	Installation Examples

▶ Key Learning Outcomes Include:

- ▶ How to improve sustainability without increasing cost.
- ▶ Adopting new design approaches to improve competitiveness.
- ▶ How the use of new pump technologies can add value for you and your client.
- ▶ How to reduce whole-life cost for your client in a profitable way.

▶ Variable Speed Pumping Solutions

▶ Overview

This training session covers the principles, applications and issues relating to variable speed pumping. The module addresses questions such as: How does variable speed pumping impact sustainability, carbon footprint and maintenance? How can I incorporate variable speed pumping into my design at no extra cost? How does my pump control strategy affect energy efficiency? How can I remove sensors from my system design and still achieve variable speed energy savings?



* Content from this module is included in the 'Energy Solutions' training on page 3

▶ Agenda

Why Variable Speed Pumping	-	Energy Efficiency
	-	Life Cycle Costs
	-	Building Comfort and Control
Pumping Basics	-	Basic Operating Characteristics
	-	Flow Control
	-	Pump Efficiency
Fixed Speed Pumping	-	Constant Flow Circuit Losses
	-	Variable Flow Circuit Losses
	-	Energy Consumption
Variable Speed Pumping	-	Differential Pressure Sensor Strategies
	-	Energy Consumption
Sensorless Pump Technology	-	How Does it Work?
	-	Benefits
	-	Operating Modes
	-	Product Solutions
	-	Flexibility
	-	Example Installations

▶ Key Learning Outcomes Include:

- ▶ Understanding the extent to which fixed speed pumping wastes energy.
- ▶ Understanding when to use variable speed pumping.
- ▶ How pump control strategies can affect potential energy savings.
- ▶ Improving carbon footprint at no additional cost.
- ▶ Reducing whole-life cost for your client into profitable way.

▶ Integrated Pumping Systems (IPS) for Multi-Pump, Multi-Zone Control



▶ Overview

This session covers the principles, applications and issues relating to parallel variable speed pumping and controls for optimizing energy while satisfying key building loads. The module answers questions such as: How can I reduce energy usage without sacrificing standby capacity? How do I develop a pump control strategy that will optimize energy savings and ensure that the needs of key building loads are met? When designing variable volume heating and chilled water systems, how can I reduce project risk for my company and my client?



* Content from this module is included in the 'Energy Solutions' training on page 3

▶ Agenda

Why Variable Speed Pumping?	-	Energy Efficiency
	-	Speed / Power Relationship
How to use Parallel Pumping	-	What is Parallel Pumping?
	-	Why Parallel Pumping?
	-	Reducing Installed kW and Carbon Footprint
Optimised Variable Speed Pumping	-	DP Sensor Strategies and use of Multiple Sensors
	-	Energy Consumption
Integrated Pumping Systems	-	What is an Integrated Pumping System?
	-	Control Sequence of Operation
	-	BMS Communications
	-	Product Solutions and Configurations

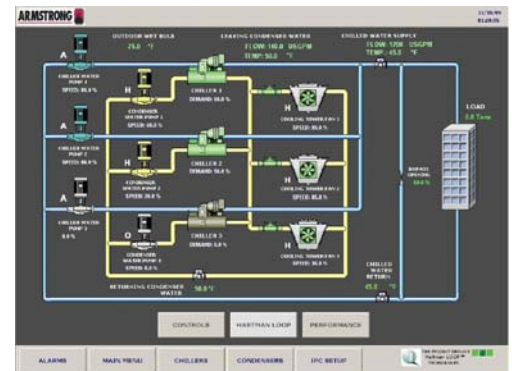
▶ Key Learning Outcomes Include:

- ▶ How the use of parallel pumping reduces installed kW and carbon footprint.
- ▶ The use of multi sensor control strategies for optimum variable speed control.
- ▶ Adopting an integrated design approach for improved efficiency.
- ▶ How to reduce both installed-cost and life-cycle costs while providing building owners with sustainable pumping systems exceeding Part L requirements.
- ▶ Reducing project risk through an integrated design approach.

▶ Ultra Efficient Chilled Water Plant Through New Demand Based Control

▶ Overview

This session examines how the latest control technologies can provide an all variable speed chilled-water plant with COPs of greater than 7.0 (.5 kW/ton). The module answers questions such as: Why is capacity-based sequencing of chiller plants no longer the optimum solution? How can I reduce my chiller plant operating energy by 30%? How can an integrated design approach make my company more competitive and at the same time add value for my client?



* Content from this module is included in the 'Energy Solutions' training on page 3

▶ Agenda

- | | |
|------------------------------------|---|
| Introduction | <ul style="list-style-type: none"> - Design Objectives - Lower Carbon Footprint - Use of Technology |
| Chilled Water Plant Control | <ul style="list-style-type: none"> - Traditional Control Methods - 'Today's' Efficiency Standard - What is Ultra Efficient? |
| Achieving Integrated Plant Control | <ul style="list-style-type: none"> - The 'Natural Curve' of Variable Speed Chillers - Demand Based Control and 'Equal Marginal Performance Principle' - Optimising All Variable Speed Configurations - All Variable Speed Plant Control |
| Integrated Plant Packages | <ul style="list-style-type: none"> - Oil Free Magnetic Bearing Chiller Compressors - Mechanical Equipment Optimisation - Plant Configuration - Benefits of Packaged Systems |

▶ Key Learning Outcomes Include:

- ▶ Understanding why performance monitoring and benchmarking are the keys to sustainability.
- ▶ Understanding how implementation of an integrated design solution can cost less and achieve more.
- ▶ How to add value for your client through reduced maintenance and space requirements.
- ▶ How to exceed current best practice performance levels and reduce carbon footprint.
- ▶ The use of system integration for achieving optimum performance and reducing business risk.

▶ Integrated Heating Systems to Exceed Part L Efficiency Levels



▶ Overview

Identifies the many benefits of taking an integrated approach to commercial heating system design. The module answers questions such as: How does an integrated heating system allow overall seasonal efficiencies of up to 94%? How can I reduce my installation cost by 25% without increasing my capital cost? How do integrated sub-systems provide a more sustainable design for my client? How can a heating system be installed in less than one hour?



* Content from this module is included in the 'Energy Solutions' training on page 3

▶ Agenda

Introduction to Integrated Heating Solutions	-	Why do we need Integrated Systems?
	-	Linking Sub-Systems Together
	-	Avoiding 'Silo Thinking'
Considering Key Areas of Design	-	System Design Temperatures—Meeting the Changing Climate
	-	Control Philosophy—Challenging the Norm
	-	Hydraulic System Design—Variable Primary Flow
	-	Utilising Variable Speed Pumping
System Installation	-	Rapid Installation using a Module Approach
	-	Multiple Installation Configurations
Energy Efficiency	-	Calculating the Overall Boiler Seasonal Efficiency
	-	Part L Compliance
Summary	-	Features and Benefits
	-	Target Marke

▶ Key Learning Outcomes Include:

- ▶ Avoiding 'silo thinking' and challenging existing design approaches
- ▶ Understanding how variable primary flow systems reduce life cycle costs
- ▶ Improving sustainability whilst reducing capital and installation cost.
- ▶ Exceeding current best practice performance levels and reducing carbon footprint.
- ▶ Understanding how system integration can deliver peak performance and reduced business risk.

Our policy is one of continuous improvement and we reserve the right to alter our dimensions and specifications without notice

EXPERIENCE BUILDING...

Armstrong Holden Brooke Pullen Ltd
Wenlock Way
Manchester
United Kingdom, M12 5JL
T: +44 (0)161 223 2223
F: +44 (0)161 220 9660
E: salesuk@armlink.com

Sales & Service Office
21-23 Ormside Way
Holmethorpe Industrial Estate
Redhill, Surrey, RH1 2NT
T: +44 (0)173 737 8100
F: +44 (0)173 737 8140
E: salesuk@armlink.com

S. A. Armstrong Limited
23 Bertrand Avenue
Toronto, Ontario
Canada, M1L 2P3
T: (416) 755-2291
F: (416) 759-9101
E: info@armlink.com

