

Curriculum vitae

Chris Parsloe BSc, CEng, MCIBSE

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Introduction

Areas of expertise:

- Design of variable flow heating and chilled water systems
- Commissioning of pipework systems
- Pre-commission cleaning of pipework systems
- Fault diagnosis of heating and cooling pipework systems

I am the author of widely quoted guides and codes on pipe system design, pre-commission cleaning and commissioning.

Career Summary

Status

British, age 53, graduated from University in 1983.

Education

A Levels: Pure mathematics, physics, chemistry

University 1979 – 1983: Brunel University, Uxbridge, London

Qualification: BSc (Hons) Building Engineering and Management

1983 – 1985

Taylor Woodrow International Ltd

Position: Graduate engineer

Role: Mechanical design for offices and hospital buildings in Oman and Ghana. Commissioning of air and water systems for Bausher stadium in Muscat, Oman.

1985 – 1987

T. Dunwoody and Partners Ltd

Position: Design engineer

Role: Mechanical design for offices and laboratories (i.e. heating, air conditioning, ventilation and specialist laboratory services).

1987 – 2001

BSRIA (Building Services Research and Information Association)

Position: Research engineer and section leader.

Role: Research, investigation and technical writing

Author/co-author of the following BSRIA publications:

- AG3/89 Commissioning of air systems in buildings
- AG2/89 The commissioning of water systems in buildings
- AG 8/91 Pre-commission cleaning of water systems
- TN 9/92 Space and weight allowances for building services plant – inception stage design
- TN 10/92 Space allowances for building services distribution systems –detail design stage
- TN12/92 Small power loads
- AG20/95 Commissioning of pipework systems – design considerations
- TR21/95 Over-engineering in building services
- AG 15/96 Value engineering of building services
- AG 11/98 Project management
- AG 14/99 Variable speed pumping in heating and cooling circuits

Other Activities

System trouble-shooting

Expert witness work

Presenting papers at conferences

Running training courses for engineers

2001 – 2003

SAV Valve Systems Ltd

Position: Technical Manager

Activities:

- Development of new valve solutions including “Commissioning Module” concept
- Technical sales support for commissioning valve products

2003 – present

Parsloe Consulting Ltd

Position: Director

Activities:

- Software development
- Pipe system trouble-shooting
- Expert witness work
- Technical authoring

Professional bodies

CEng, MCIBSE

Career details

Early career

I attended Brunel University between 1979 and 1983. My course (Building engineering and management) was a thin sandwich course which meant I undertook three six month industrial training periods. During the third of these periods, I was employed by a design consultant in Bristol (Goodyer Associates). My duties involved pipe sizing, duct sizing, heat loss and heat gain calculations. I was also stationed on site for a one month period to assist with the balancing of air and water flow rates in a large office building.

On graduating I joined Taylor Woodrow International Ltd. I was initially employed in their design department working on mechanical and electrical designs for buildings in Oman and Ghana. In 1984 I was sent for a three month period to assist with the commissioning of mechanical systems at the Bausher Stadium in Muscat, Oman. During this period I was responsible for flow balancing in air and water systems and became familiar with the contents of CIBSE Commissioning Codes A and W.

In 1985 I joined a design consultant (T Dunwoody and Partners Ltd). I was responsible for the design of mechanical services in medium sized offices and laboratory buildings. Project specification included the selection of regulating valves and flow measurement devices. My previous experience of “hands on” commissioning helped in this respect.

BSRIA Commissioning guides

In 1987 I joined BSRIA (Building Services research and Information Association). BSRIA are an independent research company that undertakes research and prepares guidance publications for the building services industry.

The job I applied for was in the field of computer aided design. However, shortly after joining it became apparent that someone with commissioning knowledge was required to help write new BSRIA guides on the commissioning of air and water systems. My background meant I was the person best suited for the role.

Therefore, during 1988 I found myself chairing a committee of industry experts on commissioning. My role was to draw on their combined knowledge (and my limited experience) to write step by step procedures for the balancing of flow rates in pipework and ductwork systems. Since the committee was also keen that the guides covered system design i.e. how to design for commissionability, I also had to develop a good understanding of the common design deficiencies that affected commissioning.

The BSRIA guides “Commissioning of water systems” and “Commissioning of air systems” were published in 1989.

Pre-commission cleaning of pipework systems

As an offshoot from the work on commissioning, some members of the committee had highlighted dirt in pipework systems as a major obstacle to successful commissioning. A short guide was produced by some of the committee members explaining how to flush debris out of pipework systems. This was issued at the same time as the main commissioning guides.

There was a lot of industry feedback on the contents of this guide with the general view being that the guide was dealing with a very important issue and did not go far enough in addressing the problems experienced. As a result, I initiated the setting up of a new committee to prepare a more comprehensive guide. The committee was attended by experts in various aspects of pipe system cleaning including chemists, metallurgists, corrosion experts, microbiologists and pipe cleaning practitioners. Over the next two years I acted as steering group chairman and technical author as we developed a guide that fully explained the requirements for pipe system cleaning. As for the commissioning guides, the new pipe cleaning guide was to provide a step by step procedure for the cleaning process as well as design guidance on how to design a cleanable system.

The BSRIA guide “Pre-commission Cleaning of Pipework Systems” was issued in 1993 and was the first publication of its kind in the UK to deal comprehensively with pipe system cleaning in building services applications. The guide underwent a further update in 1998 for which I was again the author.

Variable speed pumping

During the mid-1990s, variable speed pumps were beginning to be introduced at low enough cost to make them viable in building services systems. In order to optimize the energy saving potential of these

pumps, pipe system designs had to change from being constant flow, where the flow from the pump never changed, to variable flow where the pump flow would vary depending on the demand in the system. Until this time variable flow pumping had been mainly applied to large district heating systems. Since there were very few of these in the UK most of the experience was in countries such as Denmark and Germany.

I initiated a BSRIA project with the aim of developing design guidance on variable flow systems. This involved chairing a committee of valve experts, pump experts and design engineers with experience of district heating applications. As author of the guide I had to learn about the different valve technologies involved and consider the various theories relating to pump speed control. An understanding of pipe system network analysis was required so that the consequences of varying flows and pressures could be predicted. This experience greatly increased my understanding of fluid dynamics applied to building services pipework systems.

The BSRIA guide “Variable speed pumping in heating and cooling circuits” was released in 1999.

Allocation of design responsibilities

During this same period, the building services industry was considering how the “fuzzy edges” between the different parties with an input to design could be clarified. A particular problem area was the allocation of responsibility for those elements of the design that affected commissionability.

I proposed a BSRIA guide aimed at clarifying the allocation of design responsibilities for building services. I acted as co-chairman of a steering group that included senior partners and directors from major UK design consultancies and contractors. The aim of the guide was to provide listings of specific design duties that could be allocated to one of the parties involved, e.g. designer, installer, commissioning specialist or others.

The resulting BSRIA guide “Allocation of Design Responsibilities for Building Engineering Services” was issued in 1997.

The guide was referenced and recommended in the Egan Report “Re-thinking Construction” produced in 1998. This was a major Government report into the functioning of the construction industry undertaken by an industry task force chaired by Sir John Egan. This gave the topic, and our guide, a very high profile during the late 1990s.

Commissioning management

The recognition that commissioning expertise was important to the successful outcome of projects led to the development of so called “commissioning management”. This was a new service whereby a commissioning specialist would provide commissioning expertise during the design and installation stages of a project. This would include checking the design for potential commission ability issues, planning the commissioning activities and overseeing the commissioning process.

In response to this trend towards commissioning management, I initiated a BSRIA project to produce a guide on the subject. I was the chairman of a steering group that included representatives from

commissioning specialists, installing contractors and project management companies. Work on the publication began in 2001 but later the same year I left BSRIA to join my next company. The guide was completed by Marcus Dicks of BSRIA although I continued to attend meetings and provided input in the form of written comments at each draft stage.

The BSRIA guide “Commissioning Management” was published in 2002 and was the first guide on commissioning management to be issued in the UK. In recognition of the importance of commissioning management the CIBSE initiated their own steering committee on the subject and published their Commissioning Code M “Commissioning management” in 2003 re-enforcing the same understanding of commissioning management as expressed in the BSRIA guide.

Valve design

In 2001 I left BSRIA to join a valve distribution company SAV(UK) Ltd with the aim of helping them to develop new commissioning solutions for heating and chilled water systems. This included the development of a completely new range of double regulating valves and flow measurement devices. In developing these valves I was able to draw on my experience of system commissioning, valve characteristics, flow measurement principles and pipe system design. Production and testing of the new valves was undertaken by the Italian valve manufacturer, Cimberio. I visited the manufacturer’s laboratories near Milan to witness and approve test results and to suggest any additional modifications that might be required.

To differentiate the new valve range from other more established valves, I worked to help develop the principle of a “commissioning module” whereby all of the valves required for commissioning and pre-commission cleaning groups of up to six terminal units would be housed in a single pre-fabricated box. This box could be delivered to site and piped up with minimal input from the designer or installer. As technical manager for the product it was my role to size all of the valves that went into each module including control valves, regulating valves, flow measurement devices and differential pressure control valves. The product was a great success and I probably sized thousands of valves during this period. As the product began to be installed on UK projects, I attended site frequently to provide training and technical assistance.

Parsloe Consulting Ltd

By 2003 I had decided that my range of skills were sufficient to enable me to act as an independent consultant on issues relating to pipe system design, commissioning and pre-commission cleaning. I formed my own company Parsloe Consulting Ltd in 2004 and remain a director of the company. My workload varies between technical writing, trouble-shooting, expert witness work and occasional design.

Technical authorship

Since I am widely known as a technical author, I am regularly asked to write design guides for different organisations including those companies I have worked for in the past. My writing credits since 2003 include the following:

- CIBSE Knowledge Series Guide 1: *Reclaimed water* 2003
- CIBSE Knowledge Series Guide KS7: *Variable flow pipework systems* 2004
- CIBSE Knowledge Series Guide KS3: *Sustainable low energy cooling: an overview* 2005
- HVCA TR/6 *Site Pressure Testing of Pipework Systems*
- CIBSE Knowledge Series Guide KS9: *Commissioning variable flow pipework systems* 2007
- Frese (UK) Ltd product guide *Optima pressure independent control valves* 2008
- CIBSE Commissioning Code W: *Water Distribution Systems* 2010
- Updated BSRIA *Commissioning Water Systems* guide 2010
- Updated BSRIA *Pre-commission cleaning of pipework systems* 2003 and 2011
- BSRIA Guide BG12/2011: *Energy Efficient Pumping Systems* 2011
- SAV (UK) Ltd product guide *Akva heat interface units* 2008 and 2011
- SAV (UK) Ltd product guide *Flogen combined heat and power units*
- Marflow Hydraulics Ltd *Pressure independent control valves* 2013
- Updated BSRIA *Commissioning Air Systems* guide 2013

Heat interface units and district heating

Technical writing for manufacturers in support of new products helps me to keep up to date with the latest developments. An example of this was my introduction to heat interface units in 2008 when SAV (UK) Ltd asked me to write a design guide on the subject. The guide was to cover all aspects of system design including detailed explanations of how the units work followed by guidance on how they should be incorporated into heating distribution systems.

The heat interface units SAV were marketing had been designed by Danfoss and had been sold with great success in Denmark and other parts of mainland Europe. However, UK experience of heat interface units was limited at the time, and there were no recognized UK design guides.

In the course of writing the SAV guide, I was introduced to product development engineers at Danfoss and visited their laboratories and test facilities in Denmark. The operation of the units was explained to me in great detail focusing on the operation of the valves included within the assemblies, all of which were manufactured by Danfoss.

In addition, I was introduced to Danish engineers with extensive experience of designing district heating systems feeding to heat interface units. Through discussions with these engineers I learnt about system diversity allowances, buffer vessel sizing, pump speed control and system commissioning. The guide I drafted incorporated all of their design recommendations and provided a comprehensive explanation of how to design a heating system that incorporates heat interface units.

Design work

Although I do not undertake regular design work, I sometimes help other designers by providing design calculations for heating and chilled water systems. One example of this is the Osprey Quays housing development in Portland, Dorset. This was a development of 77 residential units with associated external works which housed the athletes who competed in the 2012 Olympic and Paralympics sailing events.

The houses were to be heated by a central biomass boiler feeding a distributed heating main running to heat interface units located in each house or apartment. The heat interface units provided instantaneous heating of hot water to outlets and heating circuits to radiators. My role was to size the heat interface units, all pipework, the buffer vessels, the biomass boilers and the system pumps. I also had to estimate and make allowance for system usage diversity during pipe sizing and buffer vessel sizing. After the system had been installed, I was appointed to oversee the commissioning of the system which involved setting flow rates and adjusting pump speed control. The system I designed was a success with no reported problems of Olympic sailors being left without a shower after a long day on the water.

Trouble-shooting

Probably the largest part of my workload is system trouble-shooting, mainly for pipework systems that are experiencing operating problems due to poor design, malfunctioning valves, inadequate commissioning or dirt contamination. This often involves checking designs, reviewing commissioning results, and physically checking system flow rates and pressure differentials. My work involves regular involvement with design consultants, installing contractors, commissioning specialists, commissioning managers and pre-commission cleaning specialists. This helps to keep me up to date with current industry practices and problems.

Expert witness

I have attended numerous projects since starting my consultancy and am increasingly involved as an expert witness where a client is defending themselves or looking for redress in a dispute situation. Examples of the type of investigation or expert witness roles I have been involved with in the last 10 years include the following:

- An investigation into the cause of water hammer (hydraulic shock) in an apartment block. The occupants had complained of loud banging noises from pipework which had remained unresolved for 12 months. I was able to demonstrate that water hammer was caused by malfunctioning pressure reducing valves in the hot and cold water supplies.
- An investigation into the cause of failing two port control valves in heating and chilled water systems. I was able to prove that the cause was due to the valves having to close against excessive pump pressures resulting in cavitation erosion across the valve seats.
- An investigation into the origin of dirt and bacteria in chilled and heating pipework systems some 18 months after handover. My role was to provide an opinion on whether the system had been cleaned in accordance with the requirements of the BSRIA Pre-commission cleaning guide.
- An investigation into the cause of a pressure imbalance between hot and cold water supplies in a hotel which resulted in unpredictable scalding temperatures from shower outlets.

- An investigation into the causes of severe erosion of two port control valves and early failure of steel radiators. I was able to determine that cavitation was possible in the system due to inadequate pressure conditions and water quality.
- An investigation into the sizing of pipework to serve a water cooled split system air conditioning unit. I was able to demonstrate that the air conditioning unit itself had been oversized and that the pipework and pumps were under-sized causing the unit to trip out under alarm conditions.
- An assessment on the capacity of a VAV air conditioning system which was due for refurbishment. I was able to demonstrate that the landlord's supply of cooled air was insufficient in volume to cope with the cooling demands of the internal spaces.
- An investigation into the causes of external corrosion on chilled water pipes which were removed and replaced after only 10 years. I gave evidence in court to argue that there was no immediate need to remove the pipes.
- Investigation into radiator leaks in a block of apartments. My findings showed that rubber seals that formed part of the construction of the radiators were deforming causing leaking at unexpectedly low pressures.
- An investigation into the pre-commission cleaning procedures at a building in which the heating system suffered severe corrosion and required early replacement.

Software development

Over the years I have developed several computer programs and Excel based spreadsheets for the purpose of pipe system analysis and design. In 2007 I was contracted by the CIBSE to develop a spreadsheet version of their standard pipe and duct sizing tables for inclusion with CIBSE guide C4 Flow of fluids in pipes and ducts. This spreadsheet is now distributed with every copy of the guide.

In 2014 I launched my own software "SystemGuru" which designs complete heating and chilled water systems.