- Effects of water hammer on pipeline systems
- Ways to minimize water hammer effects on pipeline systems during
  - o design stage
  - o commissioning of the project
  - o routine operation
- Importance of proper maintenance of the pipeline and pumping systems in minimizing water hammer effects
- Basic understanding of the mathematical modeling tools to study the water hammer phenomena
- In addition, the participants of Day 3 will be able to create and analyze simple transient models using Surge 2000 Computer Program.

Instructor

Prof. Srinivasa Lingireddy, PhD, PE, FIE

Dr. Lingireddy is a teaching and research faculty at University of Kentucky, USA. He has nearly 20 years of experience in the field of water distribution and transient modeling. He is a member of the KYPIPE and Surge2000 development team and has trained hundreds of practicing engineers in this area. His detailed CV is available at www.engr.uky.edu/~lreddy

REGISTRATION FORM

Training Programme on Methods for Controlling Water Hammer Effects on Large Irrigation and Water Supply Pipelines

The Institution of Engineers, Karnataka State Centre, Bangalore

Name ..... ……..... .....

Designation ....

Organisation ....

Mailing Address ....

....

....

Phone.....Fax..... E-mail..... .....

Registration Fee :

Participants attending Day 1 & Day 2	:	Rs. 3,000/-
Participants attending Day 3	:	Rs. 2,500/-
Participants attending all three days (Day 1, 2 & 3)	:	Rs. 5,000/-

Details of Fee Payment : (Cheque / DD in favour of **"Fluid Hammer Consultancy Pvt Ltd"** Payable at **Bangalore**)

Amount : Rs. ..... *(In words)* .....

Cheque/DD No. ..... Bank.....Dated .....

Date : Signature

For all correspondence, including registration and payment, contact:

Mr. S. Prabakaran, Fluid Hammer Consulting Services Pvt. Ltd

#3, First Main, BDA Layout, Kodihalli, HAL 2nd Stage, Bangalore-560008. India.

Tel : +91-80-56692501 / 51152496 Fax : +91-80-25260445/51152496

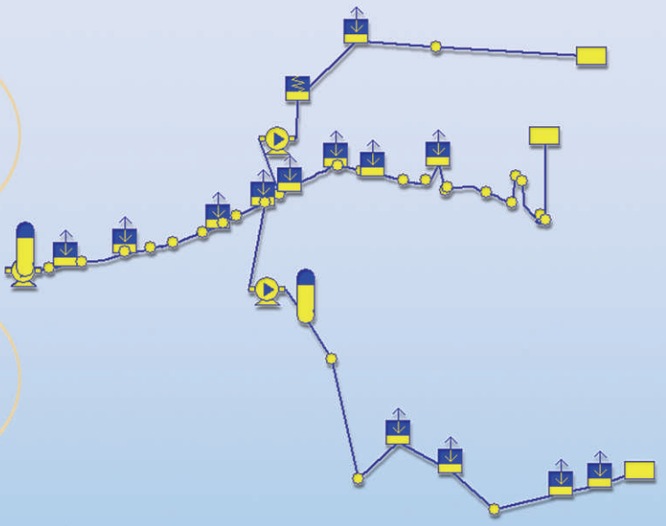
Email : contact@fluidhammer.com Web : www.fluidhammer.com

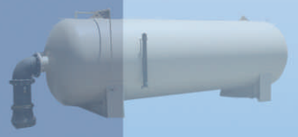
Training Programme on Methods for Controlling Water Hammer Effects on Large Irrigation and Water Supply Pipelines

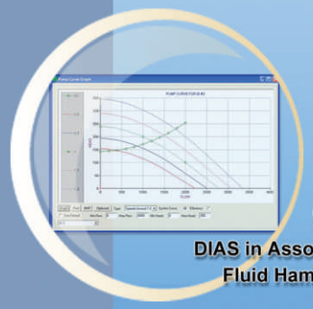
2, 3 & 4 February 2006

Venue

The Institution of Engineers,
Karnataka State Centre,
#3, Dr. B.R. Ambedkar Veedhi, Bangalore







Organised by

DIAS in Association with Team Tech Foundation & Fluid Hammer Consultancy Services Pvt Ltd

Deccan Institute of Advanced Studies

Team Tech Foundation

ABOUT THE PROGRAMME

Introduction

The demand for drinking water has been growing at an alarming rate in numerous urban areas of modern India. Simultaneously, the uncontrolled urban sprawl has shrunk the number of small lakes previously used for irrigation purposes thereby increasing the demand for imported water for irrigation. Several state governments have initiated large scale pumped water supply projects and lift irrigation schemes to alleviate the water shortage problems. These projects are generally very expensive and could range anywhere from a few tens of crores of rupees to several hundreds of crores of rupees. Projects of this magnitude call for highly optimized design of the pipeline and pumping systems. Such optimized systems in turn necessitate careful mathematical modeling studies to detect potential water hammer problems and design the appropriate protection measures.

Water hammer is a phenomenon associated with sudden stopping or starting of flow (generally associated with pump startup or shutdown) in a pipeline and can result in serious damages to the pipeline and pumping systems. This programme is designed to introduce water hammer phenomenon, its impact on large pipeline and pumping systems, and various popular measures to control the water hammer effects. Although detailed mathematical modeling studies are undertaken by the experts on hydraulic transients, the stake holder participation during design, execution, and operating stages will be highly beneficial for the overall success of the project.

Objective

The objective of this programme is to familiarize the participants with water hammer phenomenon, causes of water hammer, its effects on pipeline systems, and the measures to control water hammer effects.

Course Contents

Days 1 and 2

- Role of large water supply pipelines in modern societies
- Introduction to Water Hammer
- Causes for water hammer in pipeline systems
- Effects of water hammer in pipeline systems
  - Pipe bursts
  - Inward collapse of pipelines
  - Damages to pumping and other system
  - Direct action methods
- Methods of controlling water hammer effects
  - Direct action methods
    - Modification to Original Design
      - Alignment
      - Pipe Material
      - Pipe and Pump Sizes
  - Diversionary tactics
    - Surge tanks
      - One-way open tanks
      - Open surge tanks or stand pipes
      - Closed surge tanks or air vessels
        - Compressor vessels
        - Bladder vessels
      - Hybrid surge tanks
    - Air valves
      - Air release valves
      - Vacuum valves
      - Generic air release/vacuum valves
      - Surge suppressing non-slam air release/vacuum valves
    - Pressure Control valves
      - Pressure relief valves
      - Surge anticipation valves
      - Rupture Discs
- Advantages and disadvantages of various protection measures
- Case studies, video presentations
- Demonstration of Surge2000 program (www.kypipe.com)
- Questions and answers session

Day 3

- Introduction to mathematical modeling
- Popular computer modeling tools
- Surge2000 workshop
  - Graphical user interface
  - Developing mathematical models
  - Analyzing the model
  - Processing and interpreting results
  - Designing protection measures
- Limitations of mathematical models

Who Should Attend

- Engineers/Managers/Commissioners from Irrigation and Water Supply Departments, Municipal Corporations, Urban Development Authorities, Consultancy Agencies, and Implementing Agencies
- O&M incharge officers of Irrigation and Water Supply Systems
- Self interested personnel

Learning Outcomes

At completion of this course the participant will gain:

- Basic understanding of water hammer phenomenon
- Causes of water hammer