



دبلوم تطبيقات التحكم الأوتوماتيكي في نظم القوى الميكانيكية

MEP 579 Applications of Industrial Pipe lines: Types, Design, Construction, and Installing

Dr. Mohsen Soliman, ACC Manager
Mechanical Power Engineering Department

مق 579 تطبيقات خطوط الأنابيب الصناعية: الأنواع-التصميم-التركيب والإنشاء-الصيانة :

مقدمة عامة حول أساسيات ووظائف وطرق اختيار أنواع خطوط الأنابيب في التطبيقات الصناعية المختلفة، الأجزاء والمكونات وإعتبرات التصميم والعوامل الهيدروليكية لسريان كافة أنواع المواع في نظم خطوط الأنابيب، حسابات وخرائط ومعادلات وجداول كل من فواقد الضغط الرئيسية وفواقد الضغط الثانوية في كافة أجزاء خطوط الأنابيب. أمثلة تطبيقية ودراسات حالة لتصميم وحسابات خطوط الأنابيب بالطرق التقليدية. أمثلة وتطبيقات على أنواع متعددة لبرامج الحاسب الآلى لعمل التصميم والحسابات وإنتاج الرسومات التنفيذية لشبكات خطوط الأنابيب. الأجهزة والحساسات ووسائل القياسات الموجودة ضمن أجزاء ومكونات خطوط الأنابيب: المحابس، والعدادات، ووسائل قياس معدل التدفق أو كمية السريان أو سرعة المائع في الخطوط وشبكات الأنابيب.

What do we have in the Industrial Pipe Lines Design Course?

MEP 579-Applications of Industrial Pipe lines: Types, Design, Construction, and Installing:

Contents: (1) *Introduction & Basic Concepts:* -Fundamental Aspects of Fluid Flow Piping Systems, Types and components of Piping Systems, Review of Hydraulic considerations, Major and Minor Losses in Piping Systems, Types of Pipe Fittings, Solved Examples. (2) *Piping System Design & Calculations:* Solved Practical Cases. (3) *Using Computer Software in the design of piping systems.* (4) *Types of Valves* (basic functions, selections: hydraulic considerations, construction, ratings, materials, Flow through valves, pressure losses, design facts / parameters - Manual Valves (types, selection, connections, operation) - Check Valves (types, selection, design and installation factors)-Reducing and Pressure Relief Valves (direct acting, characteristics) - Automatic Control Valves (spool types, single/multi-stage controls)- Valve Maintenance - Examples for automatic Valves & movies. (5) *Types of Flow Meters.*

Course Objectives and ILO's

This Course is designed to give participants the skills & knowledge to:

- 1- Basic fundamentals of fluid flow in various components of pipeline systems.**
- 2- Fluid viscosity, characteristics of laminar & turbulent flow, critical Reynolds number.**
- 3- Care-full examination of how to calculate major pressure and head losses and types of minor losses in different pipeline fittings and components.**
- 4- Understanding basics about types of manual, control & industrial valves as being essential parts of pipelines. This include their various functions, materials, sizes, geometry considerations & the most essential flow characteristics through each type**
- 5- Examine the pressure drop relations and flow coefficient calculations for each valve type. How to select the proper valve size for a given flow is also considered.**
- 6- Investigate the various international standards for pipes , valve rating, material selection and methods for correct valve sizing for different type of fluids.**
- 7- Care-full examination of various types of emergency & pressure relief valves and ruptured disks.**
- 8- Examination of various types of automatic control valves and water hammer protection valves.**
- 9- Examination of various types of pipelines fluid flow measurement components and equipments.**
- 10- Some Modern Technology of Using Computer Software in design of Piping systems**
- 11- Various types of pipelines supporting, hanging and fixing elements & equipments. Some calculations for forces & moments acting on those supporting elements.**

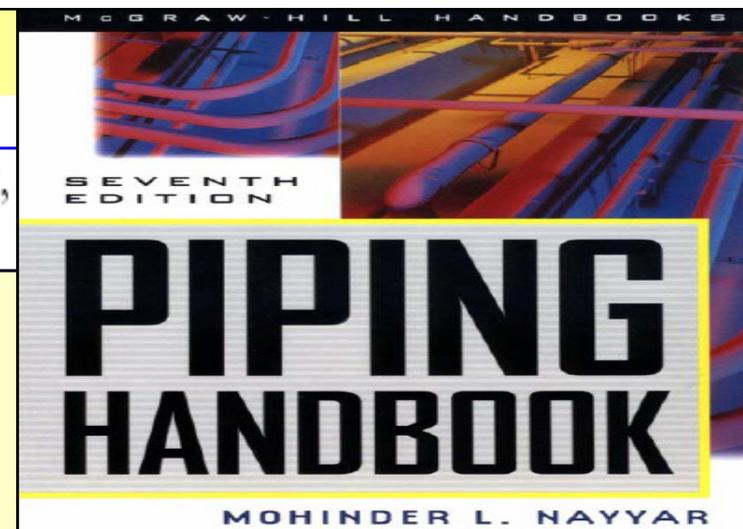
PIPING SYSTEMS: DESIGN AND CONSTRUCTION

Basics and Practical References :

"Fundamentals of Fluid Mechanics", 4th ed., Bruce R. Munson, Donald F. Young, Theodore H. Okiishi , John Wiley & Sons, Inc.

- "Pump Hand Book", 3rd ed., Igor J. Karassik, Joseph P. Messina, Pual Cooper, Charles C. Heald, Mc GRAW-HILL, N.Y
- "Fluid Mechanics", 4th ed., Frank M. White, Mc GRAW-HILL, N.Y
- "Mech. Engineering Hand Book", CRCnetBase1999, Frank Kreith, CRC Press

- Valve Handbook, Philip L. Skousen, McGraw-Hill, London.
- Valve Selection Hand-book, R.W. Zape, Gulf Pub.Com., Houston ,1991.
- Pneumatic System , Principles and Maintenance, S.R. Majumdor, McGraw-Hill, New Dalhi.
- Gate and Globe Valves, KSB Akteingesall schaft D-6710 Franhenthal.
- Industrial Valves Catal., Trouvay and Couvin Company, Le Havre Cedex, France.
- Safety Relief Valves Catalog, (Consolidated ASME), Valves & Instruments Company, Saudi Arabia.



Piping and Pipelines ASSESSMENT GUIDE



 **Flowmaster** White Paper Fowmaster Group
www.flowmaster.com
Fluid thinking for systems engineers Dynamic Analysis of Hydraulic Systems

Pumps

Reference Guide
Third Edition

**ONTARIO POWER
GENERATION**



First Edition, September 1998
Second Edition, 1999
Third Edition, 2001
Written by:
Gordon S. Bolegoh
Coordinator
Industrial Business Market Technology
Technology Services Department
Energy Management Marketing
Energy Services and Environment Group

Also related to [Course Program and Contents: What do we have on the CD ?](#)

E-books

- AUTWP03_Hydraulic_systemL.pdf
- McGraw-Hill - Piping Handbook.pdf
- piping_and_pipelines_assessment_guide.pdf
- PUMPS.pdf
- Valve_Selection_Handbook_5th_Edition.pdf

2Valve Operation.WMV
50,657 KB

3Relief Valve.WMV
159,552 KB

Standards-pipes, fittings, valves

- INDEX.PDX
- PETROL01.PDF
- PETROL02.PDF
- PETROL04.PDF
- PETROL05.PDF
- PETROL06.PDF
- PETROL07.PDF
- PETROL08.PDF
- PETROL09.PDF
- PETROL10.PDF
- TCPILING.PDF
- List of all Stand...
- ansi 5.4.pdf**

presntations

All as PDF files

- 0-pipeline-MEP579.pptx
- 1-pipeline-laminar.ppt
- 2-pipeline-losses.ppt
- 3-pipeline-examples1.ppt
- 4-pipeline-numerical.ppt
- 5-pipeline-computer.ppt
- 6-pipeline-valve.ppt
- 7-pipeline-valve.ppt
- 8-pipeline-flowmeasure.ppt
- 9-PipingSpecifications.pptx
- 9-PipingSupports.pptx
- flowMeasurement.ppt
- measurofViscosity-4.ppt
- Waterhammer-new.ppt

piping flow programs

- Convert123Setup.exe
- Desktop.ini
- flowadvisor.exe
- pfwiz.ini
- PFWizFluidsO.dat
- PFWizHelp100.pdf
- PFWizPipeIDO.dat
- Pipe Flow Wizard.exe
- pipeflow3d.exe
- PipeFlowAdvisorSetup.exe
- pipeflowwizard.exe
- PipeFlowWizardSetup.exe

Pipe Flow Expert

- ExamplePumps
- ExampleSystems
- FittingTables
- FluidTables
- Help
- PipeTables
- License.txt
- pfExpert.ini
- PipeFlowExpert.exe
- PipeFlowExpertSetup.exe
- unins000.dat
- unins000.exe

Course Specifications & Basic Information

1. Title:	Applications of Industrial Pipe lines: Types, Design, Construction, and Installing			Code:MEP579
2. Credit hrs per week	Lectures= 3 hours per week	Tutorial= 0.0	Practical= 0.0	Total=3 Cr.Hrs

B- Professional Information

1. Course description: Overall Aims:

This practical elective course is one of the 4 elective courses requirements of the Diploma. It is designed to review, effectively, all Basic design Concepts & Fundamental Aspects of Fluid Flow in Piping Systems and Types and components of Pipe-Networks. The Course aims are to give students the skills & knowledge to: - Basic fundamentals of fluid flow in various components of pipeline systems. - Fluid viscosity, characteristics of laminar & turbulent flow, critical Reynolds# - Careful examination of how to calculate major pressure/head losses and types of minor losses in different pipeline fittings & components. -Understanding basics about types of manual, control & industrial valves as essential parts of pipelines. This include their various functions, materials, sizes, geometry considerations & most essential flow characteristics through each type -Examine the pressure drop relations and flow coefficient calculations for each valve type. How to select the proper valve size for a given flow is also considered. - Investigate the various international standards for pipes, valve rating, material selection and methods for the correct valve sizing for different type of fluids. - Careful examination of various types of emergency and pressure relief valves and ruptured disks.- Careful examination of various types of automatic control valves and water hammer protection valves. - Care-full examination of various types of pipelines fluid flow measurement components and equipments.- Modern Technology of Using Computer Software in design of Piping systems - Various types of pipelines supporting, hanging and fixing elements & equipments. Some calculations for forces & moments acting on those supporting elements.

2. Intended Learning Outcomes of Course (ILOs):

a) Knowledge and Understanding:

Having successfully completed this course, the post-graduate student should have knowledge and understanding of:

- Fundamental Aspects of Pipe-Lines, Types and components of Piping Systems, Review of Hydraulic considerations, Major and Minor Losses in Piping Systems.
- Types of Pipe line Fittings, Piping System Design and pipe-networks calculations problems.
- Using Computer Software & numerical calculation methods in design & analysis of Piping systems.
- Types of industrial Valves (functions, selections: hydraulic considerations, construction, ratings, materials, Flow through valves, pressure losses, design facts/parameters-Manual Valves (types, selection, and operation).
- Hydraulic & Pneumatic control valves (Pressure, Directional, check), and Types of Flow Meters.
- Water Hammer Problems in Pipe lines.

b) Intellectual Skills:

Having successfully completed this course, the student should have the ability to do:

- Select and apply appropriate technical and optimum method in doing engineering design and analysis of automatic control problems.
- Searching for scientific information and adopting automatic control self-E-learning capabilities.
- Analyze and compare component effects, performance, and efficiency of different pipe line systems.
- Apply the concept of using software for design, simulation, analysis, diagnostics & operation of various types of pipe line systems and networks.
- Compare between various types of pipe line systems and networks components, and parts.

c) Professional and Practical Skills:

Having successfully completed this course, the student should have the ability to do:

- Identify several types of automatic control problems in pipe line systems and networks which are essential for the design and operation of mechanical power systems and energy transfer processes.
- Perform professional design and modelling for automatic control problems of pipe line systems and networks.
- Suggest possible alternative solutions for various types of components for automatic control problems in pipe line systems and networks .
- Diagnose efficiency and performance of different types of automatic control circuits/systems in pipe line systems and networks.
- Analyze different types of automatic control problems in pipe line systems and networks.

d) General and Transferable Skills:

Having successfully completed this course, the student should have the ability to do:

- Perform engineering calculations, draw feed-back control circuits, block diagrams, graphical presentation of experimental data, and perform data-regression analysis.
- Transfer knowledge, Work in group, & Communicate in written & oral forms, in English.
- Use IT& evolutionary technological tools& PC applications (Excel, Mat lab, Virtual labs, .etc).
- Prepare & write reports, Manipulate & sort data, Think logically, and continuous self-E-learning.
- Identify practical problems, compare between different technologies for measurement systems.
- Organise & manage time & resources effectively; for short-term and longer-term commitments.