

# Meng 263 – Fluids and Heat Transfer

## Series Pipeline Flow – Chapter 11 (Mott)

System analysis and design problems can be classified into three classes as follows:

**Class I** The system is completely defined in terms of the size of pipes, the types of minor losses that are present, and the volume flow rate of fluid in the system. The typical objective is to compute the pressure at some point of interest, to compute the total head on a pump, or to compute the elevation of a source of fluid to produce a desired flow rate or pressure at selected points in the system.

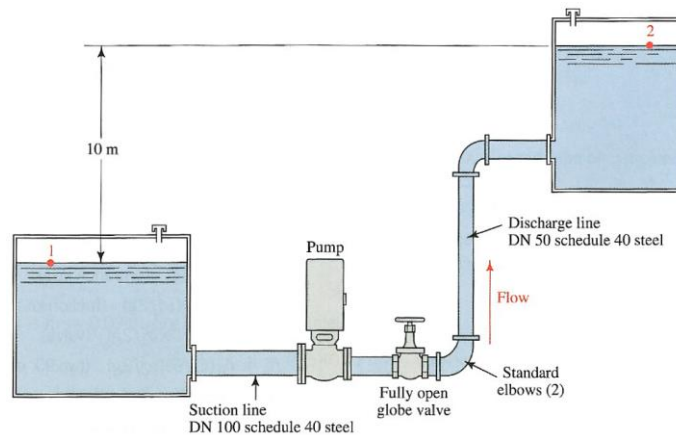
**Class II** The system is completely described in terms of its elevations, pipe sizes, valves and fittings, and allowable pressure drop at key points in the system. You desire to know the volume flow rate of the fluid that could be delivered by a given system.

**Class III** The general layout of the system is known along with the desired volume flow rate. The size of the pipe required to carry a given volume flow rate of a given fluid is to be determined.

As you study the methods of analyzing and designing these three classes of systems, you should also learn what the desirable elements of a system are. What are the better types of valves to use in given applications? Where are the critical points in a system to evaluate pressures? Where should you place a pump in a system relative to the source of the fluid? How much total head must the pump be capable of delivering? What are reasonable velocities of flow in different parts of the systems? Some of these issues were brought up in earlier chapters. Now you will be using them together to evaluate the acceptability of a proposed system and to recommend improvements.

Last week we looked at Class 1 Flow Systems. As it says above, they are systems where you know almost everything. The only unknown is the influence that actually achieves the design flowrate – elevation difference, pressure difference or head added by a pump.

Class 1 systems look like this ...



This week we look at Class II Flow Systems. They are systems where the flowrate is not known. As flowrate is of fundamental importance both to the client and to the calculation process, a whole separate method is needed to work out the solutions to Class II Flow System problems.

Study the following notes and examples in detail. You will need to know this inside and out.