

T Level Technical Qualification in Engineering, Manufacturing, Process and Control

**Employer-Set Project
(8730-034)**

**Project Brief
Summer 2024**

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The employer

WF Engineering is a manufacturer of medium sized plant and equipment for the food manufacturing sector.

One customer has a process plant which was designed to be manually controlled. All the valves allowing fluid to be pumped from vessel to vessel have to be manually turned by hand. Figure 1 shows the general layout of the plant. Each vessel is connected to the next with a valve system, stainless steel pipework and pumps.



Figure 1 – Process Plant

The customer would like to allow remote operation to save time, reduce labour requirements and significantly improve productivity. They have therefore asked WF Engineering to fit pneumatic valves to the vessels which can be operated from a control panel.

The project

You have been tasked by the Engineering Manager to replace the manual valves with pneumatically operated valves. The current manual valves are connected to the pipework with 2" 7 Thread Per Inch (TPI) British Standard Whitworth (BSW) external thread. The pneumatic valves are wider than the manual valves and have a 1" British Standard Pipe (BSP) internal thread.

An adaptor will need to be designed with one end connecting into the internal 1" BSP thread in the valve, and the other end having a 2" 7 TPI BSW thread to allow use of the existing pipe connection nuts.

This also means that the connecting pipework will need to be shortened to accommodate the increased width of the pneumatic valves. This will require a drawing showing the amount that the pipework will need to be shortened by to allow for the increased length of the adaptor and valve assembly, whilst retaining the current flanged end fitting as shown in Figure 2.



Figure 2 – Flanged Pipe / Valve connection

Project tasks

As an Engineering Technician you have been tasked with:

- designing an adaptor to allow connection of a pneumatic valve which has an internal thread, Figure 3, to existing flanged pipework, Figures 4 and 5.
- producing a drawing showing how much the pipework needs to be shortened for the increase in length due to the valves and adaptors.



Figure 3 – Pneumatic Valve
Width 90 mm
Depth of Internal 1" BSP thread = 22 mm each side



Figure 4 – BSW External Pipe Connecting Nut



Figure 5 – Manual Valve
Width 90 mm
External Thread 2" BSW 7 TPI (1" length)

Specific issues

The instruction to modify existing pipework must ensure that the existing flanged end as shown in Figure 2, and connecting nut is to be retained.

The design of the adaptor must be such that any existing seals in the existing pipe connections (as shown in Figure 2) are incorporated into the adaptor, and that all threaded interfaces are watertight to 1 Bar pressure.

General issues

Changing to pneumatic operation will require 28 adaptors to be made and the design needs to be capable of being efficiently made in one batch.

The plant is classed as a food manufacturing plant therefore any materials must be compatible with food regulations i.e. 316 Stainless Steel and also not have any voids or cavities that would prevent effective cleaning of the plant between batches.

The design of the adaptor and shortening of pipework should be considered standard and that the modification to pipework lengths and utilisation of the adaptor will be the same for all valves and as such only one adaptor and one drawing showing how much the pipework needs to be shortened for the increase in length due to the valves and adaptors.

Get in touch

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