HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DEVELOPMENT DRAWINGS FOR A SPACE HEATING MODEL

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FOR A

SPACE HEATING MODEL

by

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Project Report

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Petros A. Panayiotou

3rd Year Mechanical

THE PROJECT OBJECTIVES

1. To present selection procedures and methods, for drawing pipeline, fitting, valve and instrument symbols.

2. To present selection procedures and methods of drawing mechanical equipment for the given piping system

3. To explain the function of all mechanical equipment for the given piping system.

4. To prepare flow diagrams for the given piping systems.

5. To prepare multiview piping drawings showing the general assembly and sub-assembly drawings.

6. To prepare fabrication drawings for the details of pipelines including flanges, valves and fittings.

7. To prepare isometric drawings showing substations of different piperuns.

8. To prepare drawings suitable for experimental work for students.

SUMMARY

The Development drawings, for a Space Heating Model, were created by Petros A. Panayiotou 3rd year Mechanical Engineer.

The main objective of the present project work, was to prepare a series of drawings that would describe how the existing Space Heating Model, as a construction, was made out of many components assembled to give the piping system and to also indicate how the fluid circulating the various parts of this system, moves through each point and in which order.

Other project requirements were to present selection procedures and methods for drawing pipeline, fitting, valve, instrument symbols and mechanical equipment. The purpose of this information collected was then to be integrated in the actual development of drawings, concerning the Space Heating Model.

So, as the above stated information was finally collected and organised, a selection of the most important information concerning the system's layout was presented. As this was done as well, the process of designing the required drawings commenced.

All drawings presented in the project, were produced after hours of hand work, using technical drawing equipment such as ink draughting pens and templates, containing the basic symbols used in piping design, to represent fittings, valves and instrument symbols. Of course, if this process had been executed by the use of a specialized Computer Aided Design system, the results might have been quite different in terms of drawings clarity, presentation and general appearance. However, a rather satisfactory result, according to the designer, appeared to come out of all the manual drawing after all.

INTRODUCTION

In order to set up any kind of mechanical system, a lot of work has to be done on calculating the system's desired output, estimating it's capacity and deciding what kind of equipment, as well as in what outlay, should be used. All this aims towards the construction of a final product that will perform efficiently according to expectations. But in order to achieve this goal, it is essential that the system should be also graphically represented in drawings and diagrams, outlining its structural features, layout and function.

The work of any mechanical engineer is usually to satisfy needs, by providing a system which will work to eliminate any problems that initially created these needs. So in the process of realising his solution, or solutions to the problems, a designer is required to develop a number of drawings on which the components to be used will be specified. Also indicated should be the way that they will be interconnected and how these will function to bring out the desired result. Of course, the designs produced this way not only serve the engineer by providing him means of completing his work, but serve another important process as well. This is not other than the successful communication between the designer's desk and the construction site's worker or supervisor. As the case usually is, when systems of some volume and complexity are being set up by a big company, the mechanical engineer is not directly involved in the construction of the actual system. Instead he visits the site periodically to inspect the progress of the work being done. So the supply of the persons responsible for assembling the system with clear, accurate and detailed drawings is essential, if the work is to be successfully completed.

Although built for experimental use, the Space Heating Model, providing the subject of this project work, is certainly a mechanical system, falling into the category of domestic central space and sanitary water heating. So, as such,

the system's layout should be presented in a series of designs that would allow for the following basic functions to take place :

- The designer should decide what types of components to use, in order to bring the system together.

- The way the system's components would be connected, and the order in which the heat carrying fluid would run through them, should be cleared.

- A materials requirement and cost estimates evaluation concerning the work should be on hand before any step is taken beyond designing the system in to realising it. This is essential and should be done with great care because this information is required to be presented to the authority financing the whole work for its approval.

- Details of the construction should be outlined in such a way that these could be correctly and easily interpreted by the persons responsible for setting up the system.

- Diagrams of the whole setup suitable for experimental work should also be supplied in order for the system to serve its purpose.

Of course, the designs in the present case come after that the system has already been set up. So they are more a product of careful examination of what has already been completed, rather than a part of the whole work required including performance and capacity calculations.

The first set of drawings presented by the designer of any space heating system should be the flow diagrams. Here the system's components and the way they are working together, how the circulating fluid runs through each one and in which order, is outlined clearly and simplified.

That is why the student's experimental work drawings was decided to be drawn according to the above configuration, so as to give a clear picture of how things work in the setup.

As a next step to the completion of the system, fabrication drawings could be developed to help establish exactly the details of pipelines, including valves and fittings. With this information in hand, material requirement and subsequently cost estimates, could be extracted. The lists with the parts required could be sent to various suppliers so that offers on the job, along with reports concerning their availability, would be returned and studied.

Of course the above described use of the fabrication drawings is one of rather less importance compared to their primary function. This, as their name implies, is to indicate just how several sections of the piping system are to be assembled. Given to the workers, these drawings contain in high detail exactly what kind of valves and other fittings should be used and how. Lengths of pipes connecting the above equipment are also provided.

With the above completed, multiview piping drawing could then take turn to show exactly how all components should be connected together and also give an idea on how the finished work is supposed to look like, as seen from several possible angles of observation.

Finally a set of isometric drawings , showing sub-sections of different piperuns, could be supplied to the people responsible to set the system up. This is done in order to help them get a more clear idea about how the pipelines should run through the several components and in relation to each other.

In the parts that follow, a look into the methods applied to develop all the above mentioned types of drawings and of course the drawings themselves will be presented.

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