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NOISE IN CHEMICAL PLANTS

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Before dealing with methodology and problems associated with controlling noise in Chemical Plant, let us consider the reasons for controlling noise. As a Contractor, there are two reasons to control noise, the first is to protect the company's own employees from excessive on-plant noise during start up and commissioning, the second is because we have been asked to control the noise to limits given in the contract.

The task of the Noise Control Engineer is therefore to achieve the terms of the Contract without undue interference with the Process considerations of the Plant, and at minimum cost. The most important of these three considerations is to meet the Contract. However, this must not be at the expense of a serious interference with either the process itself, with routine maintenance, or with safety. Cost must always be controlled, but would not normally be a controlling factor unless all the other considerations are met.

The methods of controlling noise in a Chemical Plant are superfically similar to those methods used elsewhere. The Laws of Physics do not change just because one is dealing with a Chemical Plant. The major difference is one relating to the size and number of items of equipment. The significance of this difference is that because of the market size, quieter equipment may be commercially available for duties commonly met on a Chemical Plant. For example, manufacturers of electric drivers have now produced ranges of drivers which are specifically manufactured to meet the requirements of the chemical plant, and are silenced to 85 dB(A) at 1m.

One other example is in the considerable amount of development work which has been expended on reducing the noise of air cooled condensers.

The major difference in dealing with a Chemical Plant is created by the size, and the complexity of such a Plant. Because of this, there is a need to take positive steps to ensure that the effect of each item of equipment is considered and to ensure that the treatment required to each individual item of equipment is actually used. The most thorough method of doing this is to use a clearly defined procedure.

Basically, the procedure adopted to include Noise Control into a project must be followed by all the Engineers involved in the project. It must also reflect the fact that it is the whole complex which must conform to the noise standards.

The system adopted by the author's Company is one which has as much flexibility as possible. This permits the Engineers concerned in a project to discuss and adjust the necessary treatment in order to fulfil the major requirement of the Plant, which is to produce the required product.

At the earliest stage in each project a list of equipment items, a Preliminary

layout, and an estimate of electrical loads for all equipment, are produced. From these three documents, and from previous experience, a preliminary noise calculation is performed. The result of this early and relatively inaccurate estimate is used to produce a short list of equipment which contributes to the Plant Noise, and an even shorter list of special equipment which must be purchased as specially quiet. The other list which is produced at this stage is the proposed extra treatment, such as enclosures, silencers, or extra cladding. It is important that all this information is sent to other disciplines as early as possible to forewarn them of our intentions, and to permit them to discuss such treatments with Equipment Vendors to assure themselves that the treatment does not affect the performance, or guarantees, of the equipment.

Noise data is requested from Vendors. When this is supplied it is used to update the calculations and may modify the various lists produced.

It is important that the method used for calculation is exhaustive, and allows the engineer the ability to change individual equipment data with out performing the entire calculation again. For this reason, the author's company favours the use of individual hand calculations rather than the use of a computer.

This choice is, of necessity, a compromise, and the reasons for the choice are complex.

The point in favour of a computer programme is that one may consider contributions of a great number of machines to the 'on plant' levels. However, it must be remembered that there is an inconsistancy in the method of measurement of individual equipment items. This must mean that the data preparation for a computer programme involves extensive manual calculations if the results of the computer analysis are to be accurate.

When equipment has been produced by Vendors, it is inspected at the Vendors Works. One test which is frequently carried out is a noise test. It is virtually impossible to compare the noise produced by one item of equipment with another by "Sound Pressure Levels at 1m from equipment" unless the measurements are carried out in a controlled environment. Such conditions are seldom if ever provided at Vendors Works, and to transport a Compressor or a Pump to a specialist laboratory would increase the cost of supply by a considerable amount.

Fortunately, many Vendors are now installing test facilities which although far from ideal, do assist the engineer to provide an accurate estimate of the final sound level on Site.

Notable amoungst these are Vendors of Compressors, Electric Motors, Fans and Valves. Some Pump Vendors have supplied extremely useful data, but they have an extremely difficult task. In order to determine the noise emitted from a Pump in a form that will be useful for design, the test must separate the noise sources into Driver, Pump Inlet Piping and Discharge Piping, the data should be related to Pipe Wall Thickness and Insulation Thickness and will undoubtedly be affected by the number of bends in the piping within the test chamber. At the moment such measurements are beyond the scope of most testing facilities. Indeed, the tests currently required are often beyond the scope of many small manufacturers who may produce acceptably quiet equipment.

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There are many excellent standards for the measurement of sound emmission from equipment. The document to which we refer in Sepcifications is OCMA NWG2. We feel that there should be a series of more explicit standards for the measurement of sound emmission from specific equipment items. Notable amoungst these are Pumps, Compressors and Burners.

A good example of this would ke the requirement that Electric Drivers for Pumps should be silenced during the Pump Test. One method for this might be to remove the Cooling Fan from the Driver for the short time required to measure Pump Noise.