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PHILOSOPHY OF PHYSICAL PLANT DESIGN AND PROJECT EXECUTION

(PROJECT STANDARDS AND SPECIFICATIONS)

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DOCUMENT INFORMATION

1 Purpose

The purpose of this document is to set down the basis of work methods and design decisions together with their underlying rationale to be utilized on COMPANY projects. The reason for doing this is so that each individual involved in a project can do his portion with the confidence that his results will fit in to a known powerful and suitable strategy which will lead to a successful project. What is meant by successful is "resulting in a safe, properly operating and maintainable plant available on schedule which meets statutory, code, and contractual obligations as well as reasonable customer expectations for quality and life cycle costing all at a low installed cost for value received"

2 Scope

Overall goals, approach, and strategy; general design, fabrication, construction, procurement.

OVERALL GOALS AND APPROACH

1 Coordinated Strategy

Although innovation is welcomed, the individual elements brought out do not necessarily need to be novel in and of themselves. It is essential that they be carefully chosen and coordinated so as to support a single project strategy. The preferred strategy is given below in section, guidelines, and background to help project team members make decisions which support this strategy form the balance of this document.

2 Approach to Decisions

The approach to be taken to decisions is to be one of the "calculated and understood risk". Risk is inherent in all aspects of our activities on a project. What is meant by calculated risk is that the risk associated with each determination made should be in proportion to its ability to further the strategy for achieving a successful project. The measure can never be precise; indeed very often decisions will have to be made without the time for detailed analysis. Nevertheless the relative risk and effectiveness can be judged by experienced members of the project team, and this assessment process must support the strategy.

3 Different Types of Scope

In order to cover a complete scope of work a "Turnkey" project has been assumed. However, the document has been structured to assist an experienced team member in adapting it to suit other contract formulations, e.g. FOB.

When adopting this guideline for less than turnkey responsibility it is important not to unintentionally or unilaterally increase the COMPANY scope of supply. Opportunities to reduce the installed plant cost which have been identified, but which lie outside the COMPANY scope should be handled per section 5.1.9.

STRATEGY

1 Summary

The strategy to be employed can be summarized as follows:

a) meet the requirements for success as exactly as is feasible and with a minimum of complexity.

b) make each decision (project, design, construction, etc.) clearly and freshly reasoned to economically achieve the desired functional purpose.

c) reduce the duration and COMPANY staffing required for field construction, check-out, and commissioning.

d) allow for the subcontracting to partners and/or potential field subcontractors of appropriate amounts of detailed design work in a clearly defined properly supervised manner.

e) approach all aspects of the work as a coordinated whole with each part supporting the others; consider the impact of actions/designs on all project areas prior to making decisions.

APPLICATION OF GUIDELINES

1 Utilization

The guidelines are the basis by which decisions should be taken to support the strategy. They are not meant to be blindly employed; they are the preferred methods to be followed unless there is compelling reason to act otherwise. One of the key functions of the Project Manager and Project Engineer(s) is to ensure that the work is executed as intended. Therefore, departure from the guidelines requires the prior direction/agreement of either the PM or PE.

2 Project Stages

To use the guidelines effectively, it is useful to consider the design of the plant to proceed in three distinct but overlapping stages:

1. Basic process-cycle design, PFD, energy/material balance.
2. Detailed process and conceptual physical design- P&ID's, procurement cycle including supporting design work (except bulks and field work), plot plan and major pipe routings, pipe stress analysis, electrical single line, elementary drawings, instrument loop drawings, control strategies, civil brief, etc..
3. Detailed physical design-foundation design, completed piping drawings, electrical conduit/wiring drawings, instrument installation drawings, etc..

The content, demarcation, and degree of overlap between stages can be adjusted somewhat to suit specific project conditions; different organizations may perform part or all of some stages. The stages, however, remain and are always underlying to a well run project. They are essentially sequential, with the previous one fading out as the next one begins. This can never be an absolute; however, it is essential to reach a point as early in the project's life as sensible where a stage (or a key activity in a stage e.g. P&ID,s) is considered closed and only to be reopened under compelling circumstances

Recycle of ideas between the stages is an essential part of achieving an efficient design, but also a potential source for abuse. The times when stages overlap is the optimum time for recycling ideas. Once this window is past it is often counterproductive to hold up progress of the design effort for relatively minor items which would have been perfectly fine to have recycled earlier on. Judgment is required in choosing and these decisions should generally be referred to senior project team members when doubtful.

Viewing these stages as control points both internally and for work which may be subcontracted provides the proper focus for an efficient fully coordinated effort. Typically, different levels of supervision and skill/experience are required in different stages of the work; Stage 1 requires more complete involvement from senior COMPANY staff, Stage 2 less or mixed, and Stage 3 the least. If properly managed, work from all stages can be subcontracted.

However, a good rule of thumb is that most or all of Stage 3, much of stage 2, and some of Stage 1 work can be handled outside COMPANY on a given project. It is significant that essentially the same approach provides the proper control whether engineering/design work is done entirely in-house or is subcontracted.

3 Reverse or Tactical Engineering

In order to progress the work it is sometimes necessary to take important decisions before a full level of detailed information or analysis is available. In such cases an effective method is "reverse or tactical engineering". By this we mean taking the decision now in such a way that allows the detailed follow up to occur subsequently, but assures that the final result can be engineered to fall within acceptable bounds.

A typical example is placing a compressor on order to meet schedule constraints but holding the final aerodynamic design until the process can be refined further. It is significant that successful "reverse or tactical engineering" almost always requires a well coordinated interdisciplinary effort.

4 Limitations of Guidelines

The guidelines have been developed to be consistent with industry practice and general compliance with major codes. Specific contractual, code, or statutory requirements may require deviation from the guidelines. In such cases the contractual, code, or statutory requirements shall govern.