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A Study On The Extent Of Optimization Of The Procurement Cycle Time With The Help Of Pre-Approved Vendor Drawings In The Project And Engineering Management Of Epc Projects

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ABSTRACT

EPC means Engineering, Procurement and Construction and is a form of project execution methodology in the Engineering and construction industry. Every EPC project work with an estimated fixed time schedule and an estimated cost. The project management activities have their own cycle time, which affect the project execution time to a greater extent. By optimizing the cycle time of these activities, the overall project can be expedited and any possible delays creeping-up can be mitigated. The objective of this paper is to study the procurement cycle time in the conventional method and to study the extent of optimization of the procurement cycle time with the help of pre-approved vendor drawings. The details interpreted from Job completion report / Back-log analysis / progress reports of various EPC projects comprising of the disciplines viz Process, Electrical, Mechanical, Structural and instrumentation and prevailing EPC market standards form basis of this paper.

Keywords: EPC, Project management, Engineering management, vendor drawing approval, project schedule optimization.

INTRODUCTION

EPC stands for Engineering, Procurement and Construction and is a form of contracting agreement in the Engineering and construction industry. Companies involved in delivering EPC Projects are commonly referred to as EPC Contracting companies. The following disciplines of Engineering are generally involved in the lifecycle of an EPC project. The Engineering management is the area which deals with the inter-departmental co-ordination between the key engineering disciplines spelt below.

a) Process Engineering
b) Mechanical Engineering (includes piping,machineryetc)
c) Civil/structural engineering
d) Electrical Engineering
e) Instrumentation engineering

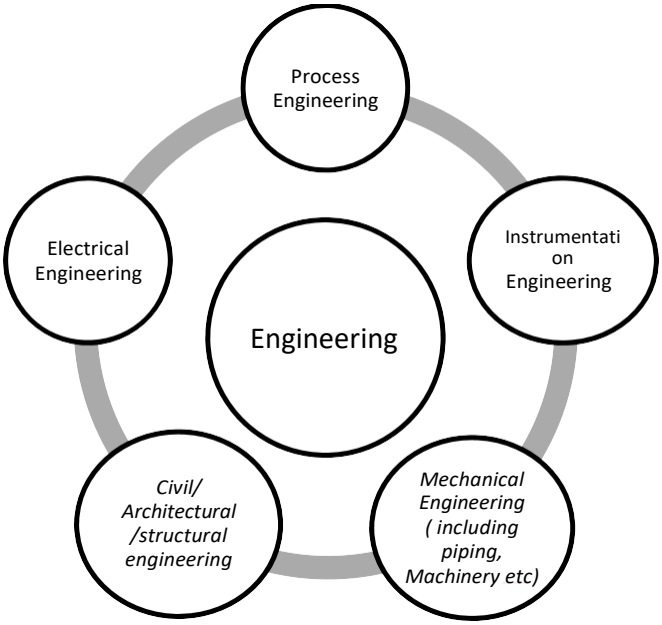
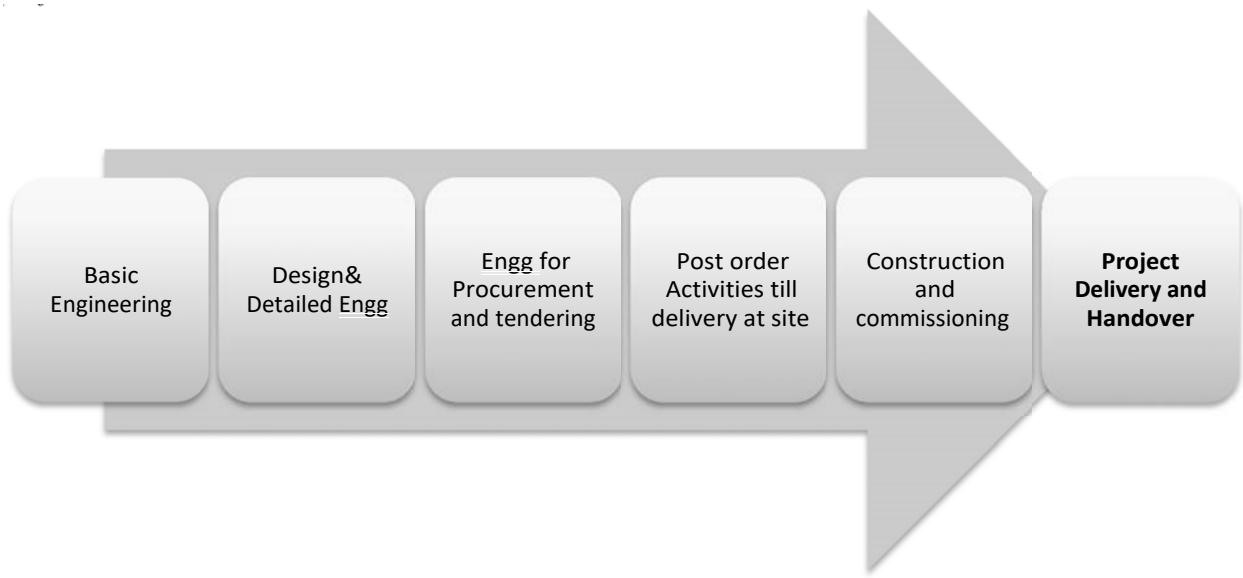


Fig-1

A. Functions of Engineering

The sketch below (Fig -2) indicates the various Functionalities of Engineering. Each of the Engineering discipline contributing to the project undergoes all the aforesaid functionalities in a project. Based on the project scope and client requirements the individual engineering discipline assume varying importance for the different projects. The process equipment get procured against mechanical procurement in most of the organizations. Such am Importance is assigned as weightage value. Such weightage value is firmed-up at the kick-off stage of the project itself, and the same gets utilized for the progress ascertainment over the course of the project.



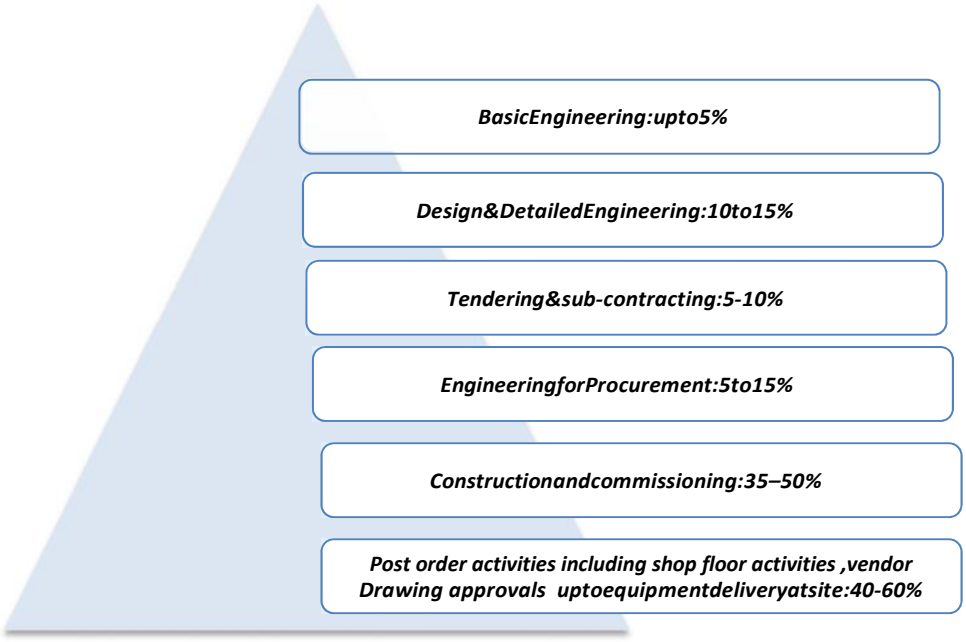
(Fig-2)

METHODOLOGY

The details interpreted from Job completion report / Back-log analysis report and progressreportsoffiveEPCprojectscomprisingofthedisciplinesvizProcess,Electrical,Mechanical, Structural and instrumentation and prevailing EPC market standards form basis of this paper.

Management of the Project Engineering functions by Weightage Values

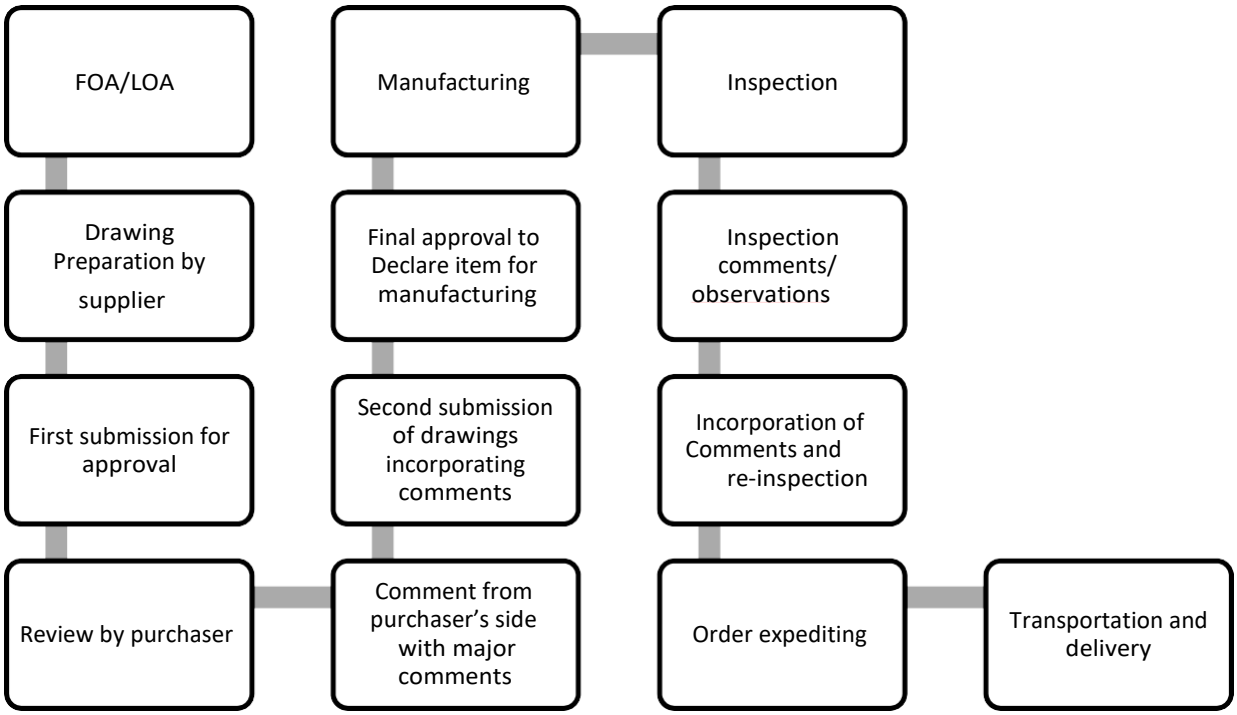
The typical range of weightage values assigned for the various functionalities of a project are as per the Fig – 3 below. The values are indicated based on the referred project data, good Engineering practice and historic data prevailing in the EPC industry. It is evident from the pyramid below that the the basic Engineering assumes the least weightage and the Post order activities including shop floor activities, vendor drawing approvals up to equipment delivery at site assume almost half of the weightage of the total project. Hence it is evident that upon controlling / optimizing the procurement cycle, after the release of the LOA (letterofacceptance),FOA(faxofacceptance)forthesupplyitemstillthedeliveryofequipmentat site, major delays in the projects can be mitigated better. Hence it becomes appropriatethatuponconcentratingonsaidactivitiesthereisapossibilitytoexpediteanEPCproject



(Fig:3) Engineering Weightage pyramid

A. Procurement Cycle Activities

A typical procurement cycle between the release of FOA / LOA till the delivery of material atsiteisdepictedbelowinfig-4.Itisevidentfromtheflowdiagramthatthecycleisverylengthyand involves so many to- and- fro communications between the supplier and purchaser.Furtherthecyclediagrambelow,considerstwosubmissionsofvendordrawingsonly,whereas out of the condition prevailing in the market, sometimes the submissions go to as many times such that the final approval is not accorded till the completion of contractual delivery date itself.



A Typical procurement cycle Fig -4

B. Delay In Procurement Cycle

A delay in procurement cycle may affect the overall project as such. The following figures depict the details interpreted from various reports of five EPC projects for the disciplines viz Electrical, Mechanical ,Structural and instrumentation procurement. The fig-5 indicate the average Delay in procurement cycle in months w.r.t contractual delivery. It is interpreted that the delay in the procurement from the date of placement of FOA till the delivery of items at site ranges between1.5to5.2months.

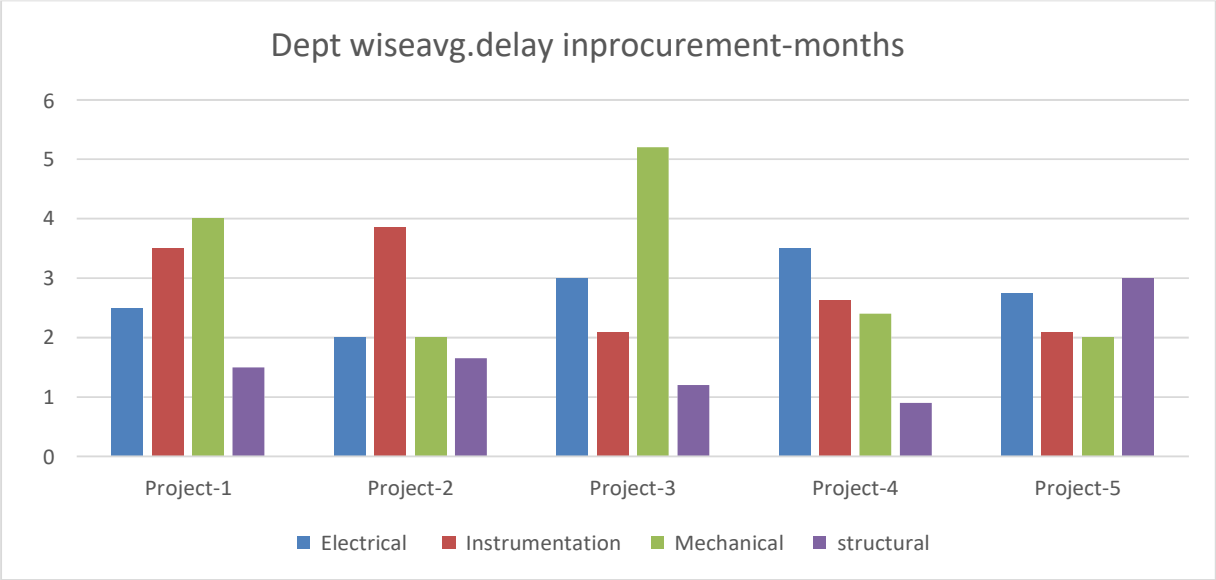


Fig-5

When the delays as discussed in the fig-5 above are derived as a percentage of overall projectschedulesoftherelevantprojectstheimpactisinterpretedbetween3.2%to23%.Theresultsplotted asbarchartsare asperthe Fig-6below.

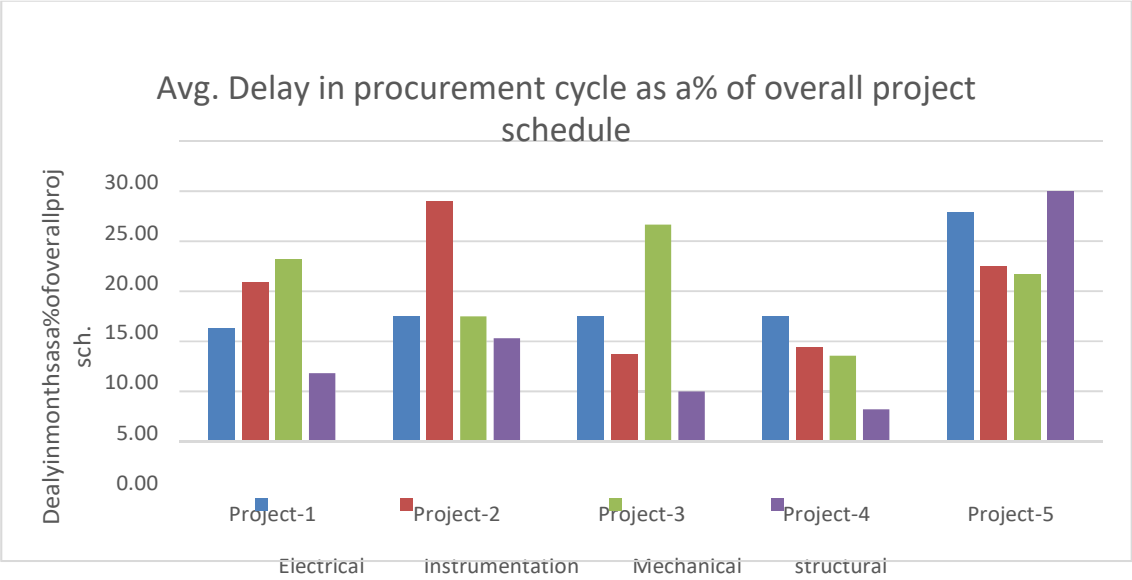


Fig-6

23%impactofprocurementintheoverallscheduleisnotreallyencouragable.Uponstudyof the various project progress reports, it is inferred that the drawing approval is impacting the procurement cycle a greater extent.

I. EXPECTEDRESULT

C. Drawing Approval Optimization By Pre-Approved Vendor Drawing Method

The typical conventional progress of the FOA into delivery is as per the Fig-7. The typical cycle times are interpretation of project progress reports, which are arrived as an average value, by assuming the overall cycle time as 'X' months..It is clear from the figure below that 50 % time of the procurement cycle is consumed at the drawing submission and approval itself. The manufacturing process takes around 40 % of the time and the successor activities consume rest10%if the time.

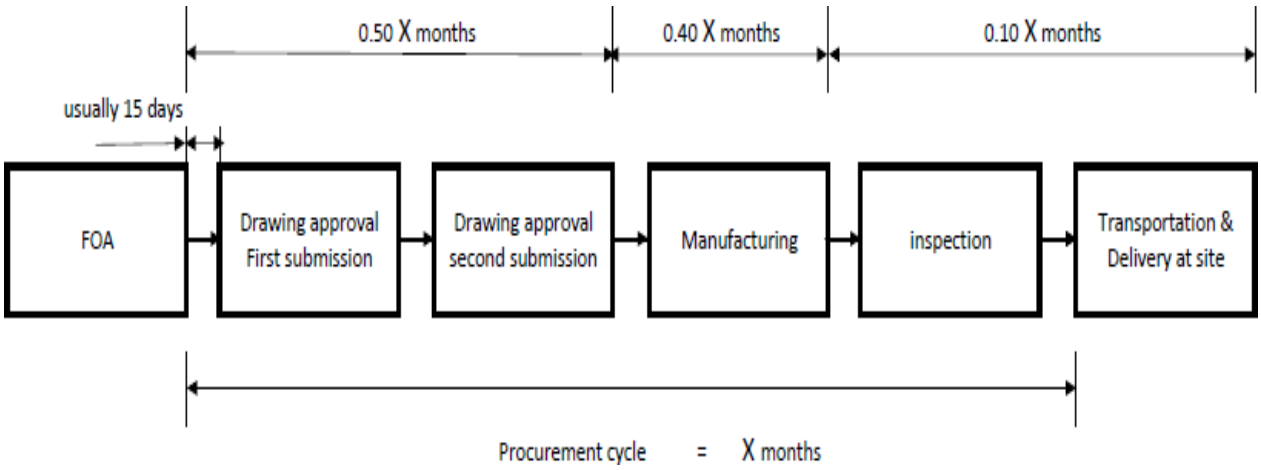


Fig-7 Conventionalmethodofdrawingapprovalanddelivery

D. Reduction In Cycle Time Through 'Pre-Approved 'Vendor Drawing Method

In this method the vendor drawing review process is minimized /eliminated for the individual projects. It is suggested that the enlisted vendors, shall make standard vendor drawings meeting the relevant company's specifications, with minimum variable data, which alone shall be fine tuned on individual project / order basis. Such standard drawings shall be furnished to the consultant / end user at the time of vendor enlistment or at a convenient time after the enlistment process. Such drawings shall be reviewed by the end user / consultant and before hand approvals shall be provided with time validity. Such document shall be stored in the repository of the client /consultant side also.

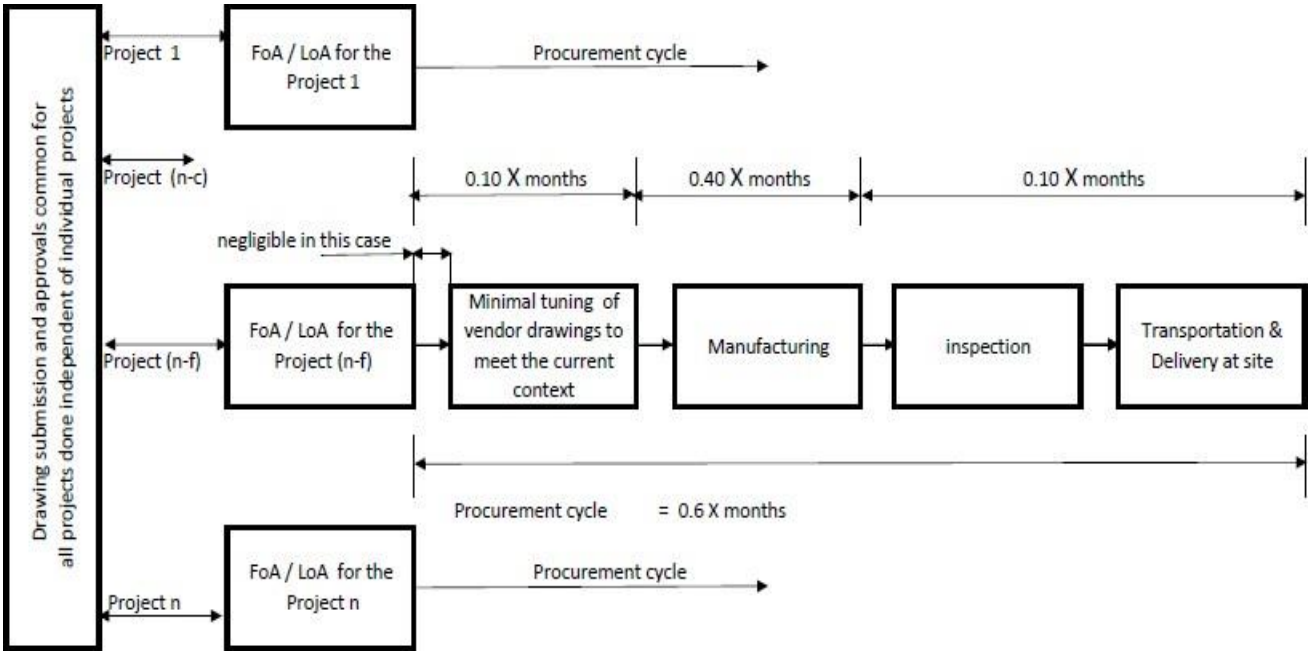


Fig-8 Pre-approved vendor drawing method of procurement

With all the material requisitions getting floated to the vendors, the relevant approved drawings shall also be floated to the respective vendors as attachments. This will help the vendors in furnishing bids quickly. Upon being the successful bidder for the given item, the bidder need not furnish the entire set of documentation for approval. Rather the already approved drawings only need to be fine tuned to the extent of meeting the current context. Review and approval of such documents shall take comparatively less time for giving clearance for manufacturing. By this process it is expected that the cycletime to give manufacturing clearance will get reduced by 40% comparing to the conventional procurement cycle. This is depicted in the Fig-8 above.

A. Advantages and Limitations Of The Pre-Approved Vendor Drawing Method Of Procurement

The pros and cons of the Pre-Approved Vendor Drawing Method areas discussed below,

a) Considerable reduction in bidding cycle as well as delivery cycle.
b) Project costing is almost accurate as costing also is done with the cost data of a given drawing.
c) Both the bidder and owner are clear about the items going to be supplied well in advance.
d) Enhances concurrent Engineering.
e) Mitigates cost, scope as well as schedule risks to a greater extent.
f) Enhances re-usability of Engineering drawings to a greater extent.
g) Possibility of generating standard templates for vendor drawing submission.
h) Incurs considerable expenditure in terms of man-hour and man-power of vendor

enlistment and sub-sequent drawing approvals.

i) Difficult in implementing in organizations handling vide spectrum of equipment.

j) Demands exhaustive standardization of equipment, which may conflict with the tailor made specifications.

k) Requires extensive eco-operation from vendors &suppliers.

l) Continuous tab needs to be kept in the market advances, varying trends and Engineering inventions to update the document repository.

m) Extensive engineering to be done before floating enquiries as changing of equipment requirements after order placement may be a limitation.

n) Best suited for closed bidding system with enlisted vendors. However not suitable to implement in NIT (Notice Inviting Tender) cases involving public procurement.

I. SUMMARY

It is obvious that by the concept of ' Pre-Approved' vendor drawings, there is considerable saving in the project schedule.This concept is applicable to the endusers / Project management consultants and EPC contractors, who review & approve the shop drawings of vendor/sub-vendors. Irrespective of the limitations discussed above, this system once implemented can fetch wonderful results.

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