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EXPERIENCE OF ENGINEERS INDIA LIMITED IN CONTRACTING METHODS

by

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ENGINEERS INDIA LIMITED

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Background Paper No 25

EXPERIENCE OF ENGINEERS INDIA LIMITED IN CONTRACTING METHODS

Engineers India Limited was registered as a Company in March 1965. The primary objective of this Company has been to establish, provide, maintain and perform engineering and related technical and consulting services for petroleum projects, petroleum refineries, oil field developments, oil and gas pipe lines, petrochemical facilities, chemical intermediates and similar industrial projects. The Company was initially formed as a partnership between Bechtel International Corporation and the Government of India. In the year 1967, the Government of India purchased all the shares held by M/s Bechtel International Corporation and since then the Company has been functioning as a wholly owned government Company.

While in the initial years, the company was mainly engaged in executing refinery projects, over the years the Organization has acquired considerable expertise and today EIL is capable of providing variety of technological services to industries other than refineries and petrochemicals. Today, four of the major assignments of EIL are in the fertilizer field. EIL services are currently being utilised for engineering, procurement and construction of four large size fuel oil based fertilizer plants in India. Besides this, EIL serves other industries like Ocean Engineering, Pipelines, Non-ferrous metallurgy, petroleum refining, Petrochemicals, etc. Special capabilities exist within EIL in areas such as design of heat and mass transfer equipment, environmental engineering and process design in selected areas. Similar to other large size consultancy organisations, support services such as planning and scheduling, cost engineering, scale modelling, systems engineering and electronic data processing are available within the Company. EIL at present has its construction offices at eight major locations within India.

EIL provides a variety of technological services including process design, technical reports on specified projects or technological problems, detailed engineering, equipment design, procurement, inspection, expediting of hardware for projects, comprehensive project management, start-up operations and specialised maintenance services.

Total value of projects handled by EIL so far since its inception is over Rs. 14,000 million. EIL employs today about 2800 personnel of which about 2200 are technically qualified personnel.

Types of Contracts

Broadly speaking the contracts so far entered into by EIL are of two types. One is a contract on a cost reimbursible basis wherein the expenses incurred on the execution of contract by EIL are reimbursed at agreed man-hour rates for office work and others at actuals by the Owner. The other type is the lump-sum fixed price contract in which case EIL undertakes to discharge all its contractual obligations for fixed price. For many of the assignments like technical reports, engineering, procurement services and construction supervision services of specific and well defined nature, EIL has been entering into fixed price contracts. However, there are a few of our assignments which have involved considerable number of man-hours and participation by practically all the departments of EIL for which EIL has entered into cost reimbursible contracts. Whether the contract would be fixed price or cost reimbursible type has been primarily decided according to the choice of the Owner. Some of the cost reimbursible contracts have an agreed ceiling price.

Initially, EIL started on major assignments on cost reimbursible basis. The owners opted for this type of contract, considering the advantages inherent in such contracts.

EIL has been associated with some of the large size petrochemical projects in India right from the inception and has participated in even defining the scope of the projects and establishing their feasibility. In very many cases where the projects have been Government owned, EIL has done considerable amount of project planning work which normally is undertaken by the Owner. In some of the cases the Owner company has been formed after the preparatory work done by EIL. Because of this special relationship between some of the clients and EIL, the Owner has often found it convenient to engage EIL with a flexible scope of work for the whole project on a cost reimbursible basis.

EIL's experience shows that where there is a mutual and good understanding between the client and contractor, this form of contracts can be executed smoothly. The main advantage of such a contract is that the scope of the work can be altered by mutual discussions between the contractor and the Owner. The Owner is at liberty to introduce technical alterations in the project scheme at any intermediate stage. The changes in the ultimate analysis may prove beneficial to the project. For example, consider a case where during the course of execution of the project a new process modification or a new design concept has been tried on a contemporary project elsewhere and this process had not been proved at the time of entering into the contract. If the owner after a careful and detailed study of some of these alternative design, reaches a conclusion that the alternative design will pay him in the long run although initially this may entail additional expense on him, it would be quite proper for the owner to introduce such a change in the project scheme, even at the intermediate stage of the contract.

As against the advantage of the cost reimbursible contract mentioned above , difficulties can arise in the execution of the cost reimbursible contract in certain cases where the schedule is tight and conditioned by extraneous reasons. In such cases every

change order issued by owner is an impediment in the progress of the work and even though the client may be prepared to bear necessary, costs, it may not be possible to accommodate the change within the project time schedule. Furthermore, it may happen that this privilege of altering the design scheme of project be overused by the owner. In the administration of the cost reimbursible contract the owner burdens himself with the additional tasks of checking of the contractors/sub-contractors costs and vendors costs in detail. The owner therefore has to sufficiently equip himself to handle this work. Otherwise payments to the contractors and sub-contractors/ vendors etc. can get delayed inordinately and work may suffer.

A fixed price contract with well-defined scope of work has been found to be fair to either side although it lacks flexibility of the cost reimbursible contract. It is however necessary that the scope of work to be performed by the contractor is well-defined. Furthermore, the project in such cases has to be well conceived in all its details of technical parameters. The owner has also to ensure that such of the works for the project which are included in the contract and are the obligations of the owner are executed well in time and in the required sequence in question. Successful functioning of a fixed price contract is very much dependent on the issue of the proper tender enquiry, proper analysis of tenders received and ensuring that the scope of contract is comprehensive in relation to the objectives in mind. This obviously assumes that the Owner has the necessary expertise at his command.

It is well known that fixed price contract also end in many payments for extra cost claims. This is to a limited extent is unavoidable. Even with the best of planning, changes of minor nature will occur and additional work needs to be done during the course of execution of the contract. There is however a danger of this getting stretched too far in the case of ill-conceived projects. The owner therefore has two alternatives - The first is,

not to introduce the change and live with a workable but an improvable scheme or secondly accept an unreasonable price and terms and unavoidable delay in the project schedule. Both of these are predicaments. It is best therefore to conceive the project properly and frame the tender enquiry with meticulous care so that changes proposed are minor and minimum.

Tender Enquiry

From what has been stated above, it is clear that in the case of a fixed price contract, the content of the tender enquiry and the analysis of the tender is a very crucial exercise to be performed by the owner and this can be worked to varying degrees of perfection depending upon theexpertise available with the owner. Since in this Seminar, there is a separate forum for discussion on this subject, it would not be necessary to go into details here. However, it necessary to emphasize that the tender enquiry for such cases should conform to the following norms.

The scope of the project needs to be properly defined in the tender enquiry. This is by no means a simple task. Besides outlining the component units of the project and mentioning their capacities, it sometimes becomes necessary to broadly describe the process and bring out the design philosophy preferred by the owner. For example, it is not enough to say that the scope of tender is to build an ammonia plant of such and such capacity starting from such andsuch feed stock. It is also necessary to mention if the owner has certain process preference with regard to gasification, gas purification, synthesis loop and other technical parameters of the ammonia Plant. Some owners have their own philosophy with regard to the energy utilisation within the ammonia plant and the steam level concept. In some cases, owners consider it expedient to define which of the rotating equipment they would prefer to be steam driven rather than electrically driven. Sometimes,

where they are unable to decide on this, they could indicate the situation of power reliability and cost at the place where the project is to be installed. In some cases, the owner indicate their catalyst preference also, likewise, owner preference if any for certain major critical vendor items like compressors, etc. should be indicated to the tenderer.

There can be restrictions which are imposed on the owner by way of particular conditions prevailing in the country. Regulations governing engineering design have to be invariably brought to the notice of the tenderer as for example fire protection rules, explosive acts & pressure vessel and boiler code rules as defined by the country's statutories.

Design Basis

In the foregoing discussion, it has been brought out that it is essential to spell out the project parameters accurately right in the beginning i.e. when the invitation to tender is issued. This need to be defined still better in the contract document. With this in view, EIL has always found it useful to have a technical addndum to the contract document. This technical annexure describes the project scope in much greater detail, both descriptively as well as with the help of preliminary plot plans and preliminary drawings where necessary. In addition to this, it has been the practice in EIL to establish a detailed design basis for the project by discussion with the client. This is an extensive work and the parameters defined as a result of this discussion cover a broad range of topics such as agreed climatological and soil data, utility specifications and quantities, functional specifications of major systems such as steam, water and air electrical parameters, codes and tolerances to be used in special cases, rules governing selection of particular type of electrical equipment for certain

usage and a host of other details which have a bearing on the engineering of the project and selection of equipment for the project.

Guarantees and Warrantees

The guarantees called for by the owner are generally of two types - one is the performance guarantee with respect to the quality and quantities of production achieved, mechanical performance of equipment and the other is the guarantee of schedule. In most of the projects executed by EIL, the guarantee for process performance has been given by the process licensor. EIL has been guaranteeing the schedule for completion of its own work and in some of the recent big size jobs, schedule for completion of the overall project also.

It is EIL's experience that wherever a schedule for mechanical completion has been given, the term 'mechanical completion' needs to be clearly spelt out. The most accepted definition of mechanical completion is the completion of installation of all the hardware. This is a stage at which the initial operations such as flushing, cleaning, etc. can commence and the plant is ready to take in the various streams of raw materials and intermediate products preparatory to commissioning operations. In relation to a particular project, this can be spelt out in greater detail. When it was so done it has led to lesser disagreement in establishing the date of mechanical completion.

In two of the EIL's major contracts, the date of mechanical completion is not the contractual completion date. In these contracts, the completion date is the date on which the plant is ready to take the raw material (feed stock) in for processing. In such a case there is a possibility of certain of activities like pre-commissioning and commissioning to be the responsibility of the owner. To the extent that the owner has to play his part

in this area there is lesser control possible by the contractor for achieving the contractual completion date.

The experience of execution of several projects by EIL reveals that it is the mutual advantage of both parties if the articles relating to the change orders, extra work, initial operation and acceptance of the plant, repair and replacement of hardware which gets damaged in the course of commissioning and the owner's obligations are properly spelt out in the contract. The implications involved herein may be briefly discussed as follows:

It becomes some times difficult to argue out a case that certain work asked for by the owner is within the work contracted or is extra work. This is specially so in those cases where the design basis or the project parameters are not properly spelt out in the contract. As stated earlier, if the technical annexure to the contract is written out carefully, this kind of difficulties can be avoided. With the help of technical annexure, it can always be demonstrated whether what is being asked for by the owner constitutes an extra facility which is not described in the technical annexure or whether there has been a change in the design basis with respect to the basic capacities or change in the raw material quality or, whether in the course of execution of the owner has discovered rather late that the climatological conditions or soil conditions as disclosed to the tenderer are in error or whether the owner is seeking to introduce some change as an improvement over the design for which he has contracted. In view of this, EIL has found it very useful to write out the technical annexure to any contract with utmost care.

Depending upon the contract, in some cases after the mechanical completion, the owner take overphysical possession of the sections of plants for initial operation. In most cases, the initial operation is done under the guidance of the contractor although the operating personnel employed belong to the owner. During this period,

if the contract is not properly written out, disagreements between the owner and the contractor can arise. The contractor interpretes that since the owner is in physical possession of the plant, any damage which results due to mal-operation, theft, etc. is to the owner's account. The owner tries to maintain that since the operations are not over and the guarantees are not proved, the plant cannot be considered as handed over and although physically it is in the custody of the owner, the responsibility of material looses is assigned to the contractor by the owner. These difficulties should therefore be foreseen and the related contract clauses should be suitably worded.

In India as elsewhere also, the owner has to discharge certain obligations to make it possible for the contractor to smoothly perform his work. Besides the facilities, etc. to be provided at the site, some of the significant obligations which invariably put the contractor in difficulty, relate to timely approvals by the owner for certain actions proposed to be taken by the contractor. These are numerous in case of cost reimbursible contracts - for example, approval to purchase recommendations, approval to appointment of certain sub-contractors for site work, approval to certain engineering documents, etc.

Besides granting timely approvals, the owner in India has also to perform an important function in obtaining certain statutory clearances from Government bodies. These either relate to import of machinery or approval from Boiler Inspector, Factory Inspector, Electrical Inspector, Explosive Inspector, etc. If the contract is not properly worded, the owner interpretes that these be obtained by the contractor. In most of the works EIL has been executing, the necessary technical documentation work for obtaining the above approvals are prepared by EIL and EIL assists the owner in obtaining these approvals. So far EIL has not experienced any difficulty in this regard.

In general it can be stated that all difficulties of this nature can be resolved if a proper coordination procedure is drawn out at the commencement of the job. This coordination procedure is not a contractual document but only a memorandum of understanding which spells out the mode of operation in the course of execution of the contract and ensures proper communication and working on an agreed basis. EIL has found this very useful. The subjects covered by a typical coordination procedure document consist of correspondence procedures, distribution of documents, listing of documents requiring owners approval, procurement procedure, tender selection procedures, delegation of powers to the personnel on the job, procedure for raising change orders, progress reporting, monitoring and inspection by client and many other identifiable details relating to activities wherein an interplay between the owner and contractor is essential.

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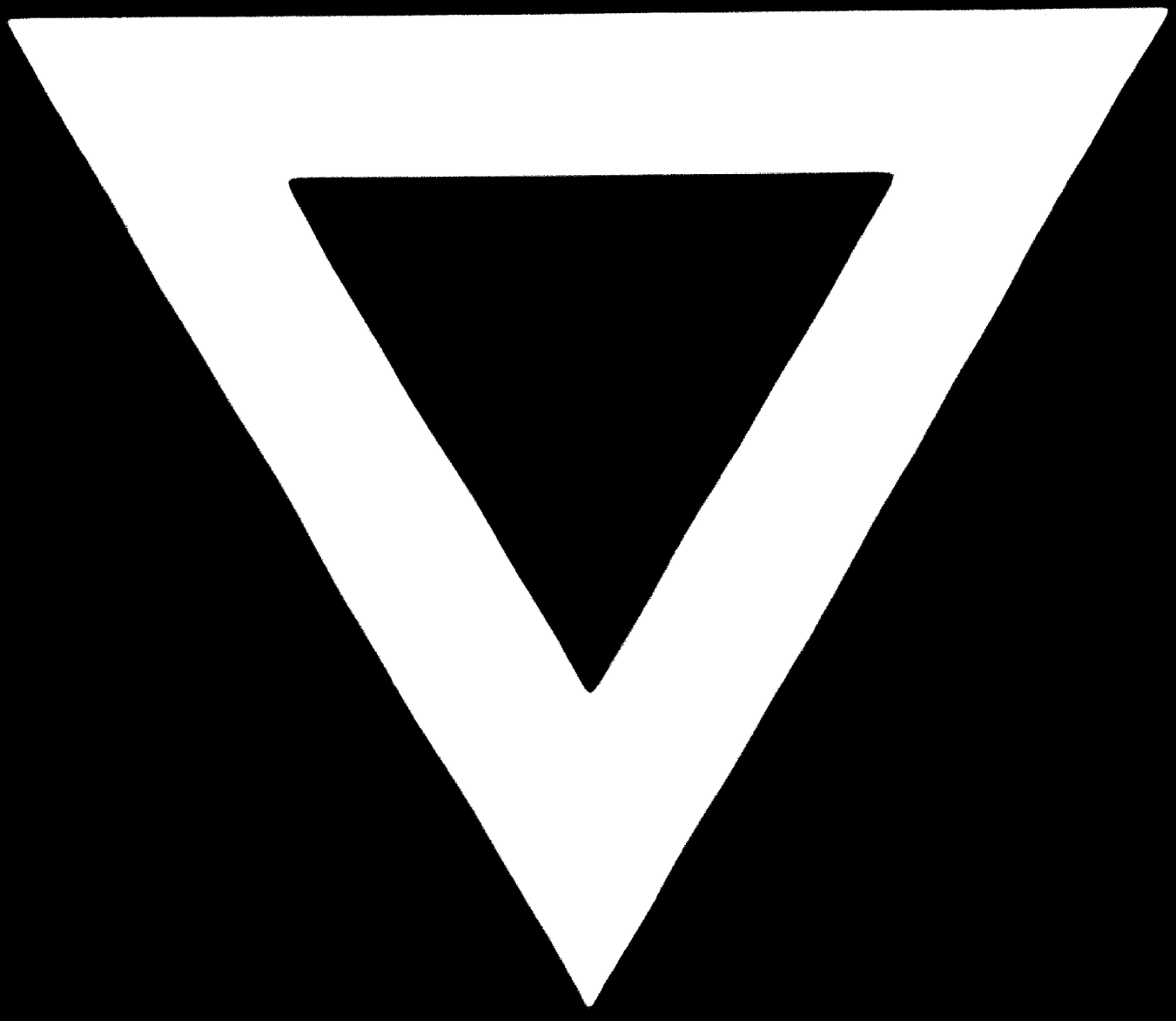

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