

E.P.C.M. – THE MISUNDERSTOOD CONTRACT

Introduction

Engineering, Procurement, Construction Management (EPCM) contracts have their merits in ways that lump sum EPC contracts do not, and vice versa. Too often, the structure of the contract, the differences in the areas of risk, and, the obligations of the two parties are misunderstood, and therefore are not properly managed from the start. As a result EPCM contracts, as a contract strategy and method, can be viewed to have failed.

Briefly, the primary difference between EPC (Engineer, Procure, Construct) and EPCM (Engineer, Procure, Construction Manage) is that the EPC contractor is paid a lump sum price to deliver a complete facility, with all subcontracts under their name. Conversely, the EPCM contractor is an extension of the Owner, executing all contracts and procurement under the name of the Owner and being compensated on either a lump sum or reimbursable basis to perform engineering and management services.

In this document we are attempting to draw a distinction between these two types of contracting strategies, and more specifically, to draw attention to the misunderstanding that Owners or Contractors might exhibit regarding the risk, responsibility, and implementation of the EPCM contract.

This can be highlighted by reviewing some comparative information in the tables which follow;

- Project traits that would cause an Owner to choose EPCM over EPC, or vice versa
- Specific differences (behaviours) between the two types of contracts
- Means for the Owner to mitigate the risk of elevated responsibilities and liabilities in using an EPCM strategy.

As a preface to the comparison, the following describes the fundamentals of basic project structures that can be used in general contracts, subcontracts, and purchases.

Types of Contracts

There are numerous types of contracts between Owner companies, General Contractors, vendors and Subcontractors. The variations are basically derivatives of the major three as below;

(it should be noted here that the following describes the most typical case of the contract type and that many variations exist for each method).

Fixed Price

A company is paid a single fixed sum to engineer, procure, construct and commission a conforming product.

The definition of scope is of prime importance in Fixed Price contracts. Inadequate preparation and lack of definition in the scope document attached to the contract may result in adversarial relationships between the parties.

Cost Reimbursable

A company is paid on a costplus (cost plus a percentage, or cost plus a fixed monthly fee) basis to fully engineer, procure, construct and commission a conforming product.

Contracts with regular partners are often Cost Reimbursable, allowing the project to pick up speed very quickly without the need for lengthy contract negotiations. Trust between the two parties must have been developed to a high level for this type of contract to be successful.

Unit Rate Contracts

Similar to cost reimbursable, a company is paid on a per-unit basis for installed product.

This type of contract is used most often in the construction phase of a project. The benefits are realized when the types of activities are known but not the total quantity. In an effort to start the project early, Unit Rate contracts can be set up quickly.

From the perspective of the Owner, the primary differences are that an EPC is an all-encompassing lump sum contract. An EPCM may itself be one of the three types of contracts, and, could employ many subcontracts, all of these contracts having a mix of each of the three standards described here.

Selecting EPCM/EPC - Project Traits

Considerations in contract type selection are shown below;

Table 1 - Project Traits in selection

USING EPC		USING EPCM	
<input type="checkbox"/>	Scope is well defined	<input type="checkbox"/>	Definition is low and therefore, scope is expected to grow substantially.
<input type="checkbox"/>	Schedule is not the top project priority	<input type="checkbox"/>	Schedule is top priority
<input type="checkbox"/>	Cost control is high priority	<input type="checkbox"/>	Strong desire for Owner to protect intellectual property
<input type="checkbox"/>	Owner realizes that strong Owner core group is not available	<input type="checkbox"/>	Strong Owner core group is available and experienced in EPCM execution
<input type="checkbox"/>	Owner wishes to utilize EPC financing support for the project.	<input type="checkbox"/>	Owner wishes to use "Preferred" contractors
		<input type="checkbox"/>	Equipment specification is unclear and Owner wishes to have control of the equipment value and quality.
		<input type="checkbox"/>	Owner wishes to order long lead procurement items immediately to reduce overall schedule duration.
		<input type="checkbox"/>	Uncertain market conditions increasing the risk of project termination or suspension.

The basic misunderstanding of EPCM is the Owners, or Contractors, perception that the risk remains with the contractor as in EPC. The overall risk of meeting or not meeting the project objectives of time, cost, quality and safety lies substantially with the Owner in that all review and approval processes for scope, engineering, design, procurement and contractual issues are primarily the obligation of the Owner. Failure to recognise and properly manage the shift in risk can impede the progress of the project, and can in fact negate the advantages of the EPCM strategy.

EPC vs EPCM Behaviours

The main differences between the behaviour of the two types of contracts are outlined below;

Table 2 - Differences in types of contracts

AREA	EPC	EPCM
Overall Risk	<input type="checkbox"/> Risk is significantly with the Contractor	<input type="checkbox"/> Risk is significantly with the Owner
Communication	<input type="checkbox"/> Only required to be one-sided, Owner-to-EPC, to communicate shortcomings in contract requirements.	<input type="checkbox"/> Needs to be two-way and rapid. Must be managed and lead by the Owner as the risk of consequence due to a delay is low for the EPCM.
Commercial Risk	<input type="checkbox"/> Commercial risk (penalty, profitability, reward) is high as it is a lump sum contract	<input type="checkbox"/> Commercial risk is low as the contract is limited liability, typically reimbursable, and the responsibility for procurement and contracting is with the Owner.
Schedule Motivation	<input type="checkbox"/> Liquidated Damages apply and delays can be demonstrated to be directly to the failings of the contractor, therefore the motivation to complete on time is high.	<input type="checkbox"/> While LDs usually apply to the EPCM contractor, they are typically low in value. Limited liabilities can provide a "no incentive" attitude, particularly in reimbursable contracts.
Personnel	<input type="checkbox"/> Owners personnel need not be "Project" strong as scope and specifications are well defined <input type="checkbox"/> Contractor has strong incentive to use "A" team personnel as risk of loss is high	<input type="checkbox"/> Owners personnel must be highly "Project" experienced as scope is volatile and contracts can be entered into hastily <input type="checkbox"/> Contractor has little incentive to use "A" team personnel as risk of loss is low

AREA	EPC	EPCM
Cost	<input type="checkbox"/> Final project costs are, with the exception of valid Owner scope change, included in the contractors lump sum budget. Cost control is better.	<input type="checkbox"/> Cost growth can be difficult as the Owner fully controls scope decision. Further to this, EPCM contractors on reimbursable basis have a negative incentive to control scope and cost
Quality	<input type="checkbox"/> Quality in engineering is defined in the bid documents. Construction quality is ensured by Owner team during execution.	<input type="checkbox"/> Quality in engineering and construction can be maintained at a high standard, particularly if EPCM contractor is reimbursable as opposed to lump sum. <input type="checkbox"/> Being that the Project priority is likely schedule, there is a high propensity for quality to be sacrificed if the project goes into recovery mode.
Scope Growth	<input type="checkbox"/> Scope growth is less likely as the scope is generally well defined in the bid documents (forced, better definition in the early stages) <input type="checkbox"/> Also less likely due to the high prices that EPC tend to put forward for extra work.	<input type="checkbox"/> Scope growth can be more difficult to control as the Owner team will be less challenged by the contractor.
Procurement	<input type="checkbox"/> With few exceptions of major equipment, all procurement is carried out by EPC requiring little Owner involvement.	<input type="checkbox"/> Procurement is managed by the EPCM under owners name. The tender and approval process between organizations can have a significant negative impact on the project schedule. <input type="checkbox"/> Contract and PO closeout can be cumbersome as it involves review and approval by Owners team.

Mitigating EPCM Risk

The significant shift of risk and responsibility to the Owner in using an EPCM contract can be mitigated through risk assessment and proper implementation of contingency planning. This should be done just after the feasibility study and prior to project sanction. The means are set out in the table below;

Table 3 - Means of mitigating shift of risk in EPCM

TYPICAL PROBLEMS	DESCRIPTION	MITIGATION MEASURES
Scope Growth	<input type="checkbox"/> Full business objectives are not defined. Project is not fully defined when sanctioned.	<input type="checkbox"/> Owner implements a scope change team using tight project controls team to monitor cost and schedule growth. In the alternate, Owner may consider shifting to alliance contract.
Cost Growth	<input type="checkbox"/> Occurs most significantly due to scope growth. <input type="checkbox"/> May also occur through poor management of construction execution	<input type="checkbox"/> Same as above for scope growth. <input type="checkbox"/> Ensure that construction contracts are fashioned to accommodate known oncoming scope growth. <input type="checkbox"/> Create the contract such that "penalties" are actually disincentives (rewards for promised performance)
"Apparent" Schedule Slippage	<input type="checkbox"/> Schedule appears to slip. Note that we use the term "apparent" as this is too often a result of poor time management (schedule control) techniques	<input type="checkbox"/> Use highly skilled project controls team <input type="checkbox"/> Accept the schedule slippage that results from scope growth and risks as they occur.
EPCM uses "B" or "C" team personnel	<input type="checkbox"/> Due to the limited liabilities of the EPCM contract, contractor uses lower skilled, less competent personnel.	<input type="checkbox"/> Owner sets and maintains high standards of recruiting for the EPCM and, maintains an interview and assessment program to ensure competency of EPCM personnel.

TYPICAL PROBLEMS	DESCRIPTION	MITIGATION MEASURES
EPCM Contractor lacks incentive	<input type="checkbox"/> EPCM contractor has negative incentive to optimize the design efficiency, procurement value-added activities, and to accelerate the project in compression.	<input type="checkbox"/> Write incentives into the contract. Such as bonus for procurement savings, bonus for all project objectives of quality, safety, schedule and cost. Incentives should be labeled as bonus and disincentives rather than penalties. <input type="checkbox"/> Increase EPCM risk in the contract. <input type="checkbox"/> Maintain vigilance with EPCM on a regular basis for slippages and overages.
Excessive contracting	<input type="checkbox"/> Work scope is split between too many vendors and contractors causing excessive management requirements and interfaces	<input type="checkbox"/> Set and meet reasonable design completion targets before tendering. <input type="checkbox"/> Fashion the tendering process to allow full contract awards.
Incorrect Approval Authority	<input type="checkbox"/> Limits of Approval are not clearly identified or values are set too low.	<input type="checkbox"/> Owner sets high level of authority approval limits to the project team and minimises further senior management approvals after execution stage commences.

Doing It Right

Given the right circumstances the EPCM form of Contract produces the 'best' Project (from the Owner's perspective) in terms of quality, achievement of schedule objectives and lowest cost. It is for this reason that the 'majors' have moved towards this form of contracting and rarely use the EPCC (LSTK) form of contracting particularly in the western world. The 'right circumstance', however, requires an elusive combination of management skills on both the part of the Owner and Contractor together with a well structured contract that is designed to meet the changing needs of a major Project.

A summary of the success elements in an EPCM Contract is:

- Incentives to reward Contractor for the achievement of Project objectives. These can include:
 - Milestone payments for the achievement of key schedule objectives (not penalties for failure to achieve milestones).
 - Completion date incentives
 - Cost incentives with Contractor sharing in cost underrun/overrun's
- A well defined basic engineering package. The Project should not be started until the Basic Engineering Package is well defined. This is a well understood principle but many projects suffer because the Owner's and perhaps the Contractors project management team, underestimate the downstream impact.
- A good control estimate at the completion of the BEP. This will form the basis of an incentive plan.
- Delegate authority to the Contractor's PMT. Set high limits above which Owner's approvals are necessary.
- Ensure that the Project is well funded and that Vendors, Sub-Contractors and the EPCM are paid promptly.
- Eliminate commercial restraints for the case where the Contractor may be required to utilize additional resources (manhours and expenses) in the interests of the Project.

Advantages of the EPCM form of contract (services reimbursable)

- Flexibility in execution to deal with problems and changes. Additional resources can be readily deployed.
- Recovery plans (all Projects need them) can be instituted without any detailed negotiations on price and schedule impact.
- Owner can get involved (where necessary) in equipment selection, commercial arrangements with major vendor's and subcontractors. Alliance arrangements can be implemented easily.

Conclusion

Any and all types of contracts have their merits. Failing to meet or exceed the project objectives of safety, cost and schedule (not quality or capacity) typically stem from misunderstanding the objectives of the project from the conceptual stage and therefore often lead to improper selection of the contract type. EPCM can be a highly beneficial choice of contracting. Proper front-end definition work can identify the stakeholders expectations, project priorities and critical success factors early on. This information is a must in order to correctly identify the proper contract strategy and structure required to meet these objectives. Personnel, contract structure, authority levels, trust and teamwork are significant factors in achieving the Project objectives.

About the Author

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Page 6 of 6