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Modern Practices in Project Management of Turnkey Construction Projects

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ABSTRACT

This paper discusses about the ultramodern practices being followed in operation of Turnkey engineering and construction systems similar as, canvas and gas units, refineries, power shops, petrochemical factory and other capital systems. The term "Turnkey" describes a design in which the service provider or the contractor takes the single point responsibility to complete the design in all aspects and hands over to holder/ client in a ready to use state. Any design prosecution has to take care of schedule (timeline), cost and quality. The ultramodern practices followed widely from generalization to commissioning in terms of Engineering, Procurement. Construction, QHSE (Quality, Health, Safety and Environmental) have also been talked over. Through all phases of the Turnkey design, certain software tools are used to optimize the. engineering results, cover the progress of design prosecution on a day-to-day base, force. and track the particulars ordered, attune the particulars/ accoutrements that are bought and used for the design, control the pre commissioning and commissioning conditioning etc. The varied Gate reviews to be carried out at applicable phase of the design prosecution have also been addressed. The design operation is a united trouble of the contractor and proprietor. The ultramodern practices followed by the contractor are discussed and consequently the design operation ways of the contractor are presented. The turnkey results in IT and robotics assiduity are also discussed

Keywords: Turnkey project, Project Management, Modern Practices, Contractor, QHSE (Quality, Health, Safety and Environmental), single point responsibility, turnkey solutions.

1. INTRODUCTION

Currently, the owner or promoter of any major architecture design takes the rout of turnkey contract. The advantage of turnkey contract is that the complete liabilities and the hazard of design completion lies with the turnkey contractor or service provider. There are varied phases in realizing a design, from feasibility study to commissioning. owner/ promoter will first carry out a detailed feasibility study to assess the techno profitable viability of setting up the design. Formerly, the viability is established, also a Front End. engineering design will be carried out to define the overall conception and design ideology for the design. The coming phase will be to prepare the turnkey tender documents and issue the tender to there-qualified contractors to bid for the design.

The offers from all the stab will be estimated technically and commercially and grounded on the techno marketable graces, the. successful bidder is chosen. The successful bidder becomes the turnkey contractor to execute the blueprint. The turnkey contract in engineering and construction systems is generally known as EPC or EPCC (engineering, procurement, construction and commissioning). In this paper, we will discuss about the Ultramodern practices followed by Turnkey contractor for. design execution of typical Canvas and gas for. contract will be a lump sum fixed schedule contract. Hence the main basics of a successful design supervision are schedule, cost and QHSE (Quality, Health, Safety for.).

1.1 Project Management

On successful award of contractor, the starting point of the design execution is a kick off meeting between owner and contractor. During this kick off meeting, generally the following are discussed and agreed.

- Level 2 Project schedule
- Milestone activities and dates
- Various gate reviews and dates

1.2 Engineering

The turnkey contract being a lump sum contract, the main ideal of the contractor will be not to exceed the design cost. In order to insure the same, various alternate results will be worked out by pretending various operating conditions. Contractors use "Simulation software tools" to optimize the engineering

results. Grounded on the optimized engineering result, the contractor will carry out the detailed engineering conditioning taking into consideration of operation inflexibility, maximum plant out the equipment, ease of out the plant layout is developed using "3D models" where the complete design is developed in 3dimension with walk through establishment. Review of 3D model will be together carried out by contractor and owner to secure that the design layout is developed without any clashes among various services and to assess the ease access of various equipment from the point of view of operation from the specification and data sheets for all the bought-out particulars will be prepared in the Engineering phase with which the procurement conditioning will be carried out. As QHSE one of the main objects of the project Execution, various reviews will be carried out during the engineering phase. "Quality Assurance views" will be carried out at regular intervals to find out any nonconformance to the design conditions. check reports will be issued and the Open points in the check report will be closed within the time frame by the responsible person. "Safety reviews" will be carried by the contractor with a "Third party chairperson" and the finding of the safety reviews will be addressed correctly.

1.3 Procurement (Supply Chain)

The equipment (Mechanical, Electrical, Instrumentation, Safety etc.) needed for the endless installation in the project will be carried as per the specifications and data sheets ready during the engineering phase. The procurement activities can be named as "Supply Chain operation" which include the activities from allocation of bids to brokers up to material check at project site. Most of the contractors now use "SAP" (Systems, Application. and packages for enterprise resource planning) for their supply chain conditioning and ERP. The contractors also use either a commercially available or an in- house "material operation software" tool to track the material status. This material operation software can be linked to engineering software tools also so that it becomes easy to track the materials right from engineering phase till the commissioning of the project. Supply chain operation includes the liabilities of buying, expediting both home office expediting and vendor shop expediting, Quality control, Inspection Logistics etc.

1.4 Project Control

During the first phase of the project, a "Level 3" schedule will be developed by the contractor and agreed upon with the owner. Based on the Level 3 schedule, Level 4" schedule will be developed by breaking the systems into various sub systems. Breaking down into sub systems is known as "Work Break Structures" (WBS). There are relatively a many Scheduling software tools Are available in the market. Contractors use one of these commercially available tools to establish the detailed schedule. As per WBS, the progress for each activity is assigned. Also based on the agreed project schedule, a progress plan will be developed and monitored on a continuous keystone.

Owner will organize a weekly/ fortnightly/ monthly "progress review meetings" where the very progress against the planned progress will be analyzed. In case of any detention in the progress, "the root cause" analysis will be carried out and suitable course correction will be taken to bring the achieved progress in line with the planned progress to ensure the timely completion of the project. The scheduling software tools have the installation to extract "look ahead schedule" and thereby enabling the plan to forecast the conditions similar as manpower, machinery, materiality. in advance.

1.5 Construction

Construction management is one of the critical conditionings of the project management. A day-to-day planning is carried out to insure mobilization of all the required resources. Contractors currently arrange the Labor camps with all installations including hygienic sanitary installations, original transportation from labor camp to sit ""Personnel protection equipment" (PPE). Safety company will take care of the safe achievement of the project by assuring wearing of PPE of all design help, safety examination previous to start of any exertion either at the grade position or at the elevated situations, allocation of "Permit to Work" (PTW), verification of machinery validity instruments etc. A regular "Tool Box talk" will be made by the safety team to the entire working team. Contractor's Quality control team will ensure use of the required quality of outfit by reviewing the test certificates of all the materials being used for construction. A planning team will be working at locality to watch the day-to-day progress.

1.6 Interface

Income designs, the project may be resolve into various packages and awarded to different contractors. In similar cases, it becomes important to have a smooth collaboration among all the contractors. Interface manger will prepare an "Interface management Register" (IMR) and list down all the interface inputs required from other contractors. Regular interface meeting with all the contractors to discuss the required interface inputs and to agree upon the schedule of damage of such inputs.

1.7 Project Manager

The Project Manager is responsible the successful completion of the project. The project administrant in addition to the control of Engineering, Procurement and Construction activities, is also responsible for Contract Administration, Cash Flow, Risk management etc.

2. TURNKEY SOLUTIONS IN INFORMATION TECHNOLOGY

A turnkey result is an end-to-end result or a system that's raised for a client that can be directly enforced into the production atmosphere of a business. Information technology result providers who can offer a single or several product packages with minimalistic discussion are said to give turnkey results. An adviser or a regular IT solution provider would offer further customizability where as a turnkey result provider would provide pare-configured result with minimalistic or no customizability. For sample, a client looking for recommendations on a database server would get a variety of options from a regular result provider whereas a turnkey result provider would give a pre-configured database server withdrew-configured erected in software. The conception of turnkey results came into existence as the country's economy came more service- initiated. Turnkey results are applicable to businesses that desire quick results to be enforced into product. though, since utmost turnkey results don't offer customizability, businesses don't prefer turnkey results unless they ask speed as it would be complex for them to make the business process adapt to the turnkey result. A more realizable result would be to approach regular service providers who can provide IT results that are custom made according to the client's business process.

Currently, the IT solution providers are moving towards customer centric approaches to result structure. Practices similar as design thinking, graceful model, zero distance are earlier in practice by software giants, as they want to know their client's business and proactively give better Results that can increase the client's profit. In such an assiduity, turnkey results deal lower as knowing what the client needs before the client realizes it would add a great deal of value to the client's business. Intelligent test mechanization solutions are also available in turnkey format. Testing done in automatic style reduces delivery time and hence results in cost savings. Turnkey test results also reduce the complexity of conventional test automation suits as it provides a well- established architecture to run test cases. Turnkey test solutions are available for both functional and reversion testing. Also, turnkey test suits save testing time and costs while maximizing performance and accessibility of all applications. A business process might have a variety of execution paths. Turnkey test results are able of strongly generating test cases suitable for the operation. These are made possible by data driven technologies with Erected- in sense and work flows to cover all prosecution paths.

2.1 Turnkey robotic solutions

The area of operation of robotics is spreading like virus. It would be easier to list the areas where robotics isn't applied, rather than listing all the areas acquired by robotics. Starting from manufacturing and healthcare services to agriculture and home, it's apparent that robots aren't only replacing humans, but also have a capability to work as efficiently as humans do and, in some cases, more effective than mortal beings.

It has been the dream of the dwellers of late 20th century and current 21st century, inspired by Hollywood film, that show robots doing all day-to-day and official work and people just command the robot. This dream is now a reality and robots can be seen in the field going smarter and effective day by day. As per PwC's Global Digital IQ Survey, the global robotic request is growing at a healthy rate. In 2016 the recorded deals were6.69 million units and is expected to grow as important as26.5 every year for the coming four years.

The same can be recorded or observed in the turnkey revolution of providing results in robotics. Majority of the tenders which are called on in the current script are on AGV's and robotic results for their ease of work in industries. Some of the results furnished in manufacturing are automatic molding, automotive parts manufacturing and assembly, equipment that perform finishing operations, loading and unloading, packaging, palletizing, and numerous more.

The most demanded turnkey robotic result is turnkey Cell. Turnkey cell is a robotic cell-a system that includes the robot, control, and other accessories which are used to place and position the robot, safety controls and environment controls. These are fully integrated-engineered solution. The cells also can be made to order and like calls are called custom cells. Applications of turnkey cells are, MIG welding, spot welding, gluing sealing, plasma Cutting, material care, material assembly etc.

The operations of turnkey cells in manufacturing, supply chains, health care and service industry are the major entries in the decade. Autonomous and adaptive robotics are developed and researched in a large scale. The trending area of exploration is bio-inspired techniques which can be used to give results for engineering practices. They would be majorly used in engineering fields by enforcing evolutionary algorithm and artificial neural networks. Strategies like self- replication and self- assembly are also likely to find operation in the real world.

There are other radically innovative solutions arising in the market similar as “The Mail Cart”, which carries correspondences throughout the floor or plant to designated drop points and “The Garbage disposer”, which uses AGV’s to pick, collect and dispose the garbage. These robotic results are programmed in three programming forms. “Teaching Pendant”, “Offline Programming” and “Teaching by Demonstration”. Teaching pendant is an extensively accepted method. It's popular among technicians as it can be fluently handled by them. To program this the operator moves the robot from one point other as per the demand on the shop floor. While moving, the operator stores all the points essential in the movement. Once the complete area is covered the points are saved and loaded into the robot. From the coming use onwards, the robot will move or work several times faster than the time taken by the operator to store the layout. This is generally operated on a joystick, key pad or a touchscreen table. Since it's a turnkey solution-programming the robot will be a tedious and time-consuming process.

Offline programming or simulation is a method used extensively in investigation of robotics, which makes sure that advanced control algorithms are operated as anticipated before delivery or operating on the factual floor. This allows the instrument to be programmed in a virtual environment or a simulation of the very environment and also tested. Depending on the functional complexity of the software which simulates the test environment, the performance of the robot can be tested more directly. This system reduces time but the delicacy on the actual shop floor is lower compared to the delicacy attained on the simulation software.

Teaching by demonstration is the classical method to Teaching Pendant. This removes multiple use of the pendant approach before repetitive recording, where it's only needed to be moved formerly by the operator in the needed direction. It's further intuitive, but it needs a physical robot to do the primary installation which is a major disadvantage. Major turnkey robotic solutions used in India are, automation in steel industries, material handling robots, pick and place systems, pick and place with delta box, turnkey automation, machine tending cells, finishing cells, welding cells, robotic tagging system, robotic fixing and plugging, robotic spray booth, robotic wrapping and packaging, robotic marking etc.

3. SUMMARY

The Modern Practices followed in a turnkey management of all the phases of design execution is brought in the above paragraphs. As mentioned over, the design execution is carried out using various software tools available in the market, still the names of specific tools being used in the industry aren't mentioned in this paper. Execution of a turnkey project being a single point responsibility, the contractors ensure that ultramodern practices are followed in successful completion of the project with the main aims of schedule, cost and QHSE. Turnkey solutions used in IT industry, the scripts where turnkey results are used and scripts where regular results are used have been bandied. The graces and faults of turnkey IT solutions have also been discussed. A briefing about turnkey robotic solutions has been given and the styles used to train these robots have also been discussed in detail.

Fig. 1 Overall Project management Organization Chart

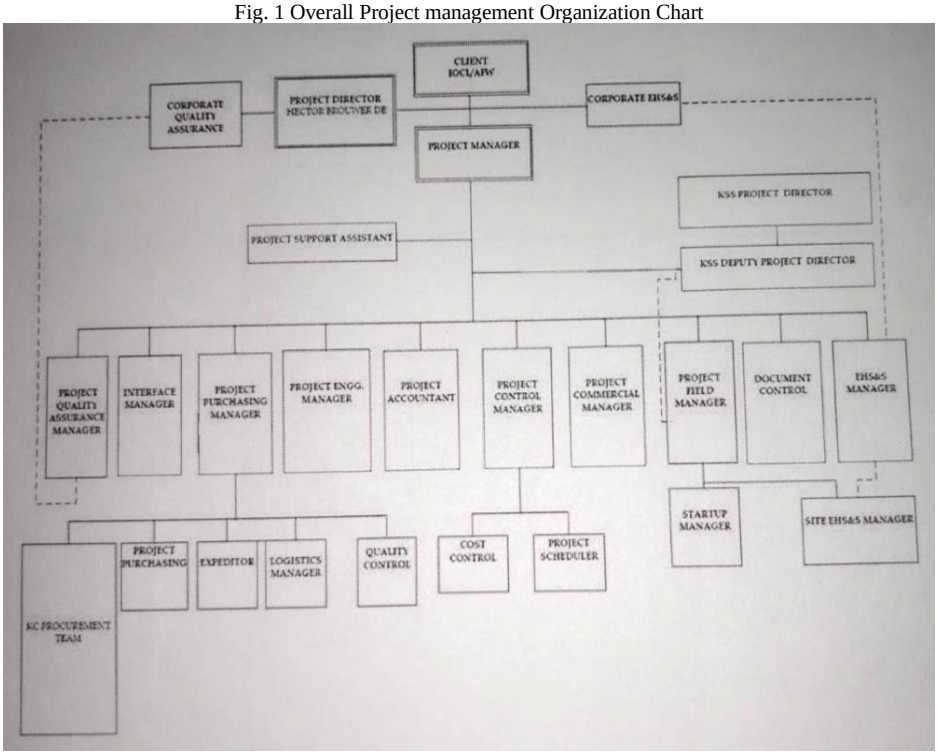


Fig. 2 Project Engineering management organization chart

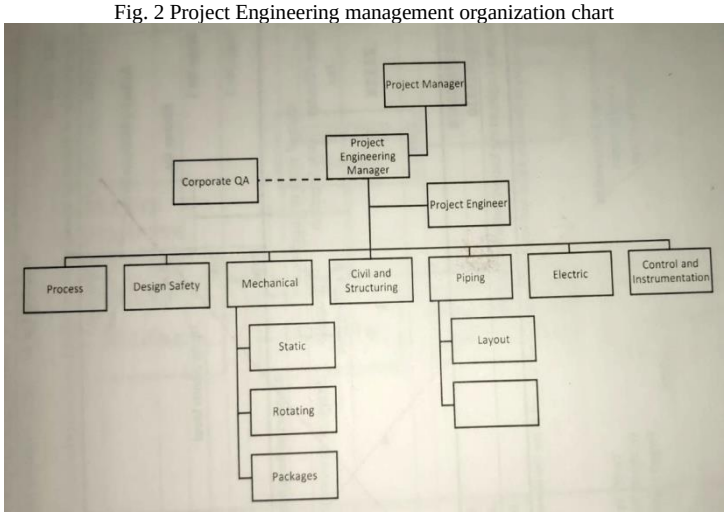


Fig. 3 Project Supply chain management organization chart

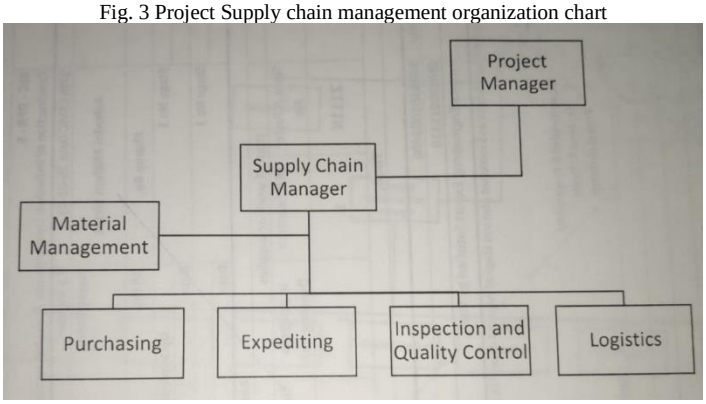
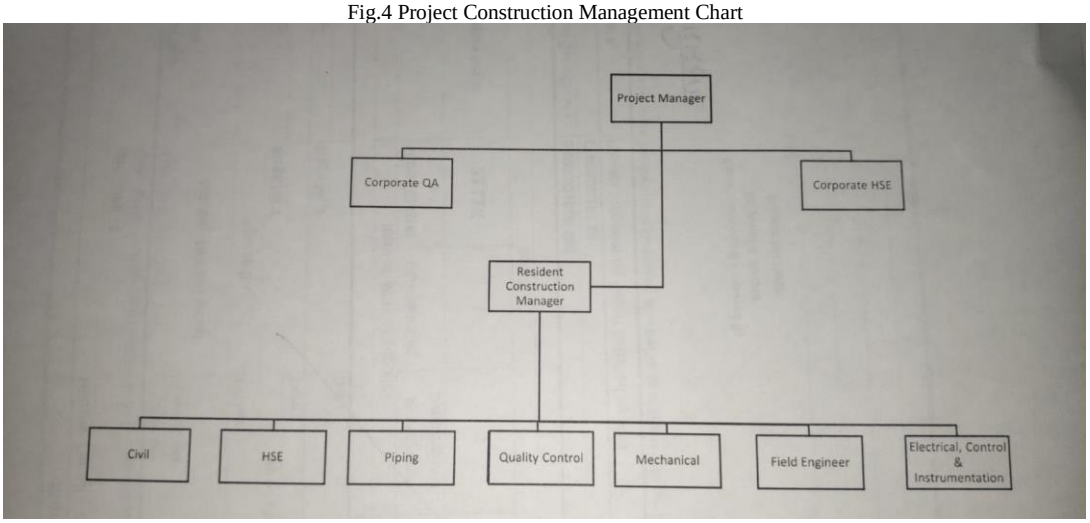


Fig.4 Project Construction Management Chart



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