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Time / Cost Overrun in Construction of a Steel Plant in Asia: A Case Study

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Abstract: *The paper presents a case study to investigate the* delay, *causes and its implications on the management & development of a steel plant project. Delay and cost overruns are common in construction projects and are not an exception. The results of the study reveal the main causes of delay and cost overruns in the completion of the project. Effective project planning, controlling and monitoring is must to enhance project performance to minimize or avoid time and cost overruns in projects of similar nature.*

I. Introduction

Managing projects encompasses situations or problems that may appear as planning issues, but may be a result of corporate culture, lack of line management support, procurement delay, land issues or may be even lack of contemporary project management tools and techniques.

The present case describes the management of the development of a US$52.52 million Cold Rolling Mill (CRM) plant in Asia. The exact location of the CRM plant and names of the participants cannot be provided as the client wanted to remain anonymous.

II. Project Environment

In late 1990's, a company in Asia undertook feasibility studies to build a CRM plant comprising of 6 Hi-Reversing Mill units to meet the growing demand of steel in the country. With the changing project scenario, the client opted for Management Oriented Procurement (MOP) strategy with options like Design & Build, and other forms which are discussed at length below.

III. Project Implementation

The project has been divided in 10 work packages **(see Table 1)**. The paper aims to investigate the level of success of the work packages with respect to project environment, contract forms used, organizational format adopted by contractors and planning & control system. The paper emphasizes on the issues that arose because of the delay caused due to the attitude of different stakeholders. The project environment led the client to choose Management Oriented Procurement system. However, the extent of design information provided by the client for the different work packages differed. These gave rise to 4 formats, viz. Develop & construct, Item rate with single tender, Item rate with 2-stage tender, Turnkey, etc. The paper analyzes the project management of the CRM plant project. The outcome of the analysis has been submitted to the clients so as to adopt the successful practices of the project and learn from the failures to ensure that their projects have a higher chance of success.

IV. Contract Form

Management Oriented Procurement Strategy/Design and Build/Item Rate Contract In the Management Oriented Procurement (MOP) strategy, the emphasis is placed upon overall management of the erection and construction process in close synchronization with the design. In this approach, there is potential to use different types of contracts. Usually owner will provide for all reimbursement of field costs, plus fixed fee, overhead cost and profit. A project owner might select the construction management project procurement because of size and complexity of the project that necessitate added supervision and management.

In the new project environment, the client's objectives were to maximize profitability and cost savings, and minimize risks. As regards procurement strategies, the client considered Design and Build (DB) for equipment likes 6 Hi-Reversing Mill, Pickling Line, and EOT Cranes etc. whereas major consumables like steel was supplied by client. DB was considered for a suitable procurement option for equipment, as it allows price certainty and early completion. DB also has other advantages such as single point of responsibility, minimum changes, better relationships among project participants and higher constructability. DB also achieves the client's objective of risk avoidance because it allocates design and construction responsibilities and associated

risks to contractors. In Design and Build type of contract or generally called EPC contract, it is the responsibility of contractor to produce design and built it. Here the tender paper should be very candid about exact specification of what is required by the client. More ever the contractor has the right to object to any variation ordered by the employer. In such a contract, the contractor has maximum liability towards the quality of the work and the Engineer's job is to give approvals and monitor the work. In a Lump Sum Contract, the owner has essentially assigned all the risk to the contractor, who in turn can be expected to quote for a higher side to take care of unforeseen contingencies. Beside the fixed Lump Sum price, other commitments are often made by the contractor in the form of submittals such as a specific schedule, the management reporting system or a quality control program. If the actual cost of the project is underestimated, the underestimated cost will reduce the contractor's profit by that amount. An overestimate has an opposite effect, but may reduce the chance of being a low bidder for the project. This type of contract was used for piling package.

MOP has several advantages as well as disadvantages: it is considered competitive with the traditional approach (with negotiated contract) and the turnkey approach in overall project delivery time. However, phased constructions may involve the owner at risks of overrunning budgets.

Management Oriented Procurement (**ref no # 4**) provides closer communication amongst the participants. The owner has an opportunity to get fully involved in project delivery process. He can utilize his construction skills at all phases of the project with no conflict of interests with the designer. The application of different management techniques to project performance improvement is also possible. Application of value engineering (in design, bidding and award stages) and constructability program are considered as other advantages of this approach. However, success of the project is highly dependent on the client's ability to monitor the project based upon its management structure dedicated on an ad hoc basis for the project **(Fig 1).**

4. The Project

The project was the installation of facilities for production of 0.25 mtpa, Fast Hard Cold Rolled (FHCR) coil. The project envisages setting up the following facilities and related utilities:

- Push Pull Pickling Line - 0.30 mtpa capacity (expandable up to 0.5 mtpa)
- 6 high Reversing Mill – 0.25 mtpa capacity (expandable up to 0.5 mtpa by adding one more stand).

Table 2 provides the major details of the project.

The delay in the starting of the project changed the statistics and dynamics of the market and thus revision of the whole project was inevitable. The revision of the project led to increase in capital cost from US $ 52.52 million to US $ 62.36 million on pretext of change in scope .The increase in capital cost was US $ 9.84 million. Mathematics of Figures due to change in Capital Cost are illustrated in **table 4.**

An endeavor was undertaken to reduce the cost of the roll grinder through re-negotiation of contract with the supplier and yielded US $ 0.46 million. It was further proposed to reduce the allocation for project by US $ 0.89 million by reduction in contingency. As a consequence of all such measures helped them to reduce just marginally i.e. US $1.35 million.

11.19-1.35=9.84.

52.52+9.84=62.36(from Table 4)

Thus the project which was planned to be completed in US $ 52.52 million which was actually going to be completed in US $ 62.36 million.

4. Work Completed & Major Events Causing Delay

The project which was to start by April 2006 actually could start by September 2007. An analytical assessment of the different packages, type of contract and procurement strategies, delay caused to the project due to particular package and reason behind have been tabulated for the exhaustive insight **(Table 1**). It was also apparent that things were not going smooth in the project and there were some disturbances in the project. Nevertheless many of the activities had been completed yet the project was facing overrun of cost and schedule and steps were needed to be taken immediately to overcome them.

Factors Contributing to Delay in Project

Several problems were encountered in this project. The reasons for these problems are now discussed. The lesson learned, and their application to future projects, are also suggested at the end.

- Delay in Selection of Site
- Change in Scope
- Delay Caused in Piling Work
- Delay due to Consultants / Engineers
- Delay caused in Erection of Pre-Engineered Building (PEB)
- Decision about Utilities

- Law & Order, Political Interference

Each of these factors are further analyzed as below:

Delay in Selection of Site

Land for the project had never been the constraint for this group. The Group had enough land in the particular region in which it had decided to set up this project. They munificently acknowledged three plots for this project, one of which was to be selected by ad hoc team. The plots were:

- P1 - Plot beside existing CRM, inside the main plant
- P2 - Plot beside the group's sister concern plant.
- P3 - Plot behind P2

The ad hoc team under took the study. Each and every consideration was analyzed and scrutinized meticulously and finally it zeroed in on a particular site, behind the existing plant i.e. P3 (**Fig 2**). It took the team, almost 16 months to zero down on the particular plot. Ironically, all the sights were within the radius of 9 km, maximum, from the main General Office where the team was stationed. To add to the worry, the selected plot was in the form of pond and it was Herculean task to fill up and handover to the contractor. Finally the mobilization at sight started in early days of September 2007 and subsequently the commencement of piling work started in late September 2007 which was scheduled to start by June 2006. This caused a delay in project by almost over a year.

Mitigation

Selection of site has always been an arduous task to zero down at the particular site but not an impossible to be completed within time frame. With reference to this project, there was hardly any predicament as management already was in knowledge of all three sites which were available for setting up a plant as they were in the vicinity of General Office, where the ad hoc team for selection of site was situated. Delay in zeroing down might be attributed to

- Delay in constitution of ad hoc team
- Pre-occupation of the personnel of team in their regular responsibility
- Lack of coordination between team members
- Ego trip in among the members

There could be 'n' numbers of problem in selection of site but what could be figured out from the ranks and files have been jotted down and these problems had never been there if there existed - what we call in French, *spirit de corps.* The basic problem was lack of team spirit and collective responsibility which inordinately delayed the project by 16 months, which, otherwise, could have been completed in 4 months and work could have started earlier.

Change in Scope

The delay of 16 months due to delay in finalization of site, market statistics changed and subsequently it had immense impact on the whole concept of plant which led to change in scope of the project itself. With change in market dynamics and to accommodate the market for higher width coils and to acquire capability to process coils from the ongoing 9.7 mtpa (million tons per anum) expansion project, width of pickling line was changed from 1270 mm to 1650 mm. The ramification of this was that the line capacity increased from 0.3 mtpa to 0.5 mtpa, which also led to the increase in cost of line by US $1.5. CRM also had to change from conventional truss type building to PEB. Augmentation of power system and additional weigh bridge was apparent with increase in capacity of plant. This also added to increase in cost and time as the whole process of technical specification; re-bidding had to be redone. This caused considerable delay in entire process. The increase in capital cost was US $ 4.9 million which was about 9% of the original scheme cost.

Mitigation

Change in scope, was very much evitable if the selection of the site would have been completed within time. Committee appointed for the selection was working at snail's pace and took almost 16 long months to zero in the site from among pool of sites provided to them. Time invested in selection of site led to change in market demand for the CR coils and as a consequence the strategist had to reconsider the whole scheme itself due to change in specification, so as to sustain in the market. This issue could not have arisen if ad hoc team would have done site selection on time.

Delay Cause in Piling Work

The lowest contractor, who was awarded the excavation and piling work of all 750 pillars in September 2007, was slated to complete the work by January 2008 i.e. within 4 months of its commencement. It was supposed to deploy 13 rig machines but only 6 rig machines were deployed. By end of July 2008, only 350 piles

were completed. Perceiving the gravity of the situation and delay, the client appointed another contractor for speedy completion of the remaining piling work of 400 pillars. The induced contractor completed the work by December, 2008. Thus a delay of 11 months was caused in work as piling work which was to be completed in January 2008 as per original schedule but was actually completed in December 2008.

Mitigation

Whatever might have been the problem but steady pace of work insinuated that there was something wrong with the attitude of the people engaged in project. Be it site selection or just selection of contractor, there was something missing and that took toll of the whole project. Selection of contractor was also under scanner as delay in piling work was due to the particular contractor and company had to re- look by replacing the lowest bidder by second lowest bidder to speed up the work. This could have been avoided, if Quality Based Selection (QBS)system was employed. If such was technical expertise of the second lowest bidder and more ever if it was known to project team then an attempt would have been made to bring second lowest bidder to the lowest level as far as financial bid was concerned.

Delay Due to Consultants / Engineers

The Consultant appointed for the project had known caliber in the power sector and was connoisseur of that sector. It was for the first time that the PMC had opted to work for steel sector and hence lacked required basics of sector. Layout design for civil and mechanical work was issued almost 12 months after finalization of bid by the Project management Consultant. Their lack of basic co-ordination in planning, scheduling and controlling was apparent as perceived from ranks and files, correspondence records and parlance. Ramification of delay in issue of designs by consultants gave rise to many issues. Few of which are listed below:

- Contractors had to face impediment in timely execution of the planned work
- Any alteration / modification in work was not properly communicated to the contractors which led to re-work
- Acerbity in relation between various contractors and client took toll of team spirit and project at large

During the time of writing this case, few designs were still pending with consultant like WWTP's civil structure and mechanical structure. There seemed the lack of coordination and total ambiguity between field staffs and office staffs of consultant as any changes incorporate at office level were not communicated properly and timely to the field staff which hampered the work as field staff proceed as per old design and schedule which result in loss of time and resource due to re-work or alteration. The lack of team spirit and ambiguity lead to total pandemonium in project ambience and perhaps could be one of major reason for the delay in project.

Mitigation

Selecting a consultant is one of the most important decisions an owner or client makes. The success of any project often depends upon obtaining the most able, experienced and reputable expertise available. And contract system in this country is such developed that now most of the contracts pertaining to engineer selection and general guidelines are as per FIDIC conditions of contract. As per FIDIC White Book (Chapter 4, Para 4.2), in Quality Based Selection (QBS) method for selection of consultant, the client selects the PMC firm on the basis of professional independence, fairness of fees structure, professional integrity and quality management system. Whereas in the other system of selection of consultant namely Quality and Cost Based Selection (QCBS), it uses a competitive process among shortlisted firms that takes into account both technical quality and the cost of the services proposed in the selection of the consulting firm. If these resources of selection would have been entrusted project would have seen the light of the day before any delay would have occurred as PMC is major cause of delay and cannot be absolved of it. Furthermore, it was apparent from the site that the PMC was victim of acute ego-trip and hence the sufferance on the part of contractors and sub-contractors were very high which ultimately cost the project very dearly

Delay Caused in Erection of Pre-Engineered Building (PEB)

Erection of PEB for the plant started in November 2008 and was supposed to complete the work by July 2009 i.e., within 8 months. But unfortunately till July 2010, only 70% - 80% of work had been extracted and fate of the project was in limbo as contractor was at large, citing reason for unavailability of equipments, etc.,. It had caused the maximum delay to the project as most of work related to commissioning of pickling line, mill, roll grinder were not undertaken as dry and moisture free ambience were pre-requisite for commissioning and testing. It had pushed the schedule of entire project almost by more than a year and trend was still continuing till recently. This delay somewhere has the root cause connected with consultant's lack of supervision skill and inability to use its power and authority to get the work executed through contractors.

Mitigation

The agency which was entrusted for the PEB structure had caused delay as discussed earlier but all these could have been mitigated earlier and work would have been completed on time if and only if the PMC would have taken pro-active role. As perceived through small talk with seniors at the site, it was apparent that engineer was in driven seat and contractor was driver which implies that engineer was in passive role and worked on advice from contractors due to lack of wrinkle in field. Why such situations arose? Basically consultant engaged in project was the organization of repute as far as power project was concerned and steel industry was new for PMC. It lacked general and specific expertise that is pre-requisite for taking up project and hence it was in driven seat and at loggerhead.

Decision about Utilities

Detailed planning about the plant core facilities were finalized way back in 2006 but decision as regards to the utilities was left unattended till late 2008.The process for the finalization, as regards to utilities, started after almost couple of years in September 2008 and which extended till March 2010. As far as Waste Water Treatment Plant (WWTP) was concerned final design was yet to be issued by consultant and this was taking toll of schedule. In a particular case, empanelment of contractor took a year long time which in general takes maximum 3 -4 months. Further to continue, the contractor submitted specification to consultant by November 2009. Consultant issued design by March 2010 and even then still few designs were awaited which was causing delay to project as there loomed uncertainty over the ambience about final shape of the system. And this ambiguity had been the reason for the delay.

Mitigation

Decision as regards to utilities were concerned, it was the client who was responsible for the delay caused in project. They sat on system till 11^{th} hour. This situation might have been avoided if they would have decided earlier and issued specification to consultant for purpose of designing activities. The problem lies in lack of proper planning and scheduling activities. Here it is apparent that there was lack of effective planning, controlling and monitoring and if it would have been managed well ahead of the nick of the moment, picture of project would have been different with schedule on time. This problem would have been mitigated well ahead of time, if pre-execution work like pre-tendering activities, would have been meticulously handled.

Law & Order, Political Interference

Law and order remains major cause of concern in locating any plant in particular area. CRM plant was located in area which was disturbed. Most of the contractors engaged on project were from the other provinces so these local delinquents took advantage of this fact to meet financial benefits. This was also one of the major causes in delay of the work and even today some of the contractors were still at large as they were unable to meet soaring demands of these outlaws and work at ground zero had come to grinding halt.

Mitigation

As far as law and order situation was concerned, it is responsibility of the client to provide basic working ambience so that contractor could concentrate on the work. The work was generally done with in precinct and it could have been managed well if proper line up and coordination between the stakeholders and administration existed. Client being the noted industrialist in the country would have managed it well. But what had prevented them to do so is still reason to find out. Even if, proper security arrangements would have been provided at the gate, this problem has been mitigated to some extent. In fact, we believe whole law and order issue could be managed amicably and thoroughly.

V. Conclusion

Right from the inception stage, project has been victim of system frills and caught in vicious circle. Whether it was case of site selection for the plant, bidding process or contractor empanelment, it had been through the vicissitude and been delayed excessively on one or the other issue. Just to adduce the fact, after the approval for the project was achieved from the Board, it took almost 14-16 months to finalize the one out of three known sites. It was not just the solitary example to adduce rather there had been chronology of incidences which had at some time or the other been instrumental in delay of project. Simple empanelment of contractor – process for which time & procedures are pre-defined in general – took almost a year whereas in ordinary case, it takes precisely 3-4 months to get the job done. Not only this, there were many things that had gone wrong with the project, callous attitude of PMC took toll of the project by large and due to which there was absence of team spirit and effort to achieve the business strategy of the organization and the project was considered in isolation of any such business motive. If anything like that would have been bared in mind of even few, something good must have happened for benefit of project.

Furthermore the client himself seemed to be least bothered about the progress of the project. May be because the Client was an organization of repute, earning profit of **Rs.4, 000 million per annum**. Since the whole budget of this project was not even 1% of group's annual profit and that might have been the reason for lackadaisical attitude of the client. But this does not mean that money and time can be wasted like this. Every stakeholder associated with the project had to bear the burn in financial term as it had to bear soaring overhead cost apart from various other expenses. If one start to accrue the all other cost, these expenses would surpass the total estimate of project by multi fold and this is just not waste of these firm but it also tantamount to the waste of national resources and organizations should ensure that such gross loss of resources should never be repeated in favor of national interest.

Just to reiterate our point, this was only company in its region who was awarded "**Deming Prize for Excellence in Quality**", so it is beyond anyone's capacity to find the reason, why the client had botch up with project due to gross violation on the part of engineer and enough action could have taken for such act.

VI. Suggestions

Create the Work Breakdown Structure (WBS)

Project as said earlier, is a typical and unique activity and thus every project activity requires specific mode of controlling as there are certain guidelines that are being laid. It is the primary responsibility of the key people associated with project to identify the scope of the project and should be made clear to every individual connected to project. Proper scope management is critical to the success of any project, especially in terms of time and money. The first task of any project manager is to develop a written scope statement.

After project scope identification, the whole work should have been broken into activities for better execution of work and thus developing a well developed 'Work Breakdown Structure'. This breaking of work into smaller task and activities creates candidness among the project personnel and yield a better result.

Developing a Project Master Schedule (PMS)

A Project Master Schedule shows the calendar time it will take to complete the works. It shows all activities and major events, like milestones and shows the logical relationship between the Work Breakdown Structure elements (at the most detail level, this will be the Work Packages).Thus developing PMS facilitates easy monitoring and clarity about schedule and progress achieved per day. The procurement should be linked with project schedule and updated regularly taking stock of the situation.

Use of Project Management Software

Furthermore, the Project planning software like Microsoft Project (MSP) and Primavera should be used and updated daily to monitor the progress. MSP helps us to develop the Gantt chart which is easy for the project personnel to understand & interpret the work easily. Based upon this software we can undertake thread wire analysis of the progress of the project and develop the Earn Value Management system using the curves like Actual Cost of work Performed, Budget Cost of Work of Performed, and Budgeted Cost of Work Scheduled.

All these curves help us to measure and communicate the real physical progress of a project taking into account the work completed, the time taken and the costs incurred to complete that work. We can also plan how we will accomplish the task. How long it will take, the resources we need and the estimated costs. By taking a snap-shot of the project and calculating the Earned Value Metrics we can compare the planned with the actual and make a subjective assessment of the project progress. Furthermore, this also helps us to find critical path of project which is the longest path in the network and its duration indicates the shortest possible time required to complete the whole project. Not only this we can crunch and crash the activities to meet the deadline as and when situation demands. All these are only possible if we use the MSP diligently and assiduously and update it regularly. This should not be used in ornamental sense to be put on wall for display.

Frequency of Project Review

There is no set rule for deciding the frequency of project review, but it should be so that a timely corrective action should be possible. Review frequency varies depending on the length of the project, size of the project, the importance and urgency of the project. However, very long interval between two reviews does not allow timely corrective action in many cases while too frequent reviews do not allow project personnel to devote sufficient time to perform the tasks as a lot of time is taken up by the review meetings.

A thumb rule that is followed by many experiences project managers is to review a project 20 times during its execution. This makes the interval equal to 5% of the total project duration.

As per the above discussion it is augmented that success of project depend upon the fact that key personnel and their understanding of the project scope, deliverables, critical activities and control activities etc. The control action should be proactive than retro-active. Once the activity gets completed, any corrective action

becomes a reactive control where 'rework' is scheduled at an extra cost and time. The whole project monitoring and control cycle can be summarizes as below **(Fig. 3).**

Apart from human finesse the paramount importance in project management and regulation of work, are the project software tools and techniques that are employed. There is no doubt that system will yield result and project can be completed in time with minor deviation from the schedule which cannot be ruled out to as ramifications of human sloppiness. Not all these tools enable us to monitor project progress but many a time they instrumental in predict future impediment and corrective measure is taken in advance. Such technique not only makes project controlling and monitoring easy but makes it enjoyable business and play juggler with process which earlier made key personnel to sweat hard.

VII. Lessons Learned

It must be understood that the projects are initiated for business reasons and expected to achieve business objectives. Every organization engaged in business has the sets of strategy and are governed by their spirits. It must be noted that every firm may have business strategy to provide a wholesome guide to all whereas the project of that particular organization may have separate project strategy. To be successful in the field and complete the project without overrun of schedule and cost, project team must develop a framework to understand the concept of aligning project management to business strategy. The Project Manager must identify the components of strategic alignment at project level, which will form a basis for the implementation of different project alignment strategy. Project team should develop the project planning approaches that will incorporate the strategic approach as a common element in project initiation planning and execution. It must be understood candidly that the purpose of corporate strategy is to sustain the business whereas the purpose of projects is to deliver objectives and then terminate. Projects are the vehicle used to execute strategic initiatives prompted by the "deliberate" or "emergent" efforts of the organization in an attempt to align the organizational components to the external environmental domains for sustainability. If effective synchronization between the two is done the most of the project would be completed in time and in estimated cost thereby fulfilling aspiration all stakeholders by and large.

VIII. Figures and Table Annexure

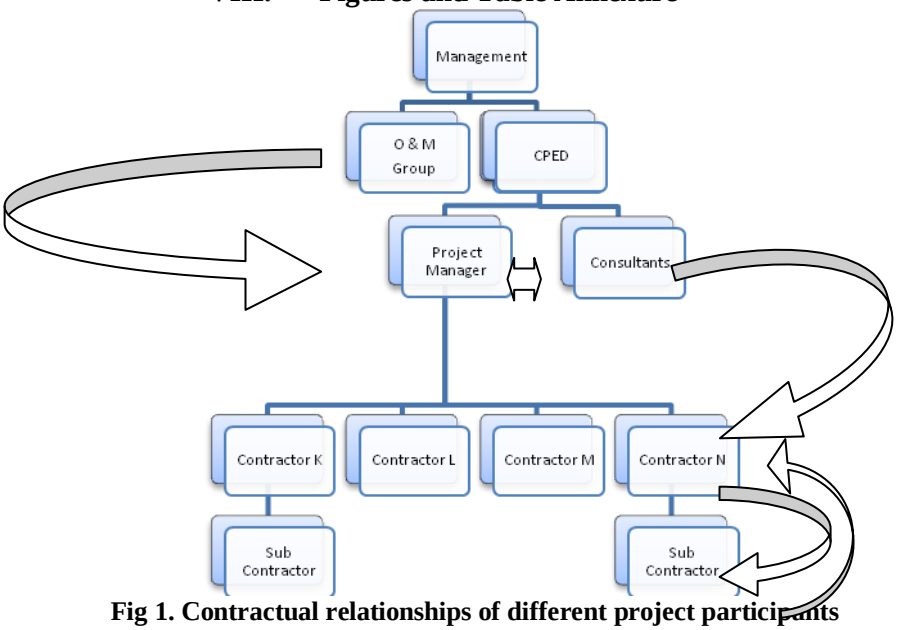

Fig 1. Contractual relationships of different project participants

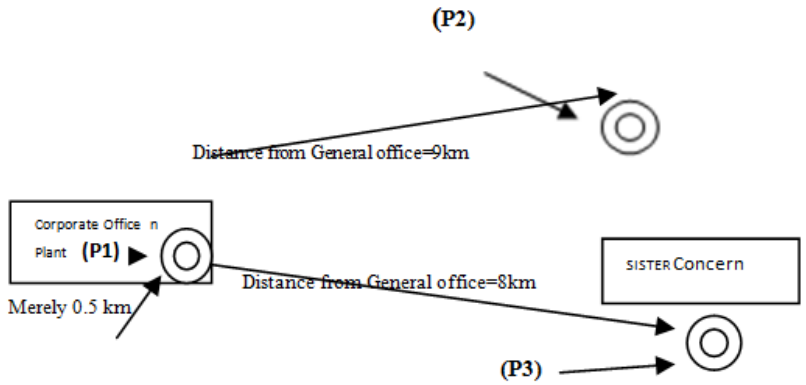

Fig 2. Graphical Representation of Distance of Plots from General Office.

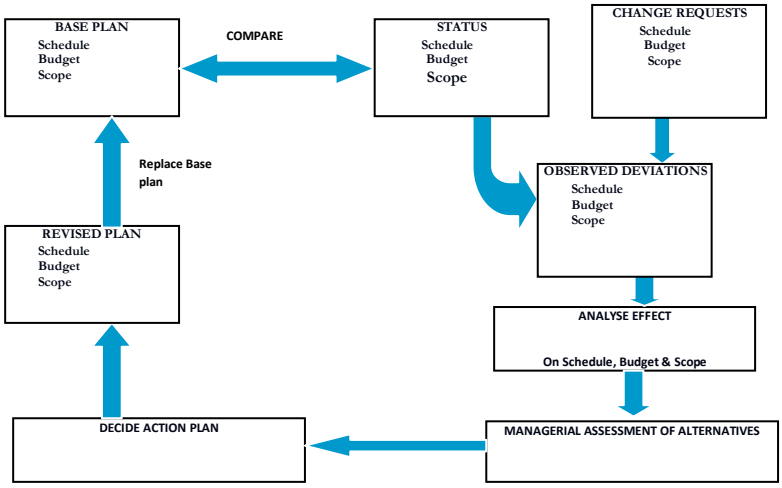

Fig 3. .Project Monitoring and Controlling Cycle

Major Work Packages and types of contract and delay along with the reason for them.

Work package	*Planned*	*Actual*	*Status (till 8Jul,2010)*	*Delays(month)*	*Reason for delay*	*Type of contract*
Piling work	Sept,2007-Jan,2008	Sept,2007-Dec,2008	completed	11	Insufficient no of Equipment employed	Lump sum Type
Pickling line	Nov,2007-Mar,2009	civil work completed	Mechanical erection awaited.	15	PEB structureincomplete undertake work	Design and built type
Mill cellar	Oct,2007-Aug,2009	civil work completed	Testing n Commissioning awaited	11	Same as above	Design and built type
ARP Tank Farm Area	Sept, 2007-April, 2009	90% civil works completed	Hydraulic connection is awaited	14	Compressor conductor renegaded from site	Design and build type
ECR for Mill	Sept,2007-Dec,2008	82% civil work completed	Test n Commissioning Awaited	18	PEB structureincomplete undertake Test	MOPS
Admin Building	Aug, 2007-Jul, 2009	90% civil work completed	Tiling of floor was on its way	11	Lack of monitoring by PMC	MOPS
Laboratory Building	Sept, 2007-Dec,2008	80% civil work completed	Major Equipment was still to be erected	18	Lack of monitoring by PMC	MOPS
Boiler & chiller	Sept, 2007-Feb, 2009	86% civil work completed	Contracting firms ran off site	16	Contractor at large	Design and Built type
Erection of PEB structure	Nov, 2006-Sept, 2008	78% completed	Still roof sheeting was on way	21	Unavailability of Cranes	MOPS
Erection of Mill	Oct, 2007-Aug, 2009	completed	Still commissioning awaited.	10	PEB structureincomplete undertake Test	Design and built type
Erection of Mill hosing	Detail not available	completed	Fitting of hosing stalled due to incomplete PEB	delayed	PEB structureincomplete undertake Test	Design and built type
Erection of 30T EOT Crane of CD bay	Jan,2007-Dec,2008	completed	Testing done on 7th june,2010	18	Delay due to delayed Piling	Design and built type
Load Test of all EOT Cranes in AB,BC,CD Bay	Dec2008-Jan2009	Testing done on7th, 8th, 9th, 10th, June, 2010.	completed	17	Delay due to delayed Pilling	Design and built type

Table No.1 Showing Major Event Leading to Delay in the project and their reasons

(Here, it is to be noted that project had already sustained a delay of 16 months which has occurred due to delay in selection of site and all these delay tabulated are over and above it.)

Name of Plant	XYZ Cold Rolling Mill
Capacity of Plant	0.25 mtpa
Product	Fast Hard Cold Roll(FHCR) Coil
Date of Approval	March'06
Date of Completion	January'08(within 21 months from the date of approval)
Estimated Cost	280.62Mn (Net Of CENVAT)
(USD)	303.21Mn (Gross Value)
Internal Rate of Return %	16.30
Present Status	70-80% work completed

Table 2: Major details of the project

Project Scope(Original)	*Change In Project Scope(After Revision)*
Supply, Erection and commissioning of Reversing Mill.	Pickling Line capacity has been increased from 0.3 mtpa to 0.5 mtpa.
Supply, Erection and commissioning of Pickling line and ARP	Additional Weigh Bridge has been included.
Supply, Erection and commissioning of Roll shop.	Augmentation of Power System for additional scope
Supply, Erection and commissioning of cranes	Changes in Civil and structural building to cater to additional scope
Power supply, ECR's etc.	Change from Conventional Structural building to PEB
Electrics and cabling work(including bay lighting)	Electrostatic Oiler Included.
Construction of new building inclusive of civil and structural work.	Computer and Networking System included.
Construction of new building for Technical services (Lab.)	
Erection and commissioning of Equipment in Lab	
Fire Extinguishing system across the plant	

Table 3: Project Scope: Before & After Revision

Work Package/Activities	*Cost Increased Under Revised Approval(In Million USD)*
Increase in pickling line capacity from 0.3 to0.5	01.50
Additional cost of Structural Modification for Pickling line	01.12
Augmentation of Power system	01.34
Civil and Structural	03.46
Additional Weigh Bridge	00.44
PEB	01.56
Computer & Networking	01.27
Electrostatic Oiler	00.50
TOTAL	**11.19**

Table 4: Mathematics of Figures due to change in Capital Costs

Change in estimated cost after revision	
Total cost under original scheme(estimated)	52.52Mn USD
Total cost (after revision)	62.36Mn USD

Table 5: Change in Estimated Cost after Revision

Phasing of	Year	2006-07	2007-08	2008-09	2009-10	2010-11
Expenditure	USD(in Million)	1.00	1.00	11.63.	42.30	6.69

Table 6: Phasing of expenditure

Abbreviations used

CRM : Cold Rolling Milling
FHCR : Fast Hard Cold Rolled Coil
CPED : Central Project Engineering Department
DB : Design and Built
QCBS : Quality and Cost Based Selection
MOP : Management Oriented Procurement
PEB : Pre-Engineered Building
WWTP : Waste Water Treatment Plant
WBS : Work Breakdown Structure
MSP : Microsoft Project
MTPA : Million Tons Per Anum

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Glossary of figures and tables

Figures

Fig 1. Contractual relationships of different project participants
Fig 2. Graphical representation of distance of Plots from General Office.
Fig 3. Project Monitoring and Controlling Cycle

Tables

Table 1: Showing Major Event Leading to Delay in the project and their reasons
Table 2: Major details of the project
Table 3: Project Scope: Before & After Revision
Table 4: Mathematics of Figures due to change in Capital Costs
Table 5: Change in Estimated Cost after Revision
Table 6: Phasing of expenditure