

# Increasing floorspace construction plan



After the negotiation of the final contract, EID was given the authorization to begin the project. But there was no formal notice to proceed and the duration of the project was not closely monitored or contractually specified.

In the appointment of an owner's representative during the design phase, to expedite owner's decisions and approvals, Mr. Ian Leadbetter, a mechanical and software engineer, was appointed as the owner representative even though he lacked project management training and experience.

Failures in submittal reviews – Mr. Leadbetter was occupied with the software development and did not have a standardized process in place for the approval of submittals and other key project management owner processes.

Design process failures – There was no process that was in place to deal with the expansion of the production train. This change caused the software design work that was completed to be discarded resulting in Mr. Ledbetter's need to focus on redesign of the software and not on his duties of facilitating and communicating information between all parties. Since there were no processes on order for submittal reviews and approvals, there was a significant delay in the delivery of the production train equipment.

During the construction phase, there were numerous problems that resulted including inter-coordination of shop drawings to design causing the structure of the building to be designed five feet less than required for the production train, owner representatives conducting business with subcontractors without the contractor being present, and other problems with process and

technical management. There was no communications plan in place for the project.

Failures in completion schedule and getting occupancy permits – There were delays due to a number of shortfalls in the project management system. The management failed to hold EID accountable for project completion and closeout causing delays in schedule. EID did not provide the building occupation permit nor did they comply with scheduling requirements for utility tie-ins causing several weeks in lost production.

b.

The real objectives of Woody were as follows:

- Increase the production capacity by 25%
- Increase the flooring of the production plant
- Install air conditioning
- Install dust free painting and finishing shop
- Add additional compressor capacity
- Completely install a semi-automatic wood working production train
- Renovate the President and Vice-President's offices

e.

The project's success can be gauged by their adherence to cost, time, usage of resources and quality standards.

Cost: Maximum cost allowed was \$ 17 million. Having a control over the budget, without any deviations would be success criteria.

Time: The maximum time allowed for the project was 18 months. Any deviation from this would reflect poorly.

Quality: Adherence to both product and process quality would be important. Product quality can be determined by the Conditions of Satisfaction established by the customer, in this case the management board of Customs Wood Work. The second quality standard can be measured by the criterion set by the project team in order to obtain the final product. Process quality has to be developed at every stage.

2.

### Project Scope

Set up in 1954, Custom Wood Works had diversified into the manufacturing of made-to-order kitchen and bathroom cabinets, furniture for wholesalers/retailers along with its traditional offering of customized furniture. The company had even taken up sub contract work supplying installing counter tops and cabinets for commercial constructions.

With the mini-boom in the construction industry, Custom Wood Works was set to expand its manufacturing business. The company was looking to enter the field of manufacturing by computer controlled automation. To give a certain grandeur to this strategy, the offices of the President and the Vice-President were being refurbished.

The scope of the project includes increasing the floor space available to the company with a focus on increasing the company's production capacity by 25%. It also includes setting up of a new semi-automatic wood working

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production train complete with air-conditioning facilities and a dust free painting shop. The project even includes renovation of the President and Vice-President's office.

The additives to Woody's project plan should include –

#### Sales Assessment

An assessment of committed sales contracts and projected contracts should be done to ensure that production can still be maintained during proposed construction and that customer demands for scheduling and delivery requirements are met. There should be a strategic planning session which includes administration, sales, and production to ensure a high standard for customer satisfaction during proposed construction process. A detailed sales and marketing plan should be prepared and should have contingency planning in case the market falls in a certain sector.

#### Process and Recommended PMLC model

A complete systems flow should be developed to include document, task and schedule accountability, and allow for the integrated coordination between the owner, design and construction teams, and governing agencies. A Woody 2000 project steering committee should be formed that includes the executive management team and key leaders of the project.

#### Strategic planning and focus groups

A systematic strategic planning session with various groups in the organization should be organized. Sub focus group which includes finance,

production and administration should be formed. All meetings would have very detailed meeting minutes to include new and old business, pending issues and accountability milestones. A task-tracking log can be maintained in each of the key disciplines.

#### Evaluate Design and Constructability

Value engineering, systems analysis, interior and exterior specification selections, program requirements, and overall design development coordination should be included. Existing production output should be reviewed along with new technologies and the affect upgraded machinery would have on production. Existing production capability should be maintained in order to service existing clients.

#### Project sequencing and mobilization

A complete interfacing of the Woody 2000 project program requirements with the existing operations to determine various solutions for construction mobilization should be included.

#### Pre-construction schedule

Woody's executive team should be included in the overall development of the pre-construction schedule with related tasks and accountability time lines. A mobilization plan must be completed in order to ensure that the existing production lines can be maintained without interruption.

#### Financial Performa and feasibility

Various alternatives to the proposed expansion including Financial Performance, implications of proposed construction, system for programming spaces, methodologies for hiring of design and construction teams, design development process, implementation process, cost controls, and quality control procedures, should be developed.

#### Contractor selection methodology

A competitive bidding process for the selection of the General Contractor should be followed. A preconstruction conference would be held in which the construction documents would be handed out and the project parameters be discussed and established with contractors.

b.

Woody's plan in managing the project included the following:

Appointing Spencer Moneysworth as the Project Lead

Inviting Expert Industrial Developers to quote on the construction.

A monthly cash flow was developed by Kim Cashman.

Mr. Leadbetter was appointed to take over the day-to-day running of the project.

Various vendors like Piecemeal Corporation etc. were appointed to supply the necessities for the impending construction.

The installation of the mechanical equipment in the dust free paint shop was given to Amos Dent of Tinknockers Associates.

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The local inspection authority was asked to intervene and check for compliance with the regulatory policies.

An additional line of project financing was opened up to meet the escalated costs, because of the delay in completion.

An expensive marketing strategy was launched to win back the lost customers.

For post project appraisal, project management consultant W. Easley Associates were retained.

A new and improved project management plan should include the following:

– Programming guidelines

#### 1. Design review

Review Architectural and Engineering Design Services Agreements and ensure that these agreements have definitive date constraints and design to budget parameters.

#### 2. Review Programming Objectives

a. Confirm the Woody team overall desires, intentions, goals and objectives for their expansion and develop a complete needs assessment

b. Confirm the long range facility strategies and the necessary sales and marketing strategies needed to keep the new production train generative for its proper production to payback ratio.



### 3. Review Programming Documents

- a. Confirm the assessment and audit of Owner's existing facilities and determine specific needs to projected revenues. Review existing operations to ensure that production is not affected by the construction process.
- b. Ensure the Owner's facility needs are fully documented by the use of a program manual and needs assessment log.
- d. Coordinate with the executive team the overall requested program to decipher between needs and wants and obtain necessary approvals.

### 4. Review/Maintain Overall Project Budget (OPB)

- a. Confirm the Owner's needs and constraints regarding overall project budget and develop concise budgeting throughout design development phase.
- b. Confirm coordination of the budget with the program to insure sufficient funds are set aside and that the sequencing of work is in line with projected cash flow.
- c. Determine cash flow requirements and projections for the duration of the master schedule and coordinate with the finance office.
- d. Prepare periodic reports to document the planned cash flow versus actual cash flow and report to the Woody 2000 executive steering committee.

### 5. Review/Maintain Overall Project Schedule (OPS)

a. Validate the preliminary schedule and expand the final project schedule and identify major milestones and the critical path for project.

b. Validate major team member's needs, responsibilities and detailed scheduling of team member's work including owner supplied equipment, subcontractors, and the entire project workforce.

6. Review Site Due Diligence

7. Zoning & Surveys – Coordinate and confirm approvals for proper permitting.

a. Transportation – Confirm the necessity of a traffic management plan to ensure that the 850 existing employees have ample parking and are not affected by the construction.

b. Legal restrictions – Confirm approvals for equipment and new paint shop area.

c. Environmental reports & Soils investigation – Confirm that all soils reports are sufficient for the new building footers and structure.

e. Existence and capacity of utilities and infrastructure – Coordinate with the appropriate utility companies to confirm that all expanded utilities are scheduled properly and without delay.

f. Determine applicable government and community agency requirements, approvals and permit.

b. Design Process

## 1. Confirm Procurement Agreements – Design Services

a. Confirm list of consultants, contractors and vendors whose services may be required in the purchasing of design services.

b. Monitor the development of agreements to be awarded to successful bidders, all required contracts must be based on hard numbers or guaranteed maximum pricing.

## 2. Performance Compliance

a. Coordinate the specification of materials with the Owner's needs there should be careful consideration given to the production train equipment.

b. With the design consultants, develop procedures for material testing and test reporting.

## 3. Consultant Coordination

a. Monitor the coordination of consultants and vendors in such areas as the production train equipment and other specialized equipment necessary for the expansion space.

## 4. Program and Design Compatibility

a. Confirm with the design consultants that the developing designs are compatible with the program, master schedule, master budget and quality expectations.

b. Confirm with the design consultants that the design as developed is compatible with the Owner's needs.

## 5. Submittals

- a. Monitor design submittals and approvals.

## 6. Insurance

- a. Confirm that design consultants have and maintain insurance in accordance with the Owner's needs.

## 7. Cost Control

- a. Manage procurement of conceptual estimates of construction costs.
- b. Assist with value engineering ideas.

## 8. Financing

- a. Assist Owner with developing a process for managing use of the contingency fund.
- b. Make adjustments as necessary to project current and future cash flows.

## 4. Quality

- a. Maintaining quality in this case, includes

Adherence to procedures and processes

Enforcement of the processes

Issuance of completion certificates

Procedures and processes

Quality assurance of The Woody 2000 project can only be accomplished through proactive involvement of the management team, interaction with the Owner, and design personnel. The tools to accomplish the same include:

Design reviews-Constructability reviews & value analysis

Submittal control and approval

Pre-construction meetings for major building components

Partnering Sessions at key intervals of the project to clarify project standards and goals

Educating trade contractors in the QA/QC (Quality Assurance/Quality Control) requirements of the project.

Quality assurance and control of the Construction Manager and subcontractors and in field operations should begin during the design phase to determine that the contract requirements are clearly understood by all parties. Periodic inspections must be conducted to ensure that all items are in conformance, or that non-conforming items are corrected.

Enforcement

A regular quality inspection process should be documented. If the quality program is not implemented properly, a notice should be given to the parties involved, calling for an immediate resolution.

3. Review and issuing completion certificate

As certain phases of the project are completed, a list of expected deliverables should be given to the contractors. The subcontractors are expected to cross check the expected deliverables with the actual deliverables and call in the quality team for a review. On successful completion of the review, the completion certificate may be given to the contractor.

b.

Leadbetter didn't invoke the quality specifications as he had not been trained in project management experience and lacked the desired skills. The result of it were the following –

The specification of the production train was changed to increase capacity resulting in the rewriting of the software. This increased debugging at the start-up.

Review and approval procedures for the various specifications and drawings were not taken, because of which there was a delay in getting the approval.

Change in the production plans made it imperative to add another 5 feet to the length of the building.

Delay in receiving and reviewing the catalogue descriptions and other specifications.

Failure to meet the local environmental compliance standards, as set by the inspection authority.

Building occupation certificate couldn't be obtained.

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Owners' inspection and dry-run tests of the production train couldn't be performed.

Customer delivery dates were missed and general contractors cancelled their orders.

Depletion in the finished goods inventory and hence loss of face and sales opportunities.

Resultant delay in the completion of the project, ensured that costs escalated and required an additional line of financing to be opened up.

c.

The importance of quality for such a project is because of the following reasons –

Ensures minimum re-work.

Would ensure complete utilization of the resources

The project would be under the stipulated budget.

Proper quality would refer to compliance of standards and procedures.

The project can be completed within the stipulated time.

## 8. Communication and People Management

### a. Organization Chart

Project Chart

b.

Leadbetter when appointed to take care of the project lacked the knowledge which would have made him an indispensable part of the project. He lacked project management training and experience. He did not have any grounding in the understanding of the project life-cycle and control concepts. But Leadbetter had specialization in the understanding of the semi-automatic manufacturing machinery, which was the area of expansion of the organization. As such, with the start of the production run, this knowledge would have proven to be an asset of the company. Hence, imparting training in project management and nurturing of his skills would have helped the company.

c.

#### Communication Plan

The communication plan addresses crucial items which should include: Responsibility Matrix, Team Coordination, Master Schedule and Specific levels of reporting for different levels of individuals within the project design and construction team. Individual team members should receive specific types of reports such as: project team meeting minutes; monthly executive reports, schedule; etc. Project goals are to be established and documented so each team member understands the common objectives. A Procedures Manual (PMP) should be completed which has all approved processes and procedures for the project.

Progress meetings:



These meetings are important and should be conducted at least weekly, with trade contractors and key subcontractors, to discuss current progress and accomplished milestone objectives, forecast the week's progress and goals, address problems encountered and actions required to correct any deficient work. This entails two primary goals:

To provide a series of tools for accurate monitoring of the progress of the project.

To provide thorough, accurate records of the project to protect the owner from potential disputes or legal problems. Therefore, the following is tracked and recorded on each project:

This can be achieved through trade Contractor Daily Reports, Construction Photos, Daily Logs, Testing/Inspection Services, Shop Drawings/Submittals, Document Management, Progress Meetings, Schedule Enforcement, Progress Reporting, Safety Inspections etc.

Contract Administration and Field Coordination:

The project manager should oversee the coordination of efforts between each contract, including issues such as accessibility to the site, maintenance of both pedestrian and vehicular traffic, eliminating disruption to on-going existing activities, tie-ins of utilities and roadways, compatibility of construction methods, construction phasing and utilization of construction forces.

Information Management Systems:

An Information Management System which implements, tracks and records all the various elements of Project management, planning, organization, meetings and reviews, site logistics, shop drawings, field orders, and document control, should be bought into place.

#### Decision Tracking:

A decision tracking system can be designed to keep the project moving. Whenever a critical issue is identified by the project team, the system would track the issue, its impact, its source, and the party responsible for the action on the issue. As individuals take action on the issue, the system would track each action taken and identify the next responsible party in the process of reaching a decision on the issue. As each issue is resolved, the decision tracking system would close the issue, but preserves the history of the decision process.

#### RFI's – Requests for Information:

These forms can be used regularly to stimulate communication between all project team members, including the owner and architect. These requests receive immediate attention and are invaluable in aiding the team members to anticipate conflicts before they become problems.

d.

#### Expected Communication during execution

This should include –

Design Package Log: Tracks drawings, specifications and key dates as needed.

Pending C. O. Log: This log tracks owner and designer wish list items and cost. They allow for timely decisions while maintaining the project budget.

Team Action List: Tracks actions needed to accomplish schedule goals and facilitated those actions.

Bi-Weekly Schedules and Meetings: Meetings, facilitating communication and planning among team members. These are directed mainly at trade contractors, but also need support from the owner and architect.

Liaison Meeting: Bi-Weekly meetings which includes owner representatives to facilitate major decisions and exchange valuable information.

Submittal Log: Tracks all submittals by trade contractors requiring approval by the architect and engineers.

Daily Manpower Reports: This report tracks trade contractor's manpower. This report is reviewed daily and weekly to monitor adequacy of work forces necessary to maintain schedule.

CCA Status Reports: Tracked changes (Contract Change Authorization) and the Owner's contingencies available for changes.

Alternate/Value Engineering Log: Tracks potential additive and deductive changes that the Owner may wish to implement.

Three-Month Calendar: A three-month calendar with all upcoming meetings and major events can be included with all meeting minutes and updated weekly.

## 10. Cost Control

a.

Reasons for the initial high price of EID

The initial bid of EID amounted to \$ 20 million on a 18 month schedule. EID believed that Woody's would need considerable help with their project planning and had allowed for a number of uncertainties. EID allowed to undertake the work on a fully reimbursable contract. The counter offer EID made was to do the work on their cost but solicit fixed price quotations for all sub-trade work.

Their position was reasonable because of 2 reasons:

The hourly rate paid would cover all the direct wages/salaries, pay roll burden, head-office overhead and profit. This rate would apply to all engineering, procurement, construction and commissioning for which EID would employ another subcontractor for the building and design work

The number of hours put in by EID can be monitored effectively by Woody's.

b.

2 years after the project was first launched, there was no meaningful planning for completion. Owners acceptance, testing, dry-run and production

start-up of the production train had not been carried out. Also the occupation certificate had not been availed. Due to late delivery of the production train, the ‘tie-in’ of power and other utility connections scheduled for the annual 2 week maintenance shut-down could not take place. Customer delivery dates were missed and some general contractors cancelled their contracts and placed their orders for mill work elsewhere. Sales opportunities were lost too.

All this put together resulted in the fact that, the project was only 85% complete because the delay in completion too was charged to Woody’s account.

c.

### Cost Control

An experienced team of experts with knowledge of quantities and historical pricing, project management and field supervision, should provide the expertise on all elements relating to cost control, including budgeting, estimating, value engineering and the qualification of subcontractors. The Woody 2000 project steering committee would receive formal reports weekly from Mr. Moneysworth and Mr. Cashman.

The following cost control methods can be implemented throughout the pre-construction and construction phases of the project:

### **Budget Planning**

In the budgeting phase of the project, the current projected costs of the project can be compared with the initial budget so that the cost doesn’t

escalate. It has to be ensured that the work involved meets the projected goals

## **Estimating**

Definitive estimates should be made through schematic design, design development and construction documents stages of the project. Work has to be done in conjunction with the various prime subcontractors in developing estimates that can be tracked in a similar format to simplify the reconciliation at each estimate phase.

## **Conceptual Pricing:**

An in-house cost coding system can be developed, to expand into more detailed pricing as the design progresses. A computer-aided quantity survey system would allow to accurately produce the basic quantities for the project.

## **Cost Forecasting:**

Prior to the start of the construction phase, transfer the estimate into a cost forecasting format used by project management staff to track costs throughout the project to completion. This estimating process built from each stage to a Guaranteed Maximum Price estimate, would check it against previous work.

## **Cost Accounting/Tracking:**

Once the contract price is determined, the estimated labor, material and subcontractor costs can be allocated among standard cost accounts at a level of detail appropriate for tracking individual tasks against the project budget.

## **Procurement and Labor:**

The procurement cycle begins as purchase orders, subcontracts and change orders are committed, then immediately documented and simultaneously recorded in the cost system. Actual labor costs, together with work-in-progress, can be recorded on a weekly basis through the payroll system.

## **Cost Reporting:**

Cost reports are comprehensive and responsive to the specific needs of the project. Labor reports, printed at the job site weekly, can be used by project management to review progress and costs. Vendor commitments and expenditures, sorted in various level of detail, can be monitored in several reports. Actual job cost detail can be reported on a limited date range, a group of cost accounts, or for the entire project to date.

## **Purchasing:**

A system must be followed that solicits competitive bids from subcontractors and suppliers based upon a set of defined bidding procedures. In conjunction with the owner, this would identify qualified and capable subcontractors and suppliers taking into consideration their previous experience, workload, ability to perform, and financial capability. Pre-bid meetings can be conducted for the purpose of assisting subcontractors in understanding the bid documents, design intent and project requirements

## **Subcontractor Qualification:**

The subcontractor qualification process remains an important part of cost and project control. However, subcontractors cannot be arbitrarily eliminated from the project unless warranted by serious business indicators.

The subcontractor qualification process is an important step in evaluating the apparent low bidders for capability to satisfactorily perform the scope of work. Additionally, the evaluation can reveal early signs of weakness, which can be supported to ensure a quality performance.

### **Pricing:**

Prices should be obtained from a minimum of three pre-qualified bidders for each category of work on the project. The accuracy and dependability of subcontractor pricing should be directly related to the content of information furnished to the bidders.

d.

Flow Chart for processing changes:

Cost Forecasting

Conceptual Pricing

Estimating

Budget Planning

Purchasing

Cost Reporting

Procurement & Labour

Cost Tracking

Sub – Contracting

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## 11. Risk Identification and Control

b & c.

List of Woody's Actual Surprises:

The allocated budget for the project was pegged at \$17 million, with 18 months as the time frame for the construction. Mr. Moneysworth invited Expert Industrial Developers to quote on the planned expansion. The fixed price quotation which was given by the firm amounted to \$ 20 million and an 18 month schedule.

Mr. Ian Leadbetter was appointed for running the project, despite his lack of knowledge in project management training and experience. On suggestion of EID, that Woody's should take over the procurement of the production train directly, the entire production train specification had to be changed to increase the capacity and consequently the program codes too.

Change in the production plan resulted in another 5 feet being added to the height of the building.

Catalogue descriptions and specifications were not received until the foundations had been poured

The surplus paint disposal method didn't meet the environmental standards as specified by the inspection authority

Failure to obtain the building occupation certificate

Failure of the ' tie-in' of the power and other utility connections

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Response to the above:

Costs arising from these changes, including the delay in the completion were charged to Woody's account. To mitigate the effect of only 85% completion, Cashman was forced to scramble for an additional line of project financing at prime plus 2.5% interest. Liquid cash was spent at every such instance. A coordinated marketing effort was launched to regain the interest of the customer, which didn't have much effect.

Possible Risk Management Plan:

The implementers of the project could have followed a 4 prong Risk Management Plan:

Risk Identification: Identify potential risks as a part of the project. Case specific potential risks can include securing permits and unfavorable weather conditions which may hamper the construction work. A 10% contingency can be accorded to the construction schedule. Care should be taken to ensure that schedule creep doesn't happen.

There can be 4 categories of risk included as a part of the Risk Management Plan –

Technical Risk: This includes a review of the quality and performance goals of the project. Proper installation of the lag bolts, coordination with the drawing shops and the foundation contractor etc. come under this.

Project Management Resources: This includes improper planning and allocation of resources and improper use of management disciplines.

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Coordination between the owners interface and the appropriate contractors can be a part of this.

Organizational Risks: This should ensure that there are enough human resources allocated to the project and that there are no conflicts between the project staff and the employees of the Custom Wood Working company.

External Risk: These risks can be caused by external parties such as regulatory agencies, labor contracts and supplier restrictions. There should be proper coordination with utility companies and that all equipments and systems should be approved by the appropriate regulatory agencies.

Risk Assessment – This can be done by 2 methods: Static and Dynamic assessment. While static risk assessment is