Projacs
an egis company
بروجاكس للتدريب والتطوير
Projacs Training and Development

Project Budgeting, Cost Estimating and Value Engineering – Certified Program

تقدير وضبط تكاليف المشاريع والهندسة القيمية – معتمد عالمياً

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Barcelona / Spain

A Member of:
PROJACS ACADEMY

ProjacsAcademy.com

Introduction

Week One

Introduction

The cost of a project is the most significant factor in its becoming a reality. Costs are dealt with at the beginning of a project by preparing a "**budget cost estimate**" incorporating relevant historical cost data and the creative skill of a seasoned estimator with similar project experience. This is the most important, as well as the most difficult, type of estimate to prepare accurately.

As a project evolves through the normal design process, additional evaluations of cost are made. These cost estimates are done as precisely as possible and include appropriate contingencies for unknown items. The "**concept estimate**" helps to ***control the project*** early in the design process to stay within budget.

As a part of the conceptual design process, building system alternatives are identified. **Life cycle costing** is a method which compares both the construction cost as well as the operating costs (energy, water, maintenance, major replacements, staffing) of these alternatives. Using engineering economics, the lowest life cycle cost alternative is identified for incorporation in the design.

This course will provide a basis for the many areas of estimating that may be faced by the design and construction professional. It will provide "hands on" examples to facilitate a familiarity with different types of estimates and their components. With this basis, a person, through research, study and practical application, can further expand their cost estimating skills relative to their own profession or branch out into new areas of estimating. Other methods of **cost control**, such as **value engineering** will also be discussed briefly.

Week Two:

Introduction

Increasing demands for capital projects are placing greater stress on available funding resources. In this period of belt-tightening and reduced budgets, it is imperative to find ways of doing more with less. Value Engineering (VE) has proved to be a valuable tool in stretching capital, construction, operation and maintenance dollars to achieve the required goals for reduced costs, both in the public and private sector. Use of VE techniques also typically results in improvements in facility performance, even at these lesser costs.

The Value Engineering Technology is a problem-solving system designed to accomplish essential functions of products and services at the lowest cost without sacrifice of quality or delivery requirements. A Value Management Program manages costs and manages change through the deliberate use of the technology. A successful program requires management support, proper

planning and organization, and an understanding of the technology. The Training Course and Its Workshops deal primarily with the learning and application of the technology.
Value engineering (VE) is a methodology that is know, accepted and has an impressive history of improving value through customizing Quality and optimizing Life Cycle Cost (LCC). VE is an organized process that has been effectively used by a wide range of companies and establishments to achieve their continuous goals. The success of the VE process is due to its ability to identify opportunities to remove unnecessary costs while assuring quality, reliability, performance, and other critical factors that meet or exceed customers' expectation. The improvements are the result of recommendations made by multi-disciplined teams from all concerned parties.

Objectives

By the end of this course practitioners shall learn to:

- Mitigation of risk by selection of the most suitable project design type
- Methods of selection of the most suitable building systems
- Terms and conditions - examples of commercial terms
- Reducing total cost of project without any changes of functions and quality
- Developing better building functions
- How to determine fair and reasonable prices and times
- Structuring economic price adjustments
- Negotiation planning and strategies
- Value Engineering management techniques

The organization will benefit by:

- Greater strategic focus of those involved in Value Engineering
- Higher productivity of design and costing personnel
- Reduced cost of contracts for materials & services
- Better outcomes in design methods evaluation
- Improved building performance

Attendees will gain by participation in this program as a result of:

- Increased skill sets in Value Engineering processes
- A greater sense of Professionalism in design process evaluation
- Knowledge of evaluating prices and times
- Greater ability to lead successful negotiations with suppliers and contractors
- Increased recognition by the organization due to improved performance

Who Should Attend?

This course is recommended for anyone involved with the design stage of construction, maintenance and repair projects:

- Architectural engineers
- Structural design engineers
- Construction engineers
- Mechanical engineers
- Electrical engineers
- Process / operation engineers
- Project Managers,
- Engineers and Planners,
- Information Technology Managers.

Course Outline

Week One

Day One

- **Welcome & Introductions**
- Welcome & Opening Remarks
- Participant Introductions
- Objectives of Training Course
- Course Organization & Agenda

Cost Management Process in Planning & Design

Introduction to Project Budgeting & Concept Estimating (CH 1 + 2)

- Budget Elements
- Design Phases
- Cost Control Concept
- Historical Budget Techniques
- Estimating Standards
- The Uniformat Elemental Classification

Capitalized Approach to Project Budgeting (CH 3)

Sample Project Cost Plan / Cost Model

- **Construction Market Survey**
- Regional & National Market Conditions, Potential Bidders
- Labor Availability, Productivity and Union Rates
- Material Availability and Unit Price Summary
- Market Analysis Survey Questionnaire

Fixing Project Scope (CH 4)

- Facilities Functional & Technical Programs
- Key Cost Drivers

Computing Program Area Requirements (CH 5)

- Space Efficiency
- Rules of Measurement
- Converting Net of Gross

Case Studies – Example Estimates

- Case Study 1: Historical Comparative Budget Estimate (UDM)
- Case Study 2: Parametric Budget Estimate (EMU)
- Case Study 3: Parametric Concept Design Estimate (4th Precinct):

Assignment Reading Assignment, Chapters 1-6

Day Two

Discuss Reading Assignment

Budget Estimating Approaches

- Capitalized Approach to Project Budgeting (CH 3)
- Historical Projects, Comparable Costs (Per UM) + Summary Level 1
- Parametric Uniformat Level 3 Systems + Summary Level 1

Case Study Project Budgeting (DTF Office)

- Team Formation & Project Familiarization
- Project Scope (CH 4)
- Program Area Requirements (CH 5)

Historical Comparative Budget Estimate

- Office Historical Costs
- Estimate Summary Assumptions

Project Workshop

- Determine Average Historical Costs
- Complete Budget Estimate Summary (Level 1)

Parametric Systems Budget Estimate

Establishing Configuration / Massing (CH 6)

- Sitting the Building/ Configuration
- Statistical Configuration Process
- Building Statistical Description Summary

Project Workshop

Determine & Document Configuration Quantities

Documenting Quality (CH 8)

- Quality Standards / Levels
- Sample Documentation by Element

Project Workshop

- Determine & Document Quality

Parametric Systems Budget Estimate Completion

- Uniformat Systems & Quantities

Project Workshop

- Determine & Document Systems Level 3 Costs
- Complete Project Summary Level 1

Assignments

- Project Assignments
- Reading Assignment, Chapter 7

Day Three

Discuss Project Assignment/ Turn-in

Concept Design Estimating Approaches

- Parametric Uniformat Level 4 & 5
- Quantity Take-off Cost Items

- Summary Level 1 Uniformat

Case Studies - Concept Estimating (Multi-Tower, NPS, PAAET)

- Team Formation
- Project Familiarization
- Project Scope (CH 4)
- Program Area Requirements (CH 5)

Project Workshop

Determine Configuration Quantities

Determining Quantities/ Costs for Structural Elements (CH 7)

- System 01 – Foundation
- System 02 – Substructure
- System 03 – Superstructure

Project Workshop

- Determine Quantities/ Costs, systems 01-03

Determining Quantities/Costs for Architectural Elements (CH 7)

- System 04 – Exterior Closure
- System 05 – Roofing
- System 06 – Interior Construction

Project Workshop

- Determine Quantities/ Costs, systems 04-06

Assignments

- Project Assignments
- Reading Assignment, Chapter 7

Day Four

Discuss Project Assignment/ Turn-in

Determining Quantities/Costs for Mechanical Elements (CH 7)

- System 07 – Conveying Systems
- System 081 – Plumbing
- System 082 – HVAC
- System 083 – Fire Protection
- System 084 - Special Mechanical Systems

Project Workshop

- Determine Quantities/ Costs, Systems 07-084

Determining Quantities/Costs for Electrical Elements (CH 7)

- System 091 – Primary Power & Distribution
- System 092 –Lighting & Secondary Distribution
- System 093 – Special Electrical Systems

Project Workshop

- Determine Quantities/ Costs, Systems 091-093

Assignments

- Project Assignments

- Reading Assignment, Chapters 10-11

Determining Quantities/ Costs for Equip./ Site Work Elements (CH 7)

- System 11 – Equipment
- System 121 – Site Preparation
- System 122 – Site Improvements
- System 123 – Site Utilities
- System 124 – Off-site Work

Project Workshop

- Determine Quantities/ Costs, Systems 11-12

Assignments

- Project Assignments
- Reading Assignment, Chapters 10, 11

Day Five

Discuss Project Assignment/ Turn-in

Project Management Plan (CH 10)

- Methods of Accomplishment
- Scheduling
- Uniformat Elemental Specifications

Budget Development Remaining Items (CH 11)

- General Conditions, OH&P, System 10
- Contingencies, Types & Use
- Escalation
- Design & Management Costs
- Management Costs during Construction
- Real Estate Costs
- Reservations

Project Workshop

- Determine Quantities/ Costs, Remaining Items

Closing the Loop – Recycling Cost Data (CH 12)

- Controlling Design Work
- Estimates at SD, DD, CD, Bids, Change Orders
- Historical Data

Life Cycle Costing (LCC)

- Methodology and techniques of life cycle costing
- LCC case studies (building systems, layout alternatives)
- Computer template for analyzing the life cycle costs of alternatives

Value Engineering

- Assuring best value for dollars spent
- Value methodology process & tools

Open Forum

- Questions & Answers

- Course Evaluation
- Certificates upon Successful Course Completion
- Next Steps

Week Two:

Day #1

INTRODUCTION

- Course Objectives

VALUE ENGINEERING BRIEFING

- Definition of Value Analysis/ Engineering
- Results of VA/ VE Programs
- History of Value Analysis/ Engineering
- Reasons for Unnecessary Cost
- All Cost is for Function
- Value Methodology
- Case Studies

INFORMATION PHASE

- Project Selection, VE Objectives, VE Team Selection
- Information Requirements for VE
- Workshop Logistics
- Workshop Information Phase

PROJECT WORKSHOP – INFORMATION PHASE

- Organize Into Project Teams (4-6 People Each)
- Select Team Leader & Recorder
- Project Overview, Design Documents, Cost Estimate
- VE Objectives

Day #2

FUNCTION ANALYSIS PHASE

- Function Models:
- Cost, Quality, Risk, LEED (Sustainability)
- Function Analysis Process
- Function, Cost, Worth Worksheet
- FAST Diagramming
- Level of Abstraction
- Development of Worth
- Function, Cost, Worth Worksheet
- FAST Diagramming

PROJECT WORKSHOP - FUNCTION ANALYSIS PHASE

- Function Cost Model
- Quality, Risk and Other Function Models

Day #3

CREATIVE PHASE

- In-Depth Brainstorming
- Delphi Technique
- Force Field Analysis
- Other Creativity Techniques

PROJECT WORKSHOP - CREATIVE PHASE

- Idea Generation for Basic Function(s)
- Force Field Analysis
- Other Creativity Techniques

EVALUATION PHASE

- Idea Generation - Advantages/Disadvantages
- Cost Estimating
- Matrix Evaluation Techniques
- Sample Projects
- Class Exercise

Day #4

PROJECT WORKSHOP - EVALUATION PHASE

- Idea Comparison
- Idea Ranking
- Initial Criteria Evaluation
- Cost Estimating
- Initial Matrix Evaluation

SPECIAL TOPIC: “VE IN DESIGN BUILD”

DEVELOPMENT PHASE

- Life Cycle Costing Techniques
- Manual Method Using Short Format
  - Annualized & Present Worth Methods
  - Inflation & Escalation
- Computer Spreadsheet Approach to LCC
- Exercise – Life Cycle Cost Analysis

PROJECT WORKSHOP - DEVELOPMENT PHASE

- Life Cycle Cost of Alternates
- Evaluation Matrix
- Life Cycle Cost of Alternates
- Weighted Evaluation
- Proposal Sketches, Narratives, etc.

Day #5

PRESENTATION PHASE

- Salesmanship, Overcoming Resistance to Change
- Oral Presentation
- Written Proposal
- Sample Projects

PROJECT WORKSHOP - PRESENTATION PHASE

- Individual Counseling Sessions - Optional
- Complete Written Proposals
- Prepare Oral Presentations
- Instructor Review of Proposals
- Team Oral Presentations

Training Method

- Pre-assessment
- Live group instruction
- Use of real-world examples, case studies and exercises
- Interactive participation and discussion
- Power point presentation, LCD and flip chart
- Group activities and tests
- Each participant receives a binder containing a copy of the presentation
- slides and handouts
- Post-assessment

Program Support

This program is supported by interactive discussions, role-play, and case studies and highlight the techniques available to the participants.

Schedule

The course agenda will be as follows:

- Technical Session 08.30-10.00 am
- Coffee Break 10.00-10.15 am
- Technical Session 10.15-12.15 noon
- Coffee Break 12.15-12.45 pm
- Technical Session 12.45-02.30 pm
- Course Ends 02.30 pm

Course Fees*

- **8,500USD**
  **VAT is Excluded If Applicable*

مقدمة

الأسبوع الاول

مقدمة:

تكلفة المشروع هو أهم عامل في تقريرها بأن تصبح حقيقة واقعة. يتم التعامل مع التكاليف في بداية المشروع من خلال إعداد "تقدير تكلفة الميزانية " ودمج البيانات ذات الصلة بالتكلفة والمهارة الإبداعية من مقدر تكاليف محنك مع خبرة سابقة في مشروع مماثل. هذا هو الأهم، وكذلك الأكثر صعوبة، وهو إعداد تقدير تكاليف المشروع بدقة.

كأي مشروع يتطور من خلال عملية التصميم العادي، يتم إجراء تقييم إضافي من حيث التكلفة. وتتم هذه التقديرات على وجه الدقة، وتشمل الحالات الطارئة المناسبة للعناصر غير المعروفة. ليساعد في السيطرة على المشروع في وقت مبكر في عملية التصميم على البقاء ضمن حدود الميزانية.

كجزء من عملية التصميم ، يتم تحديد بدائل نظام البناء. وتقدير دورة حياة التكاليف وهو الأسلوب الذي يقارن بين كل من تكلفة البناء، وكذلك تكاليف التشغيل (الطاقة والمياه والصيانة والاستبدال ، والتوظيف) من هذه البدائل. استخدام الاقتصاد والهندسة، ويتم التعرف على دورة الحياة بأقل تكلفة لتضمينها في التصميم.

هذا البرنامج سوف يوفر أساسا لكثير من مجالات تقدير التكاليف التي قد يواجهها مهني التصميم والبناء. وسوف توفر أمثلة لتسهيل التوصل إلى ألفة مع أنواع مختلفة من التقديرات ومكوناتها. من خلال تطبيق البحث والدراسة والعملية، ويمكن توسيع المهارات بطريقة ملحوظه. وسيتم أيضا دراسه وسائل أخرى لمراقبة التكاليف، مثل الهندسة القيمية.

الاسبوع الثاني:

مقدمة:

إن زيادة الطلب على المشاريع الرأسمالية ووضع مزيد من الضغط على موارد التمويل المتاحة. في هذه الفترة من التقشف وخفض الميزانيات، لا بد من إيجاد سبل لبذل المزيد من الجهد مع أقل ميزانية تصرف. وقد أثبتت الهندسة القيمية (VE) ليكون أداة قيمة في البناء والتشغيل والصيانة لتحقيق الأهداف المطلوبة لخفض التكاليف، سواء في القطاع العام أو الخاص. استخدام تقنيات VE عادة تثمر نتائج في تحسينات أداء المنشأة ، حتى في أقل التكاليف.

تكنولوجيا الهندسة القيمية هي نظام مصمم على حل المشاكل لتحقيق المهام الأساسية للمنتجات والخدمات بأقل التكاليف دون التضحية بالجودة أو متطلبات التسليم. وهناك برنامج لإدارة القيمة تدير التكاليف ويدير التغيير من خلال الاستخدام المتعمد للتكنولوجيا.وهو برنامج ناجح يتطلب دعم الإدارة، والتخطيط السليم والتنظيم ، وفهم هذه التكنولوجيا.

أهداف البرنامج

في نهاية هذه الدورة المتدربين سوف يتمكن المتدربون من:

- تخفيف المخاطر عن طريق اختيار التصميم الأنسب لنوع المشروع
- أساليب اختيار أنسب أنظمة البناء
- الشروط - أمثلة من المصطلحات التجارية
- خفض التكلفة الإجمالية للمشروع دون أي تغيير في الوظائف
- تطوير وظائف أفضل بناء
- كيفية تحديد أسعار عادلة ومعقولة
- هيكلة تعديلات الأسعار الاقتصادية
- التخطيط واستراتيجيات التفاوض
- تقنيات إدارة الهندسة القيمية

<u>وسوف تستفيد المنظمة من قبل:</u>

- زيادة التركيز الاستراتيجي للمتورطين في الهندسة القيمية
- الإنتاجية العاليه للتصميم والموظفين
- خفض تكلفة العقود للمواد والخدمات
- أفضل النتائج في تقييم أساليب التصميم
- تحسين أداء البناء

<u>سوف يكسب الحضور من المشاركة في هذا البرنامج نتيجة ل:</u>

- زيادة المهارات في العمليات الهندسة القيمية
- شعور أكبر من الاحتراف في تقييم عملية التصميم
- معرفة الأسعار وأوقات التقييم
- زيادة القدرة على قيادة مفاوضات ناجحة مع الموردين والمقاولين
- زيادة الاعتراف من قبل المنظمة بتحسين الأداء

الحضور

ويوصى هذا البرنامج الدراسي من أجل أي شخص متورط في مرحلة تصميم المشاريع الإنشائية والصيانة والإصلاح:

- المهندسين المعماريين
- مهندسي التصميم الإنشائي
- مهندسي البناء
- المهندسين الميكانيكيين
- المهندسين الكهربائيين
- مهندسي التشغيل والعمليات
- مديري المشاريع والمهندسين والمخططين
- مديري تكنولوجيا المعلومات.