

# applied engineering economics using excel

## Book Concept: Applied Engineering Economics Using Excel

Title: Applied Engineering Economics Using Excel: Mastering Financial Decisions in Engineering Projects

Captivating Storyline/Structure:

The book will not be a dry, theoretical textbook. Instead, it will adopt a case-study driven approach. Each chapter will focus on a real-world engineering project (ranging from small-scale improvements to large-scale infrastructure projects). The narrative will follow the project's evolution, highlighting the economic decisions faced at each stage. Readers will learn how to use Excel to model, analyze, and optimize these decisions. Each case study will build upon the previous one, introducing increasingly complex concepts and Excel techniques. The book will progress from simple calculations like present worth and future worth to more sophisticated analyses, such as risk assessment and sensitivity analysis. It will also include a dedicated section on creating professional-looking reports and presentations using Excel.

Ebook Description:

Stop letting financial complexities derail your engineering projects! Are you struggling to justify your project proposals? Do you feel overwhelmed by the sheer number of financial calculations required? Are you wasting valuable time on manual calculations instead of focusing on innovation?

This comprehensive guide, "Applied Engineering Economics Using Excel," empowers you to master the financial aspects of any engineering project with ease and confidence. We'll show you how to leverage the power of Excel to perform intricate calculations and make informed, data-driven decisions.

Book Title: Applied Engineering Economics Using Excel: Mastering Financial Decisions in Engineering Projects

Author: [Your Name/Pen Name]

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Introduction: What is Engineering Economics? Why Excel? Setting the Stage for Success.

Chapter 1: Fundamentals of Engineering Economics: Time Value of Money, Interest Rates, Cash Flow Diagrams.

Chapter 2: Evaluating Single Alternatives: Present Worth, Future Worth, Annual Worth, Rate of Return.

Chapter 3: Comparing Multiple Alternatives: Benefit-Cost Ratio, Incremental Analysis, Payback Period.

Chapter 4: Dealing with Uncertainty and Risk: Sensitivity Analysis, Monte Carlo Simulation, Decision

Trees.

Chapter 5: Advanced Topics in Engineering Economics: Depreciation, Taxes, Inflation, Capital Budgeting.

Chapter 6: Creating Professional Reports and Presentations with Excel: Data Visualization, Charts, Formatting.

Chapter 7: Case Studies: Real-World Applications of Engineering Economic Analysis: (Multiple diverse examples from various engineering disciplines)

Conclusion: Putting it all together – developing a robust economic decision-making framework.

## **Article: Applied Engineering Economics Using Excel**

### **Introduction: What is Engineering Economics? Why Excel? Setting the Stage for Success.**

Engineering economics is the application of economic principles to evaluate engineering projects and design alternatives. It helps engineers make informed decisions by considering both technical and financial factors. While traditional methods involved tedious manual calculations, Microsoft Excel provides a powerful and efficient platform for performing complex economic analyses. This introduction will establish the foundation for using Excel in engineering economic analysis, emphasizing its efficiency and capabilities compared to manual calculation methods. We will explore the core concepts and the reasons why mastering this combination is crucial for a successful engineering career.

Keywords: Engineering Economics, Excel, Financial Analysis, Project Evaluation, Decision Making

### **Chapter 1: Fundamentals of Engineering Economics: Time Value of Money, Interest Rates, Cash Flow Diagrams**

Understanding the time value of money (TVM) is fundamental to engineering economics. Money available today is worth more than the same amount in the future due to its potential earning capacity. Interest rates represent the cost of borrowing or the return on investment. Cash flow diagrams provide a visual representation of the inflows and outflows of money over time. This chapter will delve into the core concepts of TVM, different types of interest rates (simple, compound), and effective interest rates. We will demonstrate how to create and interpret cash flow diagrams using Excel, laying the foundation for more advanced analysis. Excel functions like PV (Present Value), FV (Future Value), RATE, and PMT (Payment) will be explained and implemented with practical examples.

Keywords: Time Value of Money, Interest Rates, Cash Flow Diagrams, Present Value, Future Value, Excel Functions, Financial Modeling

### **Chapter 2: Evaluating Single Alternatives: Present Worth, Future Worth, Annual Worth, Rate of Return**

When evaluating a single project or investment option, several methods are available to determine its economic viability. These include present worth (PW), future worth (FW), annual worth (AW), and

rate of return (ROR). This chapter focuses on calculating and interpreting these metrics using Excel. We'll explore the advantages and limitations of each method and when they are most appropriate to use. We will illustrate the calculations using various scenarios and discuss how Excel's built-in functions can simplify and automate the process. Understanding these metrics helps engineers assess the profitability and overall value of a given project.

Keywords: Present Worth Analysis, Future Worth Analysis, Annual Worth Analysis, Rate of Return, Single Project Evaluation, Excel Formulas

## **Chapter 3: Comparing Multiple Alternatives: Benefit-Cost Ratio, Incremental Analysis, Payback Period**

When several alternative projects are available, engineers must compare them to determine which offers the best value. Techniques such as the benefit-cost ratio (BCR), incremental analysis, and the payback period are used to make informed decisions. This chapter demonstrates how to apply these methods using Excel, comparing various alternatives side by side. The focus is on efficient comparative analysis using Excel's tools, allowing engineers to efficiently identify the superior investment based on a range of economic factors. We will show how to create tables and charts to visually represent the comparison and aid decision-making.

Keywords: Multiple Alternatives, Benefit-Cost Ratio, Incremental Analysis, Payback Period, Comparative Analysis, Decision Making

## **Chapter 4: Dealing with Uncertainty and Risk: Sensitivity Analysis, Monte Carlo Simulation, Decision Trees**

Real-world engineering projects involve uncertainty and risk. This chapter covers techniques to analyze and manage these risks, including sensitivity analysis, Monte Carlo simulation, and decision trees. We'll show how to use Excel's data analysis tools to perform these analyses, illustrating their applications with practical examples. Sensitivity analysis helps identify the critical parameters that impact the outcome of a project, allowing for better planning and mitigation of potential risks. Monte Carlo simulation uses random sampling to account for uncertainties in inputs and provides a probability distribution of potential outcomes. Decision trees assist in modeling and evaluating complex decisions involving multiple stages and uncertain events.

Keywords: Risk Analysis, Sensitivity Analysis, Monte Carlo Simulation, Decision Trees, Uncertainty, Project Risk Management

## **Chapter 5: Advanced Topics in Engineering Economics: Depreciation, Taxes, Inflation, Capital Budgeting**

This chapter tackles more advanced topics in engineering economics, including the impact of depreciation, taxes, and inflation on project evaluations. We will also explore various capital budgeting techniques used in large-scale projects. Excel's capabilities are leveraged for efficient calculations involving these elements. We'll show how to incorporate these factors into economic analyses using appropriate Excel functions and techniques. This allows for a more comprehensive and realistic economic assessment.

Keywords: Depreciation, Taxes, Inflation, Capital Budgeting, Advanced Engineering Economics, Excel for Complex Calculations

## **Chapter 6: Creating Professional Reports and Presentations with Excel: Data Visualization, Charts, Formatting**

Effective communication of economic analyses is crucial. This chapter covers the creation of professional-looking reports and presentations using Excel. We'll demonstrate techniques for data visualization, chart creation, and effective formatting to present economic results clearly and persuasively. We'll highlight best practices for creating visually appealing and informative reports that effectively communicate technical and economic analyses to diverse stakeholders.

Keywords: Data Visualization, Charts, Report Writing, Presentation Skills, Excel Formatting, Professional Communication

## **Chapter 7: Case Studies: Real-World Applications of Engineering Economic Analysis**

This chapter features several real-world case studies illustrating the practical application of engineering economic analysis using Excel. Each case study will cover different engineering disciplines and project types, showcasing the versatility and applicability of the methods discussed throughout the book. By analyzing real-world examples, readers will strengthen their understanding of the concepts and develop their problem-solving skills.

Keywords: Case Studies, Real-World Applications, Engineering Economics Examples, Project Analysis, Practical Applications

## **Conclusion: Putting it all together - developing a robust economic decision-making framework.**

This concluding chapter synthesizes the knowledge gained throughout the book, emphasizing the development of a systematic approach to making informed economic decisions in engineering projects. It will reinforce the importance of combining technical expertise with sound economic judgment, and highlight the role of Excel as an indispensable tool for successful engineering projects.

Keywords: Summary, Conclusion, Economic Decision Making, Engineering Project Management, Best Practices

## **FAQs:**

1. What level of Excel proficiency is required? Basic Excel skills are sufficient; the book will guide you through all necessary functions.
2. What types of engineering projects are covered? The book covers a broad range, from small-

scale improvements to large infrastructure projects.

3. Are there practice problems and exercises? Yes, each chapter includes practice problems to reinforce learning.
4. What software is required? Microsoft Excel (any recent version).
5. Is this book suitable for students? Yes, it's perfect for undergraduate and graduate engineering students.
6. Is this book suitable for practicing engineers? Absolutely, it's designed to help practicing engineers improve their economic analysis skills.
7. Does the book cover risk analysis? Yes, it dedicates a chapter to risk assessment and mitigation techniques.
8. What makes this book different from others on the same topic? Its case study-driven approach and comprehensive use of Excel set it apart.
9. Will I receive updates for future Excel versions? We will provide online resources to address any compatibility issues.

## **Related Articles:**

1. Mastering Present Worth Analysis in Excel: A deep dive into present worth calculations and their applications.
2. Understanding Rate of Return: A Practical Guide: A comprehensive guide to calculating and interpreting rate of return.
3. Sensitivity Analysis for Engineering Projects: Focuses on using Excel to analyze project sensitivity to parameter changes.
4. Monte Carlo Simulation in Engineering Economics: A detailed explanation of Monte Carlo simulation using Excel.
5. Creating Effective Visualizations for Economic Reports: Tips and techniques for creating clear and compelling data visualizations in Excel.
6. Benefit-Cost Ratio Analysis: A Step-by-Step Guide: A thorough guide to performing benefit-cost ratio analysis with Excel.
7. Depreciation Methods and Their Impact on Engineering Projects: An in-depth look at various depreciation methods and their effect on project profitability.
8. Dealing with Inflation in Engineering Economic Analysis: Strategies for handling inflation in economic analyses using Excel.

9. Real-World Case Study: Evaluating a Solar Power Plant Investment: A detailed case study applying all concepts to a specific project.

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