



普通高等教育土建学科专业“十二五”规划教材

高等学校工程管理专业规划教材

Programmed Textbook of Construction Management  
Specialty for Colleges and Universities

# 工程管理专业英语

(第二版)

徐勇戈 编  
王守清 卢有杰 审

中国建筑工业出版社

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## 第二版前言

《工程管理专业英语(第一版)》自2006年7月出版面世以来,因其专业知识覆盖面广、系统性强和可读性好等特点,受到了读者一定程度上的认可和好评,本书的作者深感欣慰。随着国际上工程建设领域新知识、新方法和新技术的不断涌现,加之读者对于教材在强化其相关能力,特别是通过英语文献攫取前沿知识信息,专业英文文献翻译和专业英文科技写作等能力上要求的不断提高,本书的作者深感应该对第一版教材进行修订,以适应本学科领域知识的更新和读者的需求。幸运的是,中国建筑工业出版社给了作者通过对教材进行修订而更好地服务读者的机会。

第二版和第一版相比,除了在内容上继续秉承原有的特色之外,较为突出的更新和变化主要体现在以下几个方面:1. 删除了本学科领域一些较为陈旧的内容,增加了新的前沿领域的相关知识。最为显著的例子是,本版专辟章节介绍工程领域未来发展的主流技术——BIM(Building Information Modelling);2. 为了提高读者英文文献的翻译能力,本版专门安排了专业英语翻译的相关内容,使读者能够清楚专业英语的特点和翻译技巧。同时还介绍了英文科技论文写作的知识,旨在提高读者规范撰写英文科技论文的能力;3. 本版在每一单元的后面,安排了大量不同类别且灵活多样的练习,使得读者能够有机会通过课后训练而强化相关的能力。值得一提的是,鉴于英语口语的重要性,本版在每个单元的课后练习当中,还专门安排了与该单元专业知识背景相关的情景对话练习,目的在于为读者提供口语训练素材和适应日益频繁的工程管理国际交流的语言环境。除了上述特点之外,本版在内容和体裁编排上亦有一些变化。

本书的第二版共12章,其中第1、2章,第8、9、10、11、12章,以及书后的工程管理专业英语翻译和英文科技论文写作简介,由西安建筑科技大学的徐勇戈老师编写;第5、6、7章,由重庆大学的林熹老师编写;第3、4章,由同济大学的马继伟老师编写。全书由徐勇戈老师统稿。

在本书的修订过程中,作者竭尽全力,以期能够最大限度满足读者的要求。但由于能力所限,书中难免存在疏漏和不妥之处,恳请读者提出宝贵建议。



## 第一版前言

编写《工程管理专业英语》的目的在于为高等院校的工程管理专业及土木工程相关专业的本科生及研究生提供一本既能够使读者掌握工程管理专业英语术语,又能够培养和提高读者阅读与笔译专业英语文献的能力,并了解国外工程管理领域最新发展动态和前沿知识的融实用性和前瞻性于一体的教学用书。通过使用本教材不仅能够提高读者以英语为工具进行外文文献阅读和翻译能力,还能够开拓其专业事业,并为日后从事相关的工程管理工作和理论研究打下坚实的基础。

本书的特色主要在于从业主的视角出发,对工程项目的整个管理流程予以系统整合的介绍,所选取的素材以被北美国家奉为“工程项目管理圣经”的由翰觉克森博士所著的《建设项目管理》一书为主,该书具有极强的系统性和完整的体系,再版了16次,且不断对内容进行补充与更新,同时又从能够反映本学科领域的最新动态和前沿知识的文献及论文选取一部分内容作为补充。这样一来,不仅保证了作为教材所需的系统性与完整性,也保证了知识的新颖性,从而有利于学生积累知识并开拓了他们的视野。

本书涵盖了包括项目管理组织、投资项目的经济评价、建设工程项目融资、工程承包价格的确定与合同、高级进度计划技术、成本控制、质量控制以及工程项目信息的组织与应用等诸多内容在内的工程项目管理领域的理论体系和方法论的精粹,并附有几乎所有的工程管理专业术语和专有表达,是对学生有关专业课知识的最好补充。此外还能够使读者对于工程管理的理论体系有一个系统而全面的认识。

本书中每一章的第一篇通常都是读者熟悉的内容。对于英语水平较好的读者,可以泛读或跳过该节;而对于初学者,建议精读这一篇。教师可根据各章标题,在每一章中若干篇文章进行教学。作为练习,可选择若干章节让学生笔译,并进行课堂讨论。

鉴于英语口语越来越重要,专业英语课程应提供一种英语环境来提高学生的英语口语能力。我们建议在教学过程中,教师可对每一章选择几个题目,让学生事先准备好用自己的语言来表达相关内容,然后分组进行讨论,再选派代表在课堂上交流。

全书分为14章,第7、8、9、11、12、13章由西安建筑科技大学徐勇戈编写,第3、4、5、6章由同济大学马继伟编写,第1、2章由西安唯赢人才培训中心兼美国项目管理协会中国首席代表焦英博女士编写,第10、14章由同济大学贾广社编写,并由徐勇戈进行统稿。全书由清华大学王守清、卢有杰两位教授主审。

感谢翰觉克森博士允许我们使用其享誉工程管理界的著作《建设项目管理》中的部分内容作为本书的主要素材。在本书的编写过程中,焦英博女士的助手曾媛,西安建筑科技大学管理学院的硕士研究生韩雪、沈雅婷等为本书的编写给予了支持和帮助,在此我们一并表示感谢。

限于作者水平,书中难免存在不妥和错误之处,敬请读者批评指正。

# CONTENTS

第二版前言

第一版前言

<b>Unit 1 The Owner's Perspective</b>	1
Section 1 The Project Life Cycle	1
Section 2 Major Types of Construction	6
Section 3 Selection of Professional Services	11
Exercises	17
<b>Unit 2 Organizing for Project Management</b>	20
Section 1 What is Project Management?	20
Section 2 Professional Construction Management	23
Section 3 Leadership and Motivation for the Project Team	27
Exercises	29
<b>Unit 3 Labor, Material and Equipment Utilization</b>	31
Section 1 Factors Affecting Job-Site Productivity	31
Section 2 Material Procurement and Delivery	35
Section 3 Construction Equipment	39
Exercises	44
<b>Unit 4 Economic Evaluation of Facility Investments</b>	46
Section 1 Basic Concepts of Economic Evaluation	46
Section 2 Investment Profit Measures	49
Section 3 Methods of Economic Evaluation	53
Exercises	56
<b>Unit 5 Bidding and Tendering of Construction Projects</b>	59
Section 1 Bidding Procedure of Construction Projects	59
Section 2 How to Bid on Projects in Competitive Bidding	66
Exercises	70

<b>Unit 6 Contract Management of Construction Projects</b>	73
Section 1 Types of Agreements	73
Section 2 Changes in Contract	79
Section 3 Claims, Disputes, Arbitration and Mediation in Contract	83
Exercises	87
<b>Unit 7 Legal Basis of International Projects</b>	93
Section 1 Introduction of International Conditions of Contract	93
Section 2 Bonds and Insurance	103
Section 3 Construction Manager (CM) Contractors	109
Exercises	113
<b>Unit 8 Construction Planning</b>	117
Section 1 Basic Concepts in the Development of Construction Plans	117
Section 2 Defining Work Tasks	120
Section 3 Defining Precedence Relationships Among Activities	125
Exercises	128
<b>Unit 9 Time Control for Construction Projects</b>	130
Section 1 The Critical Path Method	130
Section 2 Activity Float and Schedules	133
Section 3 Presenting Project Schedules	136
Section 4 Scheduling with Uncertain Durations	141
Exercises	145
<b>Unit 10 Quality Control and Safety During Construction</b>	148
Section 1 Quality and Safety Concerns in Construction	148
Section 2 Total Quality Control	152
Section 3 Quality Control by Statistical Methods	156
Section 4 Safety	158
Exercises	164
<b>Unit 11 Organization and Use of Project Information</b>	167
Section 1 Computerized Organization and Use of Information	167
Section 2 Relational Model of Databases	171
Section 3 Information Transfer and Flow	178
Exercises	181

## **Unit 12 Model Interoperability in Building Information**

<b>Modeling (BIM)</b> .....	183
Section 1 Introduction about BIM .....	183
Section 2 Industry Foundation Classes (IFC) .....	187
Section 3 BIM Interoperability .....	191
Exercises .....	196
 工程管理专业英语翻译 .....	 200
英文科技论文写作方法简介 .....	222



# Unit 1 The Owner's Perspective

## Section 1 The Project Life Cycle

The acquisition of a constructed facility usually represents a major capital investment, whether its owner happens to be an individual, a private corporation or a public agency. Since the commitment of resources for such an investment is motivated by **market demands** or perceived needs, the **facility** is expected to satisfy certain objectives within the constraints specified by the owner and relevant regulations. With the exception of the speculative housing market, where the residential units may be sold as built by the real estate developer, most constructed facilities are custom made in consultation with the owners. A real estate developer may be regarded as the sponsor of building projects, as much as a **government agency** may be the sponsor of a **public project** and turns it over to another government unit upon its completion. From the viewpoint of **project management**, the terms “owner” and “sponsor” are synonymous because both have the ultimate authority to make all important decisions. Since an owner is essentially acquiring a facility on a promise in some form of agreement, it will be wise for any owner to have a clear understanding of the acquisition process in order to maintain firm control of the quality, timeliness and cost of the completed facility.

From the perspective of an owner, the project life cycle for a constructed facility may be illustrated schematically in Figure 1-1. Essentially, a project is conceived to meet market demands or needs in a timely fashion. Various possibilities may be considered in the conceptual planning stage, and the technological and economic feasibility of each alternative will be assessed and compared in order to select the best possible project. The financing schemes for the proposed alternatives must also be examined, and the project will be programmed with respect to the timing for its completion and for available cash flows. After the scope of the project is clearly defined, detailed engineering design will provide the blueprint for construction, and the definitive cost estimate will serve as the baseline for cost control. In the procurement and construction stage, the delivery of materials and the erection of the project on site must be carefully planned and controlled. After the construction is completed, there is usually a brief period of start-up or shake-down of the constructed facility when it is first occupied. Finally, the management of the facility is turned over to the owner for full occupancy

until the facility lives out its useful life and is designated for demolition or conversion.

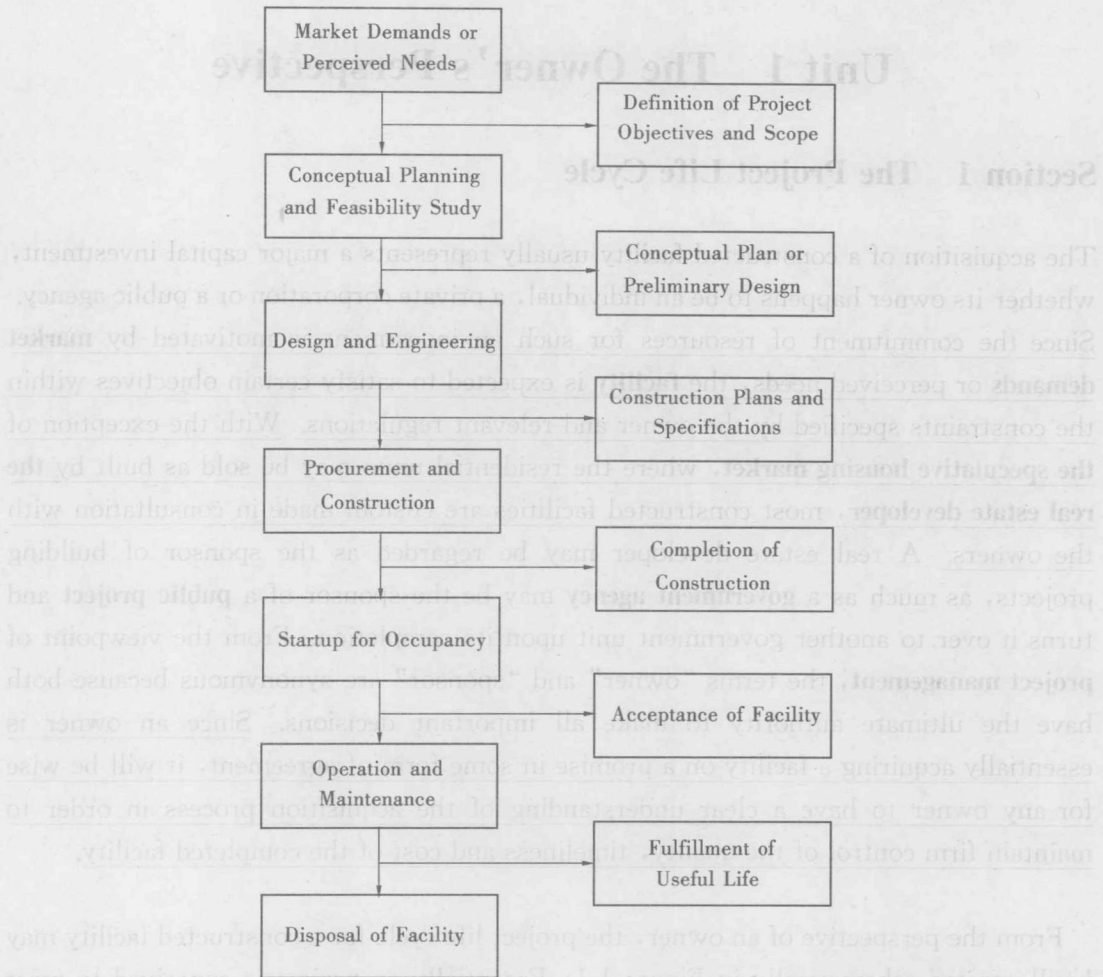


Figure 1-1 The Project Life Cycle of a Constructed Facility

Of course, the stages of development in Figure 1-1 may not be strictly sequential. Some of the stages require iteration, and others may be carried out in parallel or with overlapping time frames, depending on the nature, size and urgency of the project. Furthermore, an owner may have **in-house** capacities to handle the work in every stage of the entire process, or it may seek professional advice and services for the work in all stages. Understandably, most owners choose to handle some of the work in-house and to contract outside professional services for other components of the work as needed. By examining the project life cycle from an owner's perspective we can focus on the proper roles of various activities and participants in all stages regardless of the contractual

arrangements for different types of work.

In the United States, for example, the U. S. Army Corps of Engineers has in-house capabilities to deal with planning, budgeting, design, construction and operation of waterway and flood control structures. Other public agencies, such as state transportation departments, are also deeply involved in all phases of a construction project. In the private sector, many large firms such as DuPont, Exxon, and IBM are adequately staffed to carry out most activities for plant expansion. All these owners, both public and private, use outside agents to a greater or lesser degree when it becomes more advantageous to do so.

The project life cycle may be viewed as a process through which a project is implemented **from cradle to grave**. This process is often very complex; however, it can be decomposed into several stages as indicated by the general outline in Figure 1-1. The solutions at various stages are then integrated to obtain the final outcome. Although each stage requires different expertise, it usually includes both technical and managerial activities in the **knowledge domain** of the specialist. The owner may choose to decompose the entire process into more or less stages based on the size and nature of the project, and thus obtain the most efficient result in implementation. Very often, the owner retains direct control of work in the planning and programming stages, but increasingly outside planners and financial experts are used as consultants because of the complexities of projects. Since operation and maintenance of a facility will go on long after the completion and acceptance of a project, it is usually treated as a separate problem except in the consideration of the life cycle cost of a facility. All stages from conceptual planning and feasibility studies to the acceptance of a facility for occupancy may be broadly lumped together and referred to as the Design/Construct process, while the procurement and construction alone are traditionally regarded as the province of the construction industry.

Owners must recognize that there is no single best approach in organizing project management throughout a project's life cycle. All organizational approaches have advantages and disadvantages, depending on the knowledge of the owner in construction management as well as the type, size and location of the project. It is important for the owner to be aware of the approach which is most appropriate and beneficial for a particular project. In making choices, owners should be concerned with the life cycle costs of constructed facilities rather than simply the initial construction costs. Saving small amounts of money during construction may not be worthwhile if the result is much larger operating costs or not meeting the functional requirements for the

new facility satisfactorily. Thus, owners must be very concerned with the quality of the finished product as well as the cost of construction itself. Since facility operation and maintenance is a part of the project life cycle, the owners' expectation to satisfy investment objectives during the project life cycle will require consideration of the cost of operation and maintenance. Therefore, the facility's operating management should also be considered as early as possible, just as the construction process should be kept in mind at the early stages of planning and programming.

### Words and Expressions

market demands	市场需求
facility	设施
the speculative housing market	投机性住宅市场
the real estate developer	房地产开发商
government agency	政府机构
public project	公共项目
project management	项目管理
the conceptual planning stage	概念规划阶段
feasibility	可行性
in-house	内部的, 内业的
the project life cycle	项目生命周期
from cradle to grave	从开始到结束
knowledge domain	知识领域

### Notations

Since the commitment of resources for such an investment is motivated by **market demands** or perceived needs, the **facility** is expected to satisfy certain objectives within the constraints specified by the owner and relevant regulations. With the exception of **the speculative housing market**, where the residential units may be sold as built by **the real estate developer**, most constructed facilities are custom made in consultation with the owners.

由于该投资的资源投入受市场需求的驱动, 所以建筑设施应在其业主和相关规范规定的约束条件内满足特定的目标。

With the exception of the speculative housing market, where the residential units may be sold as built by the real estate developer, most constructed facilities are custom made in consultation with the owners.

除了投机性住宅市场, 在那里住宅单元由负责建造的房地产开发商销售之外, 大多数的建筑设施都是在与业主协商一致的基础上定制的。

Since an owner is essentially acquiring a facility on a promise in some form of



agreement, it will be wise for any owner to have a clear understanding of the acquisition process in order to maintain firm control of the quality, timeliness and cost of the completed facility.

由于业主实质上是以某种形式的合约为保证来获得一项建筑产品的,那么为了保证对完工产品的质量、工期和成本的有效控制,对于任何业主来说,他们应当对项目的全过程有一个清晰和完整的理解。

Various possibilities may be considered in the conceptual planning stage, and the technological and economic feasibility of each alternative will be assessed and compared in order to select the best possible project.

在项目规划阶段,很多不同的可能方案都可能被考虑,同时每一个备选方案的技术和经济可行性都经过评估和比较,以选出最优方案。

The financing schemes for the proposed alternatives must also be examined, and the project will be programmed with respect to the timing for its completion and for available cash flows.

我们还需检验备选方案的财务计划,同时按照项目完工期限和现金流量来安排项目的进度计划。

Finally, the management of the facility is turned over to the owner for full occupancy until the facility lives out its useful life and is designated for demolition or conversion.

最后,设施的管理将移交给业主全权使用和管理,直至其使用期结束,或者拆除,或者转作他用。

Some of the stages require iteration, and others may be carried out in parallel or with overlapping time frames, depending on the nature, size and urgency of the project.

某些阶段可以重复,另一些阶段也可以和其他阶段平行或搭接进行,这一切取决于项目的特点、规模和紧迫性。

By examining the project life cycle from an owner's perspective we can focus on the proper roles of various activities and participants in all stages regardless of the contractual arrangements for different types of work.

从业主的角度审视项目的全寿命期,我们得以将注意力集中在所有阶段不同活动和参与方的适当角色上,而不用去考虑不同工作类型合约的安排。

Very often, the owner retains direct control of work in the planning and programming stages, but increasingly outside planners and financial experts are used as consultants because of the complexities of projects.

业主通常保留规划和设计阶段的直接控制工作,而随着项目复杂程度的不断增加,会将其他工作委托给外部的咨询单位。

All stages from conceptual planning and feasibility studies to the acceptance of a facility for occupancy may be broadly lumped together and referred to as the Design/Construct process, while the procurement and construction alone are traditionally regarded as the province of the construction industry.



尽管只有采购和施工阶段被认为是建筑业的传统领域，但是从项目概念规划和可行性研究直至设施的接受占用都被广义地认为属于设计和建造过程。

Saving small amounts of money during construction may not be worthwhile if the result is much larger operating costs or not meeting the functional requirements for the new facility satisfactorily.

如果建筑设施的运营成本很高或者不能满足设施在功能上的需求，在施工阶段省一点就显得不那么值得。

Since facility operation and maintenance is a part of the project life cycle, the owners' expectation to satisfy investment objectives during the project life cycle will require consideration of the cost of operation and maintenance.

由于设施的运营与维护是项目全寿命周期的一部分，业主为了满足其项目寿命期内投资目标的期望就需要考虑运营和维护成本。

## Section 2 Major Types of Construction

Since most owners are generally interested in acquiring only a specific type of constructed facility, they should be aware of the common industrial practices for the type of construction pertinent to them. Likewise, the **construction industry** is a conglomeration of quite diverse segments and products. Some owners may procure a constructed facility only once in a long while and tend to look for short term advantages. However, many owners require periodic acquisition of new facilities and/or rehabilitation of existing facilities. It is to their advantage to keep the construction industry healthy and productive. Collectively, the owners have more power to influence the construction industry than they realize because, by their individual actions, they can provide incentives or disincentives for innovation, efficiency and quality in construction. It is to the interest of all parties that the owners take an active interest in the construction and exercise beneficial influence on the performance of the industry.

In planning for various types of construction, the methods of procuring professional services, awarding construction contracts, and financing the constructed facility can be quite different. For the purpose of discussion, the broad **spectrum** of constructed facilities may be classified into four major categories, each with its own characteristics.

### Residential Housing Construction

**Residential housing construction** includes single-family houses, multi-family dwellings, and high-rise apartments. During the development and construction of such projects, the developers or sponsors who are familiar with the construction industry usually serve as surrogate owners and take charge, making necessary contractual agreements for

design and construction, and arranging the financing and sale of the completed structures. Residential housing designs are usually performed by architects and engineers, and the construction is executed by builders who hire **subcontractors** for the structural, mechanical, electrical and other specialty work. An exception to this pattern is for single-family houses as is shown in Figure 1-2, which may be designed by the builders as well.



Figure 1-2 Residential Housing Construction  
(courtesy of Caterpillar, Inc.)

The residential housing market is heavily affected by general economic conditions, tax laws, and the monetary and fiscal policies of the government. Often, a slight increase in total demand will cause a substantial investment in construction, since many housing projects can be started at different locations by different individuals and developers at the same time. Because of the relative ease of entry, at least at the lower end of the market, many new builders are attracted to the residential housing construction. Hence, this market is highly competitive, with potentially high risks as well as high rewards.

### **Institutional and Commercial Building Construction**

**Institutional and commercial building construction** encompasses a great variety of project types and sizes, such as schools and universities, medical clinics and hospitals, recreational facilities and sports stadiums, retail chain stores and large shopping centers, warehouses and light manufacturing plants, and skyscrapers for offices and hotels, as is shown in Figure 1-3. The owners of such buildings may or may not be familiar with construction industry practices, but they are usually able to select competent professional consultants and arrange the financing of the constructed facilities themselves. Specialty architects and engineers are often engaged for designing a specific type of building, while the builders or general contractors undertaking such projects may be also specialized in only that type of building.



Figure 1-3 Construction of the PPG Building in Pittsburgh, Pennsylvania (courtesy of PPG Industries, Inc.)

Because of the higher costs and greater sophistication of institutional and commercial buildings in comparison with residential housing, this market segment is shared by fewer competitors. Since the construction of some of these buildings is a long process which once started will take some time to proceed until completion, the demand is less sensitive to general economic conditions than that for speculative housing. Consequently, the owners may confront an oligopoly of general contractors who compete in the same market. In an oligopoly situation, only a limited number of competitors exist, and a firm's price for services may be based in part on its competitive strategies in the local market.

### **Specialized Industrial Construction**

**Specialized industrial construction** usually involves very large scale projects with a high degree of technological complexity, such as oil refineries, steel mills, chemical processing plants and coal-fired or nuclear power plants, as is shown in Figure 1-4. The owners are usually deeply involved in the development of a project, and prefer to work with designers-builders such that the total time for the completion of the project can be shortened. They also want to pick a team of designers and builders with whom the owner has developed good working relations over the years.



Figure 1-4 Construction of a Benzene Plant in Lima, Ohio  
(courtesy of Manitowoc Company, Inc.)

Although the initiation of such projects is also affected by the state of the economy, long range demand forecasting is the most important factor since such projects are capital intensive and require considerable amount of planning and construction time. Governmental regulation such as the rulings of the Environmental Protection Agency and the Nuclear Regulatory Commission in the United States can also profoundly influence decisions on these projects.

### Infrastructure and Heavy Construction

**Infrastructure and heavy construction** includes projects such as highways, mass transit systems, tunnels, bridges, pipelines, drainage systems and sewage treatment plants, as is shown in Figure 1-5. Most of these projects are publicly owned and therefore financed through either bonds or taxes. This category of construction is characterized by a high degree of mechanization, which has gradually replaced some labor intensive operations.

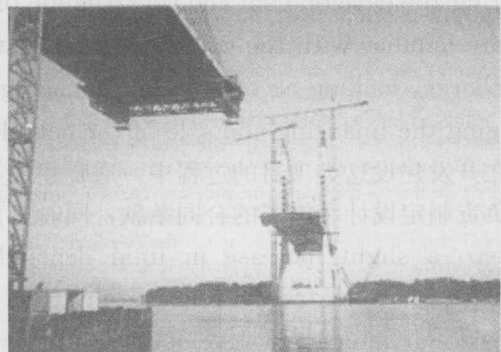


Figure 1-5 Construction of the Dame Point Bridge in Jacksonville, Florida (courtesy of Mary Lou Maher)