



工业工程专业英语

主编 于云玲 闫纪红

English in Industrial Engineering

哈尔滨工业大学出版社

21 世纪专业英语系列丛书

工业工程专业英语

English in Industrial Engineering

主 编 于云玲 闫纪红
副主编 刘 玲 纪卫卫 邢 蕾

ISBN 978-7-228-2589-9
 定价：28.00元
 哈尔滨工业大学出版社
 地址：哈尔滨市南岗区复华四道街10号 邮编：150006
 电话：0451-86414349
 网址：http://jwc.com.cn
 黑龙江省地图测绘院印刷厂
 880mm x 1230mm 1/32 印张 11.52 字数 305千字
 2007年11月第1版 2007年11月第1次印刷
 1-3000册
 2007年11月第1版 2007年11月第1次印刷

哈尔滨工业大学出版社

内 容 提 要

本书结合工业工程专业知识体系,精选其核心内容,题材广泛,涉及工业工程专业各领域知识,内容包括专业阅读、专业学术信息、专业词汇三部分。本书主干即第一部分内容均在英文原版教材、经典著作及近期国际会议上所发文章基础上进行改编或改写,共8章,涵盖几乎所有工业工程专业基础和主干课程,包括运筹学、生产计划与控制、制造系统建模与仿真、企业资源规划、工效学、库存控制、质量控制、可靠性与智能维护;设有每章导读并对其中一些单词、词组及难句、句式做了注释并给出了参考译文。第二部分附有大量工业工程专业学术期刊以及国内外著名工业工程学习、学术及研究机构网站等信息。第三部分收录英文专业词汇和词组三千余条。

本书可作为工业工程、管理科学与工程、机械工程等专业的本科生、研究生专业英语教材,也可以供从事工业工程各专业工作的工程技术人员参考。

图书在版编目(CIP)数据

工业工程专业英语/于云玲,闫纪红主编. —哈尔滨:
哈尔滨工业大学出版社,2007.11

(21世纪专业英语系列丛书)

ISBN 978-7-5603-2586-6

I.工… II.①于…②闫 III.工业工程-英语-高等
学校-教材 IV.H31

中国版本图书馆 CIP 数据核字(2007)第 155046 号

责任编辑 田新华 李广鑫
封面设计 卞秉利
出版发行 哈尔滨工业大学出版社
社 址 哈尔滨市南岗区复华四道街 10 号 邮编 150006
传 真 0451-86414749
网 址 <http://hitpress.hit.edu.cn>
印 刷 黑龙江省地质测绘印制中心印刷厂
开 本 880mm×1230mm 1/32 印张 11.25 字数 302 千字
版 次 2007 年 11 月第 1 版 2007 年 11 月第 1 次印刷
书 号 ISBN 978-7-5603-2586-6
印 数 1~3 000 册
定 价 26.00 元

(如因印装质量问题影响阅读,我社负责调换)

21 世纪专业英语系列丛书

编委会

主 任 王桂芝

副主任 赵毓琴 闫纪红

编 委 (按姓氏笔画排序)

于云玲 马玉红 王 洋 王 旻

王倩玉 王艳薇 任 丽 任 莉

任铭静 刘秀杰 李 莉 李慧杰

陈 楠 杨 皓 张凌岩 栾 岩

盖晓兰 葛乃晟

总策划 田新华

总主编 赵毓琴 李慧杰

专业英语是大学英语教学的一个重要组成部分,是促进学生完成从英语学习过渡到实际应用的有效途径。工业工程专业作为工程科学与管理科学的复合型专业,是一门综合应用自然科学和社会科学的理论和知识以提高各种组织的运作效率、有效地应用各种资源、能源,以便取得最大效益的学科。该学科在发达国家已得到广泛应用,特别在制造业的应用尤其显著。我国是全球制造业的中心之一,但在相同产值的情况下,我们的资源、能源消耗比发达国家高许多,其效率又远比发达国家低,在工业工程人才培养方面却也滞后于发达国家,工业工程人才十分短缺。

本教材是为了满足工业工程及相关专业的专业英语教学需求而编写的,其目的是不仅使学生们熟悉和掌握本专业常用的以及与本专业有关的英语词汇、词组、常用句式,而且可以深化本专业的知识,从而为今后的学习和工作打下良好的基础;同时,帮助提高专业人员与国外同行的学术交流能力和交往水平。

本教材分为三个部分:第一部分专业阅读即主体部分,涵盖几乎所有工业工程专业基础和专业主干课程。其内容包括:运筹学、生产计划与控制、制造系统建模与仿真、企业资源规划、工效学、库存控制、质量控制、可靠性与智能维护。第二部分即学术信息部分,精心挑选了工业工程领域学习网站、国内外著名工业工程学术及研究机构网站及学术期刊资料。第三部分收录了工业工程专业常见词汇,短语三千余条,书后附相关参考文献。

本教材内容丰富,在教学安排上各高校及各任课教师可根据学生的英语水平和学校对该课程的课时要求灵活安排,每章的第三篇文章可作为学生课外阅读材料。

本教材的特色是:

第一,针对性强。本教材主要是向工业工程及相关专业学生介绍与其专业课程有关的英语基础知识和专业知识。

第二,方便学生阅读。本教材设有中文每章导读,附有大量的注释和词汇表以帮助学生阅读,便于自学。

第三,每章后包含多种形式的思考题,以方便学生练习和复习,考查其领会本教材基本理论和方法的程度。

本书在编写过程中,参考了许多国外经典著作、学术期刊等作者的成果,在此一并致以谢意。

由于编者水平有限,书中难免有不足和欠妥之处,恳请广大读者批评指正。

编者

2007年10月

CONTENTS

PART ONE ACADEMIC READING

第一部分 专业阅读

1 Operations Research

运筹学	3
◇ 本章导读	3
1.1 The Origins of Operations Research	3
运筹学的起源	3
1.2 The Nature Of Operations Research	8
运筹学的本质	8
1.3 A Simulation Model For Evaluating Personnel Schedules In A Hospital Emergency Department	13
医院急诊部门人员调度评价仿真模型	13

2 Production Planning and Control

生产计划和控制	22
◇ 本章导读	22
2.1 Production Planning and Control—What It Is and What It Does 生产计划和控制——基本概念及其作用	22
2.2 Production Control	35
生产控制	35
2.3 Intelligent & Integrated Production Control System for Manufacturing Enterprise	46
制造企业的智能与集成生产控制系统	46

3 Manufacturing System Modeling and Simulation

制造系统建模与仿真	60
◆ 本章导读	60
3.1 Introduction to Modeling and Simulation	
建模与仿真导论	60
3.2 Model-based Research in Operations Research	
运筹学中基于模型的研究	75
3.3 Introduction to Manufacturing Applications	
制造领域的应用简介	87

4 Enterprise Resource Planning

企业资源规划	110
◆ 本章导读	110
4.1 Introduction to Enterprise Resource Planning	
企业资源规划导论	110
4.2 The Evolution of ERP Systems	
ERP 系统的发展过程	122
4.3 Global Enterprise Resource Planning Implementation	
全球企业资源规划实施	136

5 Ergonomics

工效学	158
◆ 本章导读	158
5.1 Introduction to Ergonomic	
工效学导论	158
5.2 Human Error	
人员导致的失误	170
5.3 Learning Ergonomics by Doing Job Analysis	
通过作业分析学习工效学	181

6 Inventory Control	
库存控制	196
◇ 本章导读	196
6.1 Inventory Theory	
库存理论	196
6.2 Planning Inventory	
库存规划	204
6.3 An Application of the EOQ Model with Nonlinear Holding Cost to Inventory Management of Perishables 具有非线性持有成本的 EOQ 模型在易腐货物 库存管理中的应用	217
7 Quality Control	
质量控制	234
◇ 本章导读	234
7.1 Introduction and Overview	
概论	234
7.2 Statistical Process Control Approaches: Basic Theory and Use of Control Charts 统计过程控制方法:基本理论与控制图的应用	243
7.3 Instrumentation Technologies for Improving Manufacturing Quality 仪表技术对于提高制造质量的作用	256
8 Reliability and Predictive Maintenance	
可靠性与预测维护	271
◇ 本章导读	271
8.1 Fundamental of Maintenance	
维护的基本概念	271
8.2 Reliability-Centered Maintenance	

以可靠性为中心的维护	284
8.3 A Prognostic Algorithm for Machine Performance Assessment and Its Application	
机器性能评价的预诊算法及其应用	296

PART TWO ACADEMIC INFORMATION

第二部分 专业学术信息

1 Academic Journals	
专业学术期刊	311
2 Academic Webstes	
专业学术网站	315

PART THREE GLOSSARY

第三部分 专业词汇

REFERENCES	349
------------------	-----



PART ONE
ACADEMIC READING

第一部分 专业阅读

1

Operations Research

运筹学

【本章导读】 运筹学是工业工程专业最重要的专业基础课之一,主要介绍优化分析方法和实用运筹学模型,并为其他相关领域提供数量分析的基础理论方法。第一节介绍运筹学的起源和主要发展动力与历程。第二节介绍运筹学的本质与内涵,指出运筹学试图以最利于组织的整体利益为目标来解决组织中各组成部分利益的冲突,达到最优决策。第三节以运筹学方法在医院急诊部门应用为例,阐述运筹学方法在实际的病例类型、病症程度分析,以及患者所需经何种医疗路线等方面的决策作用。

1.1 The Origins of Operations Research

运筹学的起源

Since the advent of the industrial revolution, the world has seen a remarkable growth in the size and complexity of organizations. The artisans' small shops of an earlier era have evolved into the billion-dollar corporations of today. An integral part of this revolutionary change has been a tremendous increase in the division of labor and segmentation of management responsibilities in these organizations. The results have been spectacular. However, along with its blessings, this increasing specialization has created new problems, problems that are still occurring

in many organizations. One problem is a tendency for the many components of an organization to grow into relatively autonomous empires with their own goals and value systems, thereby losing sight of how their activities and objectives mesh with those of the overall organization^①. What is best for one component frequently is detrimental to another, so the components may end up working at cross purposes. A related problem is that as the complexity and specialization in an organization increase, it becomes more and more difficult to allocate the available resources to the various activities in a way that is most effective for the organization as a whole^②. These kinds of problems and the need to find a better way to solve them provided the environment for the emergence of operations research (commonly referred to as OR).

The roots of OR can be traced back many decades, when early attempts were made to use a scientific approach in the management of organizations. However, the beginning of the activity called operations research has generally been attributed to the military services early in World War II. Because of the war effort, there was an urgent need to allocate scarce resources to the various military operations and to the activities within each operation in an effective manner. Therefore, the British and then the U. S. military management called upon a large number of scientists to apply a scientific approach to dealing with this and other strategic and tactical problems. In effect, they were asked to do research on (military) operations. These teams of scientists were the first OR teams. By developing effective methods of using the new tool of radar, these teams were instrumental in winning the Air Battle of Britain. Through their research on how to better manage convoy and antisubmarine operations, they also played a major role in winning the Battle of the North Atlantic. Similar efforts assisted the Island Campaign in the Pacific.

When the war ended, the success of OR in the war effort spurred

interest in applying OR outside the military as well. As the industrial boom following the war was running its course, the problems caused by the increasing complexity and specialization in organizations were again coming to the forefront^③. It was becoming apparent to a growing number of people, including business consultants who had served on or with the OR teams during the war, that these were basically the same problems that had been faced by the military but in a different context. By the early 1950s, these individuals had introduced the use of OR to a variety of organizations in business, industry, and government. The rapid spread of OR soon followed.

At least two other factors that played a key role in the rapid growth of OR during this period can be identified. One was the substantial progress that was made early in improving the techniques of OR. After the war, many of the scientists who had participated on OR teams or who had heard about this work were motivated to pursue research relevant to the field; important advancements in the state of the art resulted. A prime example is the simplex method for solving linear programming problems, developed by George Dantzig in 1947. Many of the standard tools of OR, such as linear programming, dynamic programming, queuing theory, and inventory theory, were relatively well developed before the end of the 1950s.

A second factor that gave great impetus to the growth of the field was the onslaught of the computer revolution. A large amount of computation is usually required to deal most effectively with the complex problems typically considered by OR. Doing this by hand would often be out of the question. Therefore, the development of electronic digital computers, with their ability to perform arithmetic calculations thousands or even millions of times faster than a human being can, was a tremendous boon to OR. A further boost came in the 1980s with the development of increasingly powerful personal computers accompanied by good software

packages for doing OR^④. This brought the use of OR within the easy reach of much larger numbers of people. Today, literally millions of individuals have ready access to OR software. Consequently, a whole range of computers from mainframes to laptops now are being routinely used to solve OR problems.

from: F. S. Hillier, G. J. Lieberman, *Introduction to Operations Research (7th Ed.)*, McGraw - Hill, 2001

Words and Expressions

- advent ['ædvənt] *n.* 出现;到来
- segmentation [,segmənt'teɪʃən] *n.* 分割;分类;切分
- specialization [,speʃəlaɪ'zeɪʃən] *n.* 专门化;专业化
- convoy ['kɒnvoɪ] *v.* 护航;护送;护卫
- onslaught ['ɒnslɔ:t] *n.* 冲击
- computation [,kɒmpju(:)'teɪʃ(ə)n] *n.* 计算;运算
- operations research 作业研究;运筹学
- division of labor 劳动分工
- management responsibilities 管理责任
- value system 价值体系
- available resources 可用资源
- military operations 军事运作;军事运筹
- antisubmarine operation 反潜行动,反潜举措
- business consultant 商业顾问
- linear programming 线性规划
- dynamic programming 动态规划
- queuing theory 排队论
- inventory theory 库存论
- computer revolution 计算机革命
- mainframe 大型主机

Difficult Sentences

- ① One problem is a tendency for the many components of an organization to grow into relatively autonomous empires with their own goals and value systems, thereby losing sight of how their activities and objectives mesh with those of the overall organization.
问题之一是,商业组织中的很多组成部分有了其目标与价值体系,变得相对独立了,从而忘记其行为与目标与整个团体行为与目标的协调。
- ② A related problem is that as the complexity and specialization in an organization increase, it becomes more and more difficult to allocate the available resources to the various activities in a way that is most effective for the organization as a whole.
一个相关问题是,随着商业组织复杂性与专业化的增强,在整个组织内把可用资源最有效地分配给各种组织活动,越来越难。
- ③ As the industrial boom following the war was running its course, the problems caused by the increasing complexity and specialization in organizations were again coming to the forefront.
随着战后的工业繁荣步入正轨,由商业组织渐增的复杂化与专业化引起的问题又重新成为人们关注的中心。
- ④ A further boost came in the 1980s with the development of increasingly powerful personal computers accompanied by good software packages for doing OR.
20世纪80年代,个人电脑以及大型软件包的发展,进一步促进了运筹学的发展。

Phrases and Patterns

1. as a whole 总体上;作为整体;普遍来说;一般来说
it becomes more and more difficult to allocate the available resources