普通高等教育“十二五”规划教材

高等院校安全工程专业教材

安全工程专业英语

主编　贾进章

煤炭工业出版社

普通高等教育“十二五”规划教材

安全工程专业英语

主　　编　贾进章
副主编　张景钢
参编人员　周　迪

煤炭工业出版社
·北　京·

图书在版编目（CIP）数据

安全工程专业英语/贾进章主编．--北京：煤炭工业出版社，2014

普通高等教育“十二五”规划教材

ISBN 978-7-5020-4615-6

Ⅰ．①安…　Ⅱ．①贾…　Ⅲ．①安全工程—英语—高等学校—教材　Ⅳ．①H31

中国版本图书馆CIP数据核字(2014)第213999号

煤炭工业出版社　出版

（北京市朝阳区芍药居35号　100029）

网址：www. cciph. com. cn

煤炭工业出版社印刷厂　印刷

新华书店北京发行所　发行

*

开本 787mm×1092mm $^{1}/_{16}$　印张 $9^{1}/_{4}$

字数213千字

2014年11月第1版　2014年11月第1次印刷

社内编号7470　定价18.00元

前　　言

在当今信息时代，国际范围的信息交流和学术交往日益频繁，科技活动中的专业英语显得尤为重要。安全工程专业涉及化工、石油、矿业、土木、交通、能源、环境、经济等多个行业领域。为了培养安全工程专业学生专业英语方面的阅读和写作能力，在考虑本专业本科课程设置的基础上，突出矿业特色，撰写本书。

本书较为系统地论述了专业英语的特点及学习方法、工业安全、矿山安全专业文献和词汇。绪论、工业安全部分的第9—14章和矿山安全部分的第2章、第4—7章由辽宁工程技术大学安全科学与工程学院贾进章编写；工业安全部分的第1—8章、第15章和矿山安全部分的第1章、第3章由华北科技学院安全工程学院张景钢编写；北京工业职业技术学院周迪审读了全书的词汇及语法；由贾进章负责统稿。

本书所选安全工程专业英文文章篇幅适中，每篇文章后列出了生词和注释，通俗易懂，有助于读者快速学习和掌握安全工程专业知识的英文表达方式，扩大专业英语词汇量，提高专业英语的阅读和应用技能。

由于水平有限，时间仓促，错误和不当之处在所难免，恳请读者批评指正。

编　者

2014年8月

Contents

Introduction

一、英语—科技英语—专业英语

目前，英语已成为一门世界性语言，在对外交流中起着举足轻重的作用。当今信息时代，国际范围的信息交流和学术交往日益频繁，已经突破了国家和地域的界限，新的学科不断涌现，专业分工日益细化，使英语学习也面临着许多新的问题。为了适应科技的发展，科技英语已经从普通英语中分离出来，但过于一般化的科技英语从原则上讲与普通英语并无太大的差别。因此，科技英语还需进一步细化，形成自己独立的专业，即专业英语。专业英语隶属于科技英语。

二、安全工程专业英语

1. 专业英语特点

（1）多用被动语态。

（2）专业词汇有其固有特点，大多数为派生词和复合词，希腊词根词汇多为科技词汇。

2. 安全工程专业英语特点

安全工程涉及面广，包括现代安全管理、工业安全法律法规、安全经济与风险分析、事故分析与预测、安全检查与评价以及劳动保护、环境保护和灾害防御等多方面内容，涉及矿业、建筑、石油、化工、电力、城建、民航、交通、保险、商贸等多个行业。因此在专业英语学习过程中，要充分考虑这一特点，一方面要强调专业性，另一方面要适当向科技英语靠拢。

3. 学习专业英语的目的

（1）翻译摘要，撰写学术论文需翻译摘要。

（2）撰写英文论文，国际会议论文和学报英文版都需要英文论文。

（3）阅读、使用专业文献，在科研、工作中使用外语专业文献能达到事半功倍的效果。

三、专业英语学习方法

1. 注重专业词汇构词特点

学习专业英语过程中，词汇是阅读、翻译和写作的基础。根据《大学英语课程教学要求》，大学阶段的英语教学要求分为一般要求、较高要求和更高要求。一般要求，掌握的词汇量应达到约 4795 个单词和 700 个词组（含中学应掌握的词汇）；较高要求，掌握的词汇量应达到约 6395 个单词和 1200 个词组（包括中学和一般要求应该掌握的词汇）；更高要求，掌握的词汇量应达到约 7675 个单词和 1870 个词组（包括中学、一般要求和较高要求应该掌握的词汇，但不包括专业词汇）。

美国《如何扩大你的词汇能力》（How to Increase Your Word Power）一书将词根、前

缀和后缀看成扩大英语词汇的三把钥匙，并认为最快、最有效、最容易的扩大词汇的方法就是分析和了解单词是如何构成的。

（1）词根。词根是词的核心部分，是拥有主要词汇信息的语素。例如：

hydro 水	hydromechanics 流体力学
circ 圆、环	circuit 回路，电路
cycl 圆、环、轮	recycle（使）再循环
geo 地	geology 地质学

（2）前缀。采用前缀构成的单词在专业英语中占了很大的比例，这类词都是派生词。例如：

uni - 单一	unidirectional circuit 单向回路
non - 非、不、无	nonsteady 非稳定的
sub - 子、亚、次、下、副	subway 地铁
in - 入、否定	indoor 室内的

（3）后缀。"单词 + 后缀"形成的词一般是非常容易认识的。例如：

- ic 具有……性质的	periodic 周期的
- er ……人、……者、……物	teacher 教师
- ibility 可……性、易……性	sensibility 灵敏度、灵敏性
- atory 场所、地点	laboratory 实验室

2. 注重引入语义分析，习惯英文表达方式

按句子的语义结构，将句子划分为不同的义项，针对不同的义项提问，并由此画出句子的逻辑结构图，引导学生造句。用这种方法，一方面培养学生用英语表达语义的意识，另一方面在造句的过程中使学生适应英语的语法习惯。

四、专业英语句子结构特点

1. 多用陈述句

在科技英语文献中，在表述定义、定理和定律以及阐述现象、描述实验时，常用陈述句。

2. 大量使用被动结构

专业英语在句法上最突出的特点是被动语态数量多，可以占到全部谓语动词的三分之一到一半以上。

3. 广泛使用非谓语动词

专业英语中，动词的非谓语形式（分词、动名词、动词不定式及其复合结构）广泛使用，尤其是分词短语用作后置定语的现象更是层出不穷。

4. 短语动词多

专业英语文章中大量出现"动词 + 介词""动词 + 副词""动词 + 副词 + 介词""动词 + 名词""动词 + 名词 + 介词"型的短语动词（动词词组）。这类短语动词相当于一个词，语法上可不再细分。

5. 形容词短语作后置定语多

在科技英语文章中，形容词短语用作后置定语的现象虽不及分词短语后置定语多，但

也随处可见。形容词短语作后置定语可以看作是定语从句的省略形式，因此，其作用是对所修饰的词语加以严格的限定和准确的说明，同时又会使句子结构紧凑。

6. 句子长、结构复杂

长达数行、数十行，包含几十个乃至上百个单词的句子，在专业英语文章中屡见不鲜。这种长句往往包含若干个从句和非谓语动词短语，而这些从句和短语又往往互相制约、互相依附，从而形成从句中有短语、短语中带从句的复杂语言现象。

五、专业英语的翻译

学习安全工程专业英语，应侧重培养学生阅读和理解安全工程专业英语的能力，即重点是“英译汉”，而非“汉译英”；重点是书面英语，同时兼顾口头英语。

（一）翻译的标准

翻译有直译和意译之分。关于翻译的标准，历来有各种不同的说法。在众多的说法中，影响最大的莫过于清末著名翻译家严复倡导的“信、达、雅”三原则。所谓“信”，就是要忠实准确地传达原文的内容；所谓“达”，就是译文要通顺流畅；所谓“雅”，就是译文要有文采，要注意修辞，文字简明优雅。

后来钱钟书先生提出了翻译的“化境”之说，就是原文的思想、情感、风格、神韵都原原本本地化到了译文的境界里。

对于专业英语，具体的翻译标准就是要“忠实”“通顺”，即正确地理解和表达原文的思想，译文文字流畅地道。

（二）专业英语的翻译技巧

词语是翻译活动的基本单位，无论是语篇、段落还是句子，都是由词语构成，因此，要掌握英汉翻译的技巧，如词类转换、词语增减、词的释义和同义反译等。

（三）专业英语的翻译步骤

1. 理解

理解主要通过原文上下文来进行，包括：

（1）理解语言现象，必须上下有联系地理解原文的词汇含义、句法结构和惯用法等。

（2）理解逻辑关系，逻辑关系有时可以帮助我们理解按原文语法关系所不能理解的问题。

2. 表达

表达阶段就是译者把自己从原文理解的内容用汉语重新表达出来。表达的好坏取决于译者对原文理解的深度及译文语言的修养程度。

3. 校核

校核是为了保证译文完全符合原文所陈述的内容。在检查译文时，必须借助原文才能确认自己翻译的准确性。另外，校核也包括对文字的润色。在校核阶段，应注意以下几个问题：

（1）人名、地名、日期、方位和数字的翻译。

（2）译文的词与句有无遗漏。

（3）译文中句子修饰成分的位置。

（4）有无错别字。

（5）标点符号有无错误。

六、常见翻译词汇

1. 科技论文常见翻译词汇

摘要	abstract
关键词	key words
根据……	according to…
基于……	based on…
本文	in the paper（学术论文），in the thesis（学位论文）
……研究	study on
同时	at the same time
即	namely（i. e.）
……数学模型	mathematical model for…
……分析	analysis of…
……学报	journal of…
图 1	Figure 1（Fig. 1）
表 1	Table 1（Tab. 1）

2. 习惯用法

（1）学院。大学里的学院：college，如 College of Safety Science and Engineering，也有用 school 的，但 school 多指专科学校在技能或商业方面进行教育的机构。独立的学院：institute，如阜新矿业学院译为 Fuxin Mining Institute。

（2）系：department，如采矿工程系译为 Department of Mining Engineering。

3. 特殊译法

有些翻译由于历史原因，中英文并不对应，如辽宁工程技术大学译为 Liaoning Technical University；鞍山师范学院译为 Anshan Teachers' College。

七、注意事项

1. 冠词的使用

在标题（文章标题、图名、表名等）中冠词可以省略。

2. 长句化为短句

翻译长句难度大且易出错，可把长句化为短句处理。

3. 使用插入语

适当使用插入语，能够起到解释、说明、定义等作用。

八、可参考词典及文献

（1）《新世纪汉英科技大词典》（上下卷），由电子工业出版社出版。

（2）《新世纪汉英科技大词典》（精选本），由电子工业出版社出版。

（3）《新世纪汉英科技大词典》（光盘），含 60 余万词条。

（4）《英汉矿业词汇》（第 2 次增订本），由煤炭工业出版社出版。

（5）《汉英综合科学技术词汇》（第二版），由科学出版社出版。

（6）孙娴柔所著的《实用英语科技论文写作》，由清华大学出版社出版。

Part I Industrial Safety

Chapter 1 Safety Theory

Lesson 1 The history of system safety

Prior to the 1940s, safety consisted of basically trial – and – error. The term fly – fix – fly was associated with generally having an aircraft make a circuit and if it broke they would fix it and fly it again. This process was repeated until the final solution and correction was made. This method worked in the aviation world of low and slow aircraft. However it had little success in the fields of nuclear weapons and space travel. Here the consequences of having trial – and – error were much too costly. There needed to by a way to implement safety into the design and production. Thus, making a flight a success the very first time.

This is where system safety was born. As we had discussed, the first method was fly – fix – fly or trial – and – error which was not an adequate answer for aviation or space programs.

a. 1960s—MIL – STD – 882 (DOD, NASA).

b. 1970s—MORT (Department of Energy).

c. 1980s—other agencies.

The actual roots of system safety are not clearly defined. It is presumed that they started back in the 1940s era. However pinpointing the exact date is not possible. It is evident that once both aircraft and weapon systems became more technologically advanced and more money was put into them, their accidents became less acceptable.

As defined by MIL – STD – 882, system safety is the application of engineering and management principles, criteria, and techniques to achieve acceptable mishap risk, within the constraints of operation, effectiveness and suitability, time and cost, throughout all phases of the system life cycles. Today, system safety is pushing at the constrains of its MIL – STD definitions. To accurately define system safety, one must first determine the scope of the system in question. Is it composed of only one element (e. g. , hardware or software), or will the system include the human factor as it applies to the design, operation, handling or maintenance of the system or its parts? It may be simple device or it could be a complicated series of devices and/or systems all functioning together in a specific environment. Defining what comprises the system is an essential first step in determining its system safety.

THE 1960s —MIL - STD - 882, DOD, AND NASA

In the 1960s, system safety began to take on its own role. It became an issue that needed to be addressed.

a. USAF publishes "System Safety Engineering for the Development of Air Force Ballistic Missiles" (1962).

b. USAF publishes MIL - S - 38130, "General Requirements for Safety Engineering of Systems and Associated Subsystems and Equipment" (1963).

c. System Safety Society founded (1963).

d. DOD adopts MIL - S - 38130 as MIL - S - 381308A (1966).

e. MIL - S - 381308A revised and designated MIL - STD - 882B, "System Safety Program Requirements" (1969) (Stephenson, 2000, p. 4).

Most people would agree that one of the first major formal system safety efforts involved the Minuteman Intercontinental Ballistic Missile (ICBM) program. This series of pre - Minuteman design - related silo accidents, which probably provide at least part of the incentive (U. S. Air Force 1987).

The U. S. Air Force Ballistic System Divisions were the ones who generated the early system safety requirements. Early air force documents provided the basis for MIL - STD - 882 (July 1969), "System Safety Program for Systems and Associated Subsystems and Equipment: Requirements for." This particular document (and revisions MIL - STD - 882 and MIL - STD - 882B) became, and still remain, the bible for the Department of Defense (DOD) system safety effort (Moriarty and Roland 1983).

Other early system safety efforts were associated with the aerospace industry, including civil and military aviation and the space program. Here the weapon systems were also a part in this.

The National Aeronautical and Space Administration (NASA) developed its own system safety program requirements. The development of this program closely paralleled the MIL - STD - 882 approach given by the DOD. Reasons for these two agencies to use a similar process are because the two tend to share contractors, personnel, and missions.

In the early to mid - 1960s, Roger Lockwood in Los Angeles founded the System Safety Society. The society later became known as the Aerospace System Safety Society in California in 1964. The name was changed to System Safety Society in 1967 (Medford 1973). In 1973, the System Safety Society was incorporated as an international, non - profit, organization dedicated to the safety of systems, products, and services (System Safety Society 1989).

THE 1970s —THE MANAGEMENT OVERSIGHT AND RISK TREE

In the later part of 1960, the Atomic Energy Commission (AEC) made the decision to hire William G. Johnson, a retired manager of the National Safety Council, to develop a system safety program for the AEC. This decision was made due to the awareness of the system safety efforts in the DOD and NASA communities.

The AEC programs and AEC contractors had good (some better than others) safety programs in place, the programs and approaches varied widely.

This lack of standardization or commonality made effective evaluation, monitoring, and control of safety efforts throughout the organization difficult, if not impossible.

Here the goals became to improve the overall safety effort by:

a. Develop a new approach to system safety that incorporated the best features of existing system safety efforts.

b. Provide a common approach to system safety and safety management to be used throughout the AEC and by their contractors.

A risk tree (MORT) manual and revised management oversight was published by the AEC in 1973. William G. Johnson mired his MORT program heavily off of the existing DOD and NASA programs. However it bored little resemblance to the MIL – STD – 882.

In the 1970s Bill Johnson expanded and supplemented the System Safety Development Center. (SSDC) in Idaho Falls, Idaho. The MORT program provides the direction for this second major branch of the system safety effort.

Progress in the 1970s included:

a. NASA publishes NHB 1700. 1 (V3), "System Safety" (1970).

b. AEC publishes "MORT – The Management Oversight and Risk Tree" (1973).

c. System Safety Development Center founded (1974).

d. MORT training initiated for AEC, ERDA, and DOE (1975).

e. MIL – STD – 882A replaces MIL – STD – 882 (1977) (Stephenson, 2000, p. 6).

THE 1980'S —FACILITY SYSTEM SAFETY

Three factors throughout the 1980s have driven system safety tools and techniques in other than the traditional aerospace, weapons, and nuclear fields.

First, a more sophisticated upstream safety approach was the product of highly complex and costly non – flight, and non – nuclear projects.

Second, added incentives to produce safe products had introduced product liability litigation.

Third, the upstream safety efforts lead to better design because of system safety experiences that have demonstrated positive progress.

Significant programs initiated or developed in the 1980's include the facility system safety efforts of the Naval Facilities Command and the U. S. Army Corps of Engineers and initiatives in the petrochemical industry.

a. MIL – STD – 882B replaces MIL – STD 882A (1984).

b. NAVFAC sponsors system safety courses (1984).

c. AIChE publishes "Guidelines for Hazard Evaluations Procedures" (HazOps) (1985).

d. MIL – STD – 882B updated by Notice 1 (1987).

e. USACE – sponsored facility system safety workshops initiated (1988) (Stephenson, 2000, p. 6).

The constant need for a system safety effort for major military construction projects resulted in the development of draft guidelines and facility systems safety workshops for the military safety and engineering communities. By the end of the decade, facility system safety training programs for