

English for Safety Engineering

Second Edition

安全工程

第二版

专业英语

▲ 樊运晓 编著



化学工业出版社

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· 北京 ·

本书是2006年出版的《安全工程专业英语》的修订版本。全书共16个单元，每个单元分为精读和泛读两部分，精读部分主要是安全管理和安全技术基础知识，并对其中的专业词汇和难以理解的句子进行了标注。泛读部分目的在于扩大读者的专业背景和行业知识。

本书适合作为安全工程及相关专业学生的专业英语教材，也可作为安全工程管理和技术人员的专业英语读本。

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第二版前言

正如本书第一版前言所言，随着社会的进步与科技的发展，人类对安全的需求日益增加；安全科技人才在事故预防和控制中发挥着重要的作用，这使得越来越多的高校开设了安全工程专业。《安全工程专业英语》通过安全工程的基本理论和各行各业重大安全事故架起了安全工程与国际沟通的桥梁。本书自第一版出版以来，曾多次印刷，被50余所高校选作专业教材。

近几年，安全工程专业有了飞速发展，安全工程课程改革也有了重大进展。安全工程专业英语不仅应该成为一个工具，向广大学生和专业爱好者介绍安全工程专业的相关理论、技术；更应该作为一个窗口，为众多安全工程人员进一步提高专业知识和了解国际前沿进展提供平台。为了更好地发挥专业工具和窗口的作用，本书在第一版的基础上进行了修订。

再版教材首先在内容上有较大改动，材料选取上强调安全工程专业有关职业安全与健康方面的管理和技术等方面的共性原理，一方面介绍基本的专业知识，如安全法案、事故致因理论、事故报告、变更管理、电气安全、密闭空间安全、特种设备安全、噪声防护等，另一方面则选取国际上成熟的、值得我们借鉴的一些好的做法，如“Tag out and Lock out”、“Chemical Hazard Communication”等。本教材材料来自国际上相关专业的经典读本和安全相关领域著名网站(OSHA、MSHA、CSB、FEMA、HSE等)，如《Enhancing Occupational Health and Safety》曾在欧洲获安全专业培训教材奖，先后在澳大利亚、英国、西班牙和中国出版，《System Safety Engineering and Risk Assessment—A Practical Approach》和《System Safety Engineering and Management》亦被美国多所高校指定为安全工程专业推荐教材。对于来自网站的内容，选取时主要强调科技英语的简单明了以及专业技术的严谨性和完整性。

其次，因安全工程专业英语在教学大纲上设置改为32学时，为使广大读者有更加广泛的阅读范围，再版教材在格式上进行了改变，教材共设16

单元，每单元分为精读、泛读（Further Reading）两部分，精读内容主要是安全管理和安全技术基本知识，教材在课后对专业词汇及难以理解的句子进行了标注。泛读内容目的在于扩大读者的专业背景和行业知识。

本教材每篇文章的出处通过脚注的方式列出，同时为了便于读者更好地理解以及进一步研究，本教材在脚注中另外给出文章来源的相关材料及背景介绍，目的通过所选的文章，达到抛砖引玉的效果。为使阅读材料更符合高等学校教材的特点，文章内容和编排格式有所改动，课文中不再一一说明。

限于许多专业英文词汇在我国目前没有较为准确一致的翻译，为使读者更好地理解术语的真正内涵，本教材删除了第一版Glossary部分的中文翻译，并增加了新的词汇；同时增加了中英对照词汇(Glossary II) 300余条，这些词汇在业内应用较为广泛；为使广大读者能够更好阅读专业方面的信息，本版新增职业安全与健康方面政府机构、学术研究、行业咨询等方面相关网址。

本书能够再版，感谢广大读者的厚爱；感谢化学工业出版社能够给予这个机会，使得我进一步探求安全工程专业不同领域，能与读者在专业方面进行深入交流。第二版较前版有了较大的改动，感谢美国安全工程师协会（ASSE）前主席Michael W. Thompson、秘书兼执行总监Fred J. Fortman, Jr. 和澳大利亚安全研究院（S.I.A.）墨尔本区主席Phil Lovelock先生在知识结构方面给予的美好建议和热情鼓励；感谢中国地质大学（北京）博士生导师罗云教授、中国矿业大学（北京）博士生导师傅贵教授、《中国安全科学学报》主编徐德蜀研究员从教材可读性和教材内容设计方面给出的诚恳建议。本教材在组稿时，曾与澳大利亚科廷科技大学公共安全学院Yang Mian Goh老师、中国石油大学（北京）宫运华老师、中化石油勘探开发公司科技管理部张延星先生有过众多讨论，感谢他们提供大量优秀的专业资料。

本书再版，得到“中国地质大学（北京）教学改革与教学研究专项经费”资助，感谢中国地质大学（北京）给予安全工程专业英语课程的关注与重视，感谢工程技术学院教学副院长吕建国教授、徐能雄教授和安全工

程教研室程五一主任为我提供一个鼓励改革、追求卓越的教学平台，使得我有机会进行教改的尝试；感谢安全工程教研室良好的团队氛围，使得我能深入了解不同专业领域的独到见解，他们是裴晶晶、鲁华章、许铭、吴祥、姜迪宁、闫瑞青。感谢我的学生在文字编排、绘图等方面给予的帮助，他们是方晓堃、高明、崔文倩、王鹏、马红、张国光、何倩、卢明、王悦晖、王君旭、孙江、李雨凌、秦臻、贾雯靖、郝海斌、田硕、余雯淼。另外在编辑审稿的过程中，针对一些有争议的专业词汇曾与澳大利亚科廷科技大学公共安全学院Janis Jansz、简乐高级讲师，美国职业安全与健康国家研究院陈广厢先生，中国亚新科工业技术有限公司HSE经理宫宝霖先生以及中国矿业大学（北京）马书明博士等进行了讨论，感谢他们为本书的最后完成提供的诸多帮助。

最后，特别感谢本书选用书籍、指南、文献的作者、设计者以及相应的机构，正是他们精心的工作和优秀成果促进了更多的学生和专业人士对安全工程专业的兴趣与热爱，并推进安全工程专业蓬勃发展。

尽管竭尽全力，但本书难免会存在不妥之处，恳请广大读者批评指正。

樊运晓

2011年8月

第一版前言

随着人类社会的进步和生活水平的提高，人们对于安全的需求增大，安全文化意识逐步提高。目前，由于各类安全生产事故的频发带来的惨重损失，国家加大了安全生产的监管力度，于2005年成立了国家安全生产监督管理总局，安全工作得到了前所未有的重视。此外，我国高校中许多有识之士充分认识到安全科技人才在预防和控制意外事故和损失中的重要作用，这使得越来越多的高校增设了安全工程专业，培养安全工程专业人才，以便更好地为安全生产工作服务。

笔者在多年的安全工程本科生、研究生的教学过程中发现，专业英语是安全工程专业学生所欠缺的。由于安全工程专业是新兴专业，目前国内缺乏优秀的教材，在专业英语方面还没有正式出版物。专业英语是了解国外安全工程学科发展的语言工具，为更好地了解国外的安全工程学科动态，借鉴一些先进的经验，笔者在多年安全工程专业英语教学经验基础之上，结合我国安全工程专业的培养方案，编写了这本安全工程专业英语教材。

由于安全工程专业所涉及的领域非常广泛，所跨行业也非常多，因而在本书编写过程中将行业内容通过事故案例来体现。本书内容分为三部分：第一部分为安全工程的基本理论，介绍什么是安全工程，它的历史以及在各行业中的应用，安全工程的技术手段和管理手段；第二部分为国内外各行业重大安全事故，包括印度博帕尔毒气泄漏事故、切尔诺贝利核事故等；第三部分以英、汉双语形式列出了安全工程专业词汇近500条。

笔者从良好和真诚的愿望出发，把安全工程专业中的诸多问题归纳成书，希望更多的安全工程专业的学生更加热爱这个专业，希望更多珍爱生命、关注安全的人们从这里更多了解安全工程专业的理论和实践。

本书参考了国内外安全工程专业方面的期刊、著作和报纸，在此不一一列出，谨向原作者和出版社致以崇高的敬意和诚挚的感谢。

在本书的编写过程中，很多编写思路受益于中国地质大学（北京）安

全研究中心主任罗云教授。我的研究生方梅花、黄小梅、陈晓波、张晓，本科生张琴、马飞、潘汉彬、李伟、殷勇等对资料进行了整理，宫运华博士对全稿进行了校正。中国地质大学（北京）安全工程教研室程五一博士、颜峻老师和裴晶晶老师对本书的编写也给予了大力支持。同时化学工业出版社安全科学与工程出版中心的编辑给予了宝贵的参考指导意见，在此对以上人员表示诚挚的感谢。

由于作者水平有限，书中难免存在疏漏和错误，恳请专家学者和广大读者批评指正。

樊运晓

2005年10月

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Safety Profession¹

As society becomes more complex, there is a constant need for new and advanced goods and services. This, in turn, creates jobs and professions that were unheard of just one generation ago. Because of the very rapid changes in these jobs and professions, it is hard for students to learn about future job opportunities. It is even more difficult to know about the type of preparation that is needed for a particular profession—or the qualities and traits that might help individuals succeed in it.^[1]

The purpose of this article is to provide in depth information about the safety profession that should help students considering a career in this challenging and rewarding field.^[2]

For over a century, safety professionals have protected the safety and health of the public by controlling hazards. While these efforts became more sophisticated and widespread during the twentieth century, real progress on a wide front did not occur in the U.S. until after World War II.^[3]

In 1970, a major development in safety came about when the U.S. Congress passed the Occupational Safety and Health Act (OSH Act). This legislation was important because it stressed the control of workplace hazards. This, in turn, defined a clear area of practice for the previously loosely organized safety profession. Other legislation passed during the next twenty years has increased the scope of safety practice into areas of environmental protection, product safety, hazardous materials management and designing safety into vehicles, highways, process plants and buildings.^[4]

With the increased emphasis on safety driven by laws, public concern and

1 *Career Guide to the Safety Profession*. Second Edition. ©2000 by the American Society of Safety Engineers Foundation and the Board of Certified Safety Professionals.

Founded in 1911, ASSE is the oldest professional safety organization. Its more than 32000 members manage, supervise and consult on safety, health, and environmental issues in industry, insurance, government and education. ASSE is a global member-driven association providing representation, promotion and support for those engaged in the profession and/or the practice of safety, health and environment in their efforts to protect people, property and the environment.

company values, more colleges today prepare people for careers in safety. The number of people preparing themselves for careers in the safety profession through safety degree programs is increasing. As a result, the safety profession has respect from other established professions such as engineering, medicine and law (all of which had traditionally been involved in hazard control, but had no special training in it).^[5]

In the past twenty years, employment in safety has grown and changed dramatically. The period of corporate downsizing in the early 1990's had little impact on professional safety positions. Safety has become more complex, so that today's safety professionals must have better qualifications. Safety demands the best in all of its practitioners.

The information found in this article will explain what the safety profession is about and what to study to become part of it. The information in this article is intended to show that there is a place for students in the safety profession.

What Is the Safety Profession?

The primary focus for the safety profession is prevention of harm to people, property and the environment. Safety professionals apply principles drawn from such disciplines as engineering, education, psychology, physiology, enforcement, hygiene, health, physics, and management. They use appropriate methods and techniques of loss prevention and loss control. "Safety science" is a twenty-first century term for everything that goes into the prevention of accidents, illnesses, fires, explosions and other events which harm people, property and the environment.^[6]

The U.S. has a lot to gain by reducing the number of these preventable events. The National Safety Council estimated that in the U.S., accidents alone cost our nation over \$480.5 billion in 1998. Fire-related losses exceed for \$8 billion per year.

Illness caused by exposing people to harmful biological, physical and chemical agents produce great losses each year and accurate estimates of their impact are hard to make.^[7]

In addition, pollution of all kinds causes damage to all forms of life. This generates skyrocketing cleanup costs and threatens the future habitability of our planet.

The term "safety science" may sound new, but many sources of safety science knowledge are hundreds of years old. All of the following are knowledge areas of safety science:

- Chemistry and biology provide knowledge about hazardous substances.
- Physics tells people about electricity, heat, radiation and other forms of energy that

must be controlled to ensure safe use.

- Ergonomics helps people understand the performance limits of humans and helps them design tasks, machines, work stations and facilities which improve performance and safety.^[8]
- Psychology helps people understand human behaviors that can lead to or avoid accidents.
- Physiology, biomechanics and medicine help people understand the mechanisms of injury and illness and how to prevent them.
- Engineering, business management, economics, and even sociology and geology give people the knowledge necessary to improve safety in our society.

The things that can cause or contribute to accidents, illnesses, fire and explosions, and similar undesired events are called “hazards.” Safety science gives people the ability to identify, evaluate, and control or prevent these hazards. Safety science provides management methods for setting policy and securing funds to operate safety activities in a company.

Hazard control activities go on every day throughout the world. From the careful design and operation of nuclear power generating stations to the elimination of lead-based paints in homes, the efforts to reduce threats to public safety go on nonstop.^[9] The application of safety science principles occurs in many places: in the workplace, in all modes of transportation, in laboratories, schools, and hospitals, at construction sites, on oil drilling rigs at sea, in underground mines, in the busiest cities, in the space program, on farms, and anywhere else where people may be exposed to hazards.^[10]

Safety science helps people understand how something can act as a hazard. People must know how and when the hazard can produce harm and the best ways to eliminate or reduce the danger. If a hazard cannot be eliminated, we must know how to minimize exposures to the hazard. This costs money and requires assistance from designers, owners and managers. Safety professionals must know the most cost-effective ways to reduce the risk and how to advise employees, owners, and managers. By applying safety science, all of these activities can be effectively carried out. Without safety science, safety professionals rely on guesswork, mythology and superstition.

Safety professionals are the specialists in the fight to control hazards. To be called professionals, they must acquire the essential knowledge of safety science through education and experience so that others can rely on their judgments and recommendations.^[11]

Top safety professionals demonstrate their competence through professional



certification examinations. Regardless of the industry, safety professionals help to achieve safety in the workplace by identifying and analyzing hazards which potentially create injury and illness problems, developing and applying hazard controls, communicating safety and health information, measuring the effectiveness of controls, and performing follow-up evaluations to measure continuing improvement in programs.^[12]

What Safety Professionals Do

Wherever people run the risk of personal injury or illness, they are likely to find safety professionals at work. Safety professionals are people who use a wide variety of management, engineering and scientific skills to prevent human suffering and related losses. Their specific roles and activities vary widely, depending on their education, experience and the types of organizations for whom they work. Safety professionals who have earned doctoral degrees are often found at the college and university level, teaching and doing research, public service and consulting. Most safety professionals, however, have bachelor's or master's degrees. These professionals may be found working for insurance companies, in a variety of industries, for state and federal agencies like the Occupational Safety and Health Administration (OSHA), and in hospitals, schools and nonprofit organizations.

Safety professionals' precise roles and responsibilities depend on the companies or organizations for whom they work. Different industries have different hazards and require unique safety expertise. However, most safety professionals do at least several of the following:

- **Hazard Recognition:** identifying conditions or actions that may cause injury, illness or property damage.
- **Inspections/Audits:** assessing safety and health risks associated with equipment, materials, processes, facilities or abilities.
- **Fire Protection:** reducing fire hazards by inspection, layout of facilities and processes, and design of fire detection and suppression systems.
- **Regulatory Compliance:** ensuring that mandatory safety and health standards are satisfied.
- **Health Hazard Control:** controlling hazards such as noise, chemical exposures, radiation, or biological hazards that can create harm.
- **Ergonomics:** improving the workplace based on an understanding of human physiological and psychological characteristics, abilities and limitations.

- **Hazardous Materials Management:** ensuring that dangerous chemicals and other products are procured, stored, and disposed of in ways that prevent fires, exposure to or harm from these substances.
- **Environmental Protection:** controlling hazards that can lead to undesirable releases of harmful materials into the air, water or soil.
- **Training:** providing employees and managers with the knowledge and skills necessary to recognize hazards and perform their jobs safely and effectively.
- **Accident and Incident Investigations:** determining the facts related to an accident or incident based on witness interviews, site inspections and collection of other evidence.
- **Advising Management:** helping managers establish safety objectives, plan programs to achieve those objectives and integrate safety into the culture of an organization.
- **Record Keeping:** maintaining safety and health information to meet government requirements, as well as to provide data for problem solving and decision making.
- **Evaluating:** judging the effectiveness of existing safety and health related programs and activities.
- **Emergency Response:** organizing, training and coordinating skilled employees with regard to auditory and visual communications pertaining to emergencies such as fires, accidents or other disasters.^[13]
- **Managing Safety Programs:** planning, organizing, budgeting, and tracking completion and effectiveness of activities intended to achieve safety objectives in an organization or to implement administrative or technical controls that will eliminate or reduce hazards.^[14]

No matter where people work, travel, live or play, conditions exist that can result in personal injury or illness. And wherever the possibility of personal injury or illness exists, they will find safety professionals dedicated to preventing human suffering and related losses.

Successful safety professionals are effective communicators with strong “people skills.” Most people in this profession characteristically possess the design to help and work with others. The satisfaction of knowing that people have been protected because harmful accidents and other incidents have been prevented is just one of the many rewards associated with “what safety professionals do.”^[15]



Words



- trait [trei, treit] n. 特性, 特点; 品质; 少许
- sophisticated [sə'fistikeitid] adj. 复杂的; 精致的; 久经世故的; 富有经验的
- downsizing ['daun,saiziŋ] n. 精简, 裁员; 缩小规模
- hygiene ['haidzi:n] n. 卫生; 卫生学; 保健法
- skyrocket ['skai,rɒkit] vi. 飞涨, 突然高升
- physiology [fizi'ɒlədʒi] n. 生理学; 生理机能
- biomechanics [baiəʊmə'kæniks] n. 生物力学; 生物机械学
- rig [rig] n. 装备; 钻探设备
- mythology [mi'θɒlədʒi] n. 神话; 神话学; 神话集
- superstition [ˌsju:pə'sti:ʃən] n. 迷信
- expertise [ˌekspe:'ti:z] n. 专门知识; 专门技术; 专家的意见
- regulatory compliance 遵从法规
- pertain to 适合, 合宜; 与……有关

Note



- [1] Because of the very rapid changes in these jobs and professions, it is hard for students to learn about future job opportunities. It is even more difficult to know about the type of preparation that is needed for a particular profession—or the qualities and traits that might help individuals succeed in it.

由于这些工作和职业的飞速变更, 其变化之快使得学生们很难了解未来有什么样的工作机会, 更不知道为未来的具体职业生涯做出怎样的准备, 也就是说学生们很难知道掌握何种知识、具备何种能力才能成功适应未来的社会。

- [2] The purpose of this article is to provide indepth information about the safety profession that should help students considering a career in this challenging and rewarding field.

这篇文章将提供较为深入的安全专业方面的具体信息, 它应该能够为安全专业的学生们在这个充满挑战也蕴藏着发展机遇的职业中获得良好发展而提供帮助。