

CIVIL Engineering

土木工程

科技英语读物

[英]约翰·S·斯科特 撰
清华大学土木与环境工程系
卢谦 罗福午 等 译注



中国建筑工业出版社

Technical English Supplementary Readers

Civil Engineering

JOHN S. SCOTT



Longman

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本书是英国朗曼出版公司为留英学生编写的英语辅助读物丛书的第一册,可供国内已有初步英语基础的从事土木工程的科技人员学习科技英语使用。书中除对27个土木工程专题通过课文说明外,还附有问答题及供组织讨论课所需要的讨论题。本书设想学者已经熟悉通用词汇2000个,和科技词汇425个,期望通过课文的学习,掌握各土木工程专题方面的科技词汇与用英语撰写有关科技文章时能用到的常用句型。书后还附有解释专业科技词汇涵义的词汇表。

本书课文及名词汇编由清华大学土木与环境工程系卢谦,罗福午等译出。

书末所附问答题及讨论题未译,读者可自己试译。

John S.Scott
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清华大学土木与环境工程系
卢 谦 罗福午等 译注

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译 注 说 明

- 一、为便于读者阅读，每课注释力求详尽，自成一篇，因此一些常用词组与语法解释在各课注释之间可能出现重复。
- 二、凡已在本书最后所附“名词汇编”中列入的词，一般不再进行注释。
- 三、注释中凡注明“参看 条”者，指参看本课注释第 条。如参看23条，即指参看本课注释第23条。
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1 Becoming a civil engineer

In the English-speaking countries, unlike Continental Europe, a professional engineer who wishes to be fully qualified, must join at least one engineering institution. All these institutions require candidates for admission to prove that they have some years of useful practical experience as an engineer. Each institution is a learned society not unlike a club except that the candidate's strict examination for membership is based mainly on his engineering knowledge, and all institutions publish engineering literature in their own subjects, usually in their monthly journal. Each has several grades of membership, from the highest, full Member, down through the usual grade, Associate-Member, to the grades of Student or Graduate for younger people up to about twenty-five or thirty years old.

In Britain it has always been possible for a boy on leaving school at fifteen to start work in the drawing* office of a civil engineer, whether contractor* or consultant*, and eventually after many years of study in his spare time, to become a qualified civil engineer. This is becoming less easy and it may soon become impossible. The recommended method of study for the ICE (Institution of Civil Engineers) examinations is now by full-time or sandwich* study for a degree or diploma*. Sandwich study is full-time work at a college interrupted by periods of full-time work with an employer.

Modern engineering requires more and more science, and to make use of its scientific theories, a civil engineer should study full-time for some years after leaving school. Therefore a university degree in civil engineering may soon become essential for membership of the ICE or any of the other civil engineering institutions (Institutions of Highway Engineers, Municipal Engineers, Public Health Engineers, Structural Engineers, Water Engineers, or the Permanent Way Institution, etc.).

To qualify for Associate-Membership of the ICE, a person must be at least twenty-six years old and working as a civil engineer. He must also pass certain examinations, satisfy the ICE that he has had several years of useful engineering experience under the supervision* of qualified civil engineers, both in the drawing office and on the site, and finally he must pass a mainly oral examination called the professional interview, before

*Words marked with this sign are explained in the Glossary, pages 221—255

1 怎样成为一名土木工程师

和欧洲大陆不同，在说英语的国家里^[1]，凡是希望成为完全合格^[2]的职业工程师，必须至少加入一个工程学会。所有这些学会均要求申请人会者^[3]证明他们作为一名工程师已有数年卓有成效的实践经验。每个学会都是一个学术团体，它类似于俱乐部，不同之处只在于^[4]对申请人取得会员资格所进行的严格考试主要是依据其工程知识，并且所有学会通常都在其月刊中发表自己学科课题方面的^[5]工程文献。每一学会都有几种会员级别，最高级别是正式会员，以下是普通级别的副会员^[6]，直到为年龄在25岁或30岁左右的青年人设立的大学生级别，或大学毕业生级别的会员。

在英国，一个刚刚从中学毕业的^[7]15岁男孩历来总有可能或者在承包商或者在顾问工程师这两方面的土木工程师的绘图室中开始工作，经过多年业余学习^[8]后，最终成为一名有开业资格的工程师。这种途径目前愈来愈困难^[9]，而不久就可能无法实现了。为了通过土木工程师学会考试，目前宜于采取的^[10]学习方法是全时学习或半工半读学习来取得学位或毕业证书。半工半读的学习方式是在学院的全时学习期间中断数次，以便在雇主处全时工作^[11]。

现代工程愈来愈需要科学^[12]，一个土木工程师想要利用^[13]现代工程科学理论，就应在中学毕业后^[14]再进行全时学习数年。因此，土木工程的大学生学位不久就会成为取得土木工程师学会或其它土木工程学会（公路工程学会、市政工程学会、公共卫生工程学会、结构工程学会、给水工程学会或铁路工程学会^[15]等）会员资格的基本条件^[16]。

一个人要取得土木工程师学会副会员的资格，至少应年满26岁并从事土木工程师工作。此外他还必须通过一定的考试^[17]，

a group of qualified civil engineers. This is generally the only part of the examination from which candidates are never excused, whatever their civil engineering degree.

In general education, the minimum* requirements, before a man may be accepted even as a candidate for the ICE examinations are as follows: five passes in the General Certificate of Education, (a) at advanced level in physics, (b) at advanced level in either pure or applied mathematics, (c) at ordinary level in English, and (d) at ordinary level in two other subjects. Detailed information is issued free by the ICE on all matters including the parts of the examination a candidate need not take as well as on the number of years and the types of civil engineering experience which are accepted.

In Britain the thirteen main engineering institutions were formally joined for examination purposes in 1965 in the Council of Engineering Institutions in London. A similar arrangement was made a few years earlier in the United Engineering Center, 345 East 47th Street, New York, for the United States institutions. In Britain all professions now take the Part 1 examination set by the Council of Engineering Institutions. This includes the five subjects of engineering drawing, mathematics, applied mechanics, principles of electricity, heat light and sound.

* 原文中标有此符号者在书后第221—255页的名词汇编中有解释。

使该学会确信^[14]其已经在有资格的土木工程师的指导下^[13]，在设计绘图室和施工现场两方面都已获得数年有效的工程经验。最后，他还必须在由有资格的土木工程师组成的小组面前通过一项主要以口试方式进行并称为“专业面谈”的考试。不论申请入会者的土木工程学位是什么，该项口试通常是申请入会者唯一不能免试的项目^[20]。

即使作为申请入会者，在被获准参加土木工程师学会考试以前，他们在普通教育方面也必须达到如下的最低要求^[21]：在普通教育证书中表明五个方面的成绩合格：（a）物理学成绩优秀^[22]，（b）或者理论数学或者应用数学成绩优秀，（c）英语达到普通水平，（d）两门其它课程达到普通水平^[23]。有关考试全部事项的详细资料由土木工程师学会免费提供^[24]，其中包括申请入会者免试部分^[25]和所承认的在土木工程界工作的年限和经历等。

在英国，为了统一考试要求，十三个主要的工程学会曾在1965年正式加入设在伦敦的工程学会理事会。距此几年以前，设在纽约东47条大街345号的联合工程中心早已为美国各学会作了类似的安排^[26]。目前，英国各行各业^[27]都要通过由工程学会理事会所规定的I类考试。这种考试内容包括工程制图、数学、应用力学、电学原理以及声光热等五门课程^[28]。

[1] the English-speaking Countries, 说英语的国家, 即指以英语为官方语言的国家, 尤指英联邦所属国家, 包括英国本土、加拿大、澳大利亚等国, 故Countries为复数。

[2] to be fully qualified, 成为完全合格的, 具有充分资格的。qualification 含义为“资格”或“资格证明书, 执照”; to qualify, 考核, 使具有资格, 证明合格, 故qualified意为: 合格的, 取得资格的。

[3] candidate, 候选人, (报名)投考者; admission 允许进入, candidates for admission 申请入会者。

[4] not unlike a club except that..., ...类似于俱乐部, 不同之处只是在干。except that (除了...之外, 只是)引入从句。unlike 不象, not unlike 意为“不是不象, 与...性质类似, 类似于”。

[5] in their own subjects, 在它们自己学科课题方面的。此介词短语在此句中作为engineering literature的定语。literature 含义在此为“文献”。

[6] member: 成员, 如 Party member 党员。此处指某一学会的会员, 故第一字母大写(专有名词)。Full Member: 正会员; Associate-Member: 副会员。associate 作形容词用, 意为“副的”, 如 Associate Professor: 副教授。

此句中 from the highest 后省略 grade, down through “向下通过”, 今译为“下面是”。Full Member 和 Associate-Member 都是它们前面的词的同位语, 故前后均用逗号分开。Graduate 也可理解为“研究生”, 今译“大学毕业生”, 其含义更广泛些。

[7] 此句 it 为形式主语, 实际主语为不定式 to start..., for a boy 为不定式 to start 的逻辑主语。on leaving school 为介词短语, 作 a boy 的定语。on 意为“一(经)…就”, 如 Rivets contract on cooling. 铆钉一冷却就收缩。leaving(离开)为由 leave 构成的动名词, 在介词后的动词应用其动名词形式。school 在英国指“中、小学”, 故 on leaving school 译为“刚由学校(或, 中学)毕业的”。

[8] study in his spare time: 业余时间学习, 业余学习。spare: 空闲的, 如 spare unit, 备用设备(空闲设备)。

[9] less easy: 不太容易, 更加困难。less 为副词, 意为“比较不, 不太”如, less certain, 不太有把握。

[10] recommended: 宜于采用的。recommend 原做“推荐, 建议”解。

[11] …interrupted by periods…: 直译为: “全时学习被…全时工作期间所中断”。periods 为复数, 故译为“数次”。

[12] more and more: 越来越…。

[13] to make use of (something): 利用, 运用(某物)。

[14] after leaving school: 离开学校(中学)以后, 在中学毕业以后。参看注 7。根据上下文, school 译为“中学”。

[15] the Permanent Way Institution: 铁路工程学会。permanent(原义, 永久的), way 指 finished railway track(建成的铁路), 即铁路。

[16] become essential: 变成…基本条件(对…变成基本的)。此句译法中“(essential)基本”后增加“条件”二字(词的增添法), 而介词 for 转译为动词“取得”(词的转译法); 这两种译法在科技文献翻译中经常用到。

[17] to pass examinations: 通过考试(考试及格)。

[18] to satisfy someone of (that)…使某人确信…。此处 satisfy 的含义为“to convince, to make free from doubt 使…深信, 确信不疑”, of 后接名词, that 引入从句, 如: Have you satisfied yourself of the truth of his report? 你对他的报告的真性确信不疑吗?

[19] under the supervision of A: 在 A 的监督(指导)下。

[20] never excused: 永不得减免的。to excuse A from B: 允许 A 免做 B。from which 引入定语从句, which(相当于 B)指 the only part。

[21] before a man may be accepted even as a candidate for the ICE examinations: 直译为: “即使人们可被获准作为土木工程师学会考试的应试者以前”, aman 在此意为“人们”, 考虑汉语习惯, 译时作了变动。又如“are as follows(…最低要求)如下。”也可相应改译为: “…达到如下的最低要求”, 翻译时有时需作类似的变动, 以求译文通顺。minimum 原义为: “极小, 最少的”, 故译“最低”。

[22]at advanced level, 成绩优秀(在先进的水平上)。

[23]at ordinary level, 普通(一般)水平。

[24]is issued free, 免费提供。

[25]the parts of the examination (which) a candidate need not take 直译: “申请人会者不需要应考的考试部分的内容”。take, 考(…内容), take的宾语为 which(原文中省略), 即parts, 英语定语从句中that或which在从句中作宾语时可以省略。

[26]A similar arrangement, 类似的安排。

[27]all professions, 所有行业, 各行各业。

[28]英语句中两个以上的并列成分用逗号连接, 最后两个成分之间通常用and或or连接, 它们前面可加逗号, 也可不加。汉译时一般用顿号“、”分隔。如并列成分中又包含有并列成分, 则大并列成分用逗号或顿号分开, 而小并列成分相应地用顿号分开或不加标点符号, 例如:

This includes the five subjects of engineering drawing, mathematics, applied mechanics, principles of electricity, heat light and sound.

译文1: 这种考试内容包括工程制图、数学、应用力学、电学原理以及热光声等五门课程。

译文2: 这种考试内容包括工程制图、数学、应用力学、电学原理以及热学、光学和声学等五门课程。

汉语中交替使用逗号及顿号, 是为了使句子层次更加清楚。

2 Drawing office work

The main work in a drawing* office is done by draughtsmen* who use a pencil, T-square, set square and scale (Fig. 1) to make engineering sketches, designs, and finally details* or working drawings, from which the contractor can build the structure. The draughtsmen, among whom occasionally there are women, work under the civil engineering designer* in charge of their section of the work. Very often the chief of the drawing office, though he may be a highly qualified civil engineer, is called the chief draughtsman, though he may be called the chief designer and this is becoming commoner in civil engineering.

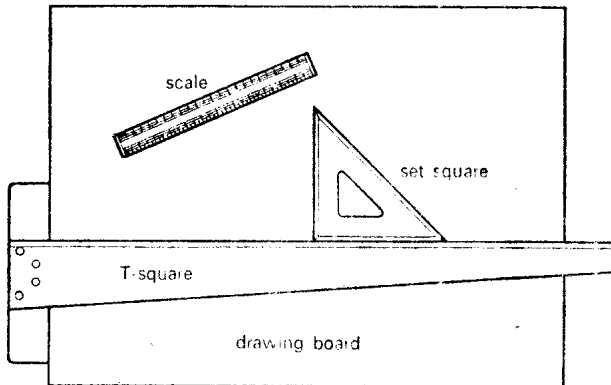


Fig. 1. Draughtsmen make drawings on a drawing board, using a pencil and a T-square, set square and scale

The drawings are made either on transparent* paper or on plastics film* (which is the most lasting) and prints are taken from the completed drawings. Until about 1950 the blueprint* was the commonest type of print, but this is now very unusual, and has been replaced by the dylene* which has dark lines on a white background and is therefore easier to write on. The blueprint had white lines on a dark blue background.

The best drawings are of course made in black ink, but this is very much slower than pencil work, and may take up too much of the time of the skilled draughtsmen. Therefore tracers* are employed in some offices to trace in ink the drawings made in pencil by the draughtsmen or designers. Tracers are now usually women but some men work as tracers for their

2 设计绘图室^[1]工作

设计绘图室中主要的工作就是绘图员用铅笔、丁字尺、三角板和比例尺(图1)绘制工程草图、设计图和最后的详图或施工图,承包厂商^[2]就根据这些图纸建造结构物^[3]。绘图员在主管该部门工作的土木工程师的领导下进行工作^[4],绘图员中偶尔也有妇女。设计绘图室主任尽管可能是一位资历很高的土木工程师^[5],通常却称之为总绘图师,虽然他称得上是一个总设计师,并且总设计师这个称呼在土木工程界中正变得越来越普遍起来^[6]。

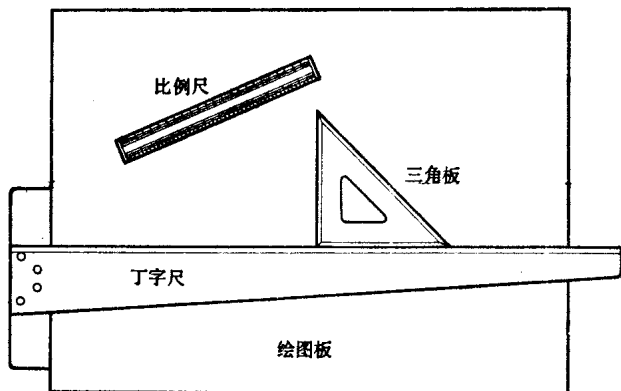


图1 绘图员用铅笔、丁字尺、三角板和比例尺在绘图板上绘图

图可在透明纸上绘制,也可在塑料胶片上绘制(胶片最为耐久),再由所完成的图纸印刷复制。大约直到1950年以前,蓝图^[7]仍是最普遍的一种复印图,但目前已很少应用,而由熏制图所代替,熏制图是在白的底色上显示出深色的线条,因而便于在上面写字^[8]。蓝图的底色为深蓝色,线条则为白色。

最好的图当然是用黑墨水绘制的,但这比用铅笔绘图要慢得多,使熟练的绘图员花费^[9]太多的时间。所以在某些设计绘图室中雇用描图员用墨水来描绘绘图员或设计师用铅笔绘制的图^[10]。目前描图员一般为妇女,但是也有终生^[11]从事描图的男描图员,他们能描出非常精致的图。然而,现在的工程图纸没有五十年前那么精致了^[12],因而很少需要男描图员^[13],何况他们的

whole lives and they produce very fine work. Engineering drawings, however, are now less fine than fifty years ago, and therefore there is little demand for men tracers, who also need more pay than women.

In a consulting* engineer's office the designers discuss their work either directly with the client* or with a partner* who in turn discusses it with the client and obtains his approval for any change in policy. In a contractor's organization, partners do not exist because almost every contractor is a limited company. Partners exist in consulting engineers' offices because theoretically their responsibility is unlimited and in fact they have unlimited moral responsibility for obtaining the best structure possible for the client. The partners share this moral responsibility.

Many civil engineers in the course of their working life pass through all the stages mentioned in this article. They begin as juniors tracing drawings, they become draughtsmen after a short time, then they spend some time on a site* setting* out work and checking the contractor's monthly certificates*; they return to the office and take their examinations for the Institution of Civil Engineers, become designers, then senior designers and eventually partners.

An active man of twenty-six with a degree in civil engineering could be a designer at this age, a senior designer at thirty, and a partner at thirty-five in a go-ahead firm. Some civil engineers start their own businesses as consultants* but generally to do this some money is needed, or at least a bank's loan. Payment for work does not come in until some months after it is done and the loan is needed to enable the consultant to live and pay for work until he is paid. Generally one could assume that not less than £3,000 would be needed to set a man up in business after he has received promises for a year or two of work.

I must explain here what I mean by a go-ahead firm. In some consulting engineering firms, the partners are frightened that they know less than those who work for them, and they do not reward people who work hard and well. In a go-ahead firm the partners recognize that they very often do know less than those who have come more recently from their studies and they are anxious to reward men for good work. Such firms are go-ahead in more ways than one. They produce the best structures, and they attract the best men because they reward them well, and because the best men are naturally drawn to good work. In one go-ahead firm, men become associate partners (half partners) at the age of thirty, a truly astonishing age compared with the period of 1926-37 in Britain when fully qualified civil engineers of forty were happy to work as draughtsmen for a low wage.