普通高等教育“十一五”国家级规划教材

冶金专业英语

YEJIN ZHUANYE YINGYU

（第2版）

主　编　侯向东
副主编　贾志勤　祁苏燕

冶　金　工　业　出　版　社
Metallurgical Industry Press

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内 容 提 要

本书是为适应高等学校冶金类专业英语教学改革而编写的一部新教材。全书在第1版内容基础上，增加了两篇有色金属冶金方面的课文，从多渠道、多角度向学生输入大量可理解、可接受的冶金专业英语信息，从而使学生能够快速积累专业英语基础知识，迅速提高专业英语应用能力。

本书既可作为冶金技术专业学生的专业英语教材，也可供材料工程技术等专业学生选用，或供一般读者学习专业外语时参考。

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第2版前言

《冶金专业英语》自2008年出版以来，以系统性、实用性、可读性、方便性等特点，获得了全国冶金类院校相关专业师生的好评。为了适应我国高等职业教育的发展，更好地满足使用者的需求，编者在保留第1版原有特点的基础上，增加了有色金属冶金方面的课文内容，并对第1版进行了修订和完善。

本书由侯向东担任主编，贾志勤、祁苏燕担任副主编。具体编写分工为：第1~7单元由侯向东编写，第8~10、12、17、18单元由贾志勤编写，第11单元由冯捷编写，第13、14、19、20单元由陈聪编写，第15、16单元由祁苏燕编写。

在本书编写过程中参考了大量的国内外相关资料，得到了许多学界前辈、同行的热心帮助和指导，在此一并表示由衷的谢意。

由于编者水平所限，书中不足之处，恳请读者批评指正。

编　者

2014年3月

第1版前言

《冶金专业英语》是冶金技术专业学生学习的专业基础课之一。随着全球一体化进程的加快和中国经济的不断发展，使用外语进行交流、了解行业的最新发展动态已成为冶金专业学生的一项重要技能。

本书为高等教育国家级“十一五”规划教材，是按照教育部高等教育人才的培养目标和规格、应具有的知识能力和素质要求而编写的。全书由18个单元组成，内容涵盖了钢铁冶金、有色金属冶金、材料加工三个方面。安排教学时，可根据培养方向，调用内容合适、难度适中的语篇和相应的练习材料，也可跨专业选用材料，以扩大知识面。

本教材的特点是：（1）根据职业发展需要，教材内容突出实用性。本书从冶金生产工艺流程入手，编有大量具有针对性的专业阅读材料，同时介绍了科技英语翻译过程中常用的翻译知识。通过学习，学生不仅可以熟悉和掌握本专业常用的单词、短语及其用法，深化本专业的知识，而且可以掌握科技英语的翻译技巧，从而满足其职业发展对英语的基本需求。（2）注重英语技能训练，提高实际应用能力。教材每单元都设计了大量的练习题，这些项目的内容与课文为同一主题，这有利于学生通过这些循环、交叉、叠加的练习，掌握技巧，形成能力。（3）改变传统编写思路，便于学生自主学习。为了方便学生自主学习，本教材还配套了参考答案。在参考答案中提供了课文的译文和全部练习答案，这既有利于教师备课和组织教学活动，又扩展了学生的思维空间，便于学生自主学习，进一步锻炼和提高英语自学能力。

本书由侯向东担任主编，贾志勤担任副主编。其中1～7单元由侯向东编写，第8、9、10、12、15、16单元由贾志勤编写，第11单元由冯捷编写，第13、14、17、18单元由陈聪编写。

本书在编写过程中得到了许多同行的帮助，编者在此表示诚挚的谢意。

由于编者水平有限，书中的不足之处，希望读者批评指正。

编　者

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Contents

Unit 1 From the History of Ironmaking and Steelmaking

Part I Reading and Comprehension

Worldwide, the iron and steel industry is one of the most significant and, in terms of tradition, one of the oldest sectors of industry. As early as 3, 000 years ago, iron was serving as a basis of human culture and civilization.

The beginning of the extraction of iron from its ores dates back to prehistoric times. In early times, iron ore was heated in a charcoal fire (doubtless by chance at first). When the fire went out, a piece of solid iron like a sponge was left. The spongy iron could be hammered into shape to make tools and weapons. Our metallurgical forefathers found that when they blew or fanned the flames, the fire became hotter and the iron was produced more rapidly, so bellows were used to increase the supply of air.

The development of modern ironmaking production benefits from the application of several important techniques:

(1) In 1709, Abraham Darby, a young man succeeded in smelting iron with coke. This innovation resulted in a steep rise in pig iron production.

(2) After the year 1755, steam engines and large electric motor were used as blast momentum to force more air into the hearth increasing blast volume greatly.

(3) In 1828, Nilson adopted the regenerative hot blast stove to heat air for blast furnace, reducing the coke ratio of blast furnace greatly.

Before the Industrial Revolution, steel was an expensive material, produced in only small quantities for such articles as swords and springs, while structural components were made of cast iron or wrought iron.

In August 1856, an Englishman, Henry Bessemer, made public the description of a process which eventually reduced the price of steel to about a seventh of its former cost and more important still, made it possible to produce steel in large quantities. Henry Bessemer's process consisted in blowing air from the bottom through the hot metal so that it could burn away impurities. This process was a mainstay of the steel industry.

The first Bessemer converter was lined with silica bricks. The ***acid*** Bessemer process, as the Victorian ironmasters discovered, could not eliminate phosphor, which is harmful to steel, so low

phosphoric pig irons had to be used. In 1878, two Englishmen, Sidney Thomas and Percy Gilchrist, contributed the improvement whereby they lined the converter with ***basic*** refractory bricks, containing magnesia or dolomite. Lime was added to the bath to combine with the phosphor and silicon, and thus remove them from the iron in the form of slag containing calcium phosphate and calcium silicate. The basic lining of the converter provided conditions under which the reactions with the lime could take place without destroying the furnace lining. If silica brick were used, as in the acid process, the lime would attack it chemically.

In 1865, another efficient process for steelmaking was introduced, this transformed the pig iron and/or scrap into regeneratively heated hearth-type furnace. After its inventors, it was also known as the Siemens-Martin process (or open-hearth process). The Siemens-Martin ***open-hearth furnace*** was so called because the molten metal lies in a comparatively shallow pool on the furnace bottom or hearth as Fig. 1-1 show. This rather inefficient performance of the open hearth, compared with the enormous output of the blast furnace, justified the emergence of the highly productive oxygen process for steel.

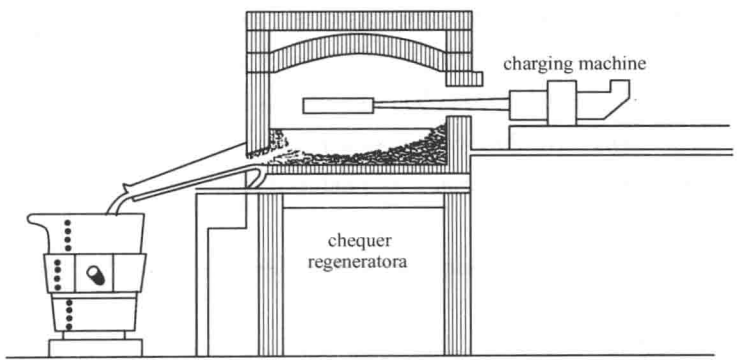

Fig. 1-1 Open-hearth furnace

The idea of using pure oxygen to convert molten iron into steel was suggested in some of the Bessemer patents over 100 years ago, but its use for steelmaking was long delayed by the cost of separating oxygen from air. After 1948, oxygen was becoming available at prices sufficiently low to make it attractive for use in steelmaking. Once the oxygen was no longer bottom-blown—as in the Thomas or Bessemer methods—but instead of top-blown, the oxygen blowing technique became widely popular after the Second World War. Oxygen top-blowing process is called the LD process. This process combines the low capital cost and speed of operation of the Bessemer process with high quality of the open-hearth.

As soon as electric energy could be supplied in sufficient quantities, electric heat was used for steelmaking. The electric-arc furnace process was first used extensively for the production of alloy steels during the 1914 ~ 1918 war. The rapid increases in demand for alloy steels during and after the Second World War led to the construction of larger furnace with lower power consumption per ton of metal. Today, electric-arc furnace has a firm footing in the industry.

After 1970s, Bessemer process and open-hearth process are losing their significance. As the demand for high quality steels increased, post-treatment became a routine step in the production of steel.

Words and Expressions

ironmaking/aiən'meikiŋ/*n.*	炼铁
steelmaking/s'ti:lmeikiŋ/*n.*	炼钢
in terms of	以…的观点，就…而言
sector/'sektə/*n.*	部分，部门
serve as	用作，充当
culture /'kʌltʃə/*n.*	文化，文明
civilization /ˌsivilai'zeiʃən/*n.*	文明，文化，文明社会
extraction /ik'strækʃən/*n.*	萃取，提取
ore /ɔ:(r)/*n.*	矿石
date back	追溯
charcoal /'tʃɑ:kəul/*n.*	木炭
go out	熄灭
sponge /spʌndʒ/*n.*	海绵，海绵状物
hammer into shape	锤打成型
metallurgical /ˌmetə'lə:dʒikəl/*a.*	冶金学的
forefather/fɔ:ˌfɑ:ðə/*n.*	祖先，先人，前辈
bellow /'beləu/*n.*	风箱
benefit from	获益，得益于
coke /kəuk/*n.*	焦炭
innovation /inə'veiʃ(ə)n/*n.*	革新，创新
result in	导致，终于造成…结果
steep/sti:p/*a.*	急剧上下的
pig iron	生铁
momentum/məu'mentəm/*n.*	动力，要素
hearth /hɑ:θ/*n.*	炉膛，炉缸
blast volume	风量
regenerative /ri'dʒenərətiv/*a.*	蓄热的
hot blast stove	热风炉
blast furnace	高炉
coke ratio	焦比
article /'ɑ:tikl/*n.*	物品
sword /sɔ:d/*n.*	剑，刀
spring /spriŋ/*n.*	弹簧
cast iron	铸铁

wrought iron 熟铁
consisted in 在于
impurity /im'pjuəriti/*n.* 杂质
mainstay /'meinstei/*n.* 支柱，中流砥柱
converter /kən'və:tə(r)/*n.* 转炉，炼钢炉
line /lain/*n.* 炉衬
v. 造衬
silica /'sɪlɪkə/*n.* 硅石，二氧化硅
brick /brik/*n.* 砖，砖块
acid /'æsid/*n.* 酸
a. 酸性的
eliminate /i'limineit/*v.* 除去
phosphor/'fɔsfə/*n.* 磷（元素符号 P）
phosphoric /fɔs'fɔrik/*a.* 磷的
basic /'beisik/*a.* 碱性的，基本的
refractory /ri'fræktəri/*a.* 耐火的，耐熔的
n. 耐火材料
magnesia /mæg'ni:ʃə/*n.* 氧化镁
dolomite /'dɔləmait/*n.* 白云石
lime /laim/*n.* 石灰
bath /bɑ:θ,bæθ/*n.* 熔池
silicon /'silikən/*n.* 硅（元素符号 Si）
slag /slæg/*n.* 炉渣
calcium/'kælsiəm/*n.* 钙（元素符号 Ca）
phosphorous /'fɔsfərəs/*a.* 磷的
phosphate /'fɔsfeit/*n.* 磷酸盐
silicate /'silikit/*n.* 硅酸盐
regeneratively /ri'dʒenərətivli/*ad.* 蓄热地，再生地
open hearth 平炉
shallow /'ʃæləu/*a.* 浅的
pool /pu:l/*n.* 坑，池
inefficient/ˌini'fiʃənt/*a.* 效率低的，效率差的
performance /pə'fɔ:məns/*n.* 生产情况
output /'autput/*n.* 产量，产品
justify /'dʒʌstifai/ *v.* 证明…是正当的
emergency/i'mə:dʒnsi/*n.* 出现，紧急情况
patent/'peitənt, 'pætənt/*n.* 专利，执照
capital cost 投资费用
electric-arc furnace 电弧炉

footing/'futiŋ/*n.*	立足处，（社会）地位
post-treatment/pəust'tri:tmənt/*n.*	炉外精炼，后处理
routine /ru:'ti:n/*a.*	日常的，常规的

Proper Names

Abraham Darby	亚伯拉罕·达比
Nilson	尼尔森
Henry Bessemer/'henri 'besimə/	亨利·贝塞麦(1813～1898 年,首创酸性转炉炼钢的英国工程师)
Victorian/vik'tɔ:riən/*a.*	维多利亚女王时代的
Sidney Thomas/'sidni 'tɔməs/	西德尼·托马斯
Percy Gilchrist	珀西·吉尔克里斯特
LD	Linz Düsenverfahren 首字母的缩写
the LD process	顶吹氧气炼钢工艺

Answer the following questions.

1. How was iron ore heated in early times?
2. When was iron serving as a basis of human culture and civilization?
3. Who succeeded in smelting iron with coke?
4. When did two Englishmen, Sidney Thomas and Percy Gilchrist, contributed the improvement whereby they lined the converter with ***basic*** refractory bricks, containing magnesia or dolomite?
5. Why was the Siemens-Martin process called ***open-hearth furnace***?
6. Could high phosphoric pig irons be used in the ***acid*** Bessemer process?
7. When was the electric-arc furnace process first used extensively for the production of alloy steels?

Notes

1. Before the Industrial Revolution, steel was an expensive material, produced in only small quantities for such articles as swords and springs, while structural components were made of cast iron or wrought iron.

工业革命以前，钢是一种贵重材料，只能少量生产以用来制造剑和弹簧这样的物件，而结构部件则用铸铁或熟铁来制造。

produced...wrought iron 是过去分词作状语。while 在此是连接词，意思是：但是，然而。例如：Some people like coffee, while others like tea. 有些人喜欢咖啡，而有些人喜欢茶。

2. In August 1856, an Englishman, Henry Bessemer, made public the description of a process which eventually reduced the price of steel to about a seventh of its former cost and more important still, made it possible to produce steel in large quantities.

在 1856 年 8 月，一位名叫亨利·贝塞麦的英国人公布了他的炼钢方法，这个工艺能

够把钢的成本降低到原来的七分之一左右，更重要的是它能够大量地生产钢了。

which 引出定语从句修饰 process, reduce 和 made 并列作 which 的谓语。

3. The acid Bessemer process, as the Victorian ironmasters discovered, could not eliminate phosphor, which is harmful to steel, so low phosphoric pig irons had to be used.

维多利亚女王时代的铁器制造商发现，酸性贝塞麦工艺不能去除对钢有害的磷，所以必须用低磷生铁进行冶炼。

as the Victorian ironmasters discovered 是插入语作状语。which...steel 是非限制性定语从句，修饰 phosphorus。

4. The basic lining of the converter provided conditions under which the reactions with the lime could take place without destroying the furnace lining.

转炉采用碱性炉衬为铁水与石灰发生反应提供了条件，从而避免了石灰对炉衬的损坏。

under which...引出的定语从句修饰 conditions。

5. After its inventors, it was also known as the Siemens-Martin process (or open-hearth process).

依据它的发明者的名字命名，就称为西门子-马丁工艺（平炉工艺）。

after 在此的意思是：以…命名。例如：The boy was named after his uncle. 那孩子以他叔叔的名字取名。

6. This rather inefficient performance of the open hearth, compared with the enormous output of the blast furnace, justified the emergence of the highly productive oxygen process for steel.

与高炉的巨大生产能力相比，平炉效率不高，这就必然促成了大生产能力的氧气转炉炼钢法的出现。

compared...blast furnace 是过去分词作状语。

7. The rapid increases in demand for alloy steels during and after the Second World War led to the construction of larger furnace with lower power consumption per ton of metal.

第二次世界大战期间和之后，合金钢需求的快速增加导致要建造炉容大和吨钢能耗低的炉子。

with...per ton of metal 是定语修饰 larger furnace。the Second World War: 第二次世界大战.

8. As the demand for high quality steels increased, post-treatment became a routine step in the production of steel.

随着对高质量钢需求的增长，炉外精炼已成为当今炼钢过程中必不可少的步骤。

As 是连词，意思是：随着。例如：As it become more common for women to work outside the house, men began to share the housework. 随着妇女外出就业的普遍，男人们分担了家务劳动。

Part Ⅱ Translation Training

翻译标准及过程

翻译标准是衡量翻译的尺度。一般概括为两点：

（1）准确。译者必须把原作的内容完整而准确地表达出来，不能篡改歪曲作者的思想

内容，要尽可能地保持原作的本来面目。

（2）流畅。译文必须用词恰当、文理通顺、结构整齐、逻辑清楚，符合汉语语法规范和修辞习惯，使读者明白易懂。

翻译过程是正确理解原文和创造性地用另一种语言再现原文的过程，大体分为三个阶段：

（1）理解阶段。即理解原文词汇含义、句法结构、惯用法，分析理解前后句子及上下段落之间的逻辑关系。对于多义词、短语，要仔细推敲来决定确切译法，然后将前后句子与上下段落联系起来理解，形成对原文的整体印象，真正理解原文的内容。

（2）表达阶段。即译者把自己从原文理解的内容用本族语言重新表达出来。可以直译，也可以意译。

（3）校核阶段。即是理解与表达进一步深化，是对原文内容进一步核实以及对译文语言进一步推敲的阶段。初校，着重内容，对照原文，边看边改，看看有无漏译、错译之处，要特别注意日期、数字。复校，着重润饰文字，脱离原文，避免受原文表达形式的束缚和影响，看看译文是否句简词精、文理通顺、传神达意。定稿，对照原文，对译文再进行一次检查修改，一定要使所有的问题都得以解决，然后定稿。

Part Ⅲ Exercises

Ⅰ. Translate the following expressions into English.

1. 钢铁工业	2. 海绵铁	3. 结构部件
4. 碱性耐火砖	5. 熟铁	6. 平炉
7. 木炭	8. 低磷生铁	9. 铸铁
10. 焦炭	11. 高炉	12. 熔池
13. 风量	14. 白云石	15. 炉外精炼

Ⅱ. Fill in the blanks with the words from the text. The first letter of the word is given.

1. As early as 3, 000 years ago, i _____ was serving as a basis of human culture and civilization.

2. The beginning of the extraction of iron from its ores dates b _____ to prehistoric times.

3. The s _____ iron could be hammered into shape to make tools and weapons.

4. B _____ were used to increase the supply of air.

5. This innovation resulted in a steep r _____ in pig iron production.

6. The first Bessemer c _____ was lined with silica bricks.

7. The idea of using pure oxygen to convert molten iron into steel was suggested in some of the Bessemer p _____ over 100 years age.

8. The e _____-arc furnace process was first used extensively for the production of alloy steels