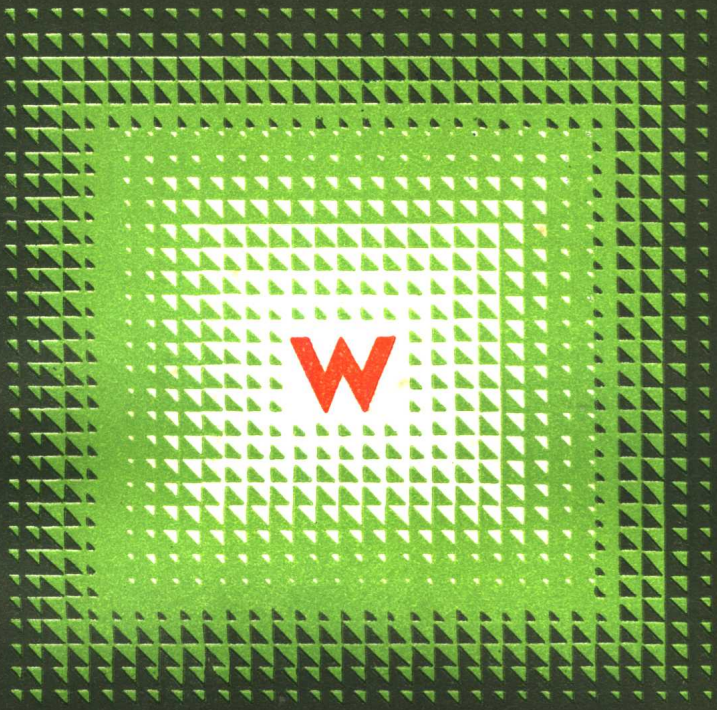

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全国十五所高等院校联编

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前　言

《焊接专业英语文选》是在全国十五所高等院校联编的《焊接英语阅读教材》的基础上修订出版的。参加联编的院校是：山东工学院、大连铁道学院、上海交通大学、太原工学院、天津大学、北京工业大学、北京航空学院、甘肃工业大学、华中工学院、华南工学院、西安交通大学、沈阳机电学院、哈尔滨工业大学、清华大学和湘潭大学。该教材经过试用，反映良好。现为适应广大读者的需要，特修订出版。

本书可供工科大专、中专院校、职工大学及业余学校等的焊接专业学生用作专业英语阅读教材，也可供广大焊接工作者自学英语提高阅读水平之用。

全书分为四个部分：一般焊接文摘选读（共十一篇，每篇有一语法重点），焊接电工，焊接冶金，焊接工艺。文章绝大部分选自七十年代出版的焊接专业原文书刊，如 Welding Handbook, Welding Encyclopedia, Welding Skills and Practice 等。内容尽量反映先进技术，编排上力求做到由浅入深，先易后难。

为便于自学，本书对语法上的一些重点和难点以及某些专业词汇作有大量注释；在原文之后并附有全部中文译文，供读者参考。文中初次出现的词组，一律用斜体印刷。书后附有总词汇表、总词组表以及焊接专业常用缩写词，以便查阅。

参加本书初稿编写的有：常顺康（组长），魏力行、王士先（副组长），林文极、汪礼瑞、华威、赵志洁、曹明明、

吴孝恩。另外，褚飞文、陈义顺、于春岩、赵桂树、周豫才、苏丽娟、谢惠韫等也曾参加初稿的规划或审阅工作。

参加本书修订的有：魏力行、常顺康、王士先、林文极、汪礼瑞。

本书在编写和修订过程中，曾先后得到余尚志、梅福欣、郝廷玺、李治强等同志热心帮助，并承蓝俊翔同志协助校阅。对此，我们表示衷心的感谢。

编者

1981年10月

A WELDING TECHNICAL READER

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A WELDING TECHNICAL READER

PART I

ACCESS TO WELDING LITERATURE

1. What is Welding?

It is generally known that① welding is the joining of two or more surfaces (usually metals, but not always) *so that*② the material of one③ mixes together with that④ of the other to produce a homogeneous union. *In order to* obtain a joint in welding metals, there must be a sufficient combination of proximity and activity between the molecules of the materials to be welded⑤ *so that* they can form common, metallic crystals. The range of combinations of proximity and activity is so great that joint may be produced only by temperature, without any external pressure, or only by pressure, without the application of heat.

Since most metal surfaces *tend to* become unclean at raised temperatures, great attention must be given⑥

to methods for preventing oxidation and other contamination *in order to* obtain high-quality welds.

Other factors that⑦ must be *taken into account* in welding are the metallurgical effects that⑧ *result from* the heating and cooling which accompany most welding processes.

To obtain satisfactory welds, then, it is necessary to have the following: a) a satisfactory heat and/or pressure source; b) a means of protecting or cleaning the metal.

According to the source of energy used for heating the metals and the state of the metal at the place being welded⑨, all existing welding processes may *be classified into* two broad systems: fusion processes and pressure processes. *In the case of* the first system, only heat is employed, and in that⑩ of the second system, *both* pressure *and* heat are used. In both systems various welding methods have been developed.

Notes 注释

① that 连词，引出由句首 It 所代替的主语从句。

② so that 为连词，引出状语从句，有时表示结果（以致…，因此…），如本句；有时表示目的（以便…，为了…），如下面一句。表示目的的连词也可用 in order that 或 that，句中常含有情态动词 can，could，may，might 等。表示结果的连词也可用 so ... that 或 that。本段

第三句中的...so great that...，即属此例。

③ 本句中 one... the other...均为代词。one 指 one surface; the other 指 the other surface。

④ 此 that 为指示代词，代表前面出现过的名词 the material，以避免重复。

⑤ ...there must be a sufficient combination of... 这是 there be 的句型，主语为 a sufficient combination; to be welded 是动词不定式的被动形式，作定语，修饰 the materials，有“将”、“要”、“被”(焊接)的含义。本句可译为：“…待焊材料分子之间的距离和活度必须得当配合…”。

⑥ great attention must be given...这是词组 give (或 pay) attention to (注意，关心)的被动扩展形式，意为：“必须十分注意…。”

⑦ 此 that 为引出定语从句的关系代词，在句中代表 other factors 作主语。

⑧ 同注⑦，that 在此代表 metallurgical effects。

⑨ ...the state of the metal at the place being welded，也是介词 according to 的宾语，与 the source of energy 并列；being welded 是现在分词的被动形式，作定语，修饰 the place，表示“正被(焊接)”的含义。这一短语可译作“(根据)…被焊处的金属状态…”。

⑩ that 为指示代词，用法同注④；在本句内代表前面出现过的名词 the case。

在这篇短文中，that 的各种不同用法比较集中，可参照比较，加以理解。

2. Heat Treatment of Steel

The welders must *be familiar with* how to heat treat metals.① Heat treatment is a method by which the physical properties of a metal can be changed. There are three main operations in the heat treatment of steel: hardening, tempering, and annealing. The hardening operation *consists of* heating the steel above its critical range and then quenching it, *that is,* rapidly cooling it in a suitable medium *such as* water, brine, oil, or some other liquid. Having been hardened,② the metal must be given a tempering treatment which *consists of* reheating the hardened steel to a temperature below the critical range, thus producing the required physical properties.③ Tempering is also called drawing the temper, because this operation gives a steel object the temper being required.④

The critical points or critical temperatures are the temperatures at which a certain change *takes place* in the physical condition of the steel. These points are very important because, *in order to* properly harden a piece of steel, it must be heated to a temperature above the upper critical point. Having known⑤ the critical points for a certain steel, we can easily control the heat in the furnace. Gas, oil,

and electric furnaces are the most commonly used for heat treating metal.

Annealing is the uniform heating of a metal above usual hardening temperatures, followed by very slow cooling. Annealing may be *carried out* either to soften a piece that is too hard to machine or to remachine a piece having been hardened.⑥ Annealing also relieves internal stresses produced by machining.

In welding, heat treatment usually *refers to* the post-welding introduction of heat to the weldment, to remove conditions *brought about* by the heat of welding.

Notes 注释

① ...how to heat treat metals为不定式短语，作介词with的宾语。动词heat treat是由名词heat treatment转化来的合成动词。

② Having been hardened是动词harden的现在分词被动态完成式，表示其动作的被动意义，并强调该动作发生在谓语动词的动作之前，在句中做状语。

③ ...thus producing the required physical properties为分词短语，作状语，修饰动名词reheating，表示结果。可译作："从而产生所需要的物理性能。"

④ being required为被动态的现在分词，表示被动意义，并强调该动作与谓语动词的动作同时进行。在句中作定语，修饰the temper。

⑤ Having known ... 为主动态完成式的现在分词，表示其动作发生在谓语动词的动作之前，在句中做状语。

⑥ 本句中 to soften a piece 和 to remachine a piece 是用 either ... or ... 并列连接的两个不定式短语，共作目的状语。that is too hard to machine 为定语从句，修饰 a piece; 其中 too hard to machine 是英语中的 too ... to ...（太…以致不能…）的句型，此处可译为："硬得不能加工"。

句末的 having been hardened 是现在分词的被动完成式，作定语，修饰另一 a piece，意为"一个已经被淬硬了的工件"。

科技英语中分词（词组）出现较多。本文就被动态和完成式的分词重点作了注释，可予注意。

3. The Selection of Metals in Welding

Most of the seventy-five *or so* metals in nature are used in industry, and about one-third of the metals are of interest① in welding. A use can always be found for the particular combination of properties represented by any metal. Besides, the range of available metals has been greatly extended by alloying, and there is no limit to the number of alloys possible to be developed.② From the one metal iron,③ probably *more than* 25,000 alloys of steel are found to have been developed,④ although the uses of pure iron are very few *in contrast to* the vast range of purposes served by the many steel alloys.

The basic characteristics that make the metals so very useful are their weldability, hardness, stiffness, and ductility (that is the property to be shaped easily⑤). These characteristics of metals are of great importance⑥ to a welder. If he has some knowledge of them, he *is certain to* have his welding jobs done⑦ *in a proper way.*

There is no such thing as an ideal metal, although nickel may be considered to have come closest.⑧ For a particular application, the best selection is the metal that has the most favourable features. Probably

the two most important characteristics to be considered are cost and weight. Weight particularly has been paid greater attention to *in*⑨ *recent years owing to* the development of modern industries. It is for this purpose that aluminium and beryllium are used to make aircrafts and rockets.⑩ Cost must be balanced against other characteristics of the metal. *For example*, it is possible to replace beryllium by metals of only a hundredth the cost, but such substitutes cannot match beryllium's stiffness and strength, and the industries⑪ concerned may decide that the superiority of beryllium warrants the increased cost. For other applications, however, beryllium is not in such a favour, and therefore is not *considered as* a metal to be required.⑫

Notes 注释

① ...are of interest in...：在…中引起关心；与…有关。

② to be developed，被动语态的不定式，作状语，修饰possible。

③ From the one metal iron 为介词短语；iron 是 one metal 的同位语。这个短语可译为："光就铁这一种金属来说"。

④ to have been developed，动词不定式的被动语态完成式，在句中作主语补足语，表示谓语动词 are found 之前所发生的情况。