

全国船舶工业职业教育教学指导委员会推荐教材
示范性高等职业院校船舶专业英语规划教材



材料工程英语

MATERIALS ENGINEERING ENGLISH

总主编/李桂杰 主编/赵丽玲

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内容简介

本教材较为全面系统地介绍了焊接技术、焊接质量检测技术、铸造技术的相关内容。内容主要包括:常用的焊接、切割、焊接质量检测和铸造工艺及其在工业中的应用,并且节选了国际船级社协会的《船舶建造及修理质量标准》《ISO 5817》质量标准的相关内容,共分 10 个单元,两个实训演练。每单元由五个部分构成,每个实训演练由三个对话构成。

本书可作为船舶焊接技术类专业三年制高职或五年制高职的全日制教材,也可供造船企业、船舶维修及船务公司等相关单位的人员参考使用。

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船舶专业英语系列教程

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编写说明

船舶专业英语系列教程是根据教育部颁发的《高职高专教育英语课程教学基本要求》(以下简称《基本要求》),从我国船舶和机械加工企业对人才的需求出发编写的一套专业英语教材。本教材在充分吸取以往船舶和机械加工专业英语相关教程、资料精髓的基础上,与时俱进、大胆创新,在内容编排、选材及设计上突破传统、注重实用,旨在使学生通过本教材的系统学习,加速将船舶和机械加工专业知识中英文的对应转化,提高语言职场应用能力,增强学生的就业竞争力。同时本教程也可以作为船舶企业员工的培训教程,及船舶相关专业人员从事英文资料研究或积累的参考教程。

一、编写原则

1. 以《基本要求》为依据,重点培养学生英语综合应用能力。
2. 充分体现以“实用”为主、以“应用”为目的的教学目标。强调内容的实用性、趣味性、直观性,注重构建基于生产过程的课程结构。
3. 力求选材新、短、实用。教材的大部分选材来自于船舶和机械加工企业一线正在使用的一手材料,以生产过程为主线编辑篇章结构,达到“学以致用”的效果。
4. 处理好两个衔接:一是处理好船舶专业理论知识与英语表述的衔接;二是处理好基础英语与专业英语的课程衔接。

二、教材特色

1. 实用

在选材上突出“实用为主,够用为度”的指导原则,彻底改变以往教材只注重船舶原理的阐述而忽视船舶专业英语实际应用的弊端,以企业生产及职场交际为着眼点提升学生的语言应用能力,真正做到学以致用。

2. 新颖

本教程的“新”分别体现在内容和内容的编排上。书中多数内容都来自于目前船舶与加工企业一线正在使用的资料,充分保证其知识结构的与时俱进性。另外,从内容的编排上编者力争做到基于生产过程的顺序编排。

3. 直观

在教材的设计风格上,添加大量的照片、图表、数据、样例,力求使学生见物想词、见词知物,从而达到语言和实物一一对应的效果。

4. 创新

本教程创新地在每五课后面增加一个实训演练部分。通过对话和身临其境地模拟练习使学生将前面学到的知识点应用到工作过程当中,切实提高学生的实际语言交流能力。

5. 简练

本教程洞察学生的英语水平和学习需求,不求教材大而全,而求其简练。充分考虑学生今后就业、学习和交际的需要,尽可能控制难度,确保学生接受语言信息输入的效果。

三、教材内容

本教程共包括六个分册,分别是:《船舶基础英语》《船舶工程英语》《船舶动力英语》《船舶电气英语》《船舶机电英语》《材料工程英语》。其中,《船舶基础英语》涉及到船体、船动、电气、船机和材料等五个船舶专业的基础理论概况,因此,每个专业皆可用之作为基础英语到专业英语的过渡教材。其他五个分册,使用者可根据本专业课程特点选用。每一分册都包括学生用书和教师用书(电子版)。

本教程每一册包括 10 个单元,两个实训演练。每单元包括五个部分:Course Design(课程设计)、Warm-up Question(热身问题)、Passage(课文)、Complementary Reading(课外阅读)、Tips(知识点滴)。每单元基本结构如下图:

Course Design(课程设计)	
Warm-up Question(热身问题)	
Passage(课文)	Article(课文)
	New Words and Expressions(生词与短语)
	Notes(注释)
	Exercises(练习题)
Complementary Reading (课外阅读)	Article(课文)
	New Words and Expressions(生词与短语)
	Notes(注释)
	Exercises(练习题)
Tips(知识点滴)	

其中每五个单元后设置一个 Practical Training(实训演练)部分,每个实训演练含三个对话。此部分意在通过模拟工作实景,展开语言应用训练,培养学生利用所学专业外语进行实际语言交流的能力。

本教程最初编写创意是由本教程编委会主任、渤海船舶职业学院丛培亭院长提出,由渤海船舶职业学院基础部外语教研室李桂杰副教授任总主编,负责总体设计、编排和审订。其他分册的主编分别是渤海船舶职业学院船舶工程系的杨文林副教授、材料工程系的赵丽玲副教授、船舶电气工程系的宋运伟副教授、动力工程系的郑学贵副教授、基础部的王锐讲师、机电工程系的魏林讲师等,负责各分册的编排、组稿和审订。

本教程在编写过程中得到了渤海船舶重工、广船国际有限公司、大连中远造船工业公司、广州黄埔造船公司的多位专家和技术人员的鼎力相助和指导,在此谨致谢忱。

由于编者水平有限,难免有疏漏不当之处,恳请各教学单位及广大读者在使用过程中给予批评指正。

编 者
2011 年 8 月

前 言

本书在编写过程中,注重语言知识与专业知识的结合,增强阅读能力与交际能力的培养。教材设计上遵从教学规律,循序渐进,由浅入深,采取师生互动,图文并茂的直观表达方式,使学生易于接受,在保证课程理论的系统性和严谨性的同时,更注重知识的实用性。

本教材较为全面系统地介绍了焊接技术、焊接质量检测技术、铸造技术的相关内容。主要内容包括常用的焊接、切割、焊接质量检测和铸造工艺及其在工业中的应用,并且节选了国际船级社协会的《船舶建造及修理质量标准》《ISO 5817》质量标准的相关内容,共分 10 个单元,两个实训演练。每单元由五个部分构成,每个实训演练由三个对话构成。其中:

课程设计(Course Design)从教学目标、课时分布和教学辅助设施方面给授课教师提出相关的建议和指导。

热身问题(Warm-up Question)以图文并茂的形式引导学生思考与课文内容相关的问题,为理解和掌握课文知识做好充分的准备。

课文(Passage)是课堂重点了解和讲解的内容,是需要掌握的专业知识。为了全面消化、掌握课文内容,每篇课文后配有生词与短语(New Words and Expressions)、难点注释(Notes)和强化课文中出现的重点词汇、词组、句子的相关习题。

课外阅读(Complementary Reading)供学生在课余时间研究学习,加深对课程的理解,弥补课堂教学的不足,进一步扩大知识面。为了达到上述效果,也配有生词与短语(New Words and Expressions)、难点注释(Notes)和阅读理解习题。

知识点滴(Tips)部分为与课程内容相关的小知识模块,拓宽学生的知识面,增强学生的学习兴趣。

此外,实训演练(Practical Training)旨在通过模拟工作场景,展开语言应用训练,培养学生利用所学专业外语知识进行实际语言交流的能力。

教师参考书以电子版的形式为教师提供每个单元的教案、练习题答案以及课文参考译文。

本教材由渤海船舶职业学院赵丽玲副教授担任主编,负责全书的设计统稿,并编写第 1,7,8 单元及附录;副主编为渤海船舶职业学院李丽茹,并编写第 5,6 单元;参编的有赵艳艳、张楠、徐双钱、魏同锋,其中第 2,3 单元由徐双钱编写,第 4 单元及两个实训演练部分由张楠编写,第 9 单元由赵艳艳编写,第 10 单元由魏同锋编写。

在本书的编写过程中,我们得到了大连中远造船工业公司、广州黄埔造船公司及渤海船舶重工等单位多位同志的大力支持和帮助,在此一并致以衷心的感谢。

由于编者水平有限和时间仓促,疏漏之处在所难免,恳请广大同仁批评指正。

编 者

2011 年 8 月

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Basic Knowledge of Welding

Unit 1

Course Design

Unit goal: Students can study the basic knowledge of welding, for example, the composition of welded joint, the types of joints and welding positions. Master the terminologies of welding.

Teaching plan: 2 hours in this chapter

Teaching aids: Multimedia classroom

Warm-up Question

Do you know the following pictures? They are all welding structures.



bird's nest



bridge



ship



pressure vessel



Passage

Basic Knowledge of Welding

Welding means that filler metal may or may not be used and heat with or without pressure is

used, but the result is that a continuity of solid metal is formed between the workpieces^[1]. The joint formed by welding can't be disassembled.

The composition of welded joint

Joint is "the junction of members or the edges of members that are to be joined or have been joined." Welded joint is a composite of all the parts involved in welding and comprises weld metal, bond area and heat-affected zone (HAZ). The composition of welded joint is shown in Figure 1.1.

Weld refers to the area of coalescence produced by welding process. Weld is the region which has been melted during welding.

Bond area is a transition zone between weld and heat-affected zone in the welded joint.

Heat-affected zone is that part of the base metal which, because of its proximity to the fused metal, has been influenced by the heat generated in the welding process^[2].

Base metal is the material to be joined.

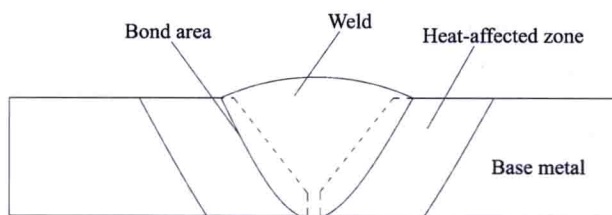


Figure 1.1 The composition of welded joint

Types of joints

There are five basic types of joints. They are butt joint, corner joint, T joint, lap joint and edge joint. The five basic joints are shown in Figure 1.2.

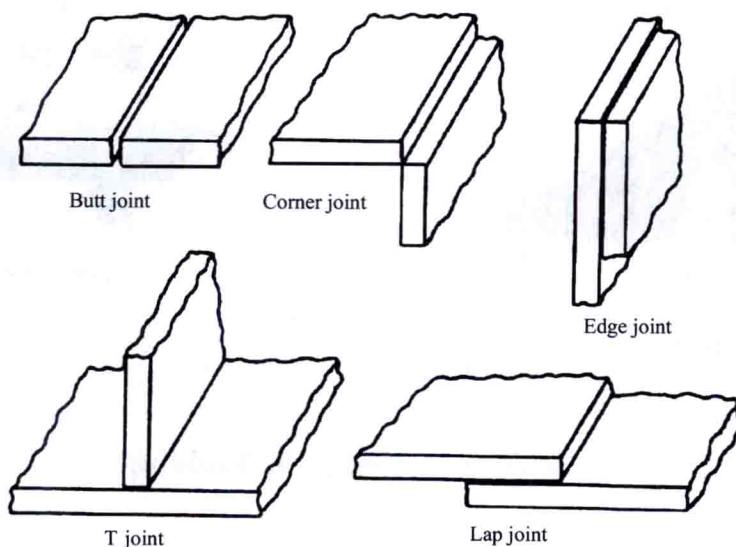


Figure 1.2 Five basic joint types

Welding positions

Welding is often done on structures in the position in which they are found. In view of this, techniques have been developed to allow welding in any position. Certain welding processes have “all-position” capabilities, while others may be used in only one or two positions. There are four basic welding positions. Figure 1.3 shows the groove weld in the four positions:

Flat position: The welding position in which welding is done from the upper side of the joint. The weld axis is approximately horizontal. This is sometimes called downhand position.

Horizontal position: The welding position in which the weld axis is approximately horizontal, but the definition varies with groove and fillets^[3].

Overhead position: The welding position in which welding is performed from the underside of the joint.

Vertical position: The welding position in which the weld axis is approximately vertical.

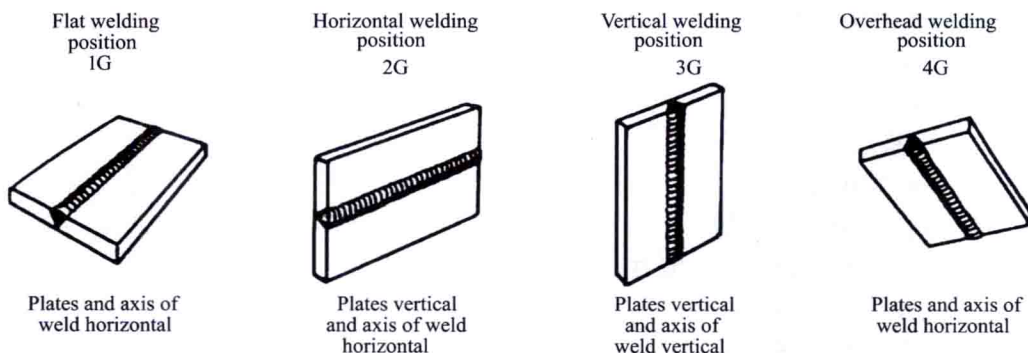


Figure 1.3 Welding positions for groove welds: plate

New Words and Expressions

weld [weld] *v.* 焊接; *n.* 焊接

filler metal 填充金属

continuity [ˌkɒntɪˈnjuːɪti] *n.* 连续性

workpiece [ˈwɜːkpiːs] *n.* 工件

joint [dʒɔɪnt] *n.* 接头

disassemble [ˌdɪsəˈseɪbl] *vt.* 拆开

composition [kəmˈpəʊzɪʃən] *n.* 成分, 组成

welded joint 焊接接头

junction [ˈdʒʌŋkʃən] *n.* 连接点

member [ˈmembə] *n.* 构件

composite [ˈkɒmpəzɪt] *n.* 结合

comprise [kəmˈpraɪz] *vt.* 由……组成

bond [bɒnd] *n.* 连接, 结合

bond area 熔合区

heat-affected zone 热影响区

refer to 指,提到

coalescence [ˌkəʊəˈleɪns] *n.* 接合

welding process 焊接方法,焊接过程

melt [melt] *v.* 熔化

transition [trænˈzɪʃən] *n.* 过渡

base metal 母材

proximity [prɒkˈsɪmɪti] *n.* 邻近,接近

fuse [fjuːz] *v.* 熔化

influence [ˈɪnfluəns] *vt.* 影响

generate [ˈdʒenəreɪt] *vt.* 产生

butt [bʌt] *n.* 对接

butt joint 对接接头

corner joint 角接接头

T joint T形接头

lap joint 搭接接头

edge joint 端接接头

welding position 焊接位置

capability [ˌkeɪpəˈbɪlɪti] *n.* 能力

groove [ɡruːv] *n.* 坡口

flat [flæt] *adj.* 平的

flat position 平焊位置

axis [ˈæksɪs] *n.* 轴,轴线

horizontal [ˌhɒrɪˈzɒntl] *adj.* 水平的

downhand [ˈdaʊnhænd] *adj.* 平焊的

downhand position 平焊位置

horizontal position 横焊位置

fillet [ˈfɪlɪt] *n.* 角焊缝

overhead [ˈəʊvəˈhed] *adj.* 在上头的

overhead position 仰焊位置

underside [ˈʌndəsaɪd] *n.* 下面,底面

vertical [ˈvɜːtɪkəl] *adj.* 竖直的

vertical position 立焊位置

Notes

[1] Welding means that filler metal may or may not be used and heat with or without pressure is used, but the result is that a continuity of solid metal is formed between the workpieces.

“焊接”是指可以用或不用填充金属,通过加热(可以用或不用压力),在工件之间形成

连续的固态金属。

句中“with or without pressure”作“heat”的伴随状语。

[2] Heat-affected zone is that part of the base metal which, because of its proximity to the fused metal, has been influenced by the heat generated in the welding process.

热影响区是邻近熔化的金属,并且受焊接热作用影响的母材部分。

句中“which, because of its proximity to the fused metal, has been influenced by the heat generated in the welding process”是定语从句,修饰前面的“part of the base metal”,其中“because of its proximity to the fused metal”作原因状语。

[3] Horizontal position: The welding position in which the weld axis is approximately horizontal, but the definition varies with groove and fillets.

横焊位置:焊缝的轴线大致水平的焊接位置,但这个定义随着坡口和角焊缝而变。

句中“in which”引导定语从句。

Exercises

I. Explain the following words and phrases.

1. Welding

2. Weld

3. Welded joint

4. Bond area

5. Heat-affected zone

II. Fill in the blanks according to the passage.

1. Welded joint is a composite of all the parts involved in welding and comprises _____, _____ and _____.

2. There are five basic types of joints. They are _____, _____, _____, _____ and _____.

3. There are four basic welding positions. They are _____, _____, _____ and _____.

III. Translation.

1. Joint is “the junction of members or the edges of members that are to be joined or have been joined.”

2. Weld refers to the area of coalescence produced by welding process. Weld is the region which has been melted during welding.

3. Bond area is a transition zone between weld and heat-affected zone in the welded joint.

4. Flat position: The welding position in which welding is done from the upper side of the joint. The weld axis is approximately horizontal. This is sometimes called downhand position.

5. Vertical position: The welding position in which the weld axis is approximately vertical.



Complementary Reading

Classification of Welding Processes

Most welding processes require the application of energy (heat or pressure) to produce a suitable bond. Therefore welding processes may be classified and named according to the type of energy source employed. If including brazing, the classification of welding processes is listed below:

(1) Fusion welding

① Oxyacetylene welding (OAW)

② Arc welding:

Shielded metal arc welding (SMAW) or Manual metal arc welding (MMAW)

Gas metal arc welding (GMAW), includes: metal inert-gas welding (MIG) and metal active-gas welding (MAG)

Gas tungsten arc welding (GTAW) or tungsten inert-gas arc welding (TIG)

Flux cored arc welding (FCAW)

Electrogas welding (GMAW-EG; FCAW-EG)

Plasma arc welding (PAW)

Submerged arc welding (SAW)

③ Electroslag welding (ESW)

④ Thermit welding (TW)

⑤ Laser beam welding (LBW)

⑥ Electron beam welding (EBW)

(2) Pressure welding

① Resistance welding, includes: spot welding, seam welding and butt welding

② Cold welding

③ Friction welding

- ④Ultrasonic welding
- ⑤Explosion welding in vacuum
- ⑥Diffusion welding
- ⑦High frequency welding

(3) Brazing welding

This way of classifying welding processes is called family-tree method.

In fact, there is no uniform method of naming welding processes. Many processes are named according to the heat source or shielding method, but certain specialized processes are named after the type of joint produced, for example, stud, spot and butt welding. An overall classification cannot take account of this because the same type of joint may be produced by a variety of processes. Stud welding may be done by arc or projection welding and spot welding by electric resistance, arc or electron-beam process^[1]. Butt welding may be done by resistance, flash or any of a number of other methods. Although in common usage many processes have abbreviated names, the full names often follow the pattern: firstly, a statement of the type of shielding; secondly, the type of heat or energy source; thirdly, the type of joint (where this is of specific and no general importance).

It is often necessary when referring to processes to mention the way they are used, particularly whether the operation is manual or automatic^[2]. The practical operation of welding can be divided into three main parts:

- (a) The control of welding conditions, particularly arc length and electrode or filler-wire feed rate and time.
- (b) The movement and guiding of the electrode, torch or welding head along the weld line.
- (c) The transfer of parts for welding.

Processes are described as manual, semi-automatic, or automatic, depending on the extent to which the parts mentioned above are performed manually. Manual welding is understood to be that the welding variables are continuously controlled by the operator and the means for welding are held in the operator's hand^[3]. Semi-automatic welding is that there is automatic control of welding conditions such as arc length, rate of filler-wire addition and weld time, but the movement and guiding of the electrode, torch or welding head is done by hand. With automatic welding at least part (a) and (b) must be done by machine.

New Words and Expressions

according to 根据

employ [im'plɔɪ] *vt.* 使用, 利用

brazing [breɪz] *vt.* 钎焊

fusion welding 熔焊

oxyacetylene [ˈɒksɪə'setili:n] *adj.* 氧乙炔的

oxyacetylene welding (OAW) 氧乙炔焊

arc [ɑ:k] *n.* 电弧

arc welding 电弧焊
 shielded metal arc welding (SMAW) 焊条电弧焊
 manual metal arc welding (MMAW) 焊条电弧焊
 gas metal arc welding (GMAW) 气体保护电弧焊
 inert [i'nə:t] *adj.* 惰性的
 metal inert-gas welding (MIG) 熔化极惰性气体保护焊
 metal active-gas welding (MAG) 熔化极活性气体保护焊
 tungsten [ˈtʌŋstən] *n.* 钨极
 gas tungsten arc welding (GTAW) 钨极惰性气体保护焊
 tungsten inert-gas arc welding (TIG) 钨极惰性气体保护焊
 flux [flʌks] *n.* 焊剂
 flux cored arc welding (FCAW) 药芯焊丝电弧焊
 electrogas welding (GMAW-EG, FCAW-EG) 气电焊
 plasma [ˈplæzmə] *n.* 等离子体
 plasma arc welding (PAW) 等离子弧焊
 submerge [səb'mə:dʒ] *v.* 浸没, 淹没
 submerged arc welding (SAW) 埋弧焊
 electroslog welding (ESW) 电渣焊
 thermit [ˈθə:mait] *n.* 铝热剂
 thermit welding (TW) 热剂焊
 laser beam welding (LBW) 激光束焊
 electron beam welding (EBW) 电子束焊
 pressure welding 压焊
 resistance welding 电阻焊
 spot welding 点焊
 seam welding 缝焊
 butt welding 对焊
 cold welding 冷压焊
 friction [ˈfrikʃən] *n.* 摩擦
 friction welding 摩擦焊
 ultrasonic [ʌltʃə'sɒnik] *adj.* 超声波的
 ultrasonic welding 超声波焊
 explosion [iksˈpləʊʒən] *n.* 爆炸
 vacuum [ˈvækjuəm] *n.* 真空
 explosion welding in vacuum 真空爆炸焊
 diffusion [diˈfju:ʒən] *n.* 扩散
 diffusion welding 扩散焊
 frequency [ˈfri:kwənsi] *n.* 频率
 high frequency welding 高频焊
 brazing welding 钎焊