

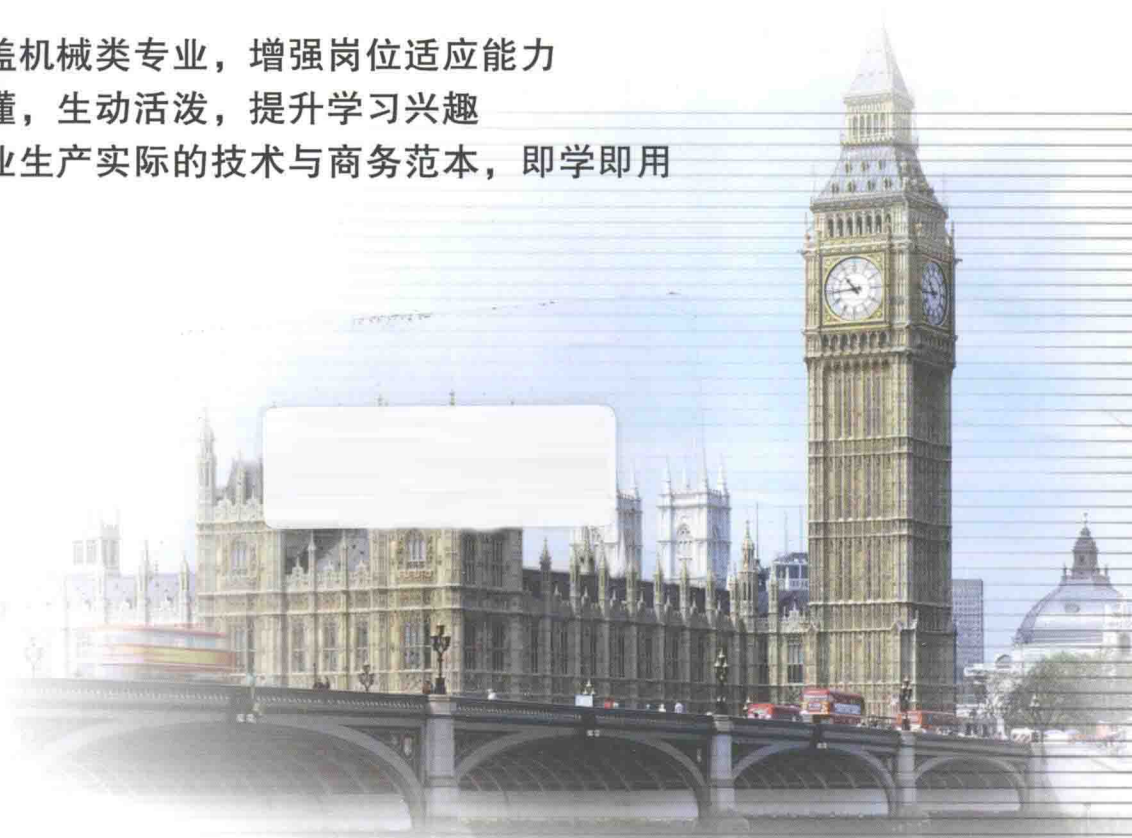


“十二五”职业教育国家规划教材
经全国职业教育教材审定委员会审定

机械专业英语

主 编 陈加明 刘 晶 郭建钢
副主编 华瑞杰 金 松 赵晓峰

完整覆盖机械类专业，增强岗位适应能力
浅显易懂，生动活泼，提升学习兴趣
来自企业生产实际的技术与商务范本，即学即用



浙大旭日科技提供教学资源



ZHEJIANG UNIVERSITY PRESS
浙江大学出版社



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内容简介

本教材以机械学科的“通识英语”为教学目标,内容分为机电、模具、数控、CAD/CAM/CAE、汽车、商务等多个专业领域,取材广泛、浅显易懂、生动活泼,其中许多内容源自企业真实的生产活动,即学即用。教材采用了独特的奇、偶页比照排版,并在配套教学资源库中提供了全书参考译文、试题库、视频短片、PPT 等,并有虚拟教学软件、在线组卷系统、基于 PAD 的在线实时考试系统等多种先进的教学工具可供选用(详见“关于本书”),大幅度提升教学效率和效果。

本书是“十二五”职业教育国家规划教材,适合用作应用型本科、高等职业院校机电、模具、数控、汽车、计辅等机械类专业的英语教学,也可作为制造业从业工程师的自学参考教材。

机械专业英语

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《机械工程系列规划教材》

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前言

中国被称为“世界工厂”，反映出中国制造业日益国际化的趋势。对许多制造业的工程技术人员来说，专业英语的使用已经成为日常工作的一部分。对院校制造类专业的学生而言，专业英语不是一门可有可无的课程，而是就业必备的一项专业技能。

与现实的需求形成鲜明对照的是，专业英语教学的现状却不容乐观，常常是学生学得痛苦，老师教得更痛苦！专业英语课程在学生眼中，成了枯燥乏味的代名词，学时无兴趣，学后无效果。在院校眼中，专业英语课程变成了“鸡肋”，许多院校甚至取消了专业英语课程。

我们认为，专业英语之所以那么不受“欢迎”，一个重要的原因是，我们常常把专业英语课当成了英语专业课！老师也好，教材作者也好，会不知不觉地试图让学生用英语去学习所谓“专业”的知识，其结果是把教学内容搞得“面目可憎”。

事实上，制造类专业的学生毕业后，其面对的就业岗位分布是非常广泛的，专业对口率并不高，一个模具专业的学生，毕业后从事的工作可能是数控编程，也可能是汽车零部件设计。所以，专业英语的教学要适应这一现实的需求，教学目标就应该是“广而浅”，而不是“专且深”。

本教材的编写从“机械通识英语”的立意出发，以培养专业英语的基本应用能力为目标，内容覆盖机电、模具、数控、CAD/CAM/CAE、汽车、商务等多个专业领域，取材浅显易懂、生动活泼。同时，在编排方式、配套资源、辅助工具等方面，做了许多新的尝试（详见“关于本书”），从而将知识性、趣味性和实用性融为一体，充分发挥教学效果。

本书是“十二五”职业教育国家规划教材，适合用作为应用型本科、高等职业院校机电、模具、数控、汽车、计辅等机械类专业英语课程的教材，也可作为企业工程师的自学参考教材。

本书由陈加明（杭州职业技术学院）、刘晶（杭州浙大旭日科技开发有限公司）、郭建钢（上海信羽电子科技有限公司）等编写。限于编写时间和编者的水平，书中必然会存在需要进一步改进和提高的地方，另外，由于部分内容取材于网络，不可避免地存在一些不规范的和口语化的语言表达。我们十分期望读者及专业人士提出宝贵意见与建议，以便今后不断加以完善。请通过以下方式与我们交流：

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杭州浙大旭日科技开发有限公司为本书配套提供立体教学资源库、教学软件及相关协助，在此表示衷心的感谢。

最后，感谢浙江大学出版社为本书的出版所提供的机遇和帮助。

作者

2013年5月

关于本书

1 教材定位

我们认为专业英语教材的定位应为“广而浅”，而非“专而深”，原因有三：一、机械类专业学生毕业后的就业面较广，专业对口率不高。二、学生对专业性太强的教学内容接受度较低，教学效果不佳。三、制造业岗位对专业英语的需求常常是浅层次的应用，如简单的阅读理解等等。

本教材希望达成以下教学目标：

- 1) 认知机械行业一些最常见的词汇。
- 2) 培养基本的科技文献阅读理解能力。
- 3) 学习最简单的英语应用能力，如利用模板撰写简单的电子邮件、报价单等。

2 特色与创新

■ 内容与素材

1) 内容覆盖机械设计、机械制造、机电一体化、模具、数控、CAD/CAM/CAE、汽车和商务英语等多个机械相关领域，职业适应面广。2) 广泛取材于网络等新媒体渠道，保证教学内容的“新鲜度”。3) 大量与生产生活密切相关的案例素材，如汽车的常用性能配置等，并辅以丰富的插图，浅显易懂，生动有趣。4) 收录了企业实际生产活动中所使用的各种技术和商务素材，如报价单、技术标准、合同和来往邮件等，并整理成模板或范本，供读者在工作中参考使用。

本教材将知识性、趣味性和实用性融为一体，既是教材，又是应用工具书，“即学即用，学用合一”，可有效提高机械专业英语的教学效果。

■ 编排方式

本教材采用独特的正反(奇偶)页对照排版方式，正面是纯英语阅读资料，反面则为对应的难句释义、中英对照词汇表等，既能使英语阅读时不会受到母语“骚扰”，又能随时获得帮助。同时，对比较专业的机械词汇，尽可能采用“看图识字”的方式表现，效果更好。

■ 新技术的采用

配套开发了基于PAD的跨平台实时考试系统、各类虚拟仿真软件等丰富的配套教学工具，供院校选购使用。例如，“虚拟制造工厂”软件中包含了常见的各类虚拟机床、虚拟工艺装备(如模具、减速器等)，通过中英文切换，以高度逼真环境模拟，提供具有沉浸感的专业英语学习空间，并可进行在线考核，大大提升教学趣味性、便利性和效果。

3 配套资源

本教材免费配套丰富多样的教学资源，包括电子文档、全书翻译、难句解析、专业词汇表、教学PPT、练习与试题库、数十个双语视频等，并免费提供资源管理软件、在线组卷系统等教学工具。(注：部分资源仅向院校用户的任课教师提供。)

教学资源获取方式参见本教材《配套教学资源与服务》中的说明。

目 录

Chapter 1 Machine Design	1
1.1 Introduction to Machine Design	1
1.2 Fundamentals of Machine Design	3
1.2.1 The Strength of Mechanical Elements	3
1.2.2 Structural Components	11
1.2.3 Mechanisms	21
1.3 Tolerances and Fits	29
1.3.1 Introduction	29
1.3.2 Setting Tolerances	31
1.3.3 Mechanical Component Tolerance	33
1.3.4 Measure Instruments	35
Chapter 2 Machinery Manufacturing	41
2.1 Introduction to Machinery Manufacturing	41
2.2 Fundamentals of Machine Manufacturing	41
2.2.1 Materials in Manufacturing	41
2.2.2 Manufacturing Processes	43
2.2.3 Machine Tool	61
2.3 Metal Materials	65
2.3.1 Properties of Metal Materials	65
2.3.2 Copper	71
2.3.3 Steel	73
2.3.4 Alloys and Application	75
2.4 Heat Treatment	79
2.4.1 Heat Treatment Materials and Theory	79
2.4.2 Heat Treatment Processes	81
2.4.3 Classification of Heat Treatment for Steel	85
Chapter 3 Mechatronics	87
3.1 Introduction	87

3.1.1	What is Mechatronics?	87
3.1.2	The Development Stages	87
3.1.3	The Key Components	89
3.1.4	Application and Modern Trends	93
3.2	Single Chip Computers	93
3.2.1	The Development Process	93
3.2.2	The Interior Structure	97
3.3	Programmable Logic Controller (PLC)	101
3.3.1	What is PLC?	101
3.3.2	History	103
3.3.3	PLC System	105
3.3.4	Advantages of PLC Control System	111
3.5	Robot	115
3.5.1	History	117
3.5.2	Modern Robots	123
3.5.3	Robots in Society	125
3.5.4	Contemporary Uses	129
3.5.5	Future Development	137
3.5.6	FIRST Robotics Competition	139
3.5.7	Latest Robotics News	141
Chapter 4	CAD/ CAM/ CAE	143
4.1	CAD-Computer Aided Design	143
4.1.1	History	145
4.1.2	Uses	147
4.1.3	Type	147
4.1.4	Technology	149
4.1.5	Common Software-AutoCAD	151
4.2	CAM-Computer Aided Manufacturing	155
4.2.1	History	155
4.2.2	Machining Process	157
4.2.3	Technology	159
4.2.4	Common Software-Mastercam	163
4.3	CAE-Computer Aided Engineering	171
4.3.1	CAE Fields and Phases	171
4.3.2	CAE in the Automotive Industry	173
4.3.3	Technology	175

4.3.4 Common Software-Abaqus	177
4.4 Integrated CAD/ CAM/ CAE Systems	183
4.4.1 Software Classification	183
4.4.2 Common Software Introduction	183

Chapter 5 Numerical Control 193

5.1 Introduction	193
5.2 Numerical Control Machine Tools	195
5.2.1 Type of NC Machine	197
5.2.2 Components of NC Machine	197
5.2.3 Principles of NC Machine	199
5.2.4 Classification of NC Machine Tools	201
5.3 Numerical Control System	205
5.3.1 Software Construction of NC	207
5.3.2 Hardware Construction of NC	209
5.3.3 Principle of NC(diagrams)	211
5.3.4 Common NC System Brands	215
5.4 Numerical Control Programming	217
5.4.1 G-code	217
5.4.2 APT Language	229
5.4.3 Automatic Programming	231
5.5 Scientific Vocabulary	235

Chapter 6 Mould 239

6.1 Introduction	239
6.1.1 What is Mold or Mould?	239
6.1.2 Mold Classification and Application	243
6.2 Injection Molding	249
6.2.1 Introduction	249
6.2.2 Structure	253
6.2.3 Application	257
6.2.4 Structure Diagram	257
6.3 Cold Stamping Die	267
6.3.1 Introduction	267
6.3.2 Classification	267
6.3.3 Main Parts of Cold Stamping Die	269
6.3.4 Structure Diagram	273

6.4 Die Casting Mold	275
6.4.1 Introduction	275
6.4.2 Structure and Classification	277
6.4.3 Common Metals	279
6.4.4 Equipment	281
6.4.5 Process	283
6.5 Mold Analysis Software	285
6.5.1 Moldflow	285
6.5.2 DYNAFORM	289

Chapter 7 Vehicle

7.1 Development History of Vehicle	295
7.1.1 The Age of Steam-driven	295
7.1.2 The Age of Internal-combustion Driven	295
7.1.3 The Age of the United States	297
7.1.4 Modern Automobile Development	299
7.2 Car Classification	299
7.3 Structure of Automobile	309
7.3.1 Engine	309
7.3.2 Body	311
7.3.3 Chassis	311
7.3.4 Electrical Equipment	313
7.3.5 Automotive Engine	313
7.3.6 Engine Fuel System	317
7.3.7 Engine Cooling and Lubrication Systems	321
7.3.8 Diesel Engine Fuel Systems	323
7.3.9 Transmission System	325
7.3.10 Braking System	327
7.4 Automobile Performance and Equipment	329
7.5 The Process of Automobile Design and Manufacture	335
7.6 Future Automobile	337
7.6.1 Advanced Control	339
7.6.2 Energy Sources	341
7.6.3 Energy Saver	341
7.6.4 Materials	343

Chapter 8 Business English

8.1 Introduction	345
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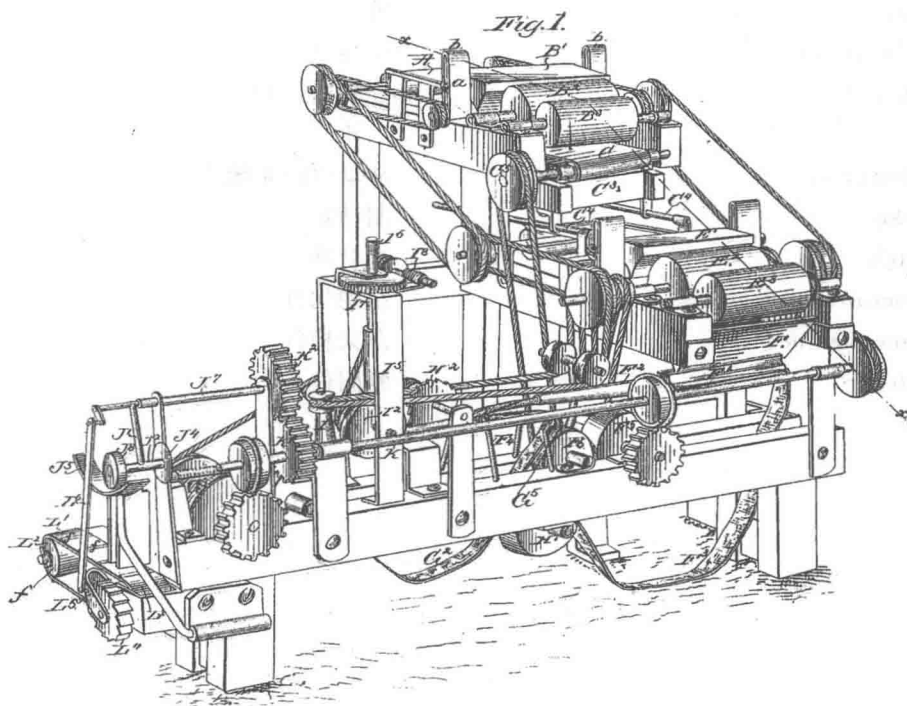
8.2 Business Letter Writing	347
8.3 Price Negotiation	347
8.3.1 Inquiry	349
8.3.2 Quotation	349
8.3.3 Bargaining	353
8.4 Orders	357
8.4.1 Place an Order	357
8.4.2 Confirm an Order	359
8.4.3 Cancel an Order	361
8.5 Contract	363
8.5.1 Drafting Principle of Contract	363
8.5.2 The Contents of Contract	363
8.6 Business Email Writing	367
8.6.1 Writing Forms	367
8.6.2 Writing Tips	371
8.6.3 Writing Example Sentence	373
8.6.4 Envelop	373
配套教学资源与服务	377

Chapter 1 Machine Design

1.1 Introduction to Machine Design

A machine is a powered tool consisting of one or more parts that is constructed to achieve a particular goal.

Machines are assembled from standardized types of components. *These elements consist of mechanisms that control movement in various ways such as gear trains, belt or chain drives, linkages, cam and follower systems, brakes and clutches, and structural components such as frame members and fasteners.*



■ James Albert Bonsack's cigarette rolling machine invented in 1880 and patented in 1881.

Machinery design involves a range of disciplines in materials, mechanics, heat, flow, control, electronics and production. Good design is the orderly and interesting

◆ 例句释义

These elements consist of mechanisms that control movement in various ways such as gear trains, belt or chain drives, linkages, cam and follower systems, brakes and clutches, and structural components such as frame members and fasteners.

这些元件组成了以各种各样方式控制机械运动的机构,例如齿轮传动,带传动或者链传动,连杆机构,凸轮和从动系统,制动装置和离合器,以及一些结构构件,比如车架构件和紧固件。

◆ 重点词汇

part	零件
component	组件
gear	齿轮
gear trains	(齿)轮系, 齿轮传动链
belt	皮带
belt drives	带传动
chain	链
chain drives	链传动
linkage	连杆(机构)
cam	凸轮
follower system	从动(件)系统
brake	制动器
clutch	离合器
structure components	结构构件
frame member	车架构件
fastener	紧固件

arrangement of an idea to provide certain results or effects. A well-designed product is functional, efficient, and dependable. Such a product is less expensive than a similar poorly designed product that does not function properly and must constantly be repaired.

1.2 Fundamentals of Machine Design

1.2.1 The Strength of Mechanical Elements

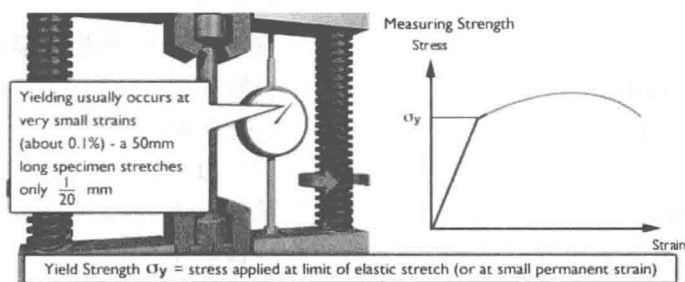
One of the primary considerations in designing any machine or structure is that the strength must be sufficiency greater than the stress to assure both safety and reliability. To assure that mechanical parts do not fail in service, it is necessary to learn why they sometimes do fail. Then we shall be able to relate the stresses with the strengths to achieve safety.

The study of strength of materials often refers to various methods of calculating stresses in structural members, such as beams, columns and shafts. *The methods employed to predict the response of a structure under loading and its susceptibility to various failure modes may take into account various properties of the materials other than material yield strength and ultimate strength.* For example, failure by buckling is dependent on material stiffness and thus Young's Modulus.

◆ Strength Terms

1. Yield strength

Yield strength is the lowest stress that produces a permanent deformation in a material. In some materials, like aluminum alloys, the point of yielding is difficult to identify, thus it is usually defined as the stress required causing 0.2% plastic strain. This is called a 0.2% proof stress.



2. Tensile strength

Tensile strength or ultimate tensile strength is a limit state of tensile stress that leads to tensile failure in the manner of ductile failure (yield as the first stage of that failure, some hardening in the second stage and breakage after a possible “neck” formation) or brittle failure (sudden breaking in two or more pieces at a low stress state). Tensile strength can be quoted as either true stress or engineering stress.

◆ 例句释义

One of the primary considerations in designing any machine or structure is that the strength must be sufficiently greater than the stress to assure both safety and reliability.

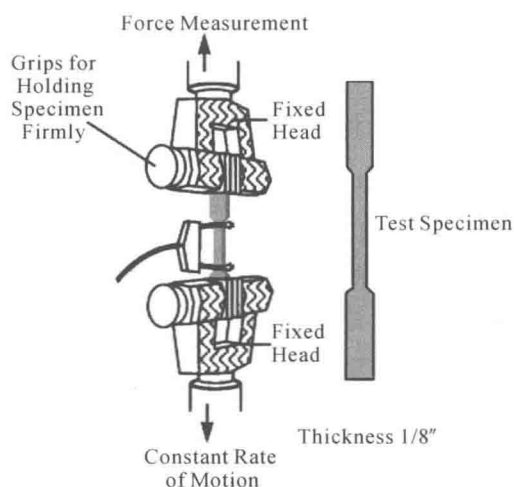
设计任何机械或结构首先要考虑是设计强度必须充分大于受力,以确保安全性和可靠性。

The methods employed to predict the response of a structure under loading and its susceptibility to various failure modes may take into account various properties of the materials other than material yield strength and ultimate strength.

用来预测某个结构在负载下的反应和对各种失效模式的敏感性的方法,除了要考虑屈服强度和极限强度外,还要考虑材料的各种特性。

◆ 重点词汇

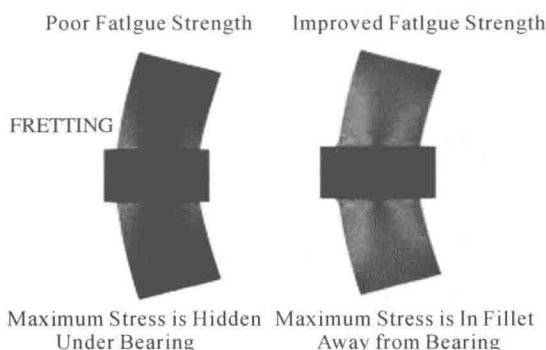
strength	强度
stress	压力,应力
beam	横梁,受弯构件
column	柱,压杆
shaft	轴
buckling	翘曲,屈曲
stiffness	刚度
Young's Modulus	杨氏模量(弹性模量)
yield strength	屈服强度
permanent deformation	永久形变
aluminum alloy	铝合金
plastic strain	塑性应变
proof stress	安全限应力,弹性极限应力
ultimate strength	极限强度
tensile strength	拉伸强度
tensile stress	拉应力
tensile failure	拉伸破坏
ductile failure	延性破坏
brittle failure	脆性破坏
true stress	真应力
engineering stress	工程应力



■ Tensile strength test

3. Fatigue strength

Fatigue strength is a measure of the strength of a material or a component under cyclic loading, and is usually more difficult to assess than the static strength measures. Fatigue strength is quoted as stress amplitude or stress range ($\Delta\sigma = \sigma_{\max} - \sigma_{\min}$), usually at zero mean stress, along with the number of cycles to failure under that condition of stress.



■ Fatigue strength test

◆ Strain (Deformation) Terms

1. Deformation

Deformation of the material is the change in geometry created when stress is applied (in the form of force loading, gravitational field, acceleration, thermal expansion, etc.). Deformation is expressed by the displacement field of the material.

2. Strain

Strain or reduced deformation is a mathematical term that expresses the trend of the deformation change among the material field. Strain is the deformation per unit length. In the case of uniaxial loading-displacements of a specimen (for example a bar element), strain is expressed as the quotient of the displacement and the length of the specimen. For 3D displacement fields it is expressed as derivatives of displacement functions in terms of a second order tensor (with 6 independent elements).

◆ 例句释义

Fatigue strength is a measure of the strength of a material or a component under cyclic loading, and is usually more difficult to assess than the static strength measures.

疲劳强度是指材料或者组件在周期荷载作用下(而不破坏)的强度,和静强度的测量相比,疲劳强度通常更难进行评估。

Deformation of the material is the change in geometry created when stress is applied (in the form of force loading, gravitational field, acceleration, thermal expansion, etc.). Deformation is expressed by the displacement field of the material.

材料的变形是指在外力(以载荷力、重力、加速和热膨胀等形式)作用下材料在几何形态上的变化。变形由材料的位移场来表示。

In the case of uniaxial loading-displacements of a specimen (for example a bar element) strain is expressed as the quotient of the displacement and the length of the specimen.

试件(例如棒)在轴向拉伸/压缩变形的情况下(简单拉伸/压缩),应变表示为形变量和物体原长之比。

◆ 重点词汇

fatigue strength	疲劳强度
cyclic loading	周期载荷
static strength	静强度
stress amplitude	应力幅值
stress range	应力范围
failure	失效,破坏
deformation	变形
force loading	载荷力
gravitational field	重力场
acceleration	加速(过程)
thermal expansion	热膨胀
geometry	几何形状,几何结构
displacement field	位移场
strain	应变
mathematical term	数学术语
unit length	单位长度
uniaxial loading-displacements	单轴载荷位移
specimen	样品
quotient	商,商数
derivatives	导数
second order tensor	二阶张量
displacement function	位移函数