

**ỦY BAN NHÂN DÂN THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG CAO ĐẲNG KINH TẾ - KỸ THUẬT
THÀNH PHỐ HỒ CHÍ MINH**

☞ ☜



ISO 9001 - 2008

**GIÁO TRÌNH
TIẾNG ANH CHUYÊN NGÀNH CƠ KHÍ
(ENGLISH FOR MECHANICS)**

BẠC CAO ĐẲNG

Thành phố Hồ Chí Minh, năm 2017

ỦY BAN NHÂN DÂN THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG CAO ĐẲNG KINH TẾ KỸ THUẬT
THÀNH PHỐ HỒ CHÍ MINH



GIÁO TRÌNH
TIẾNG ANH CHUYÊN NGÀNH CƠ KHÍ
(MECHANICS)

BẠC CAO ĐẲNG

THÔNG TIN CHỦ NHIỆM ĐỀ TÀI

Họ tên: Phạm Thị Ngọc Duyên

Học vị: Thạc sỹ

Đơn vị: Khoa Ngoại Ngữ

Email: ngocduyen1985@gmail.com

TRƯỞNG KHOA

**TỔ TRƯỞNG
BỘ MÔN**

**CHỦ NHIỆM
ĐỀ TÀI**

**HIỆU TRƯỞNG
DUYỆT**

Thành phố Hồ Chí Minh, năm 2017

NOTE ON PRODUCT NAMES

This material includes some names that are or claimed to be owned by the Foreign language department. For legal purposes, the inclusion of these words does not suggest that they are no longer owned by a specific company or that they have passed into general use, nor is any other understanding implied regarding their legal status.

The author will rectify any credit omissions or errors in a subsequent edition of this book, should notification of any such error be made at any time.

PREFACE

Mechanics is a new educational resource for professional mechanics who want to improve their English communication in work environment. Incorporating career-specific vocabulary and contexts, each unit offers step by step instruction that immerses students in the four language components: reading, listening, speaking and writing.

The series is organized clearly and every unit includes a test of reading comprehension, vocabulary, and listening skill and leads students through written and oral production.

Includes features

- A variety of realistic reading passages
- Career specific dialogues
- Reading and listening comprehension checks
- Vocabulary terms and phrases
- Guide speaking and writing exercises

It is hopefully expected that students will find this book useful and interesting and to some extent facilitate their learning process.

As in any textbook, there are a number of aspects that cannot be covered due to space limitations and time restraint. We especially welcome good comments or any ideas for improvement.

Dated on July 28th 2020

Author: Phạm Thị Ngọc Duyên

TABLE OF CONTENT

PREFACE	1
TABLE OF CONTENT	2
THE SUBJECT SYLLABUS	3
UNIT 1: SAFETY AT WORK	7
UNIT 2: ENGINEERING MATERIALS	12
UNIT 3: COMPUTER AIDED DESIGN (CAD)	17
UNIT 4: LASERS	21
REFERENCES	27

THE SUBJECT SYLLABUS

BM04c

UBND THÀNH PHỐ HỒ CHÍ MINH CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
TRƯỜNG CAO ĐẲNG KINH TẾ - KỸ THUẬT Độc lập – Tự do – Hạnh phúc
THÀNH PHỐ HỒ CHÍ MINH

Tp. Hồ Chí Minh, ngày tháng năm 2017

CHƯƠNG TRÌNH MÔN HỌC

Tên môn học: TIẾNG ANH CHUYÊN NGÀNH CƠ KHÍ

Mã môn học: 3107109

Thời gian thực hiện môn học: 30 giờ; (Lý thuyết: 28 giờ; Thực hành, thí nghiệm, thảo luận, bài tập: 00 giờ; Kiểm tra 02 giờ)

I. Vị trí, tính chất của môn học:

- Vị trí: học ở học kỳ III
- Tính chất: là môn học chuyên ngành, thuộc modul đào tạo bắt buộc

II. Mục tiêu môn học:

- Về kiến thức:
 - Trình bày được những thuật ngữ chuyên ngành cơ khí bằng tiếng anh
- Về kỹ năng:
 - Viết được những thuật ngữ chuyên ngành cơ khí cơ bản bằng tiếng anh
 - Đọc hiểu được các đoạn văn chuyên ngành bằng tiếng anh
 - Tra cứu được tài liệu chuyên ngành bằng tiếng anh
 - Đọc hiểu được các hướng dẫn sử dụng máy bằng tiếng anh
- Về năng lực tự chủ và trách nhiệm:
 - Hình thành tính tự giác trong học tập có trách nhiệm trong học tập, có tinh thần hợp tác

III. Nội dung môn học:

I. Nội dung tổng quát và phân bổ thời gian:

Số TT	Tên chương, mục	Thời gian (giờ)			
		Tổng số	Lý thuyết	Thực hành, thí nghiệm, thảo luận, bài tập	Kiểm tra
1	Chương 1: Safety at work	10	10		
2	Chương 2: Engineering materials	15	14		1
3	Chương 3: CAD (computer aided design)	10	9		1
4	Chương 4: Laser	10	9		1
	Cộng	45	42	00	3

2. Nội dung chi tiết:

Chương 1: Safety at work (Thời gian: 10 giờ)

1. Mục tiêu:

- + Đọc hiểu được những thuật ngữ tiếng anh chuyên ngành về an toàn lao động
- + Viết được những thuật ngữ tiếng anh chuyên ngành về an toàn lao động

2. Nội dung:

2.1 Tuning – in

2.2 Reading: understanding the writer's purpose

2.3 Language study: making safety rules

2.4 Writing: ways of linking ideas

Chương 2: Engineering materials (Thời gian: 2 giờ)

1. Mục tiêu:

- + Đọc hiểu được những thuật ngữ tiếng anh chuyên ngành về vật liệu
- + Viết được những thuật ngữ tiếng anh chuyên ngành về vật liệu

2. Nội dung:

2.1 Tuning – in

2.2 Reading: Scanning tables

2.3 Language study: making definitions

2.4 Writing: adding information to a text

Chương 3: CAD (computer aided design) (Thời gian: 3 giờ)

1. Mục tiêu:

- + Đọc hiểu được những thuật ngữ tiếng anh chuyên ngành CAD
- + Viết được những thuật ngữ tiếng anh chuyên ngành về CAD

2. Nội dung:

2.1 Tuning – in

2.2 Listening

2.3 Language study: Necessity have to and need (to)

Chương 4: Laser (Thời gian: 9 giờ)

1. Mục tiêu:

- + Đọc hiểu được những thuật ngữ tiếng anh chuyên ngành về laser
- + Viết được những thuật ngữ tiếng anh chuyên ngành về laser

2. Nội dung:

2.1 Tuning – in

2.2 Reading

2.3 Language study: used to/for

2.4 Word study: Noun+noun compounds

2.5 Writing: Describing a process

2.6 Technical reading: laser cutting

IV. Điều kiện thực hiện môn học:

1. Phòng học chuyên môn hóa/nhà xưởng: phòng lý thuyết
2. Trang thiết bị máy móc:
3. Học liệu, dụng cụ, nguyên vật liệu: Bảng phấn, máy chiếu, tài liệu học tập, dụng cụ tháo lắp, nhớt, giẻ lau.
4. Các điều kiện khác: 20 học sinh/ lớp

V. Nội dung và phương pháp đánh giá:

1. Nội dung:

- Kiến thức:

Trình bày được những thuật ngữ chuyên ngành cơ khí bằng tiếng anh

- Kỹ năng:

Viết được những thuật ngữ chuyên ngành cơ khí cơ bản bằng tiếng anh

Đọc hiểu được các đoạn văn chuyên ngành bằng tiếng anh

Tra cứu được tài liệu chuyên ngành bằng tiếng anh

Đọc hiểu được các hướng dẫn sử dụng máy bằng tiếng anh

- Năng lực tự chủ và trách nhiệm: Tự giác, có trách nhiệm trong học tập, có tinh thần hợp tác

2. Phương pháp:

TT	Phương pháp	Hình thức	Số cột kiểm tra
01	Kiểm tra thường xuyên	Viết 30 phút	1
02	Kiểm tra định kỳ	Báo cáo	2
03	Thi kết thúc môn học	Báo cáo tiểu luận	

VI. Hướng dẫn thực hiện môn học:

1. Phạm vi áp dụng môn học: Chương trình môn học tiếng anh chuyên giảng dạy cho trình độ cao đẳng nghề công nghệ kỹ thuật cơ khí

2. Hướng dẫn về phương pháp giảng dạy, học tập môn học:

- Đối với giáo viên, giảng viên:

+ Đề cập cố các kiến thức sau khi học cần có những bài tập cho học sinh tự làm tại nhà

+ Giáo viên cần giải đáp những thắc mắc do học sinh đặt ra

+ Cần có những ví dụ, liên hệ thực tế để học sinh hiểu rõ vấn đề hơn

+ Cần hiểu đầy đủ mục tiêu đào tạo, yêu cầu môn học để lựa chọn nội dung, phương pháp giảng dạy, phương tiện giảng dạy, mô hình học cụ, tổ chức lớp học... nhằm mang lại hiệu quả giảng dạy tốt nhất.

+ Thực hiện kiểm tra thường xuyên theo quy định

- Đối với người học:

+ Tham gia lớp học ít nhất 70%

+ Điểm trung bình kiểm tra $\geq 5,0$

+ Trang bị giáo trình học liệu đầy đủ

+ Tích cực trong quá trình học tập: đặt câu hỏi, giải quyết vấn đề cùng giảng viên

+ Thực hiện tự học tại nhà theo yêu cầu của giáo viên

+ Trao đổi với giáo viên, bạn học về những thắc mắc, những vấn đề chưa hiểu rõ

3. Những trọng tâm cần chú ý:

+ Trọng tâm của môn học chương 1, chương 3, 4

4. Tài liệu tham khảo:

TT	Tên tên giả	Tên sách – giáo trình	NXB	Năm XB
1	Eric H. Glendinning, Norman Glendinning	Oxford English for Electrical and Mechanical Engineering	Oxford University Press	2012
2	Greenbaum Sidney	A Student's grammar of the English language		2005
3	Betty Schramper Azar	Fundamentals of English Grammar		2012

HIỆU TRƯỞNG

TRƯỞNG KHOA

Nguyễn Phan Khánh Tâm

TỔ TRƯỞNG BỘ MÔN

Lâm Đức Sinh

UNIT 1: SAFETY AT WORK

Introduction: this chapter introduces about safety at work and making safety rules.

Objectives: By the end of the lesson, students are able to present the definitions in English relating to safety at work as highly flammable, corrosive, oxidizing... They also practice skills (reading, listening, speaking and writing) and give ways of linking ideas.

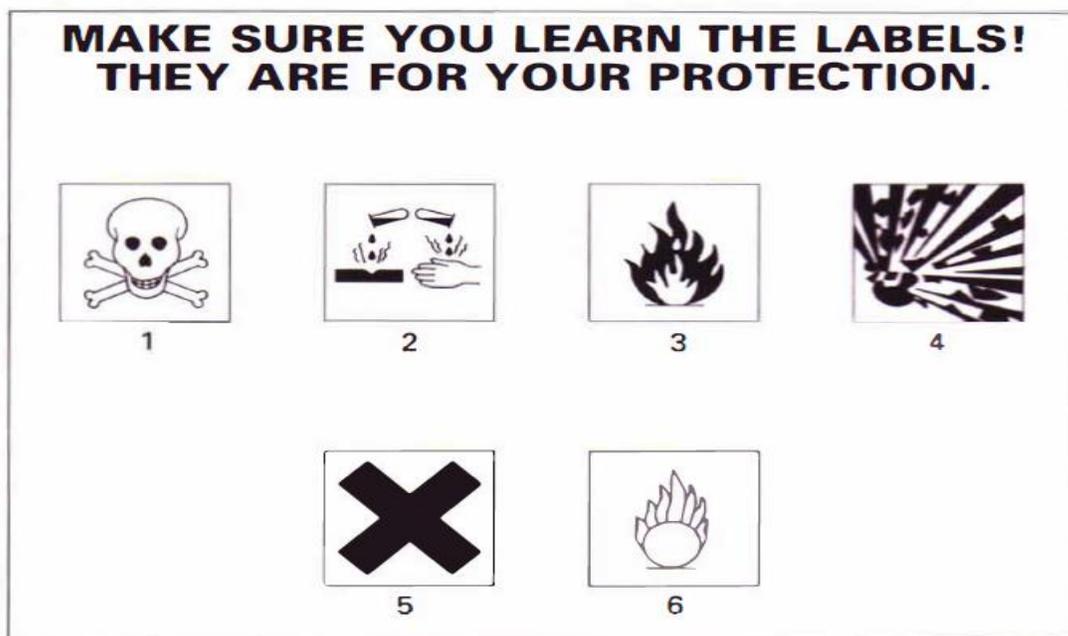


TASK 1

Tuning in

What do these warning labels on chemicals mean? Match each label to the correct warning.

- a. Highly flammable
- b. Harmful
- c. Explosive
- d. Corrosive
- e. Oxidizing
- f. Toxic



TASK 2

List some of the potential dangers in your laboratory, workshop, or place of work. How is the risk of these hazards reduced?

TASK 3

Study the safety instructions from a workshop below, and then answer these questions.

- Who are the instructions for?
- Who wrote them?
- What was the writer's purpose?

1. Wear protective clothing at all times.
2. Always wear eye protection when operating lathes, cutters, and grinders and ensure the guard is in place.
3. Keep your workplace tidy.
4. The areas between benches and around machines must be kept clear.
5. Tools should be put away when not in use and any breakages and losses reported.
6. Machines should be cleaned after use.

TASK 4

Reading _ Understanding the writer's purpose.

Knowing what the writer's purpose is, who the writer is, and who the intended readers are can help us to understand a text. The safety instructions in Task 3 are clearly intended to encourage employees to be safety conscious and reduce the risk of accidents. The writer is perhaps a supervisor or the company safety officer, and the intended readers are machine operatives. Knowing these things can help us to work out the meaning of any part of the text we may not understand.

Study the company document on safety on the next page. and then answer these questions.

- 1 Who is this document for?
 - a. machine operatives
 - b. managers
 - c. all employees
 - d. injured employees
2. Who wrote this document?
 - a. trade union representative
 - b. technician
 - c. manager
 - d. medical staff
3. What is the writer's intention?
 - a. to prevent accidents
 - b. to ensure speedy help for injured employees
 - c. to protect the company
 - d. to warn about dangers

Accident investigation

Whenever an accident occurs that results in an injury (medical case), damage of equipment and material, or both, prompt accident investigation by the immediate manager is required. A written preliminary investigation will be completed by the end of the particular shift or business day on which the accident occurred.

In no event should there be a delay of more than 24 hours. Failure to comply with this requirement may subject the immediate manager to disciplinary action up to and including discharge.

Without adequate accident investigation data, the Company may be subjected to costs, claims, and legal action for which it has no defense. As a minimum, the preliminary accident investigation report will include the following:

1. Name, occupation, and sex of injured worker.
2. Place and date/ time of accident.
3. Description of how the accident happened.
4. Immediate causes of the accident-unsafe acts and unsafe condition.
5. Contributing causes -manager safety performance, level of worker training, inadequate job procedure, poor protective maintenance, etc.
6. Witness(es)-name and department.
7. Corrective action taken -when.

The employee who was injured and any employee(s) who witnessed the incident should be separately interviewed as soon as possible. A copy of the report must be submitted to the Manager-Human Resources for review. Another copy of the report is to be retained for a period of not less than the injured employee's length of employment plus five (5) years.

TASK 5 Study this brief report of an accident. In which points does it not meet company policy on reporting accidents?

To:	Name	Department & Location	Date
	Manager	Human Resources	17 May
From:	Name	Department & Location	Tel.
	D. Taylor	Mech. Eng. Workshop	6200
Subject	Preliminary Report, Accident, 12 May		

While turning a brass component on Tuesday, last week, Kenneth Oliver, machinist, received an injury to his eye. He was taken to the Eye Hospital where I understand he was operated on. I believe the accident was due to carelessness.

Language study _ *Making safety rules*

What are the differences in meaning, if any? between these statements?

1. Wear protective clothing.
2. Always wear protective clothing.
3. Protective clothing must be worn.

We can make safety rules in these ways:

1. Using an imperative.
Wear protective clothing.
Do not wear loose-fitting clothing.
2. Always/never are used to emphasize that the rule holds in all cases.
Always wear protective clothing.
Never wear loose-fitting clothing.
3. We can use a modal verb for emphasis.
Protective clothing *must* be worn.
Protective clothing *should* be worn.

TASK 6

Study this list of unsafe environmental conditions (hazards). Write safety rules to limit these hazards using the methods given above. For example:

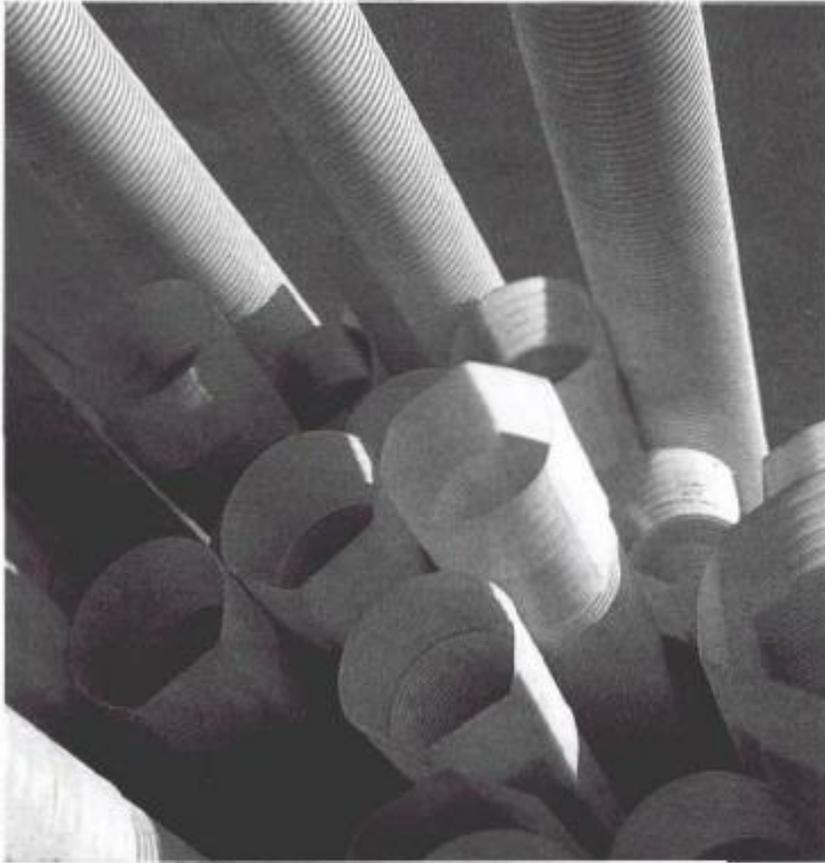
inadequate lighting
Lighting must be adequate. or
Lighting should be adequate.

1. uneven floors
2. unguarded machinery
3. untidy workbenches
4. untidy workplaces
5. badly maintained machinery
6. carelessly stored dangerous materials
7. inadequate ventilation
8. damaged tools and equipment
9. machinery in poor condition
10. equipment used improperly
11. equipment operated by untrained personnel
12. apprentices working without supervision

UNIT 2: ENGINEERING MATERIALS

Introduction: this chapter introduces about engineering materials.

Objectives: By the end of the lesson, students are able to present the definitions in English of materials as scratch-resistant, conductive and malleable... They also practice skills (reading, listening, speaking and writing) relating to the topic.



Ribbed plastic pipes stacked near a road construction site where they will be laid for drainage along the sides of a new section of motorway.

TASK 1

Tuning in

List the materials you know which are used in engineering. Combine your list with the others in your group and classify the materials as metals.

thermoplastics. etc.

Reading _ Scanning tables.

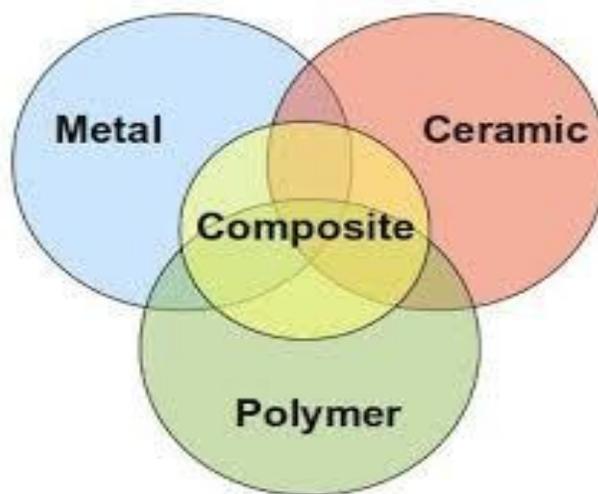
In engineering it is important to practice reading tables, charts, diagrams, and graphs because so much information is presented in these ways. We will start in this unit with a table.

Scanning is the best strategy for finding information in a table. With scanning, you know before you read what sort of information you are searching for. To scan a table, you move your eyes up and down the columns until you find the word or words you want. To scan quickly, you must learn to ignore any information which will not help you with your task.

TASK 2

Scan the table which follows to find a material which is:

1. soft
2. ductile
3. malleable
4. tough
5. scratch-resistant
6. conductive and malleable
7. durable and hard
8. stiff and brittle
9. ductile and corrosion-resistant
10. heat-resistant and chemical-resistant



Materials	Properties	Uses
Metals		
Aluminium	Light, soft, ductile, highly conductive, corrosion-resistant.	Aircraft, engine components, foil, cooking utensils
Copper	Very malleable, tough and ductile, highly conductive, corrosion-resistant.	Electric wiring, PCBs, tubing
Brass (65% copper, 35% zinc)	Very corrosion-resistant. Casts well, easily machined. Can be work hardened. Good conductor.	Valves, taps castings, ship fittings, electrical contacts
Mild steel (iron with 0.15% to 0.3% carbon)	High strength, ductile, tough, fairly malleable. Cannot be hardened and tempered. Low cost. Poor corrosion resistance.	General purpose
High carbon steel (iron with 0.7% to 1.4% carbon)	Hardest of the carbon steels but less ductile and malleable. Can be hardened and tempered.	Cutting tools such as drills, files, saws
Thermoplastics		
ABS	High impact strength and toughness, scratch-resistant, light and durable.	Safety helmets, car components, telephones, kitchenware
Acrylic	Stiff, hard, very durable, clear, can be polished easily. Can be formed easily.	Aircraft canopies, baths, double glazing
Nylon	Hard, tough, wear-resistant, self-lubricating.	Bearings, gears, casings for power tools
Thermosetting plastics		
Epoxy resin	High strength when reinforced, good chemical and wear resistance.	Adhesives, encapsulation of electronic components
Polyester resin	Stiff, hard, brittle. Good chemical and heat resistance.	Moulding, boat and car bodies
Urea formaldehyde	Stiff, hard, strong, brittle, heat-resistant, and a good electrical insulator.	Electrical fittings, adhesives

TASK 3

Scan the table to find:

1. A metal used to make aircraft
2. Plastics used for adhesives
3. Steel which can be hardened

4. An alloy suitable for castings
5. A plastic with very low friction
6. A material suitable for safety helmets
7. A metal suitable for a salt-water environment
8. A metal for general construction use but which should be protected from corrosion
9. A plastic for car bodies
10. The metal used for the conductors in printed circuit boards

Language study _ *Making definitions*

Study these facts from the table about aluminum:

- 1 Aluminum is a light metal.
- 2 Aluminum is used to make aircraft.

We can link these facts to make a definition of aluminum:

1 + 2 Aluminum is a light metal which is used to make aircraft.

TASK 4

Use the table on the previous page to make definitions of each of the materials in column A. Choose the correct information in columns B and C to describe the materials in column A.

A	B	C
1 An alloy		allows heat or current to flow easily
2 A thermoplastic		remains rigid at high temperatures
3 Mild steel		does not allow heat or current to flow easily
4 A conductor	a metal	contains iron and 0.7% to 1.4% carbon
5 An insulator	a material	becomes plastic when heated
6 High carbon steel	an alloy	contains iron and 0.15% to 0.3% carbon
7 Brass		formed by mixing other metals or elements
8 A thermosetting plastic		consists of copper and zinc

Writing _ *Adding information to a text*

Study this text about aluminum.

Aluminum is used to make aircraft, engine components, and many items for the kitchen.

We can add extra information to the text like this:

Aluminum, **which is light, soft, and ductile**, is used to make aircraft. engine components - **for example, cylinder heads** - and many items for the kitchen, **such as pots**.

Note that the extra information is marked with commas or dashes:

which ... ,

for example, ...

such as ...

TASK 5

Add this extra information to the following text about plastics.

1. Plastics can be moulded into plates. car components. and medical aids.
2. Thermoplastics soften when heated again and again.
3. Thermosetting plastics set hard and do not alter if heated again.
4. ABS is used for safety helmets.
5. Nylon is self-lubricating.
6. Nylon is used for motorized drives in cameras.
7. Acrylic is a clear thermoplastic.
8. Acrylic is used for aircraft canopies and double glazing.
9. Polyester resin is used for boat and car bodies.
10. Polyester resin is hard and has good chemical and heat resistance.

Plastics are synthetic materials. They can be softened and moulded into useful articles. They have many applications in engineering. There are two types of plastics: thermoplastics and thermosetting plastics.

ABS is a thermoplastic which is tough and durable. Because it has high impact strength. it has applications where sudden loads may occur.

Nylon is a hard. tough thermoplastic. It is used where silent. low-friction operation is required.

Acrylic can be formed in several ways. it is hard. durable. and has many uses.

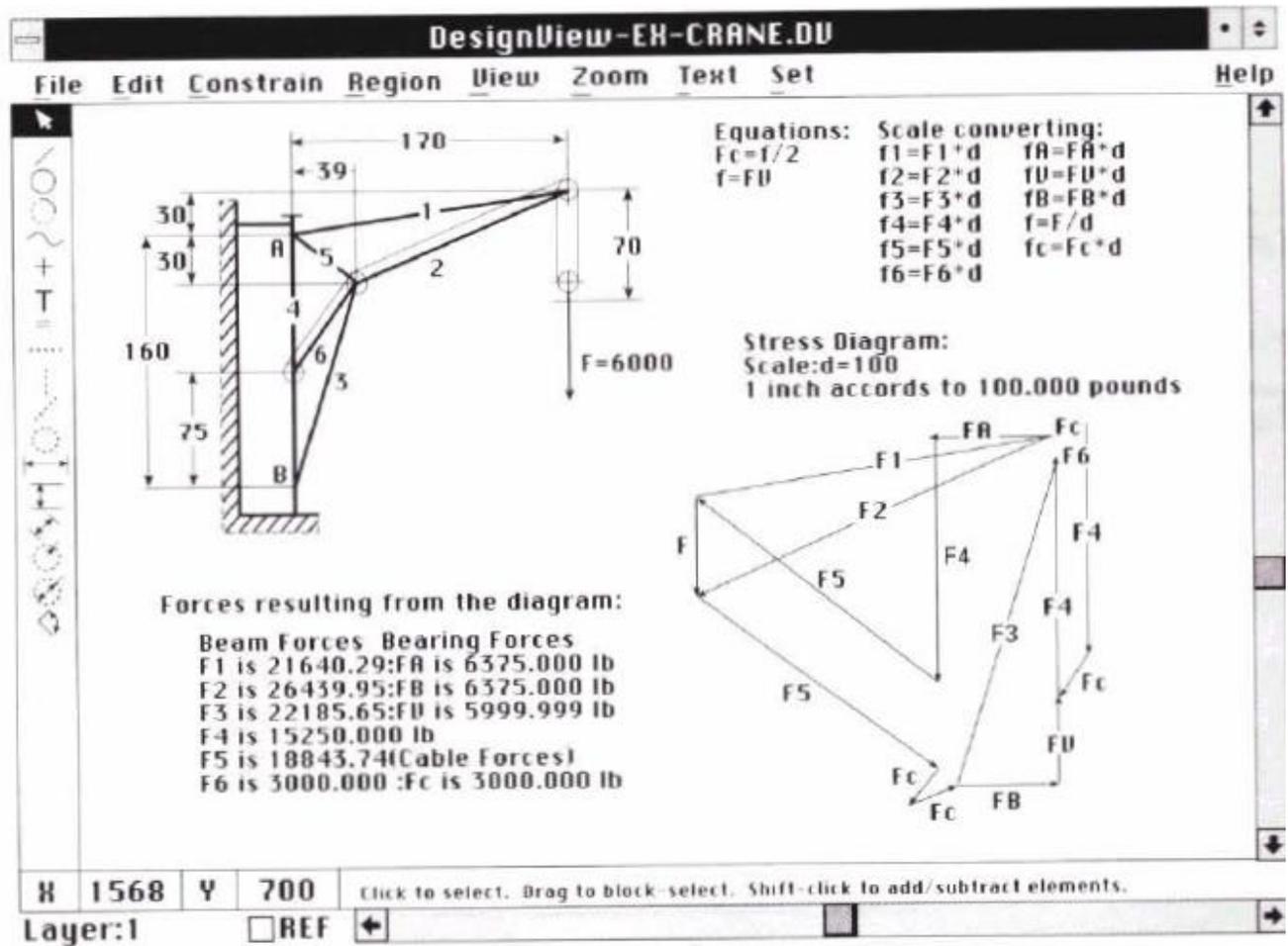
Polyester resin is a thermosetting plastic used for castings. It has a number of useful properties.

UNIT 3: COMPUTER AIDED DESIGN (CAD)

Introduction: this chapter introduces about Computer aided design (CAD).

Objectives: By the end of the lesson, students are able to describe the computer aided design. They also practice skills (reading, listening, speaking and writing) relating the topic and usages of necessity (have to and need to).

Tuning in



TASK 1

Study the example of Computer Aided Design above. Answer these questions about the diagram.

1. What structure does it show?
2. Apart from the design, what other information does the drawing provide?
3. What do you think the top row of words are for-File, Edit, Constrain, etc.?

TASK 2

You are going to listen to an interview with a designer of car engines. He describes some of the advantages of CAD over traditional approaches to design -for example, drawing and modelling. Before you listen, list any advantages you think CAD has over these traditional approaches.

TASK 3

Study the following extract from the typescript of the interview. It covers the interviewer's first question and answer. Fill in the gaps before you listen. One word is missing from each gap. Then listen to this part of the interview to check your answers.

Interviewer:	What do you like about designing on computer?
Designer:	The fact that you 1. _____ get into three dimensions immediately. You don't 2. _____ to imagine how a component will 3. _____ from two-dimensional drawings. You can put your thoughts into the solid without 4. _____ to go via paper. You can see, in the mind's 5. _____ exactly how the components fit together or 6. _____ fit, and you can modify, replace, and generally, tailor parts very quickly as ideas 7. _____ to you.

TASK 4

Now listen to the tape and list any advantages of CAD. Combine your answers with others in your group to make as full an answer as possible. When you have finished, compare your answers with the list you made in Task 2.

TASK 5

Work in pairs, A and B. Listen to the whole tape again.

Student A: Note any disadvantages of drawing in the table below.

Student B: Note any disadvantages of modelling in the table below.

Now compare notes to complete both sections of the table.

Disadvantages:

Drawing

Modeling

TASK 6

The designer mentions these components of a design cycle. Put them in the correct sequence: study results, modify design, stress analyze, design, stress analyze

Language study _ *Necessity: have to and need (to)*

Study these examples from the interview.

1. You don't **have to** imagine how a component will look from two dimensional drawings.
2. ... at the end of the day models **have to** be converted back into drawings for manufacture.
3. Normally one **needs to** go round tile circle at least four times.
4. With CAD, you **need** not describe such as a feature more than once.

Have to and need (to) can both be used to express necessity. In this sense, they are similar to must. Must is a modal auxiliary verb and has no other forms, whereas *have to* and *need (to)* have the same range of forms as other verbs.

The table opposite shows ways of expressing necessity and no necessity in the present.

+ necessity	- necessity
have to	do not have to
need to	need not <i>or</i> do not need to
must	—

TASK 7

Fill in the blanks in these sentences with appropriate forms of the verbs in the table above.

1. Designers who work with CAD _____ produce drawings on paper.
2. The production planner can use the computer model to calculate what machining _____ be done.
3. One problem in working with wood or clay models is that they _____ converted into drawings for manufacture.
4. With traditional design, you _____ imagine a three-dimensional shape from a two-dimensional drawing.
5. With CAD, designers can put their ideas into solid shapes without _____ use paper.
6. In engineering drawing repeated features _____ be drawn again each time but with CAD they _____ be redrawn.
7. Making cars lighter mean making them flimsier or less safe.

UNIT 4: LASERS

Introduction: this chapter introduces about lasers and techniques for laser cutting.

Objectives: By the end of the lesson, students are able to describe the lasers and the process. They also practice skills (reading, listening, speaking and writing) relating to the topic. Moreover, they can present techniques for laser cutting.

TASK 1 Tuning in

What are lasers? List any applications you know for lasers.

TASK 2 Reading

Read this text to check your answers to Task 1.

Lasers (Light Amplification by Stimulated Emission of Radiation) are devices which amplify light and produce beams of light which are very intense, directional, and pure in colour. They can be solid state, gas, semiconductor, or liquid.

- 5 When lasers were invented in 1960, some people thought they could be used as 'death rays'. In the 1980s, the United States experimented with lasers as a defence against nuclear missiles. Nowadays, they are used to identify targets. But apart from military uses, they have many applications in engineering,
10 communications, medicine, and the arts.

In engineering, powerful laser beams can be focused on a small area. These beams can heat, melt, or vaporize material in a very precise way. They can be used for drilling diamonds, cutting complex shapes in materials from plastics to steel, for spot welding
15 and for surfacing techniques, such as hardening aircraft engine turbine blades. Laser beams can also be used to measure and align structures.

Lasers are ideal for communications in space. Laser light can carry many more information channels than microwaves because of its
20 high frequency. In addition, it can travel long distances without



losing signal strength. Lasers can also be used for information recording and reading. Compact discs are read by lasers.

In medicine, laser beams can treat damaged tissue in a fraction of a second without harming healthy tissue. They can be used in very precise eye operations.

In the arts, lasers can provide fantastic displays of light. Pop concerts are often accompanied by laser displays.

TASK 3

Complete this table of laser applications using information from the text opposite. You may also add any applications you know of which are not included in the text.

Military	Engineering	Communications	Medicine	Arts
	drilling diamonds		treating damaged tissue	
	cutting complex shapes	information recording and reading		

Language study _ *used to/for*

Study these examples of laser applications:

1. Laser beams can be used to measure and align structures.
2. They can be used for drilling diamonds.
3. They can be used for light displays.

We can describe applications with used to + infinitive or used for + ing or noun.

TASK 4

Describe the applications of lasers using the information in your table in Task 3 and the structures given above.

Word study *Noun + Noun compounds*

We can use adjectives to describe an object in greater detail. For example:

- | | |
|---------|-------------------|
| light | electric light |
| a motor | an electric motor |
| steel | stainless steel |
| gears | helical gears |

We can also use nouns. For example:

- | | |
|---------|----------------|
| light | Laser light |
| a motor | an air motor |
| steel | carbon steel |
| gears | titanium gears |

Many relationships are possible in noun compounds. For example:

- | | |
|----------------|-----------------------------|
| an air motor | a motor which uses air |
| carbon steel | steel which contains carbon |
| titanium gears | gears made of titanium |

TASK 5

Put each of these examples in the correct column.

- | | |
|-----------------|------------------|
| carbon blocks | a power tool |
| aluminum alloy | a ball bearing |
| carbon fiber | a concrete beam |
| a gas burner | a diesel boat |
| roller bearings | a spring balance |
| a circuit board | a plastic tube |
| a plastic pipe | steel sheets |
| magnesium alloy | |

uses	is made of	contains

TASK 6

What new relationships can you find in the examples below? Rewrite each compound to show the relationship. For example:

a foot pump	<i>a pump which is operated by foot</i>
a ribbon cable	<i>a cable which is like a ribbon</i>
a gear lever	<i>a lever for operating gears</i>
1. chain wheel	6. college lecturer
2. disc wheel	7. toe-clip
3. foot brake	8. boiler thermostat
4. a hand throttle	9. safety helmet
5. strain gauge	10. aircraft engineer

Writing _ Describing a process_ sequence

When we write about a process. we have to:

1. Sequence the stages
2. Locate the stages
3. Describe what happens at each stage
4. Explain what happens at each stage

In this unit we will study how to sequence the stages.

Consider these stages in the operation of a washing machine.

1. The drum is filled with water.
2. The water is heated to the right temperature.
3. Soap is added.
4. The drum is rotated slowly.
5. The dirty water is pumped out.
6. Clean water is added.
7. The drum is rotated much faster and the water pumped out.
8. The clean clothes are removed.

Instead of numbers. we can show the correct order using sequence words.

First the drum is filled with water.

Then the water is heated to the right temperature.

Next soap is added.

After that. the drum is rotated slowly.

Next the dirty water is pumped out.

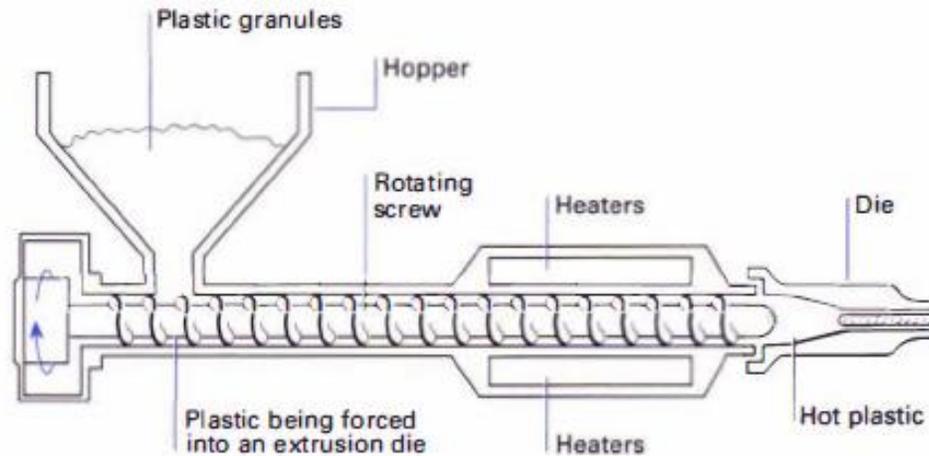
Then clean water is added.

After that. the drum is rotated much faster and the water pumped out.

Finally. the clean clothes are removed.

TASK 7

Study this diagram. It shows an extruder for forming plastic pipes. Describe the extruder.



TASK 8

Now put these stages in the process in the correct sequence.

- The hot plastic is forced through the die to form a continuous length of pipe.
- The rotating screw forces the plastic past heaters.
- The plastic granules are mixed and placed in the hopper.
- The pipe is cooled and cut to suitable lengths.
- The plastic melts.

TASK 9

Describe the correct order using sequence words. Add to your description of the process your description of the extruder from Task 7. Form your text into a paragraph.

TASK 10

Technical reading Laser cutting

Engineers have to read sales literature describing the products and services of companies.

Read the following sales literature to answer these questions:

- Who is this text for?
- What service does the company provide?
- What are the design benefits of laser cutting?
- Can lasers cut non-metals?
- What limitations are there on the service they provide?
- How does the service cut lead time?

DESIGN ENGINEERS – DEVELOPMENT ENGINEERS – BUYERS – STOCK CONTROLLERS

Frustrated?

- By having to restrict designs to suit manufacturing processes?
- By the difficulty and high cost of producing accurate prototypes?
- By the high cost and lengthy lead times associated with press tools?
- By the high stock levels necessitated by minimum batch sizes?

If your answer to any of the above is yes ...

WE HAVE THE SOLUTION!

OUR NEW 1500 WATT CNC-CONTROLLED LASER CUTTER IS AT YOUR DISPOSAL.

■ **The Process**

Laser technology is not new, but it is only recently that the full benefits have become available to manufacturers.

Taking light and passing it through a series of lenses makes the light source so great that its power density is several million times that of the sun – this laser energy is then used to cut almost any material.

The light is directed down towards a CNC-controlled table making it very easy to produce accurate complicated shapes without distortion, giving burr-free, smooth, and perfectly square edges.

■ **The Materials**

The laser is suitable for cutting:

- All types of steel including stainless and spring steel.
- Most non-ferrous metals.
- Plastics, wood, fibreglass, and almost any other material you care to mention!

■ **The Capacity**

Carbon Steel – up to 13 mm
Stainless Steel – up to 10 mm
Plastics – up to 40 mm
Wood – up to 40 mm
Rubber – up to 40 mm
Table movement 1650 mm x 1250 mm

■ **The Advantages**

Short lead time
No tooling costs
Low set-up costs
Extremely accurate
Highest quality
Minimal heat affected zones
Design flexibility

Source: Eraba Limited

REFERENCES

- (1) Eric H. Glendinning, Norman Glendinning (2012), Oxford English for Electrical and Mechanical Engineering, Oxford University Press
- (2) Greenbaum Sidney (2005), A Student's grammar of the English language
- (3) Betty Schramper Azar (2012), Fundamentals of English Grammar