



面向“十二五”高等教育课程改革项目研究成果

数控专业英语

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前 言

本书从实际出发,结合专业英语的教学实践,精心选编了与数控专业相关的科技信息,选材新颖,内容丰富。全书安排由浅入深,循序渐进。

本书共分为 17 个单元,主要包括数控机床的发展历史,数控机床的组成、操作面板、坐标系及进给伺服系统,加工中心简介,数控编程,计算机辅助设计与辅助制造,计算机集成制造系统,柔性制造系统,机电一体化以及工业机器人等方面的内容,书中还附有插图,生词和短语,注释,练习,译文及阅读资料等。通过本教材的学习,可使读者有效提高对数控英语词汇和语法的运用能力及阅读理解能力。

《数控专业英语》是供高等院校数控及机电等专业使用的专业英语教材,同时也可作为相关工程技术人员的参考用书。

在编写的过程中,本书力求突出以下特色:

- (1) 选材新颖,尽量反映现代制造的先进性。
- (2) 图文并茂,便于读者理解记忆。
- (3) 各单元都配有专门的练习,帮助读者巩固所学知识。
- (4) 各单元都配有知识链接和阅读资料,便于读者随时查阅。
- (5) 书后附有完整的译文和答案,以供读者参考。

本书由卜养玲担任主编,梁忠效担任副主编。卜养玲负责全书的统稿和修改工作,梁忠效负责全书文章资料的收集和整理,以及文字的录入、编辑和处理工作,杨爽、吕栋腾参加了编写。

由于时间仓促,加之编者水平有限,疏漏之处在所难免,恳请广大读者和同行批评指正。

编 者

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Part 1 Texts

Unit 1 The Development of NC Machine Tools

Text

What is an numerically controlled machine tool? A numerically controlled machine tool is a machine which uses the information in coded form (program instructions) to control cutters to machine automatically according to the set work programs, speeds and paths, referred to as an NC machine tool. Then, how did it develop?

As scientific technology and social production developed, three high requirement (high performance, high precision, high automation) were put forward about the production equipments which machine mechanical products. For solving the problems, a new type of numerical program controlled machines emerged at the right moment. It solved a series of these contradictions effectively and provided automatic processing methods for single and small batch productions, especially for the parts with complex profiles.

In 1948, the U. S. Parsons Corporation accepted a commission of the U. S Air Force to develop a type of machining equipment which could machine the contour model of a propeller blade. As the shape of the model is complex and diverse, its precision requirement is high, to which a general machining equipment is difficult to adapt, the idea of developing computer numerical control was proposed. In 1949, with the help of servo laboratory of the Massachusetts Institute of Technology (MIT), the corporation began the research of NC machine tools. And it succeeded in trial-producing the first three coordinates NC milling machines retrofitted from the copying milling machine. Soon, the three coordinates milling machine was put into production and was used in 1957. This was a significant breakthrough in the process of the development of manufacturing technology, marking the beginning of the age of NC machining in the manufacturing area. Since NC machining is the base of modern manufacturing technology, in terms of manufacturing industry, the invention has had epoch-making significance and profound influence. The world's major industrialized countries attach great importance to the research and development of NC machining technology.

In the fifty years from the time the first NC machine tool came out to now, it experienced six-generation NC systems including the electronic tube (1950), the transistor and

the printed circuit board (1960), small-scale integrated circuits(1965), the minicomputer(1970), the microprocessor or the microcomputer(1974) and the intelligent NC system based on PC-NC(the late 1990s). On the first numerically controlled (NC) machines, its numerical data was controlled by a tape, and because of that, the NC systems were known as tape-controlled machines. They were able to control operations entered into the machine by a punched or magnetic tape(Fig. 1-1). There is no possibility of editing the program on the machine. To change the program, a new tape had to be made.

Today's systems have computers to control data. They are called Computer Numerically Controlled(CNC) machines(Fig.1-2). At the same time of the continuous update of NC systems, the varieties of NC machine tools have been developed. That is to say, the machine tools adopting NC systems are increasing, such as lathes, milling machines, boring machines, drilling machines, grinding machines, gear cutting machine tools and electric spark machine tools.

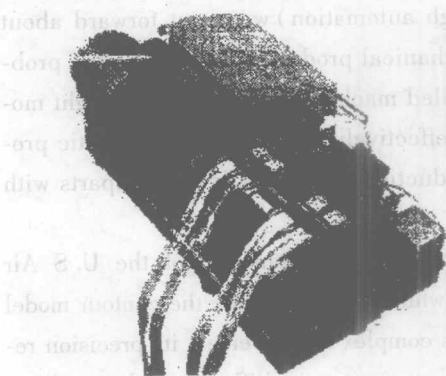


Fig. 1-1 A punched-tape of part programmer

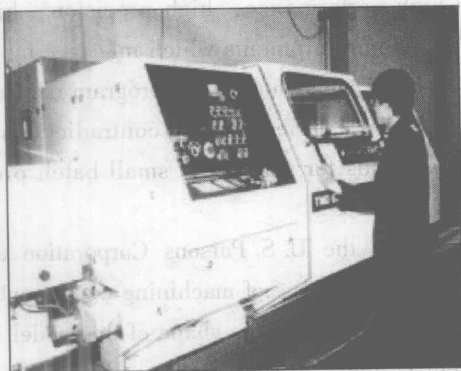


Fig. 1-2 CNC machine tool

Words and Expressions

production	[prə'dʌkʃən]	n.	生产, 制造
work	[wə:k]	n.	工件
cutter	['kʌtə]	n.	切削刀具, 刀片
mechanical	[mi'kænikəl]	a.	(用) 机械的
automatic	[ɔ:tə'mætik]	a.	自动的
automatically	[ɔ:tə'mætikli]	ad.	自动地
retrofit	['retro,fit]	v.	改型, 式样翻新
coordinate	[kəu'ɔ:dinit]	n.	坐标

	[kəu'ɔ:dineit]	v.	使协调, 调整
develop	[di'veləp]	v.	开发, 发展
model	['mɒdl]	n.	模型, 式样, 样板
technology	[tek'nɒlədʒi]	n.	工艺, 技术
profile	['prəʊfaɪl]	n.	轮廓, 外形(观)
contour	['kɒntʊə]	n.	轮廓线, 形状
machine	[mə'ʃi:n]	n.	机器, 机械, 机床
		v.	机械加工, 机械制造
manufacture	[.mænju'fæktʃə]	v.	(机械) 制造
code	[kəʊd]	n.	制造业代码
		v.	译为代码
lathe	[leɪð]	n.	车床
numerical control (NC)			数字控制(数控)
numerically controlled machine tool			数控机床
machine tool			机床
printed circuit board			印刷线路板
milling machine			铣床
boring machine			镗床
gear cutting machine tool			齿轮加工机床
electric spark machine tool			电火花加工机床
copying milling machine			仿形铣床
magnetic tape			磁带

Notes

1. An NC machine tool is a machine which uses the information in coded form (program instructions) to control cutters to machine automatically according to the set work programs, speeds and paths, referred to as an NC machine tool.

which 所引导的句子为定语从句, 修饰 a machine。

in coded form 以编码的形式

大家都知道 code 是代码的意思, 但可能会忽略它的动词含义——代码, 这里用的是它的过去分词形式修饰 form; 短语 in ... form 表示“以……的形式”。

Information is input in numerical form.

信息是以数字的形式输入的。

according to 依据, 按照

New equipment needs to be designed according to the production states.

依据生产状况, 需要设计新的设备。

2. And it succeeded in trial-producing the first three coordinates NC milling machines retrofitted from the copying milling machine.

句中 retrofitted from the copying milling machine 是过去分词短语做后置定语, 用于修饰 milling machine。

3. . . . in terms of manufacturing industry, the invention has epoch-making significance and profound influence.

in terms of 就……而言, 对于……而言, 在……方面, 用……措辞

In terms of cost, the NC machine tool is always more expensive than the general-purpose machine tool.

就成本而言, 数控机床总比普通机床昂贵。

4. The world's major industrialized countries attach great importance to the research and development of NC machining technology.

世界上主要工业发达国家都十分重视数控加工技术的研究和发展。

句中 attach great importance to 表示“非常重视”。

Our school attaches great importance to training students' practicing ability.

我们学校非常重视锻炼学生的实践能力。

5. In the fifty years from the time the first NC machine tool came out to now, it experienced six-generation NC systems including the electronic tube (1950), the transistor and the printed circuit board (1960), small-scale integrated circuits (1965), the minicomputer (1970), the microprocessor or the microcomputer (1974) and the intelligent NC system based on PC-NC (the late 1990s).

句中的介词短语 from . . . to 做后置定语, 修饰前面的 the fifty years, 而在介词短语中又套有定语从句, 先行词为 the time, 后面的从句 the first NC machine tool came out 做定语, 起修饰、限制作用。

6. On the first numerically controlled (NC) machines, numerical data was controlled by tape, and because of that, the NC systems were known as tape-controlled machines.

句中 that 指代上一句: On the first numerically controlled (NC) machines, numerical data was controlled by tape.

所以此句译为: 在最初的数控机床上, 其数据由磁带提供及控制, 因此这种数控系统被称为磁带控制机。

Exercises

I. Mark the following statements with T (true) or F (false) according to the text.

1. The new type of numerical program controlled machines provided automatic simple profile processing methods for small batch productions, especially for the parts with complex profiles according to the text. ()
2. In 1952, the United States Parsons Corporation accepted a commission of the United States Air Force. ()
3. According to the text, without any help the United States Parsons Corporation began the research of NC machine tools. ()
4. The trial-producing success of the first three coordinates NC milling machine marked the beginning of the age of NC machining. ()
5. The world's major industrialized countries don't pay attention to the research and development of NC machining technology. ()

II. Choose the best choice according to the text.

1. Numerically controlled machine tool is a machine which uses the information in _____ form to control cutter.
 - A. digital
 - B. code
 - C. coded
2. As scientific technology and social production developed, the production equipments were put forward _____ high requirements.
 - A. two
 - B. three
 - C. four
3. In the fifty years from the time the first NC machine tools came out to now, it experienced _____ generation NC systems.
 - A. four
 - B. six
 - C. seven
4. In which year did the printed circuit board emerge?
 - A. 1950
 - B. 1974
 - C. 1960
5. In the following reasons except _____, made the idea of developing the computer numerical control was proposed.
 - A. complex diversity of model shape
 - B. the higher precision of model shape
 - C. the expensive model

III. Translate the following phrases into Chinese or English.

1. 铣床
2. 提出三高的要求
3. 在伺服机构研究室的帮助下
4. 镗床
5. gear cutting machine tool
6. electric spark machine tool
7. the intelligent NC system
8. drilling machine

【Reading Material】

Advantages of CNC Compared to NC

The computer numerical control opens up new possibilities and advantages not offered by older NC machines. Some of these are:

(1) Reduction in the hardware necessary to add a machine function. New functions can be programmed into the MCU as software.

(2) The CNC program can be written, stored, and executed directly at the CNC machine.

(3) Any portion of an entered CNC program can be played back and edited at will. Tool motions can be electronically displayed upon playback.

(4) Many different CNC programs can be stored in the MCU.

(5) Several CNC machines can be linked together to a main computer. Programs written via the main computer can be downloaded to any CNC machine in the network. This is known as direct numerical control or DNC.

(6) Several DNC systems can also be networked to form a large distributive numerical control system.

Knowledge Link

动词的分类

一、什么是动词

动词是用来表示主语做什么（即行为动词），或表示主语是什么或怎么样（即状态动词）的词，例如：

(1) The equipment performs a variety of operations. (这台设备可以完成各种

操作。) performs 表示主语的行为。

(2) The machine is new. (这台机器是新的。) is 与后面的表语 new 表示主语的状态。

二、动词的分类

(一) 行为动词

行为动词(实义动词)是表示行为、动作或状态的词。它的词义完整,可以单独做谓语。

In 1948, the U. S. Parsons Corporation accepted a commission. (在1948年,美国帕森斯接受了一个委托。) accept, 接受。

(二) 连系动词

连系动词是表示主语“是什么”或“怎么样”的词,它虽有词义,但不完整,所以不能独立做谓语,必须跟表语一起构成谓语。

Many western countries are industrialized countries.

(西方很多国家是工业化国家。) are, 是。

are 这个词的词义“是”在句中常常不译出。

连系动词可具体分为三类。

1. 表示“是”的动词 be, 这个词在不同的主语后面和不同的状态中有不同的形式,如 is, am, are, was, were。

(1) The application of plastics is on the increase. (塑料的应用日益增加。)

(2) These machines are of high quality. (这些机器的质量很好。)

2. 表示“感觉”的词,如 look (看起来), smell (闻起来), sound (听起来), taste (尝起来), feel (觉得,摸起来)。

(1) The machine looks very old. (这台机器看起来特别陈旧。)

(2) In winter the metal feels cold outside the room. (在冬天室外的金属摸起来很冰凉。)

3. 表示“变”“变成”的意思的词,如 become, get, grow, turn, 都解释为“变”“变得”。

(1) The cold weather turns the metal brittle. (寒冷的天气使金属变脆。)

(2) The temperature of the cutting tool gets higher and higher in processing. (在加工过程中,切削刀具的温度变得越来越髙。)

(三) 助动词

这类词义本身无意义,不能单独做谓语,只能与主要动词一起构成谓语,表示不同的时态、语态或表示句子的否定与疑问等,如 do。

(1) The crank does not turn the wheel. (曲柄不能转动轮子。)

(2) Don't touch the engine while it is running. (当发动机运转时不要去

碰它。)

(四) 情态动词

这类词本身虽有意义,但不完整。它表示说话人的能力、语气或情态,如“可能”“可以”等。这类动词有 can, may, must, could, might 等。它们不能单独做谓语,必须与行为动词(原形)一起做谓语,才能表示完整的意思。

In cutting different materials and works of different diameters, lathes must be run at different speeds. (在切削不同的材料和不同直径的工件时,车床必须以不同的转速运转。)

1. can, could.

(1) 表示能力。

The lathe can perform round parts. (车床能加工回转体零件。)

(2) 表示允许,准许,这时 can 与 may 可以互换。

Can/May I have a look at the process of the parts? (我可以看看这些零件的工艺吗?)

(3) 表示客观可能性,用在否定句和疑问句中表示说话人的怀疑、猜测或不肯定等。

Can the news be true? (这个消息可能真实吗?)

(4) could 除表示 can 的过去式外,在口语中还常代替 can,表示非常委婉的请求。这时 could 与 can 没有时间上的差别。

Could/Can you tell me if he will go tomorrow? (你能告诉我他明天是否去吗?)

2. may 和 might.

(1) 表示“准许”和“许可”,这时可与 can 替换。

May (can) I use your cutter for a moment? (我可以借你的刀具用一下吗?)

(2) 表示说话人的猜测,认为某事“可能”发生。

Where's John? —He may be at the workshop. (约翰在哪儿?他可能在车间。)

(3) might 除表示 may 的过去式外,在口语中还常代替 may,表示非常委婉的请求或实现的可能性较小。这时 might 和 may 没有时间上的差异。

Might (May) I operate the parts in your factory? (我可以在你们厂加工这些零件吗?)

3. must.

(1) must 表示说话人的主观意志,表示义务、命令或必要、应当、必须等。它的现在式与过去式同形。

I must finish my job tonight. (今晚我必须完成工作。)

(2) must 表示推测,“一定是”“准时”。

She must have heard of the news. (她一定听到了这个消息。)