

高职高专教材

制浆造纸技术 专业英语

Pulping and Papermaking Technology

云 娜 曹晓瑶 编



华南理工大学出版社
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前 言

聚焦中国的造纸工业，我们深感近年发展的迅猛，造纸工业正逐渐走上由大变强之路，大量引进发达国家的前沿技术和先进设备方兴未艾，深度参与国际竞争势所必然。这些都客观地对技术人才专业英语水平提出了更高的要求，可以说，掌握并熟练应用制浆造纸技术专业英语进行阅读、翻译和写作等已经成为高素质专业人才的必备技能。

深感于此，我们组织编写了这本《制浆造纸技术专业英语》。本书编写以“前沿、地道、专业、趣味”为宗旨，结合编者在制浆造纸技术专业教学及科研的多年经验，以制浆造纸技术的基本生产过程为主线，选择当前最新制浆造纸技术的英文原文作为课文内容，编排上宽基础、广覆盖，深入浅出，既突出专业知识，也强调对基础知识的拓宽和延伸，尽可能体现制浆造纸技术的现状和发展趋势。

本书共 21 个单元，每个单元都由课文、生词和短语注释等部分组成。课文侧重讲解制浆造纸专业的核心内容和关键技术，着力介绍本专业的实用技术、前沿领域以及发展趋势等，在进行专业英语学习的同时，以扩大学生的知识面。本书还配有详细的课文参考翻译以及按字母顺序排列的总词汇表，以便查阅。通过本书的学习，学生应基本具备阅读专业书刊、阅读和翻译引进设备技术文件、用英语撰写专业论文等能力。

本书既适合制浆造纸技术专业学生，用作学习教材；也可以满足专业技术人员的一般需求，用作参考用书。不仅对提高英语水平和专业技能有一定的帮助，还有助于拓宽视野、深化对制浆造纸专业技术的认识。

本书的第6单元、第13~21单元由广东轻工职业技术学院云娜老师编写，第1~5单元、第7~12单元由江门职业技术学院曹晓瑶老师编写，全书由云娜老师统稿。

由于编者水平有限，书中难免有疏漏和错误之处，恳请广大读者批评指正。

编 者

2011年6月

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Unit 1

The History of Papermaking

Paper has been around for nearly 2000 years! Try to imagine life without it.

Our intellectual and material literacy are dependent on paper. This type of writing material rescued our hereditary knowledge from the destructive hand of time. With paper's help, we can further augment this heritage and bequeath many things to posterity. Therefore it is appropriate that paper, which has patiently served mankind's progress, should speak about itself and its past.

Prior to the invention of paper, various materials were used for writing. First soft clay, which transformed into terracotta tablets, was used. Later it was followed by large plant leaves, animal skins, parchments, waxsheets and especially papyri. The latter eventually gave paper its name. The Egyptians found a native reed-like plant, the so called papyrus, and they used its phloem for making rolls suitable for writing. Some foreign museums exhibit 5500-year old papyri.

When papyrus almost disappeared from Egypt, there grew a need to find another raw material. Parchment was the material that quickly replaced papyrus rolls. As a matter of fact, parchment was the depilated, flattened skin of various animals. Lamb, goat or calf skins were refined to create a very soft and fine surface to write on. Parchment's great advantage is that during folding it does not get

broken. This way it was possible to knit more sheets into one book.

The paper we use today has Chinese roots and was invented by Cai Lun, a courtier to the emperor Han Hedi in A.D. 105. He was the one who recommended to the emperor that the heavy bamboo tablets and costly silk with paper be replaced. The emperor accepted the idea and decreed the dissemination of papermaking. The paper was made from plant fibers, a plate suitable for writing. Chinese papermakers used mulberry tree phloem, bamboo fiber, grass, and other plants as raw material. A small amount of rag scrapings were mixed in. The fibers were cooked to loosen them up then they were pulped in a mortar. The pulp then was diluted with water and the fibers were planked with a bamboo sieve (so called "mould"). A thin layer of pulp was scooped up on the mould's surface, throwing off any excess and holding the mould perfectly level, shaking it from side to side and front and back as the water drained through (this "shake" when done correctly, interlocks the fibers into a smooth, even mat that is said to have good formation). The freshly formed sheets were then transferred on wood boards: one layer of paper sheet, one layer of wood board, another layer of paper, wood board again and so on. This stack was then placed in a hydraulic press under tons of pressure and the bulk of the water was squeezed out. The paper was then ready to be dried either in open air or on heated walls. To make the sheets' surface writable, a thin layer of rice starch was brushed on them. The main phases of the technology are as follows: pulp creation, sheet formation, drying, surface treatment. These phases have not changed since their invention.

The earliest known paper still in existence was made from rags about A.D. 150. In about A.D. 610, papermaking was introduced

into Japan and to other parts of Asia in A.D. 750.

The art of papermaking later find its way to Egypt in A.D. 800 to 900 where it was popularized. The use of paper was introduced into Europe by the Moors. Gradually, the craft spread throughout European countries. The first paper mill in England was established in 1495, and the first such mill in America in 1690.

William Rittenhouse and William Bradford founded the first North American paper mill in 1690 at Wissahickon Creek, near Philadelphia. Thanks to a great deal of imagination and hard work, they successfully collected, separated, cleaned, and recycled old cloth rags to make America's first writing papers.

In the early 1800s, Nicholas-Louis Robert of France invented the Fourdrinier, a machine that produces paper on an endless wire screen. Fifty years later, papermakers began successfully using wood fiber to make paper, a process that was introduced in the United States in the early 1900s.

In 1840, groundwood pulping method was developed in Germany. The first manufacture of pulp from wood using soda process was patented on July 1, 1854 to an England inventor named Hugh Burgess.

In 1866, an American named Benjamin Tilghman developed the sulfite pulping process. The first mill using this process was built in Sweden in 1874. This was the dominant pulping process until 1937. At that time, kraft pulping became the dominant chemical pulping process and still is today. A German chemist, C. F. Dahl, developed the kraft (from the German word meaning "strong") pulping process in 1879. The kraft process had several distinct advantages: the chemicals used to dissolve the lignin were

recoverable and tremendous amounts of energy were produced during the recovery process, and the process could pulp pine trees, a predominant forest species in the United States. The kraft process allowed the United States to become a major producer of paper products.

The digital age has made papermaking faster and more efficient. Today, papermaking facilities utilize advanced technology to control operations (such as refiner mechanical pulping, continuous cooking, continuous multistage bleaching, on-machine paper coating, twin-wire forming, and computer process control), ensure high quality, and track deliveries to customers. Also, changes in society have created new opportunities for papermakers. The rise of personal computing created a market for paper for home printers, online commerce created a new market for packaging.

New Words and Expressions

intellectual [ˌɪntəˈlektʃuəl] *adj.* 有才智的; 智力发达的

n. 知识分子, 脑力劳动者, 有极高智力的人

literacy [ˈlɪtərəsi] *n.* 读写能力; 文化, 教养

rescue [ˈreskjʊː] *n.* 营救 *vt.* 营救, 救援, 使免遭损失

hereditary [hiˈredɪtəri] *adj.* (生物学中) 遗传的; 世袭的, 承袭的

destructive [diˈstrʌktɪv] *adj.* 引起破坏 (或毁灭) 的

augment [ɔːɡˈment] *vt.* 增加, 提高, 扩大

bequeath [biˈkwiːð] *vt.* 将……遗赠给; 将 (知识等) 传给 (后人)

posterity [pɒsˈterɪti] *n.* 后代, 后世; 子孙, 后裔

- appropriate [ə'prəʊpriət] *adj.* 合适的, 适合的
- clay [klei] *n.* 黏土, 泥土
- terracotta [ˌterə'kɒtə] *n.* 赤土色
- tablet ['tæblɪt] *n.* 片状物
- parchment ['pɑ:tʃmənt] *n.* 羊皮纸; 羊皮纸手稿
- papyrus [pə'paɪərəs] *n.* 纸莎草; 纸莎草纸
- phloem ['fləʊem] *n.* 韧皮部
- depilate ['depɪleɪt] *vt.* 去……的发, 为……去毛
- calf [kɑ:f] *n.* 牛犊, 幼崽
- refined [rɪ'faɪnd] *adj.* 经过改良的, 提炼的
- courtier ['kɔ:tjə] *n.* 侍臣; 廷臣
- decree [di'kri:] *n.* 法令, 政令, 命令 *v.* 颁布, 命令
- dissemination [dɪ'semi'neɪʃən] *n.* 散播, 传播, 普及
- mulberry ['mʌlberi] *n.* 桑树
- rag [ræg] *n.* 碎布, 抹布, 碎片; 破旧衣服
- scraping ['skreɪpɪŋ] *n.* 被刮削下的碎屑
- mortar ['mɔ:tə] *n.* 白, 研钵, 灰泥
- dilute [dai'ljʊt] *vt.* 冲淡, 稀释 *adj.* 淡的, 稀释的
- plank [plæŋk] *n.* 厚木板, 支架, 木板制品 *vt.* 在……上铺板
- sieve [siv] *n.* 筛子, 滤网 *vt.* 筛, 滤
- stack [stæk] *n.* 堆叠, 堆, 大量
- hydraulic [haɪ'drɒlɪk] *adj.* 与水有关的; 水力的, 水压的
- Philadelphia [ˌfɪlə'delfjə] *n.* 费城
- Fourdrinier [fuə'drɪniə] *n. & adj.* 长网造纸机 (的)
- sulfite ['sʌlfait] 亚硫酸盐
- predominant [pri'dɒmɪnənt] *adj.* 占主导地位的
- digital ['dɪdʒɪtl] *adj.* 数字显示的, 数字的
- track [træk] *n.* 轨迹, 足迹, 径迹



Unit 2

Raw Materials

Probably half of the fiber used for papermaking today comes from wood that has been purposely harvested. The remaining material comes from wood fiber from sawmills, recycled newspaper, some vegetable matter, and recycled cloth. Coniferous trees, such as spruce and fir, used to be preferred for papermaking because the cellulose fibers in the pulp of these species are longer, therefore making for stronger paper. These trees are called “softwood” by the paper industry. Deciduous trees (leafy trees such as poplar and elm) are called “hardwood”. Generally, softwood has higher amount of fibers while hardwood has higher percentage of vessels. Softwood fibers are twice as long as hardwood fibers. Because of increasing demand for paper, and improvements in pulp processing technology, almost any species of tree can now be harvested for paper.

Paper is made from cellulose fibers that are found in all plant cell walls. The fibers may come from any one of several plant sources such as wood, bamboo, cotton, esparto, hemp, jute, sugar cane, wheat, or rice. A mixture of water and fibers is filtered through a fine screen to form a sheet of paper. As the wet sheet is dried, chemical bonds are formed between the molecules in the cellulose fibers to give the paper its strength. Hemp and jute fibers are commonly used for textiles and rope making, but they can also be used for paper. Some high-grade cigarette paper is made from

flax.

Cotton and linen rags are used in fine-grade papers such as letterhead and résumé paper, and for bank notes and security certificates. The rags are usually cuttings and waste from textile and garment mills. The rags must be cut and cleaned, boiled, and beaten before they can be used by the paper mill.

Other materials used in paper manufacture include bleaches and dyes, fillers such as chalk, clay, or titanium oxide, and sizings such as rosin, gum, and starch.

2.1 Main Components

The main chemical components of raw material for paper-making include the followings.

1. Cellulose

In cotton, the content of cellulose accounts for more than 90%; wood and reed also contain 40% to 50% of cellulose. From the point of view of papermaking, cellulose should be retained as much as possible in the pulping process, so as to increase the strength of paper.

2. Hemicellulose

In the plant fibers, hardwood and grass contain up to about 30% of hemicellulose; while coniferous wood contains only about 20%; and the content of hemicellulose in cotton is even less. In order to improve the strength of paper, it is also necessary to retain as much hemicellulose as possible in the pulping process.