

LIFE-CYCLE STUDIES



Pencils

Introduction

The modern pencil was once a controversial addition to the classroom. Some American schoolteachers said the 1858 invention of pencils with attached erasers would encourage student carelessness. But the pencil prevailed and is now among the world's most popular tools for writing and drawing.

The pencil's origin lies in the late sixteenth century, when shepherds in Borrowdale, England, discovered deposits of pure graphite and used it to mark their sheep. (The Greek *graphein* means "to write.") One of the oldest pencils was made with Borrowdale graphite wrapped with string. Scribes would unwind the string as the graphite wore away to avoid covering their hands with carbon. The earliest eraser was a loaf of bread.

European and American manufacturers perfected wood-cased pencils by the nineteenth century, but these regions now mostly import their pencils from the world's largest pencil manufacturers in China, Indonesia, Brazil, Costa Rica, and Thailand. The U.S. domestic industry is worth \$1 billion per year, but the country still imports more than 18 million pencils annually.

Yellow paint first became the popular coating for pencils when a mine of high-grade graphite was found along the Russian-Chinese border in 1847. Manufacturers chose yellow, the color of royalty in Chinese tradition, to differentiate this optimal graphite source. Others followed suit, regardless of their graphite quality.



© Hulton-Deutsch Collection/CORBIS
Putting grooves in cedar blanks, ca. 1925.



Ron Gilling/Peter Arnold, Inc.
School girl adornment, Monrovia, Liberia.

Closing the Loop

In many cases, pencil wood production has depleted forest reserves, contaminated waterways, and choked the air with pollutants. Herbicides are often sprayed over the forest to kill plants that compete with saplings.

Several companies have developed more responsible methods and have sought Forest Stewardship Council certification, widely considered the international standard for sustainable forestry. After approving each step of harvesting, extracting, and processing the wood, the Council has granted certification to 41 pencil manufacturers across the world.

Forest Ethics, an environmental organization that lobbies against unsustainable logging operations, has recently begun dialogues with pencil manufacturers to encourage more widespread FSC certification. But the Council has also been accused of being too complacent. Certification has been granted to logging companies that cut down old growth forests, for instance, and to those who rely on monoculture plantations. Due to concerns over "mixed label" products, which contain wood that may not be 100-percent certified, Norway last year banned any Council-certified wood products in public buildings.

Some pencil manufacturers have completely avoided the need to cut timber in recent years through the use of recycled materials. Examples include pencils made from old newspaper, dollar bills, denim, and rubber tires.

Production

The many parts of a pencil originate all over the world. The largest graphite producers are South Korea and Austria. The most popular pencil wood, incense cedar, is found in the forests of California's Sierra Nevada Mountains. The leading producers of rubber—the original foundation of erasers—are Malaysia, Indonesia, and Thailand.

Old-growth forests are often clear-cut to harvest timber for pencil production. Plantations then replace the forests, and trees generally grow for 14 years before they are removed to become pencils, about 2,500 per tree.

Pencil manufacturing became almost entirely mechanized by the late 1870s. Grooves are carved into the wood and the pencil's graphite core is glued into the slots. A second slab of wood is pressed on top, forming a sandwich around the graphite. The sandwiches are then trimmed into separate pencils.

Erasers are made from natural or synthetic rubber. Natural rubber is made from the latex of rubber trees, while synthetic rubber is petroleum-based. Erasers are attached to pencils using casings made of aluminum, or brass for more expensive models.

