TIMELINE – CHAPTER 12

THE HUMAN ORGANISM AND MANUFACTURING

2004 End of residential use of arsenic-treated wood in Canada

Treated wood repels insects and prevents mould and rot. However, the solution of arsenic, copper and chrome (chromated copper-arsenate, or CCA) used to treat wood is highly toxic and may cause cancer. Since 2004 residential use of arsenic-treated wood has been banned in Canada. The material is still used, however, for power-line poles, construction beams and other industrial installations. Newer copper-based preservatives and heat treatments are now applied to extend the life of wood used in construction.

1989 Invention of biodegradable plastics

Italian research chemists invented a biodegradable plastic comprised mainly of corn starch. This plastic can be decomposed by microorganisms in just a few weeks. Many European municipalities have adopted use of bags made of this biodegradable plastic developed by Catia Bastioli and her colleagues. Companies around the world have since developed plastics made of wheat or potato starch. There are many uses for such plastics: grocery bags, plates, knives, forks, spoons, toys, pens and the like. Research in the field continues today.

1913 Development of stainless steel

To solve the problem of corrosion in the barrels of firearms, English metallurgist Harry Brearley invented stain-proof steel, made of iron, chrome and nickel, which withstands chemical erosion. He first called it *rustless*, then changed its name to *stainless*. In 1920 his discovery earned him a gold medal from the Bessemer Iron and Steel Institute.

1901 Opening of Canada's first aluminum plant in Shawinigan

Although Canada has no bauxite mines (the ore from which aluminum is made), it is the third most important aluminum producer in the world. Canada's first aluminum plant opened at Shawinigan in the Mauricie early in the 20th century. Since then, three other companies have started making aluminum in Canada, which now includes ten smelters in Québec and one in British Columbia. These developments followed the creation of the first industrial producers of aluminum in Switzerland, France and the United States in 1888.

1889 Invention of derailleur gears for the bicycle

Several systems of derailleur gears were invented for the bicycle in the late 19th century. In France the first derailleur gears were invented in 1885 by Jean Loubeyre: the *Polycelere*. This mechanism shifts the chain from a front or back sprocket of a gear to another in order to change speed. Paul de Vivie, a pioneer in the field of cyclotourism in France, helped to perfect and distribute derailleur gears. During the 1912 Tour de France, French cyclist Joanny Panel used an experimental system of derailleur gears which were then banned until 1937. The first bicycles had only a single derailleur gear in the back, but after 1946 front derailleur gears were added to racing bicycles.

1874 Invention of the electrical light bulb

A Canadian student invented the electrical light bulb, which was then perfected in 1878 by English chemist, physicist and inventor Joseph Swan and American inventor Thomas Edison, who patented his device in 1879. This first incandescent bulb was made with a carbon filament in a vacuum bulb. When a weak voltage was applied, the filament burned, providing light for several hours.

1865 Synthesis of celluloid, the first plastic material

Celluloid was the first artificial plastic material to be invented. It is made by chemically modifying cellulose, a natural polymer, and composed mostly of nitrocellulose and camphor. It was in response to a contest to find a product for replacing the ivory in billiard balls that brothers John-Wesley and Isaiah Hyatt invented celluloid and first marketed it in the United States. Their work was independent of English chemist and inventor Alexander Parkes who had developed a similar material in the early 1860s. A material that is easy to work, mould and tint, celluloid was used to make many plastic objects: dolls, piano keys, brushes, film strips and the like. In the end, though, the material did not make a good billiard ball. Highly flammable, this form of plastic is hardly ever used today, having been replaced by better plastics. It is now used almost exclusively to make ping-pong balls.

1859 Drilling of the first oil well

In Canada the first commercial oil well was located in Oil Springs, Ontario. Discovered in 1857 by industrialist James William, it was the first oil well in North America. The same year, the country that produced the most oil was Romania. The U.S. oil industry was launched two years later in Titusville, Pennsylvania, by American industrialist Edwin Drake who drilled an oil well for production. He built the first derrick, a metal structure that holds drilling equipment for a well. Many countries started drilling for oil in the 1850s: the world became caught up in the search for "black gold." In the early 20th century oil was discovered in Alberta. Today Alberta is the Canadian province with the highest oil production.

1800 Invention of the pile battery

In the course of his work on electrical phenomena in living organisms, in particular the nerves and muscles of the frog, Italian physicist Alessandro Volta invented the battery. It was composed of a pile of disks (hence the term *pile* battery) made of two metals, zinc and copper, separated by cloth or cardboard soaked in a saline solution. To generate electricity (the first continuous current), Volta's battery made use of the differing electrical potentials of two metals linked by a liquid conductor. The saline solution was later replaced by an acid solution. Discovery of the battery is the origin of the study of electrical current.

1737 Opening of Canada's first foundry in Trois-Rivières

The first operational iron foundry in Canada was the Forge Saint-Maurice in Trois-Rivières. It produced mostly stoves, pans and other cast-iron (an iron-carbon alloy) products for domestic use until it closed in 1883.

CIRCA 1400

Invention of ice skates with iron blades

The first ice skates were made of animal bones and strapped onto the bottom of the feet with strips of animal skin. Following the discovery of iron, metal blades came into use as early as the second century B.C. in Scandinavia. At the time, ice skates were used as a mode of transportation between towns. Later, nearing the 12th century, use of iron blades spread to the Netherlands, where skating became a recreational activity as well as a mode of transportation. Then, the blades were fastened to blocks of wood and tied onto the feet with strips of leather.

723

Invention of a clock with gears that turn at a regular rhythm

The verge escapement was the first mechanism to regulate speed of gears in clockworks and was invented in China. Buddhist monk, astronomer, mathematician and engineer Yixing included the first known escapement in one of his inventions. This regulatory mechanism, called *foliot* at the time, was used in early mechanical (verge or foliot) clocks in 14th century Europe to transform continuous movement of gears into a motion synchronomous with the regular rhythmic swinging of a pendulum.

CIRCA 100

Invention of the horseshoe

To protect the hooves of horses, the Romans invented hipposandals made of metal plates with raised edges that were held in place under the hooves with strips of leather. The hipposandal is the ancestor to the horseshoe. At the beginning of the Middle Ages, the iron horseshoe and horseshoe nails came into use in Western Europe, gradually replacing the hipposandal. In the 12th century the U-shaped horseshoe was in use around the world while continuing to evolve. Today, a hipposandal may still be worn on an injured hoof.

CIRCA –1500

Earliest heat treatment of iron to improve its properties

Iron was first used around 2500 B.C. Around –1300 a procedure was discovered in Asia Minor to purify iron and forge stronger, more durable objects. To do this, a type of furnace called a *bloomery* was used. This furnace uses the combustion of charcoal to transform iron ore into purer metallic iron. Iron objects from ancient civilizations have been found: spearheads, daggers and ornaments. Iron weapons were stronger than those made of bronze.

CIRCA –3700

Invention of bronze

Bronze was the first alloy (copper and pewter) made by man. The earliest discoveries date from –3000 and even –5000 in Mesopotamia and include both weapons and tools. At the time, pewter was an abundant natural resource. Combining copper and pewter yields bronze, which is easy to shape, fold, mould and sharpen. Objects made of bronze are harder and more durable than objects made of copper or stone.

CIRCA –5000

Earliest extraction of lead, copper and pewter

Mining and transforming of metal started at this time: it was the dawn of metallurgy. Copper was the first metal to replace stone tools. Pure copper found in nature was at first simply hammered into a shape. The first traces of metal objects made by humans were found in Mesopotamia (now Iraq, Iran and Syria). The Egyptians quickly mastered the use of copper for creating tools, then other objects and jewellery. Hieroglyphics have been found that describe Egyptian forging techniques. Copper was a source of wealth and used for trade. According to some experts, lead may have been used as early as 5000 B.C., possibly 7000 B.C., because of its abundance, ease of extraction and malleability. The Romans later used lead to make pipes for transporting water. Pewter has been known around the world since ancient times and was also an abundant resource. Since pewter melts at low temperatures, it was easy to work and, in contrast to iron, required no special knowledge or technique.