Waterwheel Encyclopedia Article

Waterwheel

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The waterwheel is considered the first rotor mechanism in which an outside force created power to spin a shaft. The Greeks are said to have first developed the waterwheel, using it to raise water from rivers. Polls or pots were attached around the circumference of a large wheel; then oxen would walk in a circle around a vertical shaft connected through a simple gear to the horizontal shaft of the waterwheel. When possible, the current of a fast-flowing river would do the work of the oxen.

By Roman times, ancient engineers realized that the spinning shaft could be used as a power source to turn millstones. However, few were built for this purpose due to the abundance of slaves to grind grain into flour. After the fall of the Roman Empire waterwheels spread throughout Medieval Europe largely through the efforts of monks who introduced the technology to landowners, many of whom had lost workers to disease and war. The first factories--textile mills--were powered by water. Other early uses of waterwheels included sawmills for sawing lumber and gristmills for grinding grain. Many large cities owe their existence to power drawn from nearby rivers, but this power source was not very dependable due to floods and droughts that changed the amount of water flowing in the river.

Several types of waterwheels evolved over the centuries. The two most used were the overshot wheel, which involved water falling on the paddles from above, and the undershot wheel, which was placed directly in the water and worked especially well in swift streams. A more unusual and less frequently used type was the reaction wheel in which water was dropped into a hollow tube from a great height. The tube had hollow spouts attached to it, and the water would spray out the spouts, causing the tube to rotate much like today's lawn sprinklers. The tidal wheel required an enclosed pond with a gate. As the tide rose, water flowed into the pond until the gate was closed, effectively trapping the water. Later, the gate was opened, allowing water to flow out and turn a wheel for power. By the late eighteenth century, more efficient and powerful steam engines began to replace waterwheels as Europe's primary source of power. However, the principle of the waterwheel lives on in today's water turbine.