



## Discovery of Air-Conditioning system: July 17, 1902

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### General Note

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Air conditioning is the process of altering the properties of air (primarily temperature and humidity) to more favourable conditions. More generally, air conditioning can refer to any form of technological cooling, heating, ventilation, or disinfection that modifies the condition of air. The first modern air conditioning system was developed in 1902 by a young electrical engineer named Willis Haviland Carrier. He was also known as the Father of Modern Air Conditioning. His invention was designed to improve the manufacturing process of a printing plant. By controlling the temperature and humidity of the plant, the processes were made more efficient as the paper size and the ink alignment were consistently maintained. The air conditioner started in the early days with the need to preserve foods. Foods that are kept at room temperature spoil easily due to the growth of bacteria. At temperature below 4° C (40° F), the growth of bacteria is reduced rapidly. As a result of the development in food refrigeration, other application that follows includes air conditioning, humidity control and manufacturing processes. The subject of refrigeration and air conditioning has evolved out of human need for food and comfort, and its history dates back to centuries.

Air conditioning can also be provided by a simple process called free cooling which uses pumps to circulate a coolant (typically water or a glycol mix) from a cold source, which in turn acts as a heat sink for the energy that is removed from the cooled space. Free cooling systems can have very high efficiencies, and are sometimes combined with seasonal thermal energy storage (STES) so the cold of winter can be used for summer air conditioning. Common storage mediums are deep aquifers or a natural underground rock mass accessed via a cluster of small-diameter, heat exchanger equipped boreholes. Some systems with small storages are hybrids, using free cooling early in the cooling season, and later employing a heat pump to chill the circulation coming from the storage. The heat pump is added-in because the temperature of the storage gradually increases during the cooling season, thereby declining in effectiveness. Free cooling and hybrid systems are mature technology. Carrier used his knowledge of the heating of objects with steam and reversed the process. Instead of sending air through hot coils, he sent it through cold coils (ones filled with cold water). The air blowing over the cold coils cooled the air, and one could thereby control the amount of moisture the colder air could hold. In turn, the humidity in the room could be controlled. The Carrier Air Conditioning Company of America was formed to meet rising demand. Over time, air conditioning came to be used to improve comfort in homes and automobiles as well. Residential sales expanded dramatically in the 1950s.

The widespread development of air conditioning is attributed to the American scientist and industrialist Willis Carrier. Carrier studied the control of humidity in 1902 and designed a central air conditioning plant using air washer in 1904. Due to the pioneering efforts of Carrier and also due to simultaneous development of different components and controls, air conditioning quickly became very popular, especially after 1923. At present comfort air conditioning is widely used in residences, offices, commercial buildings, air ports, hospitals and in mobile applications such as rail coaches, automobiles, aircrafts etc. Industrial air conditioning is largely responsible for the growth of modern electronic, pharmaceutical, chemical industries etc. Most of the present day air conditioning systems use either a vapor compression refrigeration system or a vapor absorption refrigeration system. The capacities vary from few kilowatts to megawatts.