



# Heartland Science



Ohio's Legacy of Discovery & Innovation



## Energy

From Amps to Air Conditioning

### The Wizard From Ohio

Thomas Alva Edison, born in 1847 in Milan, became the world's most famous inventor, with more than 1,000 patents. Edison's inventions included the incandescent electric lamp, phonograph, and the motion-picture projector. His genius launched hundreds of new industries and changed the world forever.



Less well known, however, are Edison's contributions in inventing the framework that generations of other inventors used in systematically researching and developing their new products. Edison invented the first true industrial research and development (R&D) center. He built the "Invention Factory" in 1887 in West Orange, NJ, that consisted of a complex of brick buildings, each devoted to a different part of the invention process. There were buildings devoted to chemical research, physics, and metallurgy, for instance. A research library allowed Edison and his team to avoid wasting time trying to reinvent the wheel. Instead, they stood on the shoulders of giants from the past, giving old ideas new life. A pattern shop and machine shop changed ideas into prototypes of marketable products. That was Edison's goal, and it remains the bottom line for industrial R&D today: To take ideas to market and bring back a profit. Edison designed his Invention Factory to develop "useful things every man, woman, and child in the world wants at a price they could afford to pay."

In the R&D complex, Edison and his team worked out the basics for the phonograph and motion pictures. One of their longest and most difficult projects resulted in the alkaline storage battery, which vastly improved on existing batteries and became a standard in the battery industry. Perfecting the storage battery took 10 years, but that battery became Edison's single most profitable invention.



Edison also integrated R&D into production. Prototypes, or working models, of products went from the Invention Factory to a complex of real factories that Edison built nearby in 1888. Workers produced Edison's inventions in huge quantities to sell around the world.

In 1882 Edison made another tremendously important, but often-forgotten, contribution. He discovered that an electric current would flow between two wires separated by empty space in a vacuum. The discovery of this phenomenon -- known as the Edison effect -- led to development of "vacuum tubes." These devices, which amplified and changed electric signals in other ways, were used in early radios, televisions, and other electronic devices before invention of the transistor. Applications of the Edison Effect eventually led to foundation of the global electronics industry.

## Find out more...

- [The Inventions of Thomas Edison](http://inventors.about.com/library/inventors/bledison.htm)  
(<http://inventors.about.com/library/inventors/bledison.htm>)
- [Edison's Timeline of Invention](http://americanhistory.si.edu/timeline/05ed.htm)  
(<http://americanhistory.si.edu/timeline/05ed.htm>)
- [Edison Birthplace Museum - History](http://www.tomedison.org/)  
(<http://www.tomedison.org/>)
- [Smithsonian's Edison After Forty](http://americanhistory.si.edu/edison/index.htm)  
(<http://americanhistory.si.edu/edison/index.htm>)