LINCOLN® ELECTRIC

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A Century of Excellence, A Future of Innovation

John Lincoln, an innovative and inventive genius, portrayed in a 1944 photograph.

From very humble beginnings, near Lake Erie's northeastern Ohio shores, a spark of inventive genius in one man ignited the kindling to start two companies that would reach the Fortune 500: Reliance Electric and Lincoln Electric. In 1888, in his first job, young John Cromwell Lincoln earned 10 cents an hour. But John had engineering talent and the young science of electricity was charging through his body. The light bulb had just been invented. John saw a need for DC motors and, in 1892, he began designing and making custom motors in his home.

Herbert H. Dow, future head of Dow Chemical Company, asked him to redesign a cement mill motor. The motor's design was simplified, made durable and inexpensive. The $200 fee was the seed money needed to launch The Lincoln Electric Company in 1895. In 1900, John C. Lincoln invented a motor-generator set to charge batteries in the new fangled electric automobiles.

John C. Lincoln (with ball) played right tackle and was the captain of his Painesville, Ohio high school football team.

1895
A CENTURY OF EXCELLENCE
LINCOLN ELECTRIC
A FUTURE OF INNOVATION
1995

Enter Arc Welding

John Lincoln realized that the same motor-generator set used in electric cars could generate electricity for the new process of arc welding. Motor-generators were the basis for development of welding machines. A power control system had to be added. With refinements, optimum welding arcs were achieved. Lincoln's insight as to what makes the ultimate arc was crucial to the company's success. The refinement of this knowledge has been a Lincoln advantage in the manufacture of power sources—redesigning and improving them year after year, progressing to today's sophisticated power and space efficient inverter designs.

Rugged hard working crew of the 1908 Lincoln machine shop.

At one time, it was believed that riveting was the "only way" to secure two pieces of metal. John thought otherwise, envisioning small, portable welding machines for machine shops and small factories. In 1907, he felt that his younger brother, James Finney Lincoln, studying electrical engineering at The Ohio State University, was needed for his talent and energy. James became the only salesman, at $50 per month and 2% commission. Years later, Ohio State presented James with an honorary degree in electrical engineering.

James F. Lincoln, a man who believed in the honesty and integrity of the individual worker, as photographed in 1943.

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All the Lincoln Electric employees of 1910 gathered outside their plant surrounding John Lincoln.

The First Machine

In 1911, the first Lincoln welder was revolutionary because of its versatility. It was smaller and more compact than existing machines. More importantly, the electrical current could be adjusted by the operator. He could control the intensity of the arc. The Lincolns' experience with motor-generator sets enabled them to instantly produce low cost machines.

1919 Lincoln Electric ad

To improve weld strength, the inventive John conducted numerous experiments. When the metal in the weld was purified, he found the resulting joints to be less brittle. He patented a way to apply finely powdered metals next to the edges and surfaces of the metals to be joined—producing an alloy which made the weld both strong and ductile. By introducing iron powder as a coating on stick electrodes, welders achieved higher productivity, higher deposition rates, and the electrodes ran smoother.

To reduce costs, Lincoln began making its own iron powder. A more consistent manufacturing process resulted in better quality control, uniformity of particle size, and a lower price to customers. Lincoln Electric historically has set prices based on manufacturing cost. When the cost went down, the selling price went down. Refinement upon refinement gave customers greater and greater productivity. That philosophy continues today. To ensure component quality control, Lincoln makes virtually all of its own printed circuit boards, all of its own tooling and fixturing, and injection molds, over 6000 different components. Some call it vertical integration; we call it controlling quality and costs.

Given the reins of the company after World War I, James Lincoln began the transformation of Lincoln Electric from a small engineering shop to the leading innovator of arc welding products. In 1917, Lincoln Electric demonstrated that sabotaged German ships, abandoned in U.S. harbors, could be repaired by arc welding. Because of military demand and the rapid growth of arc welding applications, trained welders were in short supply. So, The Lincoln Electric Welding School was started in 1917. It continues today—proud of its more than 100,000 graduates.

The Individual

James F. Lincoln believed in the natural abilities of each individual and the effectiveness of competition. He instituted a piece-work and bonus system to reinforce the relationship between productivity and money earned. Every employee is responsible for quality, attendance, and teamwork with minimal supervision. The result: productivity of more than twice the national average with warranty claims virtually nonexistent. Dedicated, skilled workers don't make mistakes and Lincoln increases personnel only to satisfy customer demand. Lincoln's guaranteed continuous employment program has provided job security with no layoffs for over 45 years.

The office staff of 1910 kept the orders moving to customers.

The average length of employment at Lincoln Electric is

14 years—more than twice the national average. Almost 1000 now belong to the 25-year-seniority Quarter Century Club. Customers also benefit from the Lincoln Electric

Pipeline welding in the 1930's.

incentive program because the lower manufacturing costs means lower selling prices.

Another innovation was the creation of an Advisory Board made up of representatives of various departments. It gave employees a mechanism for presenting problems and sug-

Massive early motor-generator-welder was not easily portable.

gestions to management. The piece-work system and the Advisory Board provided important building blocks for Lincoln's famous incentive management system.

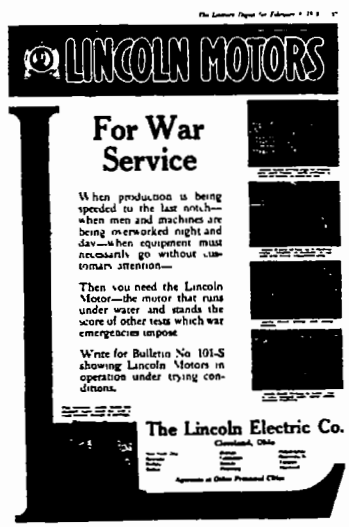
From the Advisory Board meetings over the years came employee relations built on trust. If management treated employees fairly, and shared profits with them, employees would give their best effort. Customers were treated with the same integrity. They came to identify Lincoln Electric with fair pricing, quality, and service. Shareholders found that these policies were profitable for them as well.

Better and Better Products

Even during the Great Depression of the 1930's, Lincoln Electric grew steadily. Sales climbed from $4,000,000 in 1934 to $24,000,000 in 1942. Electrodes that sold for 16 cents per pound in 1929 sold for less than five cents in 1942. This met a Lincoln goal: "to sell a better and better product to more and more people at a lower and lower price." As a company, Lincoln did not believe in protection by patents or other forms of monopoly that interfered with competition. Certain products were patented only to protect the company from infringement suits.

World War II

The welding of ship hulls was resisted by the U.S. Navy until the Germans proved the effectiveness of the applications. At the time, Lincoln was making 35% of the welders produced in the United States and was selling them at half the price competitors charged. James Lincoln turned down an offer from the government to fund a new plant to expand electrode production for the war effort. Instead he felt it was more efficient to show competitors how to increase their production. In 1951, William Irrgang, as the new company president, led Lincoln Electric's move to a new plant in Euclid, Ohio. The assembly lines were designed with worker input for maximum efficiency and further cost cutting. Raw materials went directly to work stations and finished products were immediately shipped to customers. George E. Willis became president of the company in 1972 and continued the Lincoln tradition. "We're a manufacturing company," he said, "And we are the best manufacturing company in the world." Solid state electronics started to become prevalent as digital meters ushered in a new level of accuracy for machine setting and repeatability.


LINCOLN MOTORS

For War Service

When production is being speeded to the last notch—when men and machines are being overworked night and day—when equipment must necessarily go without customary attention—

Then you need the Lincoln Motor—the motor that runs under water and stands the score of other tests which war emergencies impose

Write for Bulletin No 101-S showing Lincoln Motors in operation under trying conditions.

The Lincoln Electric Co.

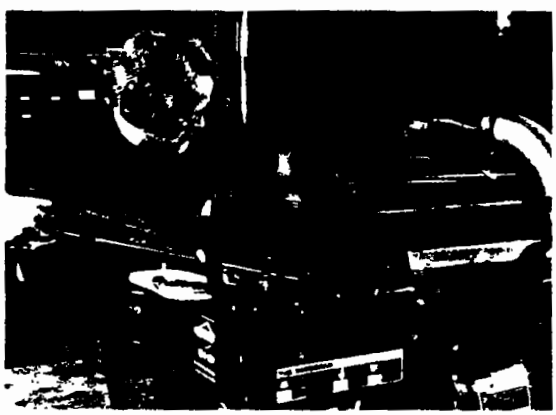
1918 Lincoln Electric ad.

The current Lincoln Electric Company headquarters building in Euclid, Ohio.

Global Competition

In the early 1980's, increasing global competition led the company to develop its own distribution network overseas. The 1983 recession sparked Lincoln's move to broaden its product line. A new Engineering and Development Department was created to introduce gas-shielded welding, plasma arc cutting power sources, oxy-fuel cutting, and more. The company continues to make electric motors, and a subsidiary sells industrial gases, regulators, and torches. In 1989, Harris Calorific was acquired.

Donald F. Hastings became company president in 1986, chairman of the board in 1992. Under his leadership, the company is aggressively working at capturing markets worldwide. It is anticipated that 1994 will be one of the most successful years in the history of Lincoln Electric.



Today's Lincoln production personnel are dedicated to producing reliable, problem free, quality products.

From the machine shop of 1895, The Lincoln Electric Company has grown because of its emphasis on production efficiency and fair product pricing to serve the customers first. Everyday Lincoln produces enough rod and wire to circle the globe—more than 1850 different wires and electrodes. Manufactured every year are more than 320,000 power sources and electric motors. The company is currently adding over 300,000 square feet dedicated to the expansion of motor manufacturing capacity. Our goal for our 100th year of 1995 is to reach one billion dollars in sales for the first time in the company's history. We are committed!

Modern Lincoln Electric powder coating station designed to help produce quality products at the lowest possible prices.

Behind our company's success and growth are the people who "buy Lincoln". So all the employees of Lincoln Electric want to express a heartfelt 'Thank You' to the world's best people—our customers—for a successful century. Here's to the next 100!

Randy Glassburn
Editor

Today's state-of-the-art Surface Tension Transfer (STT) Inverter Power Source for exceptional arc control and reduced fume level with the GMAW process.