

Engine-Driven Arc Welding Machines

By Mark E. Sapp

The Slavianoff electric arc welding process, also known as metallic arc welding, is the precursor to today's arc welding machine. This familiar process works by completing an electrical circuit from the weld metal and the ground from the workpiece through three elements: a suitable source of power, an electric circuit and a controller for arc manipulation, and a ground clamp and filler metal.^[1]

One of the earliest commercial attempts, in 1919, to provide welding capability away from the shop was the Wilson 'Plastic Arc' Welding Machine.^[2] It combines an automobile engine as a power source with the controller side of an electric arc welding machine.

During this time The U.S. Light and Heat Corporation, near Niagara Falls, developed specialized portable equipment using a truck with a motor-generator or converter panel, a reactor, and a cover and reel. The portability permitted repairs to power lines in remote areas away from the power generator center.^[4]

Every welding machine requires a prime mover, an electric motor or fuel-powered engine, connected to a generator to provide the necessary volts and amperes. In the early years of arc welding, it was known and problematic that volts delivered to one location could vary widely at another location further away or even next door. Sometimes, the provided current would be alternating or direct. Without the correct connection or setup, the welding machine would not work.

An engine-driven prime mover, fueled by gasoline, kerosene, or natural gas, provided the best solution for consistent and stable electricity. Thus the arc welder became portable and independent of the electric power lines.^[3]

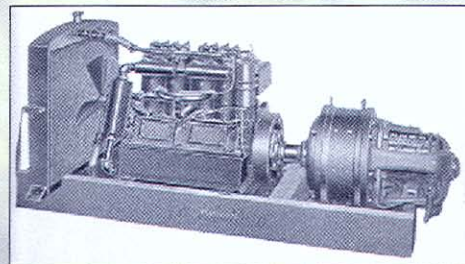
General Electric produced an engine-driven welding machine by October 1921. The unit is divided into four distinct sections: engine, generator, controller, and frame. The engine, with radiator and muffler, is designed for continuous output, adapted to handle the intermittent loads from welding, and balanced to eliminate vibration. The generator is self-exciting and self-regulating to provide no load (0 V) to short-circuiting of 60 V then automatically dropping to the welding volts of 18 to 20 V. The engine connects to the generator with a direct and flexible coupling/flywheel. A panel on the front has a field rheostat and a series field dial switch for adjusting the current from 200 to 75 A in 25 A increments. A reactor choke coil, connected in the welding circuit, protects the generator from current surges. The whole unit mounts on a rigid cast-iron frame attached to wooden skids and weighs approximately 2,000 lb.

As America entered World War II, the government requested proposals for a portable welding machine at a meeting in Chicago.

Overnight, Hobart Brothers of Troy

Ohio, put together a proposal to manufacture engine-driven welding machines. The next morning at 9:02, Mr. Hobart entered the room with his proposal, the only proposal offered. The firm soon began supplying portable welding machines to shipyards and military forces. The machines featured either a Willy's 4-cylinder engine or Chrysler 6- or 8-cylinder engines. These came in 200/300/400A models. Hobart also designed the familiar 'Canopy' for engine-driven welding machines.^[5]

The next major application and demand for engine-driven arc welding machines occurred during 1974 -1977 when America began the arduous task of building a pipeline from Prudhoe Bay to Valdez, Alaska. Without the necessary resources to use delivered electricity to the vast expanses, the portable welding machine offered the best solution. Again, Hobart rose to the challenge, developing welding machines that could tolerate minus 50°F temperatures for months on end.



Wilson 'Plastic Arc' Welding Machine, *The Welding Engineer* - 1919.

Sources:

- [1] Hart, Richard N., *Welding - Theory, Practice, Apparatus and Tests*, McGraw-Hill Book Company, 1914.
- [2] Wilson Welder & Metals Co. Ad, *The Welding Engineer*, 4:10, 49.
- [3] Anonymous, "Electric Arc Welder for Portable and Stationary Use", *The Welding Engineer*, 4:6, 52.
- [4] Kinkead, Robert E., "Arc Welding for the Commercial Welding Shop", *The Welding Engineer*, 4:10, 42.
- [5] Hobart, Peter C., *The Industrial Hobarts - One family's story through the American Century*, The Donning Company Publishers, 2004.

About the Author

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