75 years of innovation in motion: the Curtiss-Wright legacy

By John Wranovics

On the event of a historic anniversary, it is worthwhile to pause from technology's ceaseless push forward to celebrate what can be accomplished in the span of a human lifetime. August, 2004 marks the 75th anniversary of Curtiss-Wright Corporation, one of America's most enduring technology companies, and a leading supplier of VME boards and systems through the company's Curtiss-Wright Controls Embedded Computing group. Curtiss-Wright was originally formed by two of America's most important pioneering aviation firms, who separately, and later as a single entity, put innovation in motion to drive the creation and advancement of the avionics and aerospace industries that so many commercial and military VME vendors support today.

The Wright brothers

The later half of the Curtiss-Wright name is a legacy of the Wright Brothers, Orville and Wilbur, whose accomplishments in producing the first powered human flight were honored around the world on the occasion of the event's centennial in December of last year. While these men and their achievements are well known, few are familiar with the remarkable achievements of Glenn Curtiss. In addition to making his mark in early aviation history through numerous achievements of his own, he also earned a place in history as the *Fastest Man on Earth* when he reached the then incredible speed of 136.3 mph in 1907 on a bicycle outfitted with an 8-cylinder engine (Figure 1).

Early rivalry

In their early years, Curtiss Aeroplane and Motor Company and Wright Aeronautical,

Figure 1

were business and technology rivals. The main area of contention between the two was the Curtiss company's use of a movable airfoil surface on the wings for flight control. The Wright brothers considered this as an encroachment of their patented wing-warping flight control technology. It is interesting to note that almost 100 years later, Curtiss-Wright is known as one of the leading providers of flight control systems for commercial jetliners.

The World War I era

Prior to WWI, a Curtiss plane made the first shipboard takeoff in late 1910 (Figure 2), and the first shipboard landing in 1911. Additional milestones in Naval aviation took place in 1911 when Curtiss designed the first successful pontoon aircraft, and flew the first passenger in a seaplane.

The advent of WWI provided a resolution to the companies legal disputes when the government created a patent pool for all aviation intellectual property, thereby setting a formal patent royalty structure. During the war, both companies made major contributions to the victorious outcome while each took great strides in advancing aviation technology and production.

During WWI, Curtiss produced more aircraft than any other American airplane manufacturer with a production output of approximately 1,800 flying seaplanes and boats, 4,000 JN trainers (the famous *Jenny*), and 5,000 engines.

The merger

At the end of WWI, the government unexpectedly cancelled $100 million worth of aviation contracts, causing business to tailspin. In an additional blow to business, the government sold off its unneeded aircraft, flooding the market for years with an excess supply of aircraft. One benefit of the downturn was the wider availability of aircraft which ushered in the *barnstorming* era, and helped drive general interest in flying.

Facing an increasingly difficult business environment, the two aviation companies chose to merge forces. While Curtiss Aeroplane offered a liquid-cooled engine, the aircraft market was moving toward lighter air-cooled models, and Wright Aeronautical possessed the leading edge technology for air-cooled radial engines. On June 27, 1929, the Curtiss Aeroplane and Motor Company and Wright Aeronautical merged to form the Curtiss-Wright Corporation. This union immediately created the largest aviation holding company in the country.

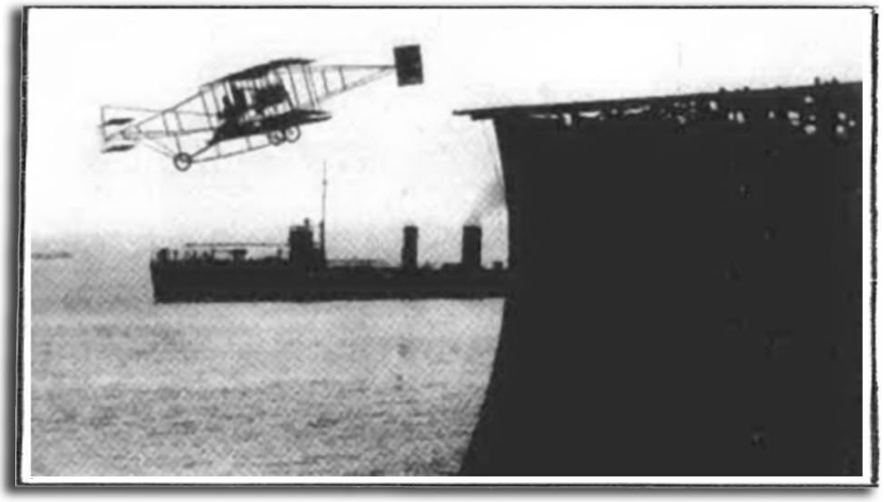

Figure 2

1930's innovations

During the 1930's, Curtiss-Wright produced many groundbreaking technological innovations such as forged aluminum pistons, a dynamic damper to absorb crankshaft vibration, and finned cylinder heads for cooling. They also used a metallurgical process to produce nitrided cylinder barrels which gave engines vastly improved wear resistance.

In 1933, they launched the Curtiss Condor, the first sleeper plane with six compartments. In 1934, Curtiss-Wright was chosen to build the 9-cylinder radial engines for the four-engine Boeing B-17 Flying Fortress. In 1937, the first fighter-bomber to feature retractable landing gear was introduced. By the end of the decade, Curtiss-Wright engineers had pushed engine horsepower above the 1,000 mark.

Innovation in 1930's propeller design included the development of the variable pitch propeller, and the hollow-steel propeller. They also developed the concept of *feathering*, a technique for disengaging a propeller from an inactive engine in order to prevent engine rotation.

The World War II era

In 1940, Curtiss-Wright introduced the famous P-40 War Hawk. Through December of 1944, this plane had a production run of 13,738 planes, and served with distinction in the Air Forces of 28 nations. During WWII Curtiss-Wright produced 142,840 aircraft engines, 146,468 electric propellers, and 29,269 airplanes. During WWII, the company focused on the development and mass production of reciprocating engines and propellers which found use after the war in planes like the Douglas DC-7 and the Lockheed Super Constellation.

After the war

As jet technology became pervasive, popularized by its use in the Boeing 707 and the Douglas DC-8, new demand for the company's propellers and reciprocating engines declined. In response, the company expanded into other technologies such as the first flight simulators for military and commercial aircraft.

Business diversification brought the company into a variety of industries including plastics, military nuclear rod control equipment, automotive components, heavy earth moving equipment, metal extrusion, and even the distribution of Mercedes-Benz automobiles in the US.

The 1960's

As the 1960's began, Curtiss-Wright contributed to the space race as a major subcontractor of precision machined rocket motor cases and exhaust nozzles. As the space program developed, the company used its expertise in propeller and transmission systems to engineer and produce mechanical, hydraulic, and electro-mechanical control and actuation systems for aerospace and defense applications.

Later, the company entered the highly specialized field of safety and relief valves for use in United States Navy nuclear submarines and aircraft carriers. Another new company business was metal forming using shot-peening.

The 1970's to present

Curtiss-Wright owned the North American rights to the Wankel rotary engine, and during the 1970's it was used in the

Mazda RX-7 sports car, and adapted by Ingersoll-Rand for highly reliable rotary compressors.

Other areas of technology leadership for the company included the development of cleaner methods for using coal to generate electricity and process steam. In addition, further valve technologies for the Navy Nuclear Propulsion Program, for commercial nuclear power, and for steam valves for the commercial fossil power market were developed. As an offshoot of the company's investment in jet engine technology, it became a leader in refurbishing and rebuilding industrial gas generators.

In the late 1990s, Curtiss-Wright became a complete aviation overhaul and repair provider, expanding its capabilities beyond form shaping to include other aircraft components and systems.

Current products and services

In recent years, Curtiss-Wright has strengthened its range of products and services for the defense and aerospace industries by building a strong embedded electronics operating group. Curtiss-Wright Controls Embedded Computing was formed through the acquisition of several of the industry's leading vendors including VISTA Controls, Dy 4 Systems, Systran, Peritek, and Primagraphics.

For 75 years Curtiss-Wright has served as a technology leader, driving technological advances, and responding to changing market demands. Now, moving forward, Curtiss-Wright brings its legacy of *Innovation in Motion* to the embedded board market. Ω

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