To Build Wings for the Angels: Los Angeles and Its Aircraft Industry, 1890-1936.

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In the decades following the Second World War, Southern California became the most powerful geo-political region in the United States. Much of its political and economic strength was due to its preeminence in the fields of aerospace and defense related technology. By the early 1960s, more than forty percent of the billions of Federal dollars spent on research and development went to California's aerospace industry. This fact has led historians to focus on wartime and postwar developments to explain the state's geo-political position. They point to the explosive growth of Southern California's aircraft industry during the war, suggesting that the war itself pushed California into prominence on the nation's industrial map. This argument however, overlooks the foundation upon which the state's aerospace industry rests. Southern California had become a significant locale for research, development, and manufacture of aircraft before the Second World War. Already in 1938 the Los Angeles Chamber of Commerce had made a study of the American aircraft industry and concluded that "twenty-five percent by number, and fifty percent by dollar volume, of all aircraft manufactured in the United States" were built in the City of the Angels [1]. The Second World War thus accelerated the development of a process already underway. To understand California's post-war control of the nation's aerospace and defense industries, we must examine the origins of the region's economic and industrial base.

Traditionally, questions concerning the success of industries in certain regions have been approached through the economics of industrial location. Essentially, location theory attempts to explain economic growth as a response to market forces. It identifies the specific economic and geographic factors that influence the location of an industry in a certain area. By weighing the relative value of these factors--which include the location of raw materials, labor, transportation, the location of markets, availability of energy, and capital resources--location theory seeks to define an industry's ideal location.

The problem with models based exclusively upon economic or geographic location theories is that they describe why an industry might

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concentrate in a certain region but fail to explain how it happened, or more importantly, who made it happen. In the only major study concerning the location of the American aircraft industry, published in 1951, geographer William G. Cunningham emphasized the importance of labor and capital in the concentration of the aircraft industry in Los Angeles during and after World War Two. The aircraft industry at this time required large numbers of skilled and semi-skilled laborers, both of which were abundant in Los Angeles. A substantial financial center also existed in the city, which gave aircraft manufacturers access to the capital they needed to expand their facilities and develop new aircraft. Cunningham, however, makes no attempt to explain how those factors came to exist there. Instead he presents a model based upon historical accident, which ignores the political and social aspects of capital and labor. In the end, Cunningham's economic and geographic model tells only half of the story of why Los Angeles became a major center for aeronautics in the United States.

The strength and success of the aircraft and aerospace industries in Southern California lie in the development of a strong economic-industrial infrastructure based upon high technology. This infrastructure was created by the business leaders of Los Angeles--men like Henry Huntington, Harrison Gray Otis, and Harry Chandler--in response to a fierce inter-urban rivalry with both San Diego and San Francisco for economic and political control of the state. These businessmen literally created a garden in the middle of the Southern California desert by applying state-of-the-art technology to overcome the geographic deficiencies of the region. Among the most significant of these projects were the construction of the 230-mile Los Angeles Aqueduct, and the excavation of a deep-water harbor at San Pedro. These projects, constructed between 1890 and 1914 with local capital generated through the real estate and railroad booms of the 1880s, broke the hold of Northeastern capitalists on development in the West. Freed from these constraints, Southern California business leaders were able to create their own economic-industrial base founded on the development of the new industries of the twentieth century: including high-tension electrical transmission, hydraulics, and electronics. Only by leading in science could the region capture these new industries. To that end, business leaders in Los Angeles funded the creation of a first-rate science center at the California Institute of Technology (Caltech). By the mid-1920s, with the financial support of the city's business community, Caltech had built several state-of-the-art research facilities and brought in some of the world's top scientists to direct research in technologically-oriented industries, including aviation.

The aircraft industry emerged in California early in the age of flight. Glenn Martin, a transplanted midwesterner, became the fourth American to fly, after the Wright brothers and Glenn Curtiss, when he flew an aeroplane of his own design in 1909, just south of Los Angeles. Martin opened his first company that same year and would eventually employ many future giants in aviation, including Donald Douglas.

The following year, in 1910, the first international air meet in the United States was held near Los Angeles at Dominquez Field. Nearly 200,000 spectators witnessed the ten day show, which included flights by Curtiss, the

famous French flier Louis Paulhan, and several others. The event was sponsored by members of the local business community, including Henry Huntington, who sought to promote the development of an aviation center in the Southland. The meet's success prompted the creation of the Southern California Aviation Association to host annual winter air meets in Los Angeles. Gradually, a small aviation industry began to develop in the Southland.

The outbreak of the First World War disrupted aeronautical developments in California. Beginning in 1914, a series of mergers among the nation's few scattered aircraft manufacturers occurred as Northeastern capitalists attempted to create a centralized industry capable of meeting any potential wartime needs of the Federal government. One of these mergers, in 1916, brought together Glenn Martin and the Wright Company of New York. As the subordinate member of the new organization, Martin moved his operations to the East, virtually ending aircraft manufacturing in the Southland.

These mergers resulted in the creation of a weakly organized industry concentrated in the northeastern United States. When America entered the war in 1917, the Wilson administration pumped over one billion dollars into the industry, hoping to see it produce 20,000 warplanes per year. The effort failed however, and by 1918 the nascent enterprise collapsed under the weight of corruption and collusion. The mass cancellations of government contracts at the end of the war closed all but a handful of builders and put the industry up for grabs.

With the industry's very survival in question in 1919, the Aircraft Manufacturers Association, a national organization of aircraft builders, concluded that only through the creation of a commercial market could aviation survive in the United States. By manufacturing commercial aircraft for passenger and transport purposes, the industry could survive the slack periods between government contracts. The billion dollar appropriations the Federal government paid into the aircraft industry in 1917-18 proved that aviation could be profitable. As a result, campaigns to capture and centralize the industry began in virtually every section of the country.

For Los Angeles the creation of this commercial market proved to be the most significant factor in the success of aviation in the Southland. In 1920, the same year that Donald Douglas open his own company in Los Angeles, a group of L. A. businessmen formed the Aero Club of Southern California to promote the development of aviation and to educate the public on the advantages and safety of air travel. Other booster organizations followed, including the California Air Race Association and the local chapter of the National Aeronautics Association. Composed of businessmen, teachers, lawyers, laborers, Hollywood film personalities like Cecil B. De Mille, and many state and local political figures, these groups sponsored the airmeets and air races which brought the public out to the airfields, where they could see first hand the latest advances in aviation technology. These organizations worked with local school boards to introduce classes on aeronautical theory into high school and adult school curriculums. They provided the experts requested by the Los Angeles City Council and the County Board of

Supervisors to aid in establishing guidelines for the licensing of pilots and aircraft. They lobbied against restrictive legislation which would prohibit flying over urban areas. Finally, and perhaps most importantly, they spearheaded the drive to persuade the Los Angeles City Council to establish municipal airports for the city. Early in 1928, the City Council adopted Mines Field in nearby Inglewood as the city's first municipal airfield. Eventually it would become the Los Angeles International Airport.

Through the efforts of the Aero Club of Southern California, and other booster organizations, the public came to support and use commercial aviation. In Los Angeles, after the opening of Mines Field provided a base of operations for local air carriers, the number of paying passengers using air transportation increased rapidly, jumping from just 1,800 passengers per month in January 1928, to 8,400 in July of that same year [3]. This growing commercial market allowed Donald Douglas, Alan Lockheed, and other local aircraft manufacturers to survive and prosper.

This social factor, together with the technology-oriented economy supported by the strong business-science coalition developed around Caltech provided an ideal situation for the development and manufacture of aircraft. In 1925, aircraft builder, Donald Douglas and *Los Angeles Times* publisher Harry Chandler, worked together with Caltech president Robert Millikan to bring a state-of-the-art aeronautical research laboratory to the Pasadena college. Douglas' own chief engineer, Arthur Raymond, joined the staff of the lab as a part-time instructor, an advantage which allowed Douglas to recruit some of Caltech's best and brightest students for his company. This connection also allowed Douglas the opportunity to utilize the lab's wind-tunnel and research staff while designing his DC-1, 2, and 3. In this way, the DC-3, undoubtedly the most successful aircraft design ever built, represented more than just a single designer's project. It was a regional product, the result of an alliance of business and science created over the preceding five decades. When introduced in 1936, on the eve of the Second World War, the DC-3 proved that Los Angeles' aircraft industry had come of age and stood ready to dominate the nation in the research, development, and manufacture of aircraft.

References

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