

Development of Aircraft Engines

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THE BEGINNINGS OF GAS TURBINE DEVELOPMENT: 1939-1941

Proposals from Builders of Airplanes: the Northrop Turboprop and Lockheed Turbojet

The earliest complete designs and serious proposals for the development of aircraft gas turbines in the United States, aside from Lasley's abortive attempt, came not from builders of engines of any sort, but from builders of airplanes. This fact is of considerable significance: the two earliest gas turbine projects in Germany likewise came from builders of airplanes.

The first of these designs originated in Northrop Aircraft, Inc. One of the original employees of this company, which was founded in March 1939, was a Czech engineer, Vladimir H. Pavlecka, who had acquired considerable enthusiasm for the gas turbine during his work in the aircraft industry abroad. Pavlecka considered the gas turbine a superior replacement for the reciprocating engine in driving a propeller, and convinced the head of the company, J. K. Northrop, that such an engine should be developed, chiefly on the grounds that it was simpler than a reciprocating engine and required less complication of accessories, but in part also because it would be freer of vibration and somewhat lighter.

Since Northrop intended to develop a turbine which could compete with reciprocating engines on their own ground, he had to develop one with nearly as high efficiency as a reciprocating engine, regardless of the difficulties which this entailed. He hoped to attain a specific fuel consumption of only 0.55 lb per hp/hr, or less than a third higher than the cruising consumption of average conventional engines at that time, by the use of the very high pressure ratio of 10.5:1 and by the development of a compressor and a turbine with efficiencies of 85%. The achievement of this efficiency from the turbine was not thought to be exceptionally difficult in the existing state of the art, and it was believed that enough had been learned about axial compressors to make it possible to obtain 85% efficiency from a compressor of that type.⁶

⁶Since about 1936 Brown-Boveri had been building and selling axial compressors with efficiencies of 85% or better, but this did not mean that all the problems were solved for Northrop in advance; problems of accurate machining and small