DESIGN ANALYSIS OF

Messerschmitt Me-262 Jet Fighter

Part II — The Power Plant

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First complete engineering study ever published on jet power plant reveals, in addition to fundamental principles of jet propulsion, the design and production compromises made necessary by limitations of materials.

AS IS THE CASE with the airframe of the Me-262, the Junkers Jumo 004 axial flow gas turbine jet power plant is a compromise between design desire and available materials and production facilities.

Outstanding evidence of compromises resulting from lack of materials is the fact that more than 7% of the air taken in is bled off for cooling purposes. Despite this, however, most engines were found to have a service life of about only 10 hr., against a "design life" of 25 – 35 hr. Additional compromises are evident in the design, which shows that the production engineer – undoubtedly hampered by lack of both plant facilities and adequate skilled labor – has been as important a factor in its construction as was the designer.

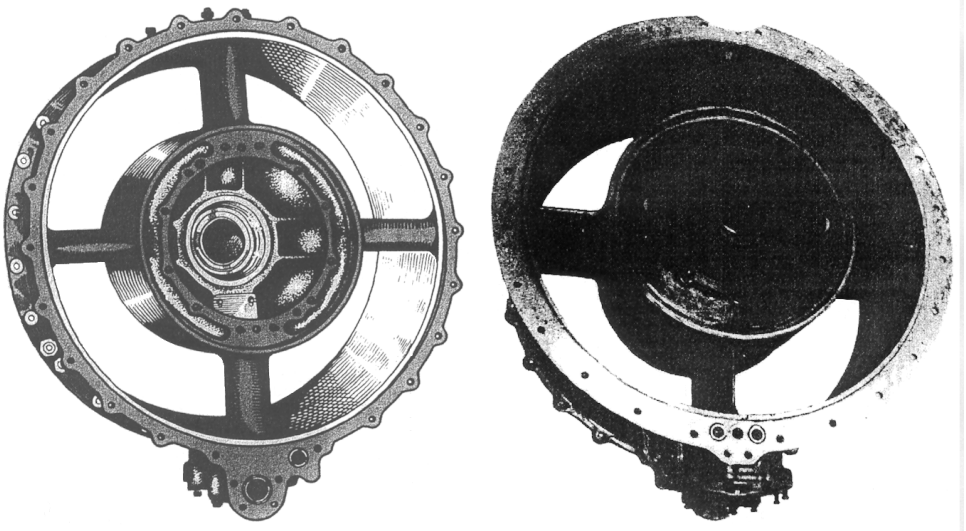
But the Germans had made real progress in overcoming materials difficulties, for just after they capitulated that development of a new alloy of excellent heat-resistant qualities had made it possible to get up to 150 hr. service in actual flight tests, and up to 500 hr. on the test stand.

A large unit, the 004 is 152 in. long from the intake to the tip of the exhaust; 30 in. in dia. at the skin around the six combustion chambers, with maximum diameter of the cowling reaching 34 in.

The circular nose cowling is double skinned, the two surfaces being welded together near the leading edge and held in position by riveted channel shaped brackets. Diameter at the intake end is 20 in., the outer skin increasing to 31½ in., the inner to 21½. Inside the cowling is an annular gasoline tank which is divided into two sections, the upper being of ¾-gal. capacity feeding fuel to the starting engine, the lower of 3¼-gal. capacity, feeding starting fuel to the combustion chambers.

The nose cowling attaches by eight screws in captured nuts to the annular-shaped combination oil tank and cooler. Having 3-gal. capacity, this tank has a baffle close to the inner surface so that as warm oil is fed in from the top it is cooled as it flows around to the bottom of annulus and the tank proper.

The oil tank, in turn, is attached by 23 bolts on a flange to the aluminum alloy intake casting. This unit comprises the outer ring, with flanges on both front and rear faces,



Front of Junkers Jumo 004 intake casting (left), with oil lines at bottom. Holes in outer flange are for attaching oil and starting-fuel tank assembly. Twelve studs on inner ring hold bevel gear assembly, from which drives for accessories and oil pumps extend through vertical streamlined fairings. Right: Aft face of intake casting, with front compressor bearing held in place by round plate attached to ten studs. Bolt holes in outer flange are for attachment to compressor stator casting.