Book Reviews

MAKING JET ENGINES IN WORLD WAR II: BRITAIN, GERMANY AND THE UNITED STATES

BY HERMIONE GIFFARD

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REVIEWED BY MR MARK RUSSELL

Biography: Mark Russell is completing an MA in Air Power at the University of Birmingham. His poor eyesight precluded any aviation-related career, so for the last 30 years he has worked for a major accounting firm, helping clients review, challenge and change their processes. He is currently writing his dissertation on the RAF's approach to developing, testing and refining tactics in the late 1920s and early 1930s.

INTRODUCTION

"Engine supply was the limiting factor in aircraft production." This statement by Ely Devons, a planner in the Ministry of Aircraft Production (MAP) during World War Two, demonstrates the importance of Giffard's subject. Her book does the subject justice - a judicious blend of the technical with a wider view of how each country moved from developing to producing jet engines, providing new insights into "an advanced manufacturing industry [that] involves scientific, managerial and engineering problems of extraordinary complexity". Her approach differs from previous authors, and her conclusions provide a well-argued alternative to their views, making this a valuable contribution to the historiography.

Looking first at Giffard's approach, she works back from production to invention, the better to focus on the key contribution made by the production engineers in bringing the jet engine to mass production. Andrew Nahum has already done significant work in relation to the British jet engine story, outlining the significant support Whittle received from the Air Ministry and MAP, but what Giffard adds is a broader examination of the

role played by manufacturers in bringing designs into production. She convincingly shows how this understanding of production engineering was central to manufacturing engines in useful quantities, and how the feedback between designers and engineers was essential to successful volume manufacturing. In looking at mass production, she extends our knowledge beyond Anthony Kay's work on turbojet development, which is more focused on development than the problems of production, and does not offer the same level of comparison between the three countries Giffard covers. She makes the point that not having both sets of expertise in-house, Power Jets' (Whittle's company) wish to lead the development while subcontracting the manufacturing would have slowed this essential feedback. Thus Giffard sees Whittle's view that industrial leadership was stolen from Power Jets as incorrect; Power Jets lacked the manufacturing expertise to lead the mass production of jet engines.

This feedback from the needs of mass production into design is also seen in Giffard's description of how the German Ministry of Aviation's (RLM's) demands for output led German designers to design jet engines to make best use of the "unique and desperate" conditions of late-war Germany – not to develop the high quality, high technology solution that the popular view of German wartime engineering would expect.

This is Giffard's most significant new perspective on the three countries. Edward Constant puts forward the popular view, namely that "Germany also probably had the most comprehensive programme for advanced turbojet development, both engine and airframe, of any of the powers," and Sterling Pavelec has echoed this. However, Giffard sees the German engines as an 'ersatz' solution to the Luftwaffe's needs: cheap, mass-produced and low quality, while the British and American manufacturers focused less on wartime urgency and more on building a firm foundation for the postwar era, which was expected to be dominated by jet engines. She shows that the British engines were much more robust in service; a Welland could run for 150 hours between overhauls, whereas the Jumo 004 required an overhaul after only 25 hours, and "something like a third of the engines produced never entered service" due to quality issues.

Germany was "the third country to decide to produce jet engines", and did so because of the "failure to develop new, faster piston-engined aircraft", which left the jet engine as the answer to matching the superior Allied piston engines. This was the military logic for moving to jet engines, but Giffard also makes a strong case for the economic argument for developing jet engines as the war progressed. Giffard cites manufacturing times of 700 hours for the Jumo 004 engine v. 3,000 hours for piston engines (cut to 1,250 for certain BMW piston engines by the end of the war) while the British Welland engine took "many times longer". The resulting German engines were, however, "dangerous" and "routine flights were often fatal", again in contrast to the British approach.

Giffard's conclusion that the British were adopting an approach focused on long term success, which paid off after the war, is persuasive and a valuable challenge to much of the historiography. This is a key contribution to our understanding - the fact that German jet engines were not a breakthrough, focused on high technology and quality, but were "evidence not so much of technological superiority as of the turbojet engine's ability to be mass-produced under conditions of extreme scarcity and using brutal, authoritarian labor practices". Britain and America did not have the same need for jet engines; their piston engines were superior to those produced by the enemy, and they had the resources to produce them, unlike the Germans who lacked the resources to build enough engines, which were not as good as the Allied ones anyway.

In conclusion, this book is an excellent example of how an examination of the detail of a subject, using an alternative approach, can throw light on wider issues and help the reader revisit and reshape how they look at an historical question. It provides a new perspective on the way jet engines were developed and manufactured, and in doing so provides a useful counterbalance to the 'heroic inventor' approach to the subject. As such, it should be read by all those interested in air power, since as Tony Mason has pointed out, the strength of the industrial base is a key part of air power. It will also provide useful insights and examples to those interested in the relationship between the inventor of a technology and its eventual production.

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