

46ESS-02: Intake Systems for Supersonic Aircraft

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Supersonic intake systems are found on military aircraft configurations, and were also used on the most famous civil aviation aircraft; Concorde – the only supersonic passenger aircraft to have ever flown. The intake geometry found on supersonic aircraft is usually comprised of a rectangular duct, or a sharpened lip; for very high supersonic speeds. These geometries are highly effective in reducing the speed of the airflow from supersonic to subsonic, before it enters the first stage of compression. Variable geometry intakes are also found on many military propulsion systems, such as the SR-71 aircraft; where the intakes change their geometry for different flow regimes and allow for higher cruising altitudes. Inlet efficiency is a crucial parameter that must be maintained through the entire mission of the aircraft. At high supersonic speeds the aircraft must be able to manoeuvre aggressively, without the airflow entering the compressor being disrupted. This paper will focus on the different types of intake systems found on supersonic aircraft, and the aerodynamic phenomena associated with such designs, as well as how they affect the overall performance of the engine at different flight regimes.