

# [Theory of operation and performance of turbine engines](https://assignbuster.com/theory-of-operation-and-performance-of-turbine-engines/)

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Theory of Operation and Performance of Turbine Engines
Understanding how the turbines engine works forms the main theoretical concept that defines the performance and operation the turbine engines. Turbines work and operate on similar concepts as those followed by the piston aero engines. These engines incorporates the air and spray fuel on it after compressing and making the air hot. Upon compression it will vaporise and ignite thereby causing continuous burning, a concept that distinguishes turbines from pistons (Hunecke, 2010; Sonntag and Borgnakke, 2006). The exhausted air is hot and expands faster hence existing the combustion zone. The turbine drives as this cycle goes on because the process rotates the compressor (Çengel and Boles, 2011). There are several forces involved the operation and performance. These include the thrust, power production, constant pressure, working cycle, the Boyle, and Charles law that defines the operation of these engines.
The most significant information concerning the turbine engines with respect to their operation is the process that happens in the internal engine and the sections of the engine involved in bringing about rotation of the compressor (Hunecke, 2010). A typical combustion engine has internal mechanisms that follow four basic process that include the intake of fuel or air, the air undergoes compression, burning of the fuel to convert stored energy through combustion process, and the utilisation of the converted energy through the expansion and exhaustion (Çengel and Boles, 2011). However, in the turbine engines the above four stages takes place in different places at the same timing. Therefore, the turbine engine has sections of the engine that serves four functions. These sections include the inlet part, the compression part, the combustive segment, and the exhaustive sections (Çengel and Boles, 2011).
Performance and operation of turbine engine is not always efficient hence, the need to identify areas that are likely to experience challenges so that effective monitoring and evaluation is considered whenever necessary. The turbine engines rarely experience challenges, for instance one of the challenges is called the compression stall or compression surge. Though this concept is rare, it occurs when the takeoff power is very high (Hunecke, 2010; Çengel and Boles, 2011). The surge takes place when there are instabilities in the operation of the engine, especially when the cycle of the operation is interfered with when taking off. The interference of the cycle at any stage of intake of air, compressing the air, igniting the fuel, or exhausting the energy is the likely cause of compression surge. The most susceptible phase likely to cause this problem is the compression phase because of the instabilities. The instability takes place when the air is confined in the compressor leading to the stalling of air therefore creating unstable compression of the incoming air (Sonntag and Borgnakke, 2006). Besides, the engine compression surge is likely to occur when the engine undergoes deterioration.
The investigation of how turbine engines work is an important concept in the comprehension of their performance and operation. Besides, it enables one to have the required knowledge on the identification of challenges or defects that are likely to occur at any phase or stage of operation. Understanding the concept and theoretical perspective of turbines, which define their operation helps engineers to understand their performance and would be in a better position to institute corrective measures.
Reference
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Sonntag, R. E, and Borgnakke, C. (2006). Introduction to Engineering Thermodynamics, Michigan, USA: John Wiley & Sons,