SNS COLLEGE OF TECHNOLOGY
(An Autonomous Institution)

Department of Aerospace Engineering

23AST101-Fundamentals of Aerospace Engineering

UNIT-4:
POWER PLANTS

TURBOSHAFT ENGINE

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A **turboshaft engine** is a type of gas turbine engine optimized to produce **shaft power** (rather than thrust, as in a turbojet or turbofan). It is commonly used in **helicopters, power generation, and industrial applications**.

How a Turboshaft Engine Works:
Air Intake – Air is drawn into the engine.
Compression – A compressor (axial or centrifugal) increases air pressure.
Combustion – Fuel is injected and burned in the combustion chamber.
Expansion – Hot gases expand through turbine stages:
- **Gas Generator Turbine –** Extracts energy to drive the compressor.
- **Power Turbine (Free Turbine) –** Extracts remaining energy to drive an output shaft.

Exhaust – Spent gases exit, providing minimal thrust (not the primary purpose).
Shaft Power Output – The power turbine is connected to a gearbox, which drives rotors (in helicopters) or generators/machinery (in industrial uses).
Key Features:
High Power-to-Weight Ratio – Lighter than piston engines for the same power.
Reliability & Smooth Operation – Fewer moving parts than piston engines.
Efficiency at High Loads – Better suited for continuous high-power demands than reciprocating engines.

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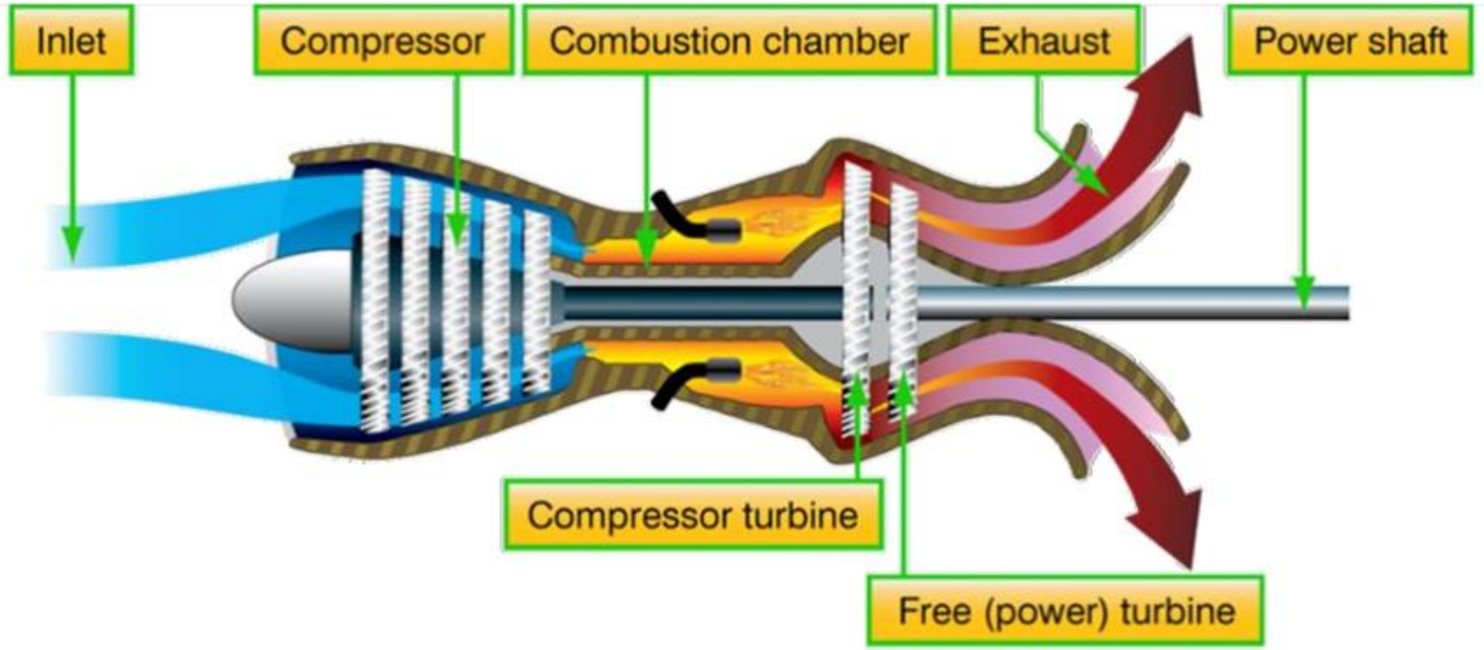
Applications:

- **Helicopters** (e.g., Pratt & Whitney PT6, Rolls-Royce M250, Safran Arriel)
- **Auxiliary Power Units (APUs)** – Provide electrical and pneumatic power in aircraft.
- **Marine & Industrial Power** – Used in ships, pumps, and power plants.
- **Military Vehicles** – Some tanks and armored vehicles use turboshaft engines.

Turboshaft vs. Turboprop:

- **Turboshaft** → Delivers power to a shaft (e.g., helicopter rotor or generator).
- **Turboprop** → Delivers power to a propeller (for aircraft propulsion).




THANK YOU!