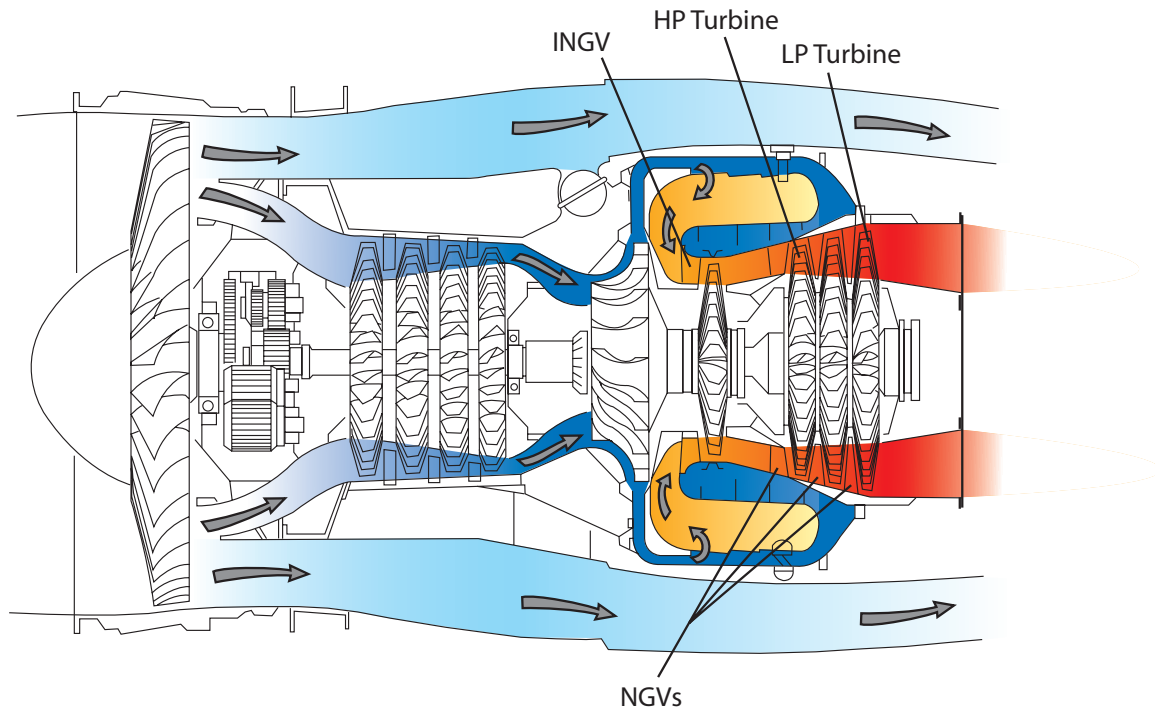


The multi-shaft arrangement allows each turbine to run at its optimum speed since it is mechanically independent of the other turbine shafts. In the multi-shaft arrangements, the LP compressor, fan, or propeller connects to the LP turbine, which is the rearmost turbine and runs the slowest. In the case of a triple-shaft arrangement, the IP compressor connects to the IP turbine located in front of the LP turbine, and runs faster than the LP turbine. Finally, the HP compressor connects to the HP turbine, which is located immediately after the combustion section and in front of the IP/LP turbines and runs faster than the previous mentioned turbines.

## TURBINE PRINCIPLES OF OPERATION



**Fig. 16.5**

The turbine section of an engine consists of rotors and stators, the rotors being the turbine itself and the stators being fixed blades that guide the gas flow onto the turbine blades at the correct angle. These are termed nozzle guide vanes (NGV). The first nozzle guide vane mounts immediately after the combustion chamber and is termed the inlet nozzle guide vane (INGV). It is through this guide vane that the gases reach their highest velocity. Figure 16.5 illustrates this.

Theoretically, there are three types of turbine blade that can extract power from the exhaust gases. These are reaction, impulse, and a combination of impulse and reaction.