PS41 Propulsion – Chapter 5
Principles & Characteristics of Components

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SINO-EUROPEAN INSTITUTE OF AVIATION ENGINEERING

Contents

- Compressor
  - Axial Flow Compressor
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- Turbine
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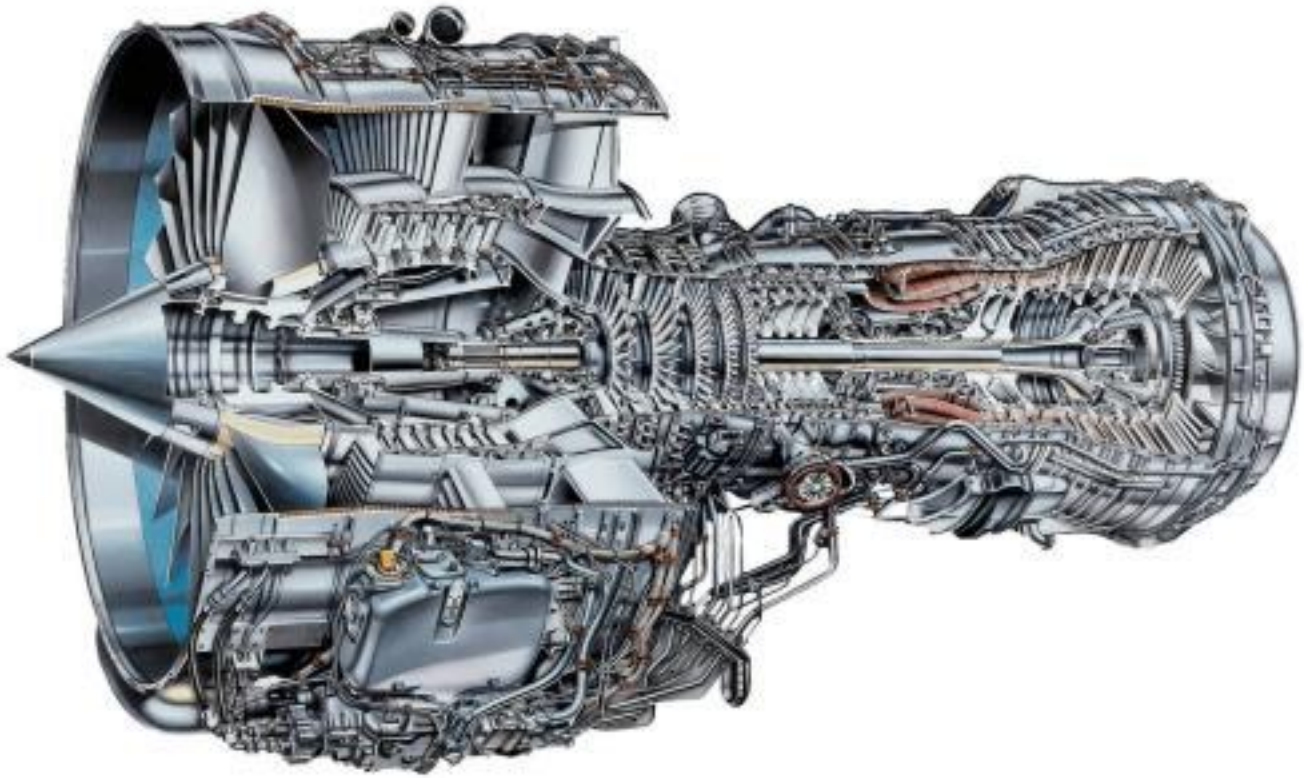
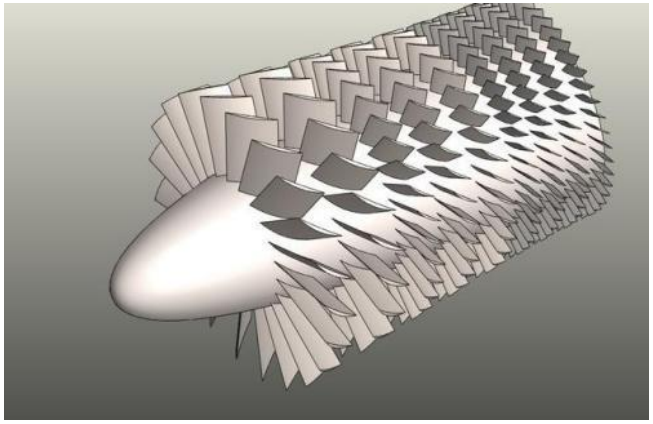
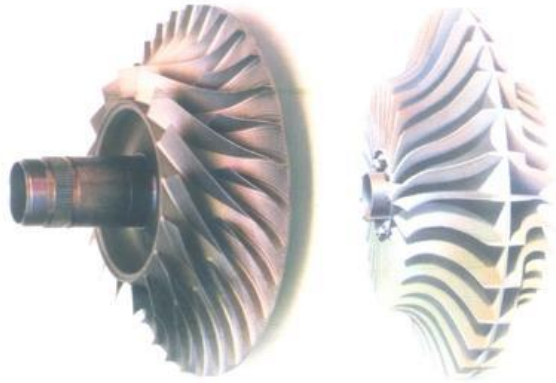
Compressor



Compressor

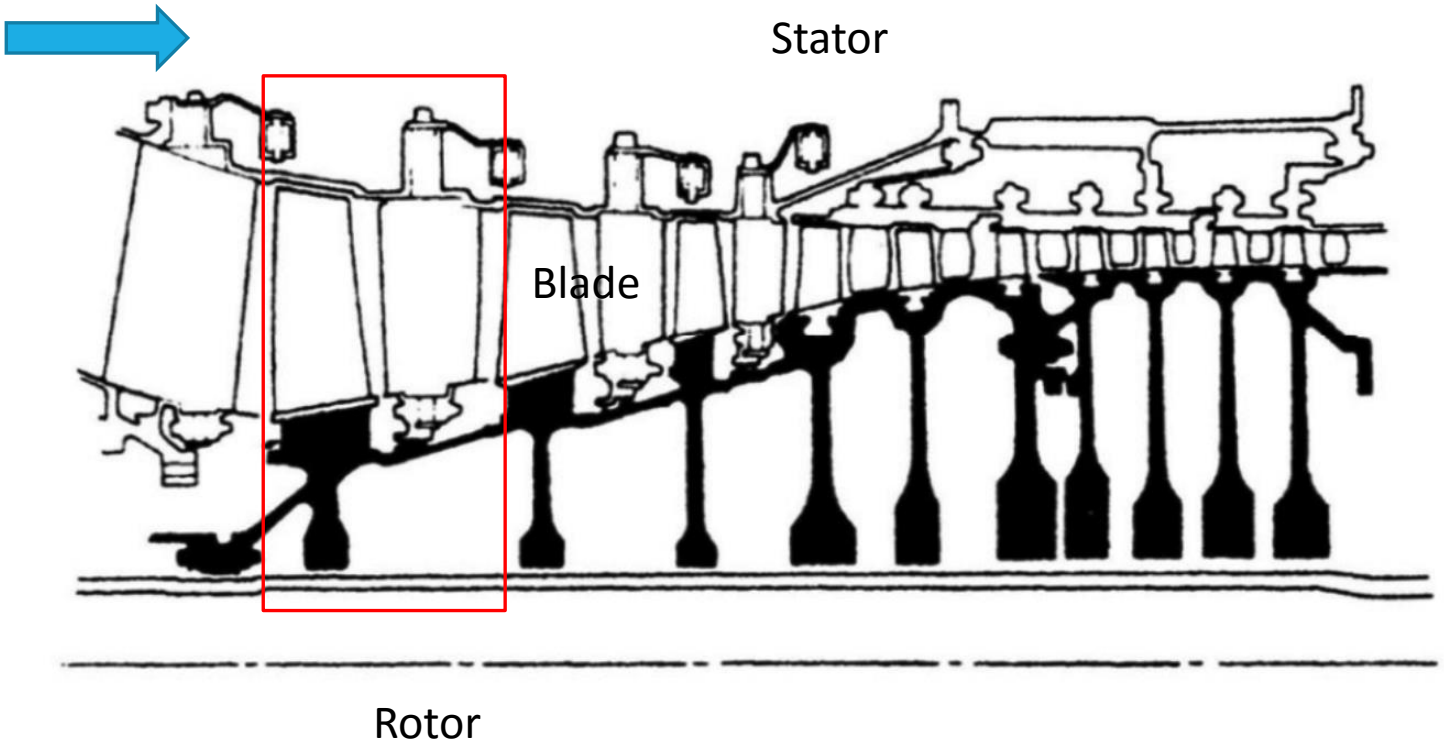


Axial-flow type compressor



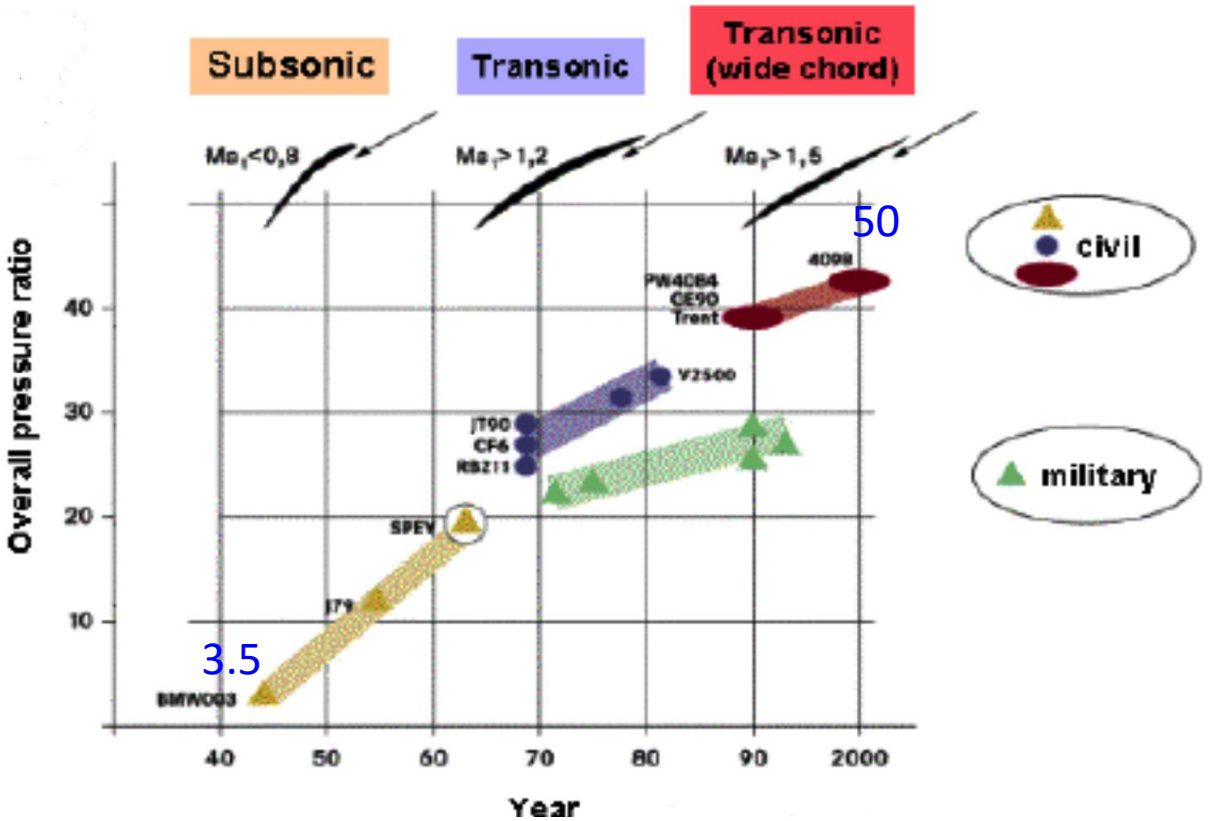
Centrifugal-flow type compressor

Axial Compressor

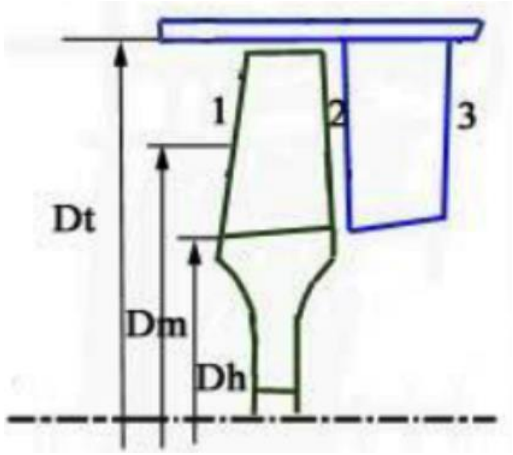


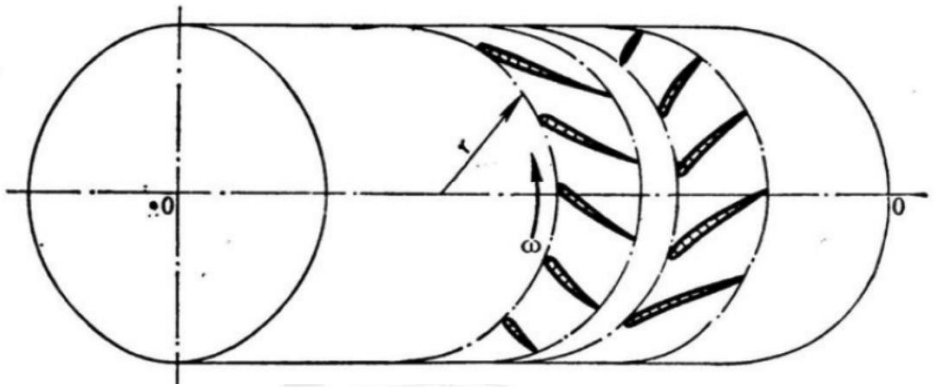
Axial Compressor

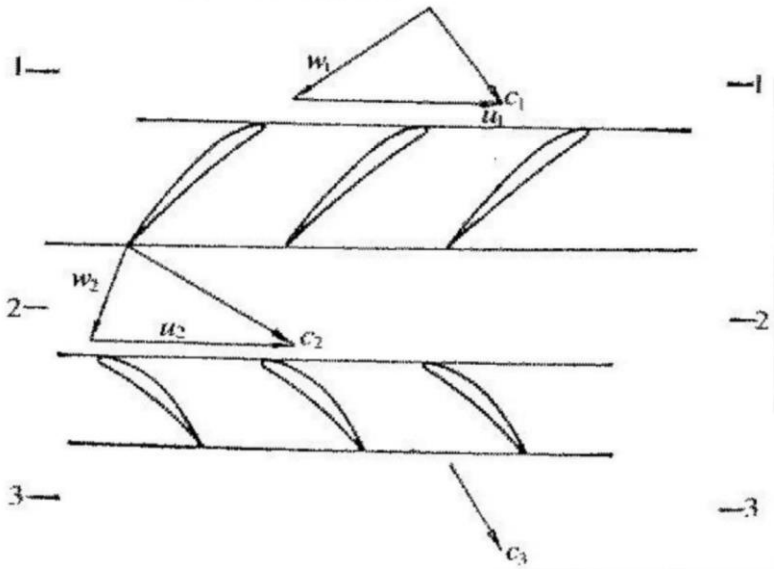
- $\pi_c^* = \frac{P_c^*}{P_1^*}$
- $\eta_c = \frac{l_{c,is}}{l_c}$



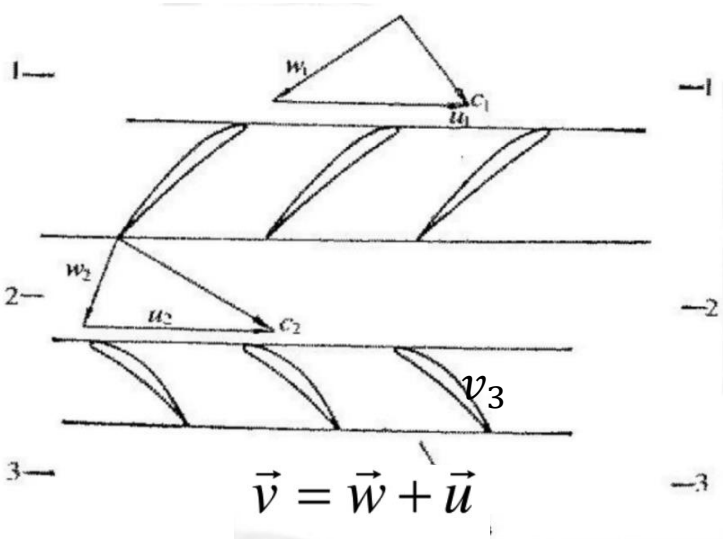
Axial Compressor





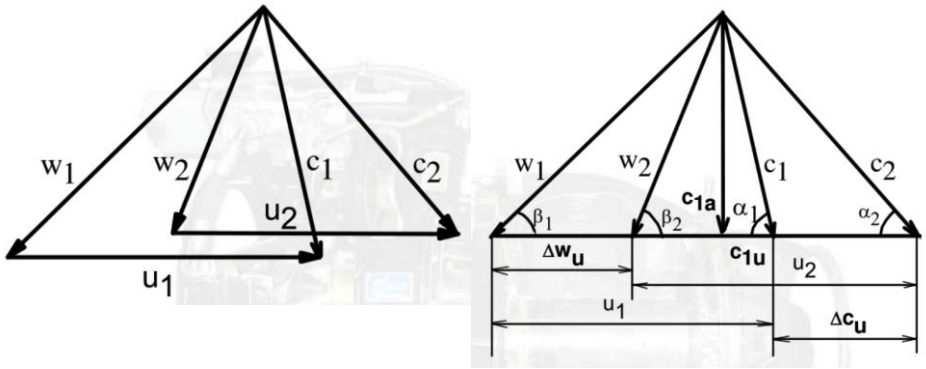


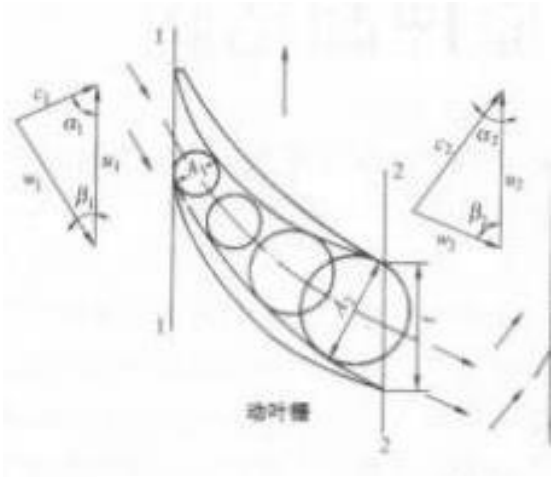
Axial Compressor

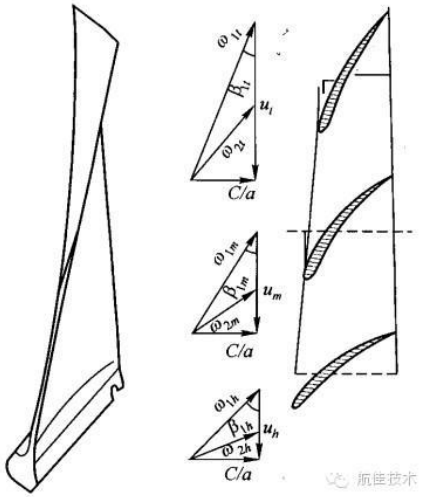


$$\vec{v} = \vec{w} + \vec{u}$$

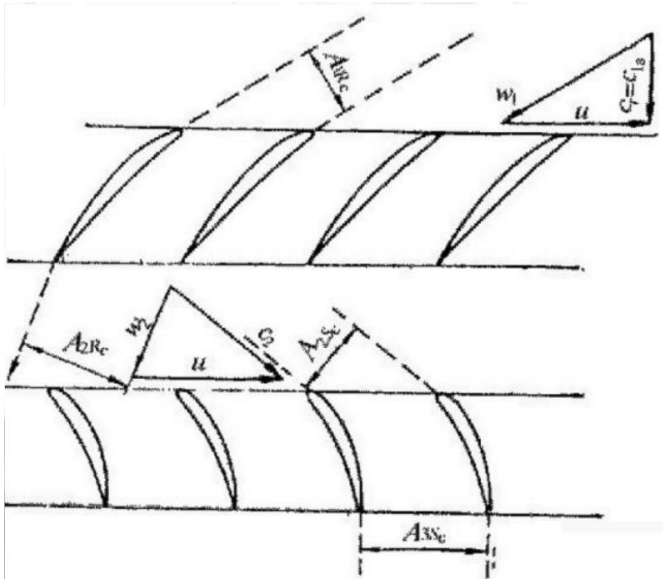
$$\vec{u} = \vec{\omega} \times \vec{r}$$

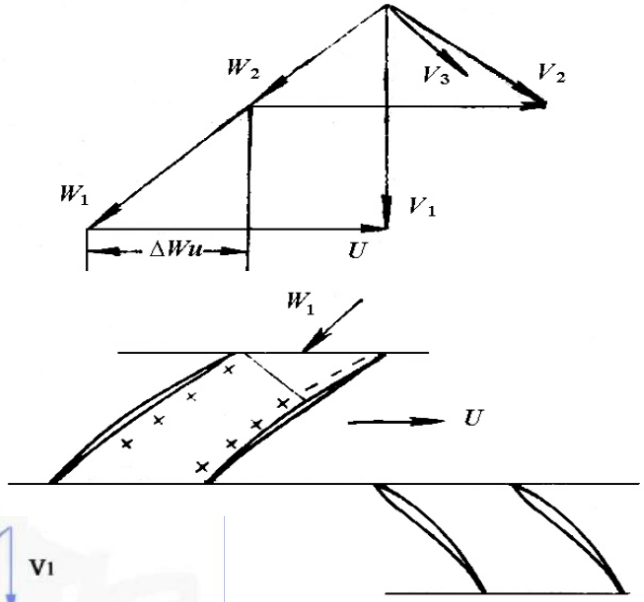


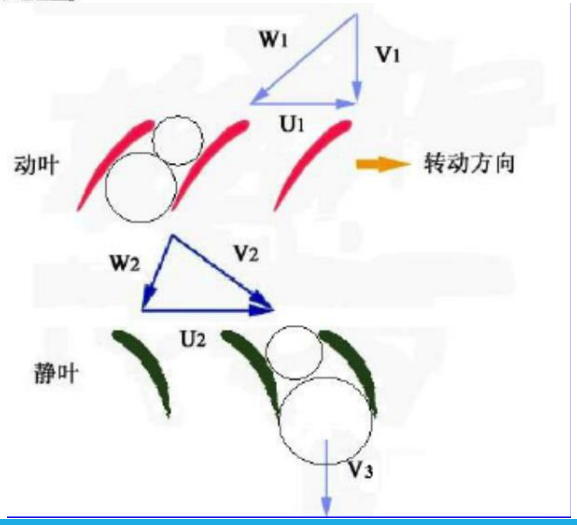




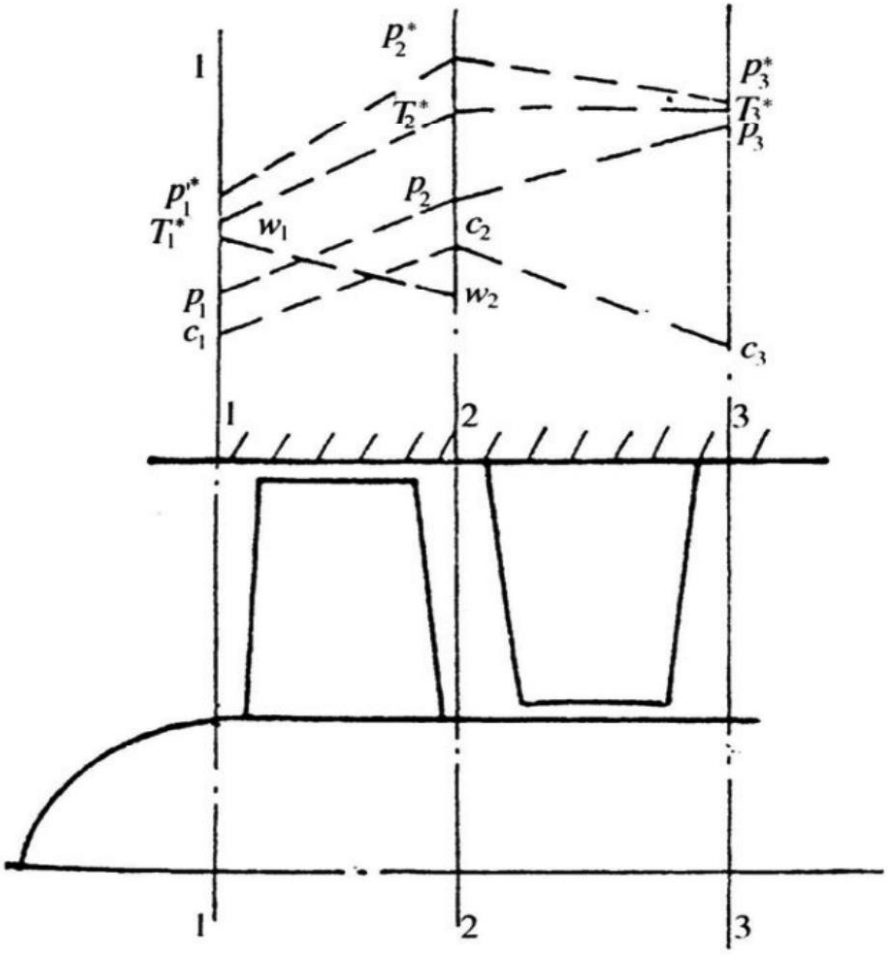
Axial Compressor



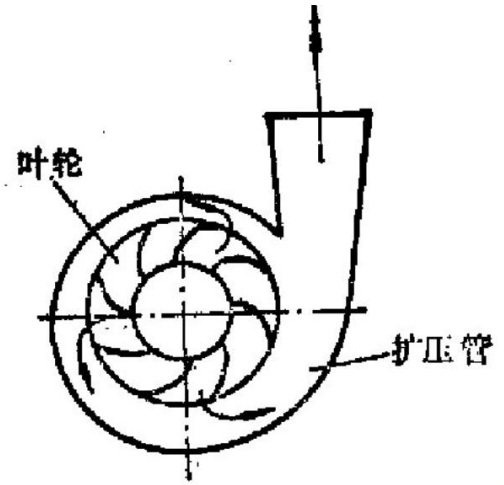


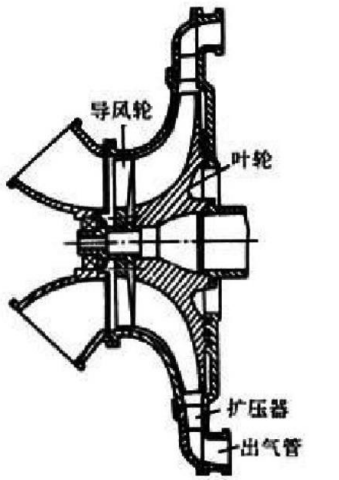


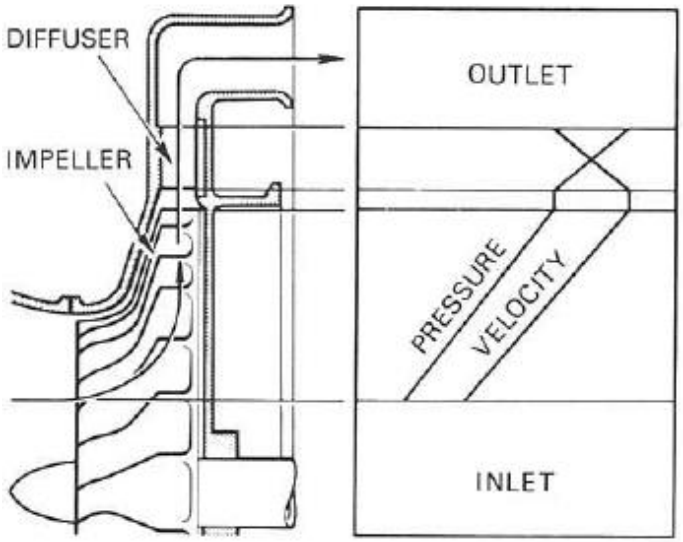
Axial Compressor



Centrifugal compressor

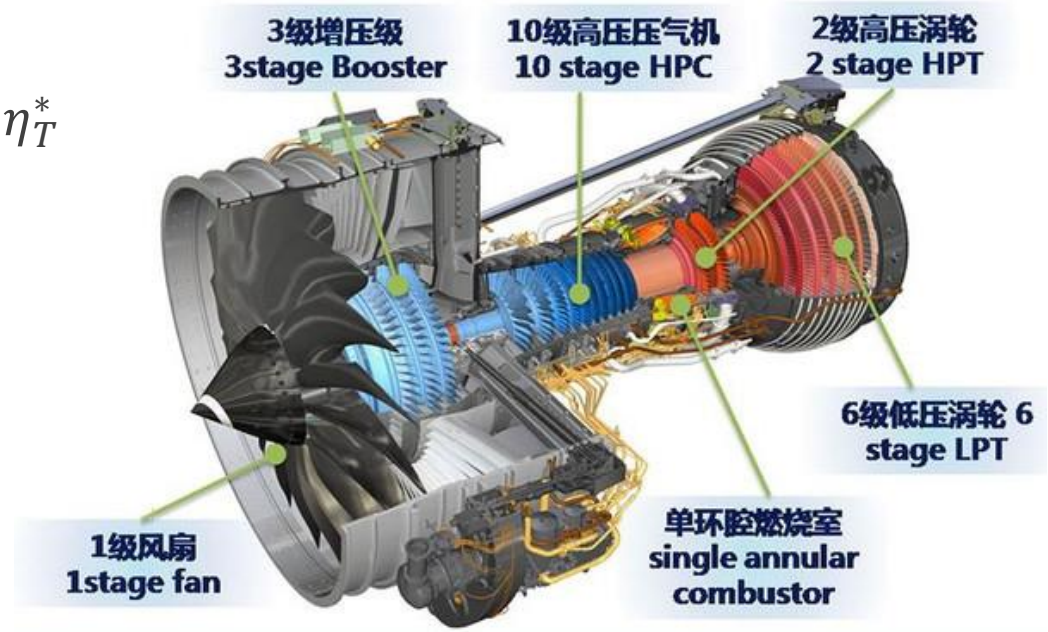




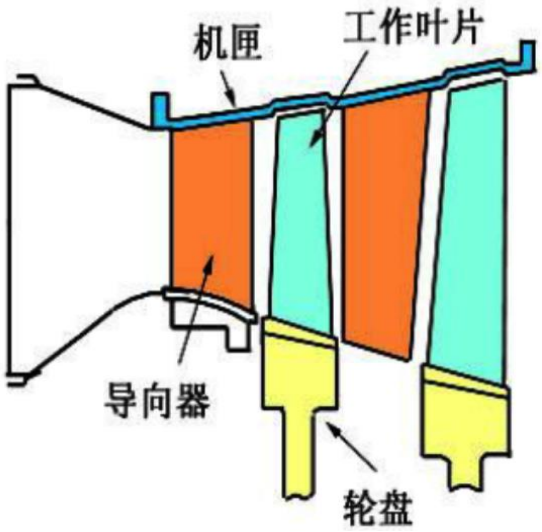


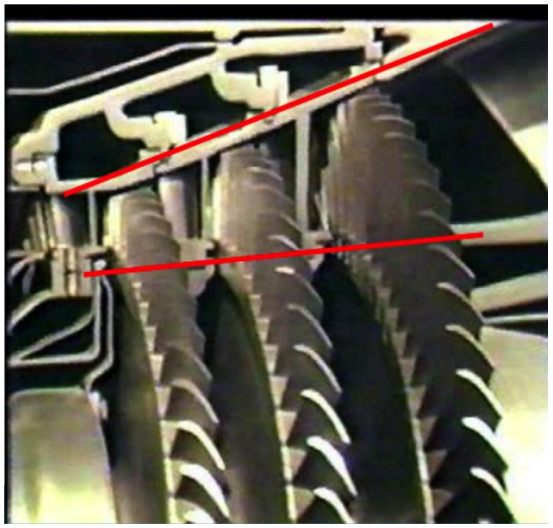
Turbine

- $\pi_T^* = \frac{P_4^*}{P_5^*}$
- $l_T = c_p T_4^* \left[1 - \frac{1}{\pi_T^{*\frac{\gamma'-1}{\gamma'}}}\right] \eta_T^*$
- $\eta_T^* = \frac{l_T}{l_{T,ad}}$

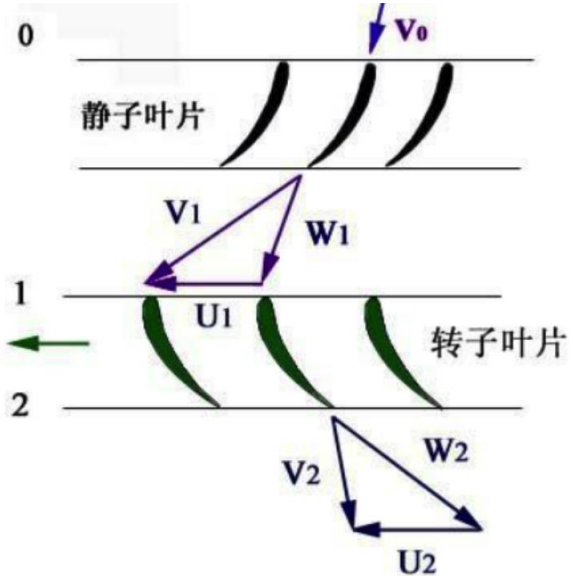


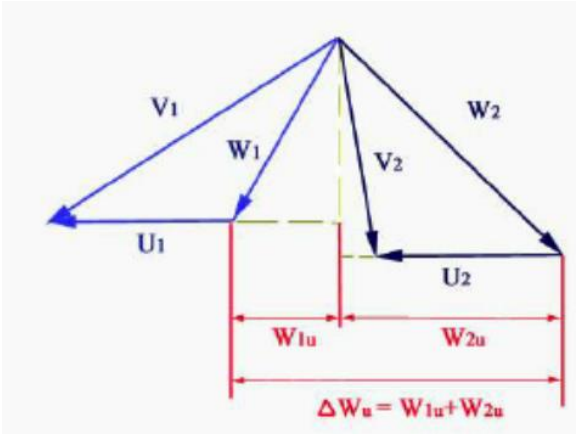
Turbine

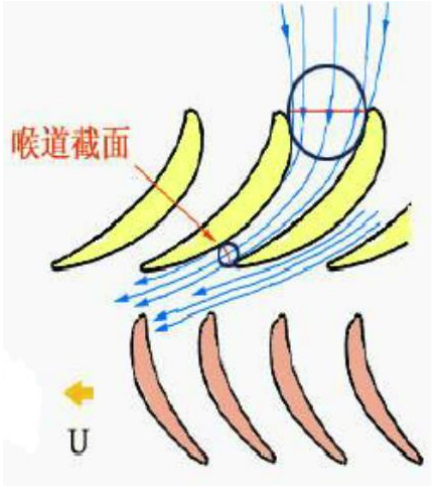




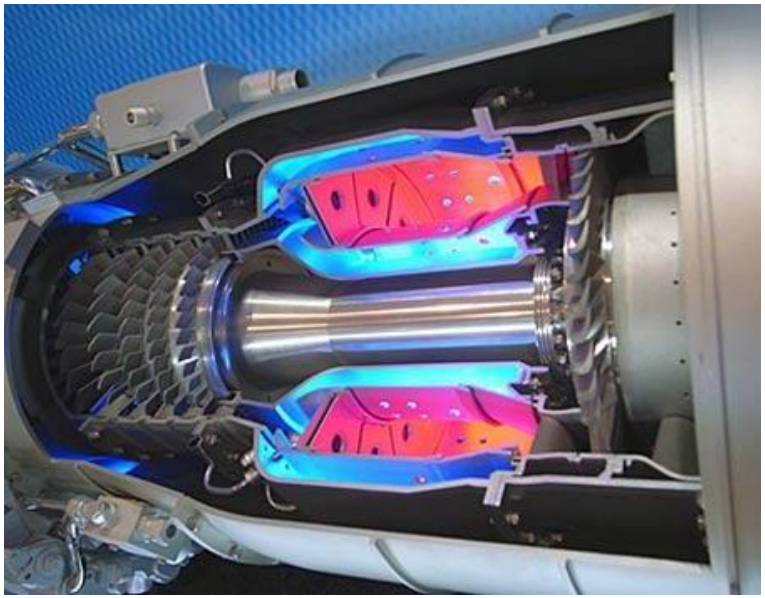
Turbine

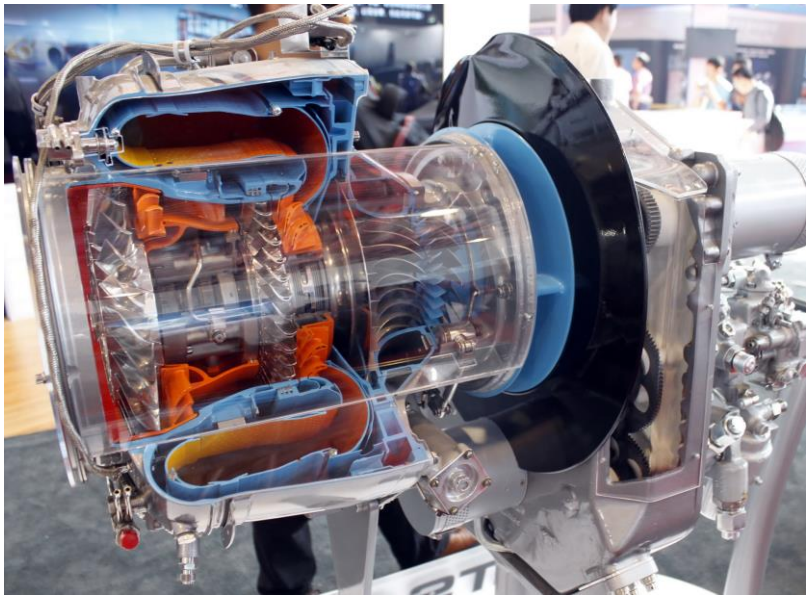

0
V0
静子叶片
V1
W1
1
U1
转子叶片
2
W2
V2
U2

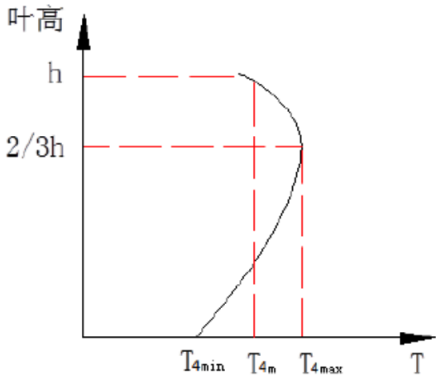

V1
W1
W2
V2
U1
U2
W1u
W2u
ΔWu = W1u+W2u


喉道截面
U

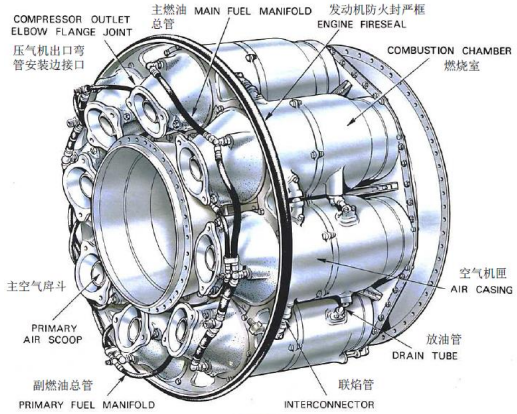
Combustion Chamber



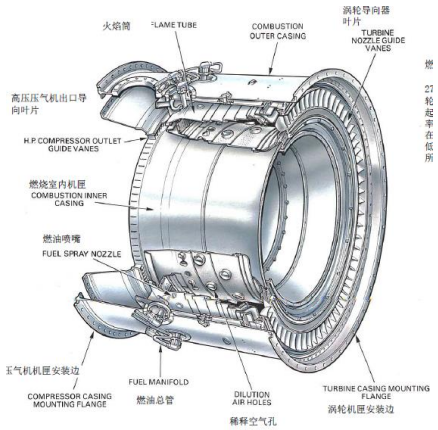


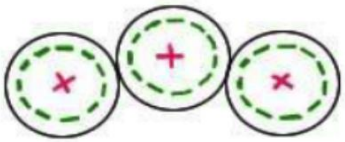


Combustion Chamber

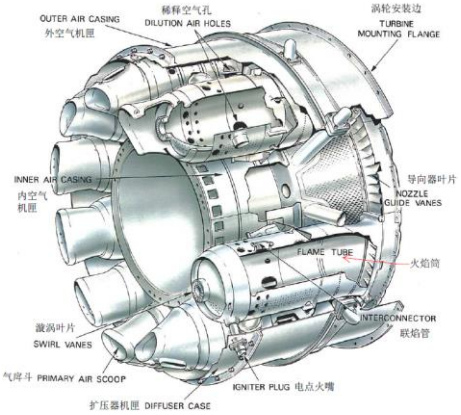


Multiple Combustion Chambers





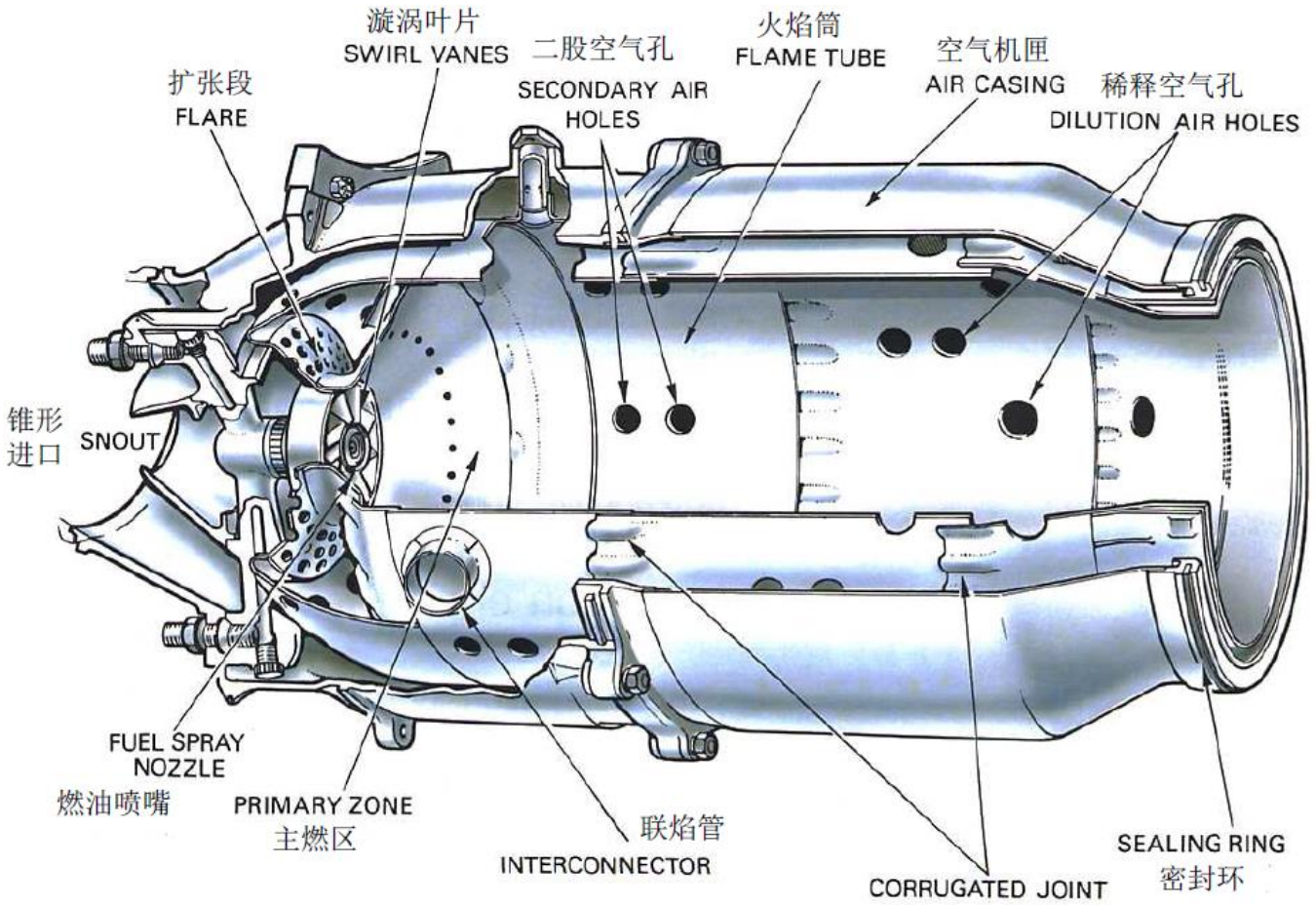
Annular Combustion Chamber



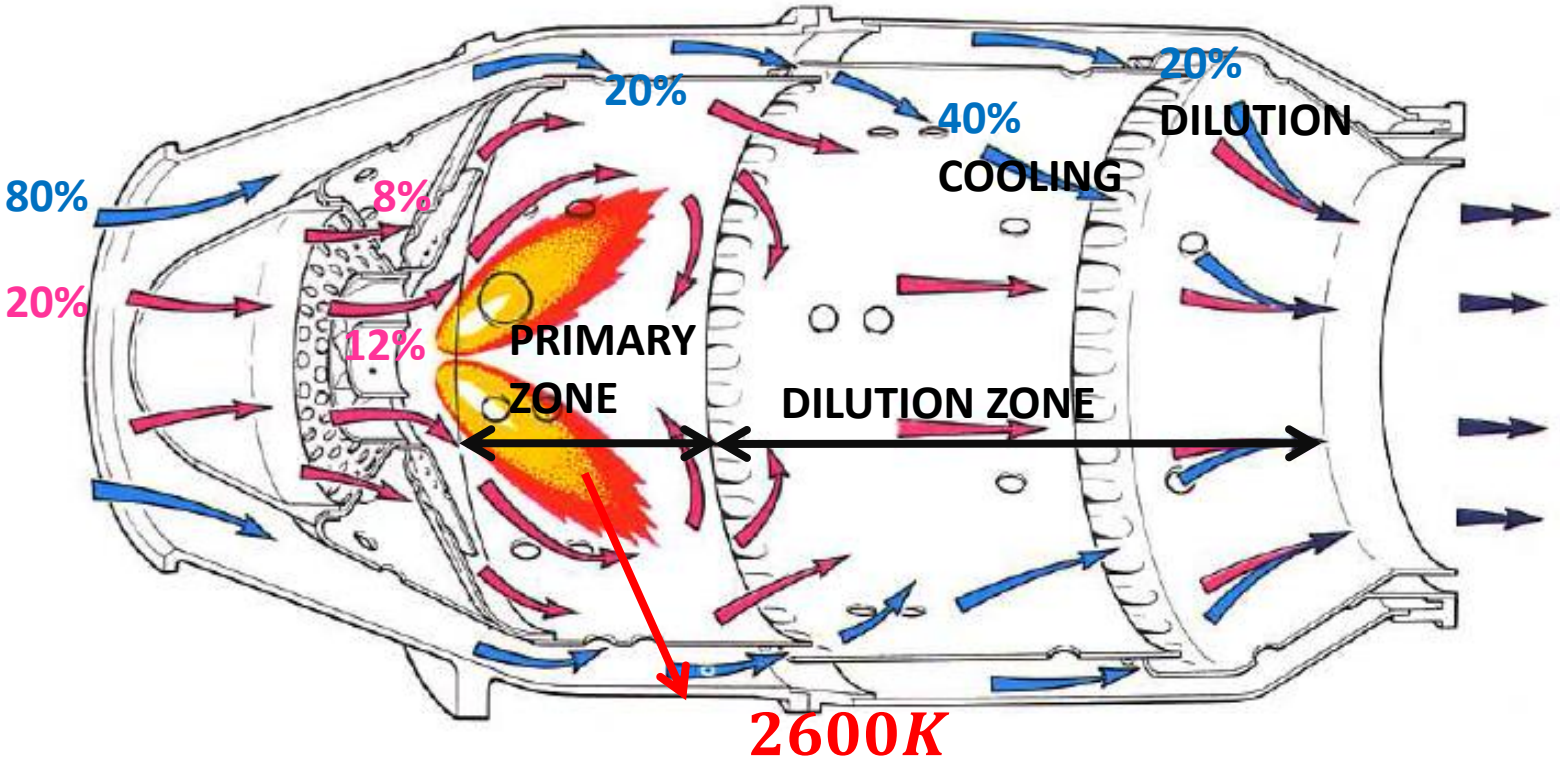
Tubo-annular Combustion Chamber

+ 喷嘴 - 火焰筒 — 外套

Combustion Chamber



Combustion Chamber



- The combustion chamber must also be capable of maintaining stable and efficient combustion over a wide range of engine operating conditions.

Combustion Chamber