



Turbofan Performance

- “Real” turbofan
 - configuration
 - forward fan with separate nozzles
 - $\beta=5$, $Pr_f=1.5$
 - component efficiencies

Component	Efficiency
Diffuser	90%
Fan/Compressors*	90%
Combustor	99%
Turbines*	91%
Nozzles	95%

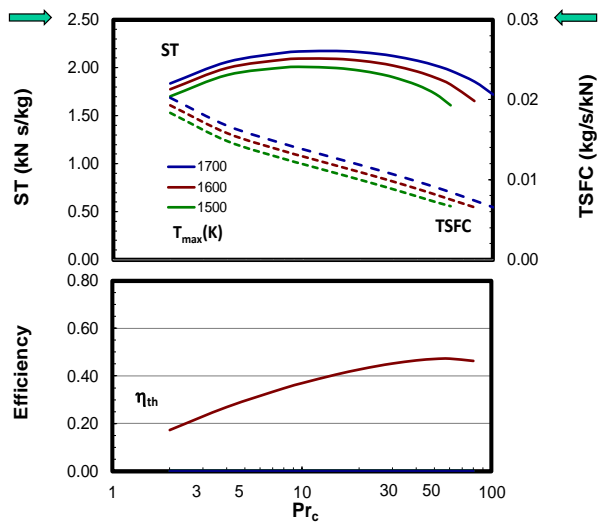
*polytropic efficiency



Static Performance

- $M=0$
0 ft alt.

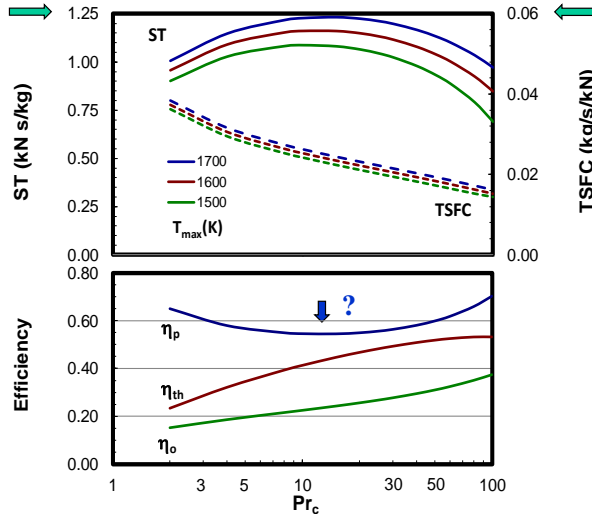
- $\eta_p=?$





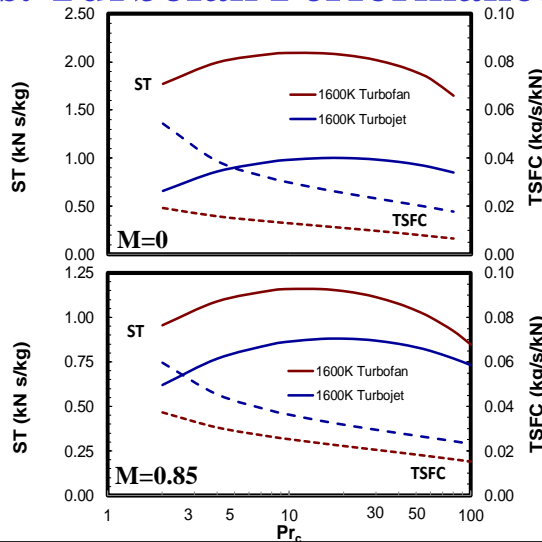
Cruise Performance

- $M=0.85$
30 kft
- vs. static
 - ST ↓
 - SFC ↑



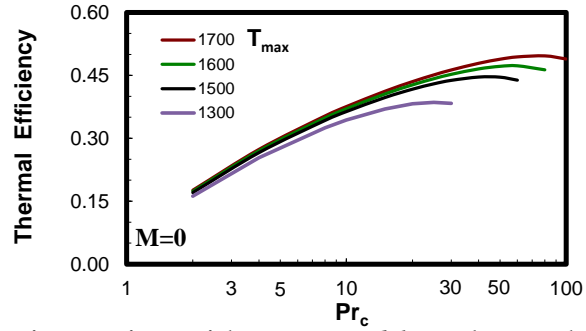
Turbojet vs. Turbofan Performance

- Turbofan
 - SFC ↓
 - why?
 - ST ↑
 - why?
 - reduced improvement at higher M
 - why?





Cycle Efficiency



- For jet engine with *irreversible* turbomachinery losses, cycle efficiency can be a function of T_{max}
 - $\eta_{th} \uparrow$ with T_{max}
 - cycle pressure ratio still dominant influence