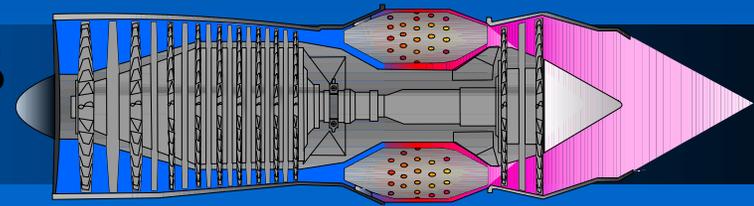


In the name of Allah, Most Beneficent Most Merciful

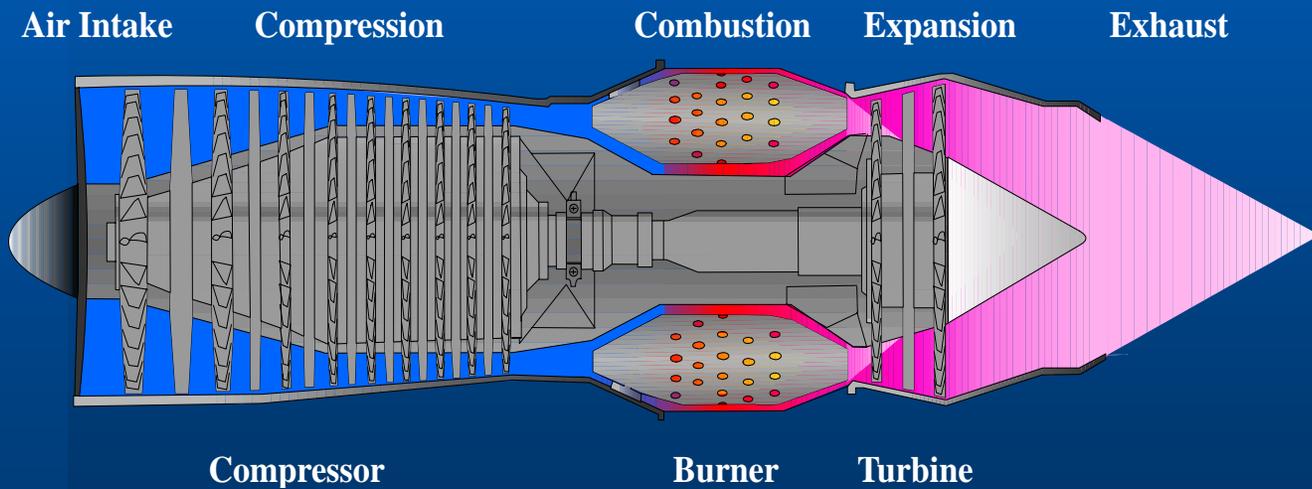
Aero-thermodynamics of Jet Propulsion



Dr. Farooq Saeed
Aerospace Engineering Department
King Fahd University of Petroleum & Minerals

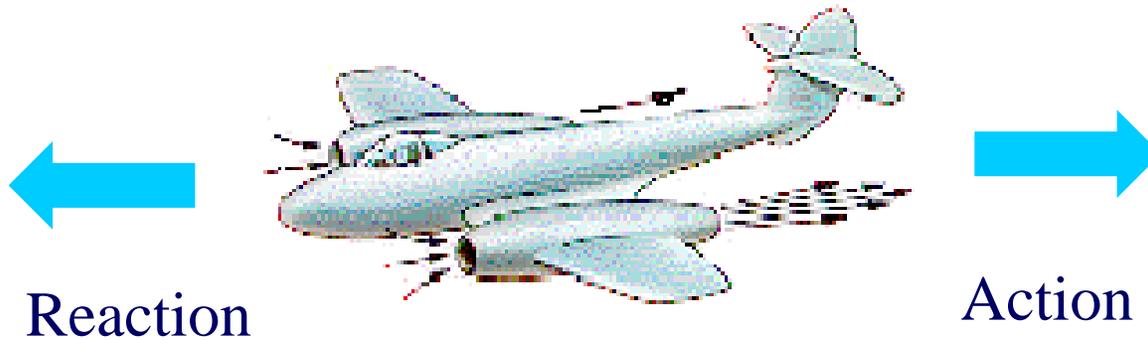
Aerospace Engineering Science & Technology
Aerospace Engineering Short Course
March 20–24, 2004
Dhahran

Part I - Introduction



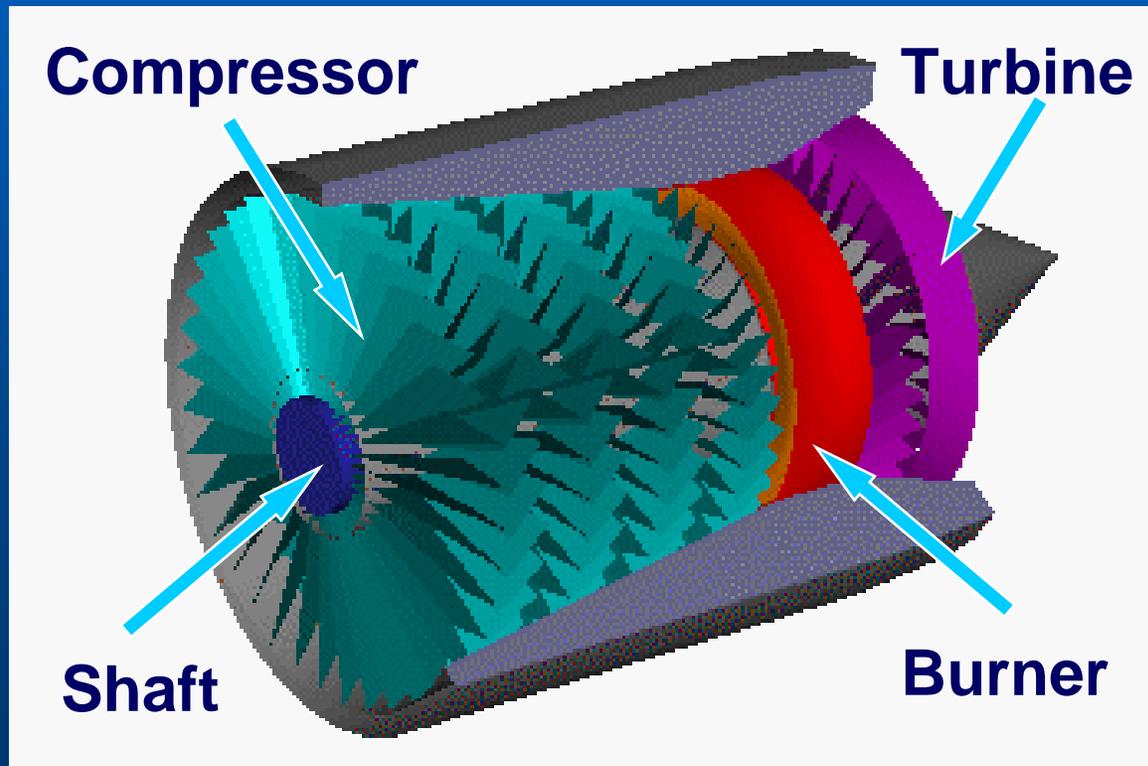
Jet Propulsion Basics

Newton's Third Law of Motion



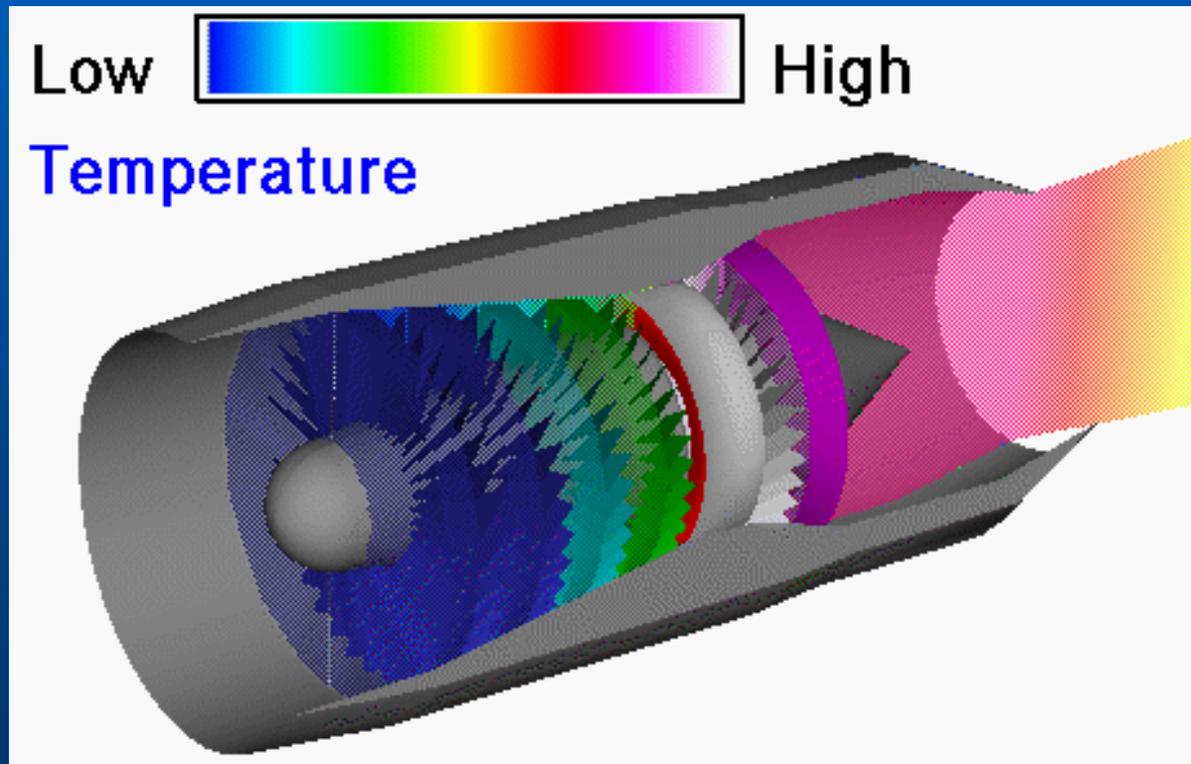
Jet Propulsion Basics (Cont.)

- **Basic Gas Generator**



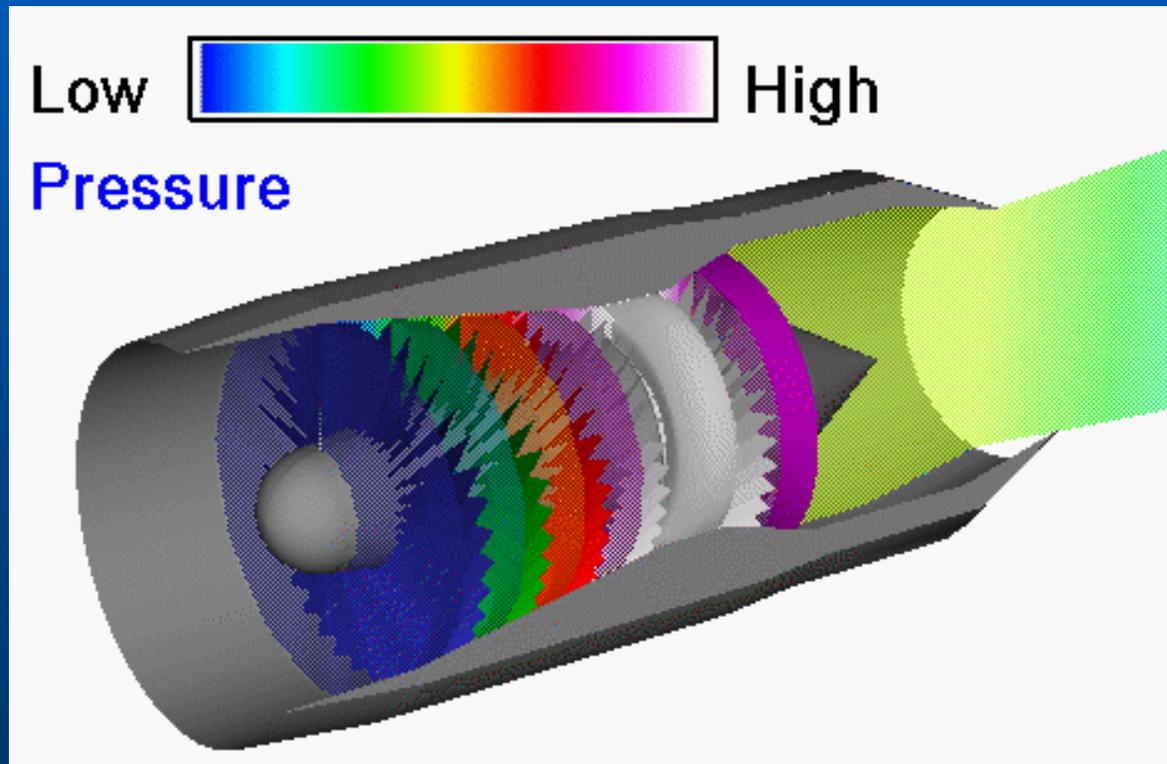
Forms of Jet Propulsion (Cont.)

- Turbojet – Temperature



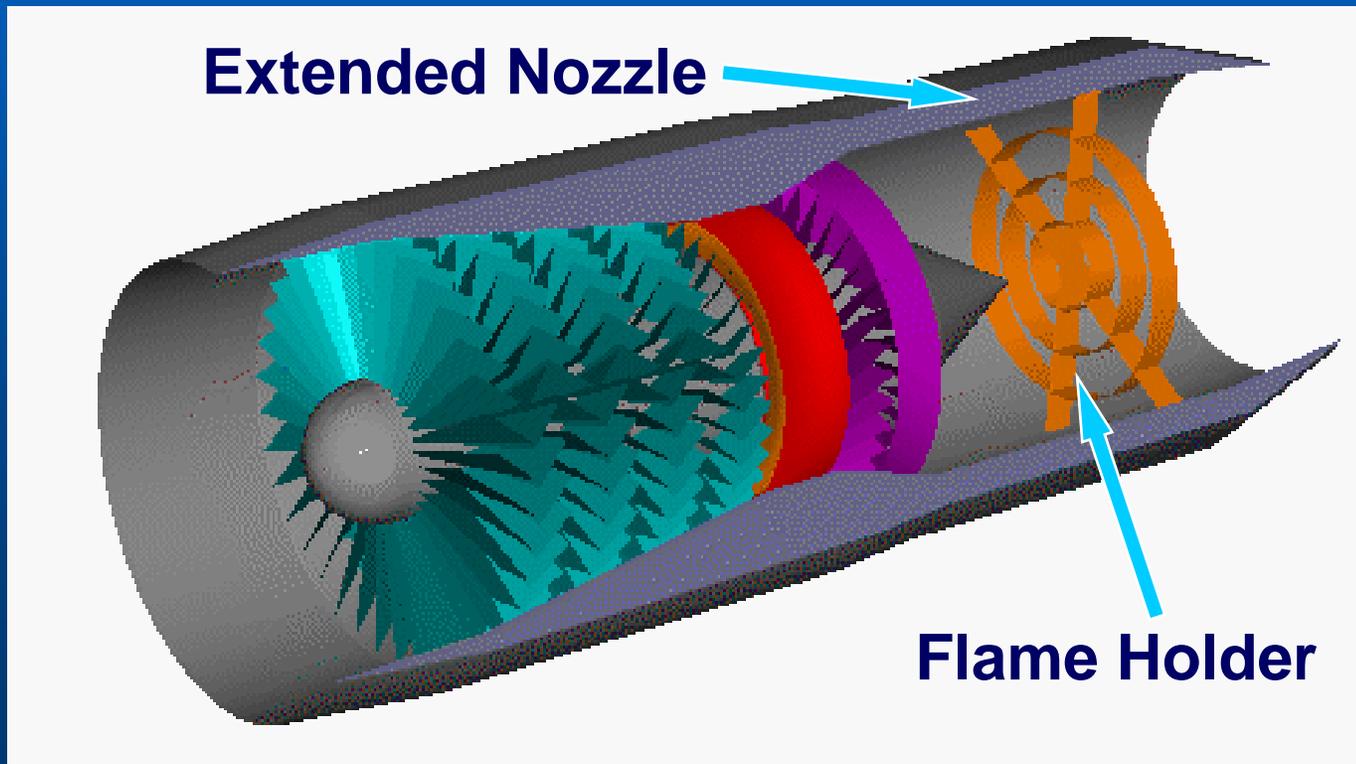
Forms of Jet Propulsion (Cont.)

- Turbojet – Pressure



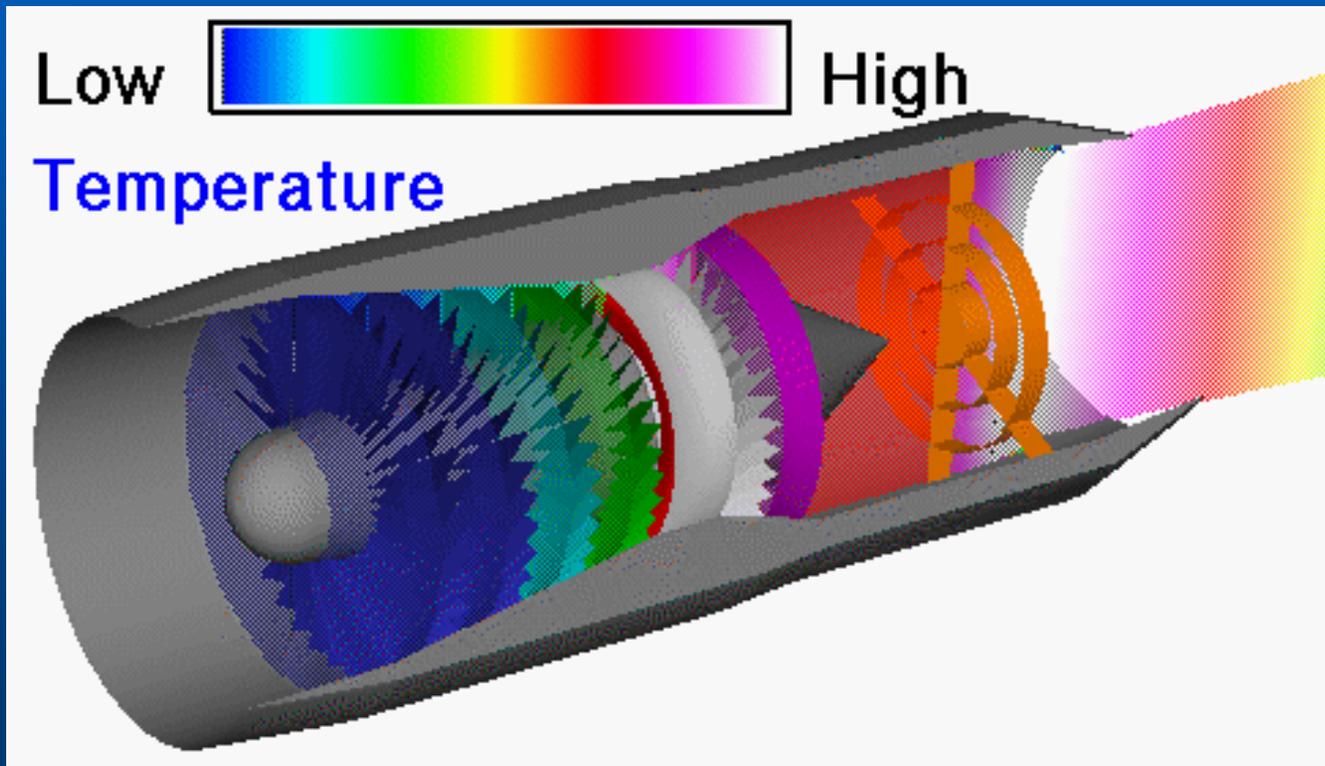
Forms of Jet Propulsion (Cont.)

- **Afterburning Turbojet – Run**



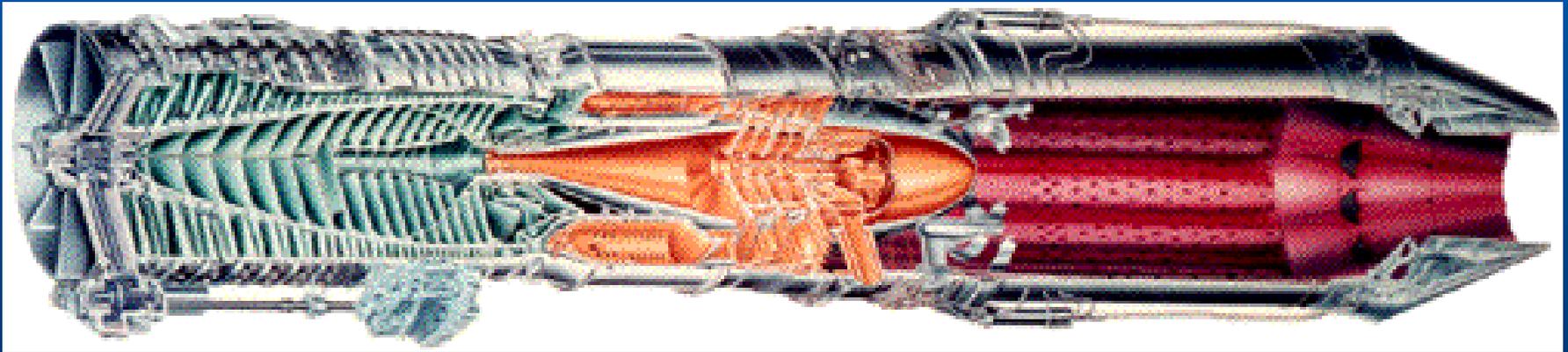
Forms of Jet Propulsion (Cont.)

- Afterburning Turbojet – Temperature



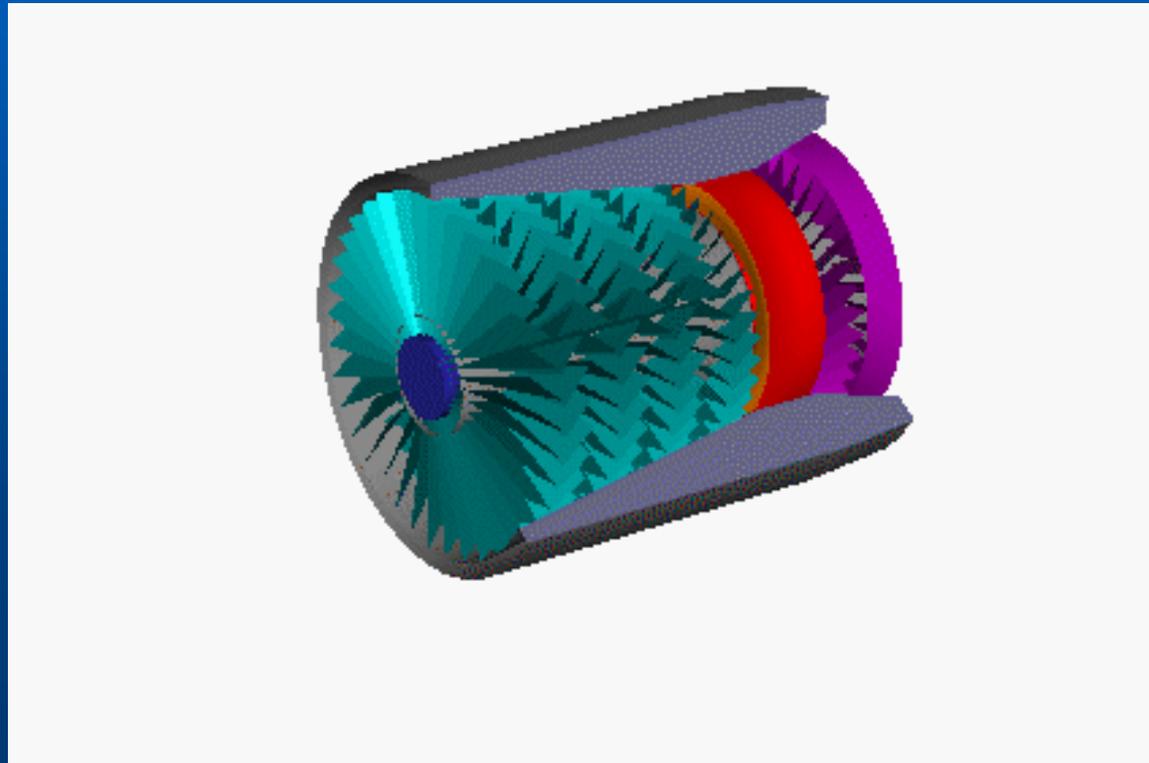
Forms of Jet Propulsion (Cont.)

- **General Electric J79 turbojet with afterburner**



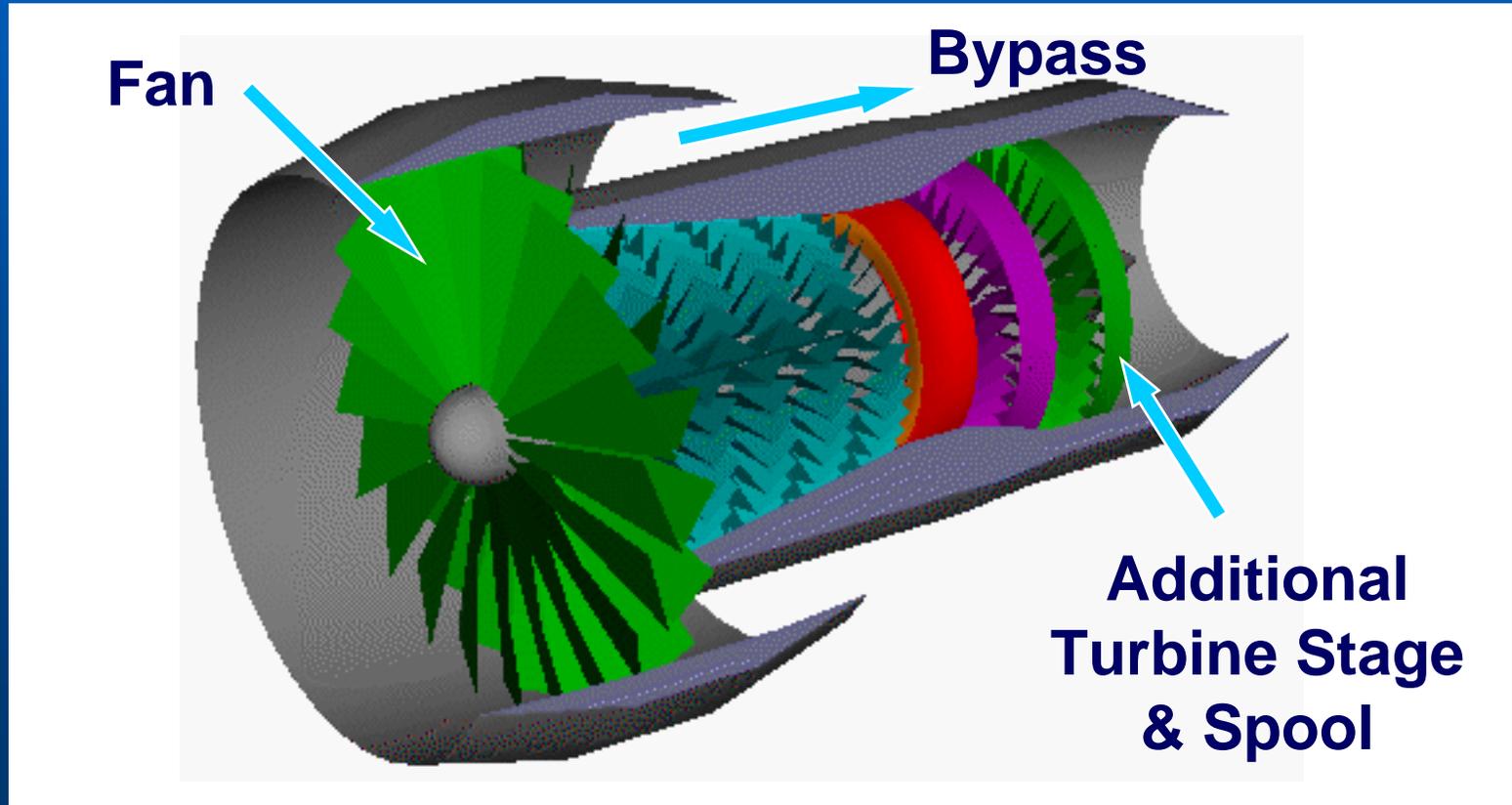
Forms of Jet Propulsion (Cont.)

- **Turbofan – Makeup**



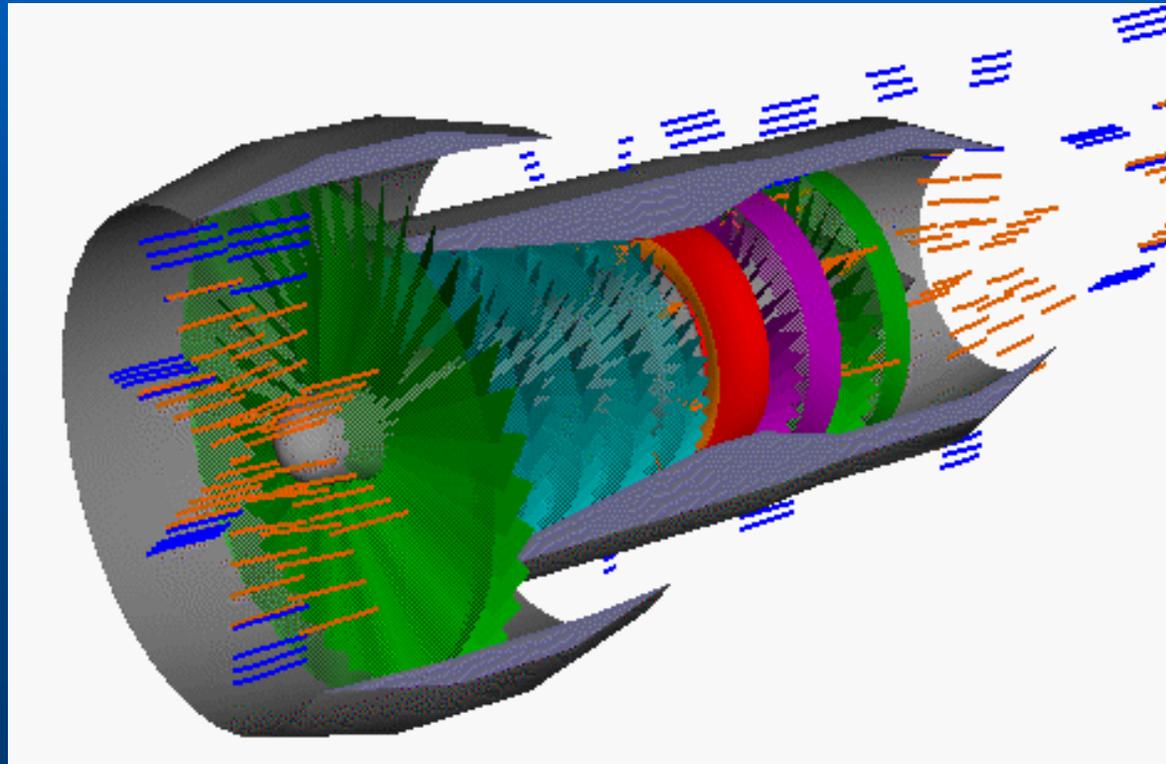
Forms of Jet Propulsion (Cont.)

- Turbofan – Run



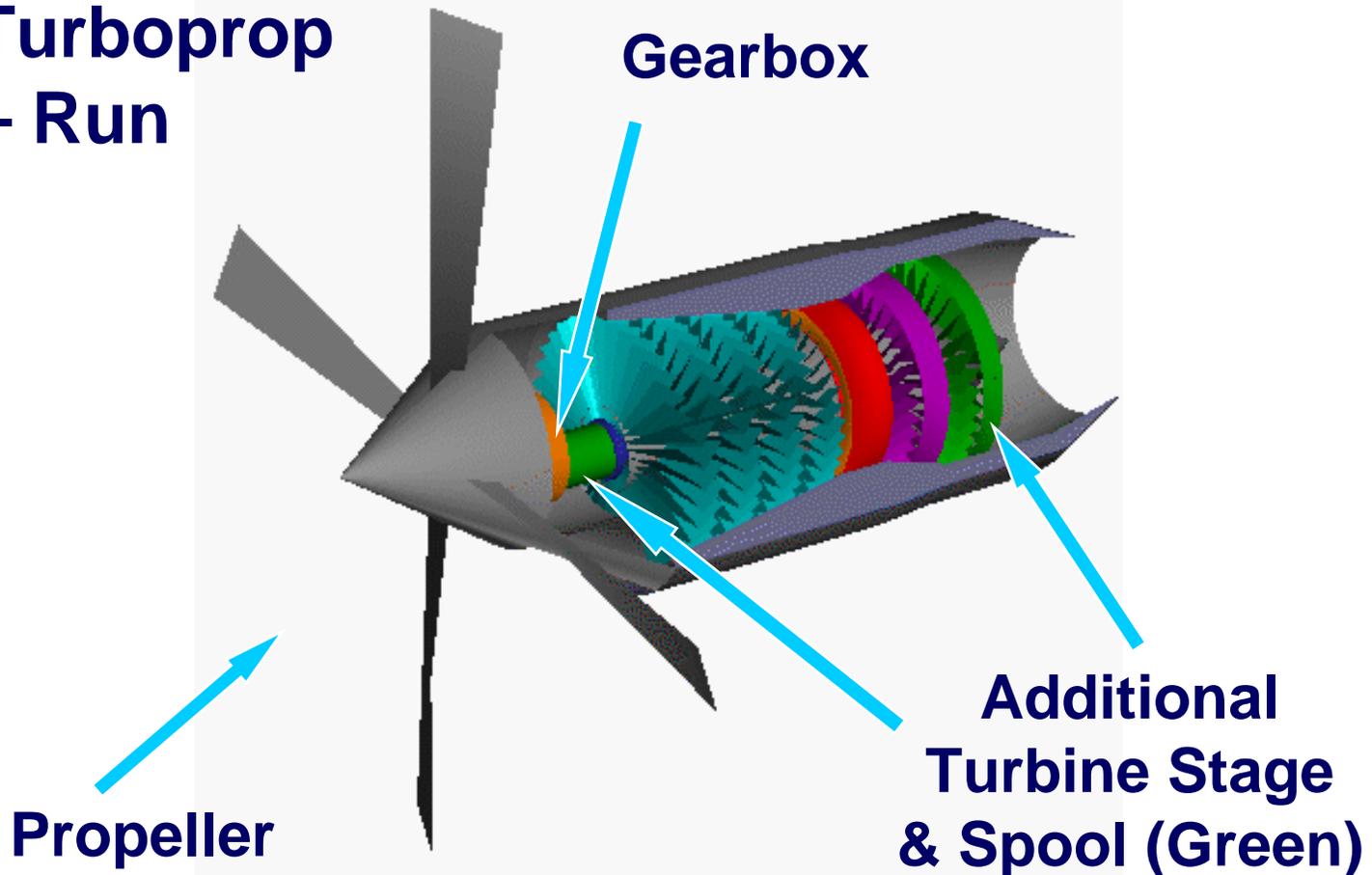
Forms of Jet Propulsion (Cont.)

- **Turbofan – Flow**



Forms of Jet Propulsion (Cont.)

- **Turboprop**
– Run

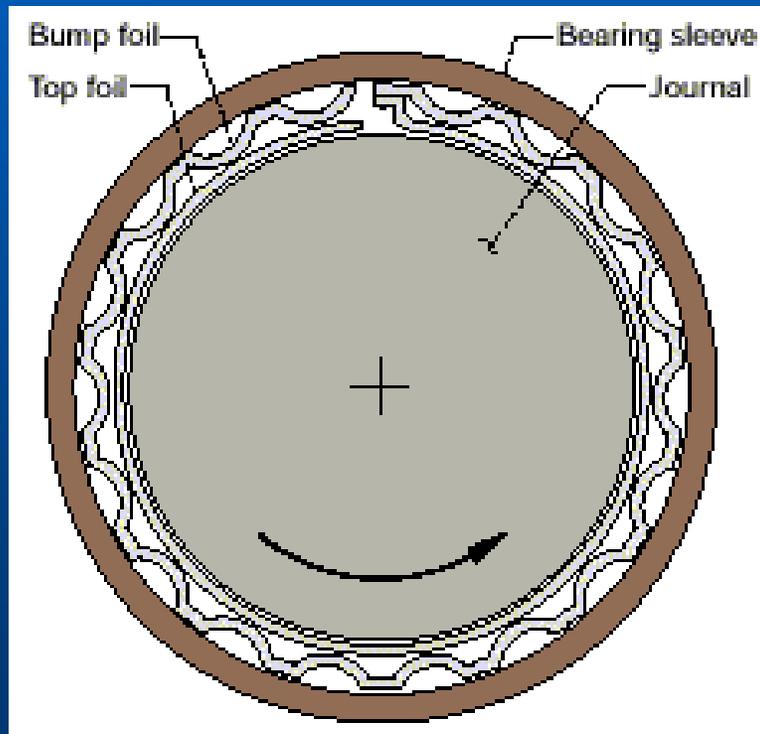


Part II – Case Studies



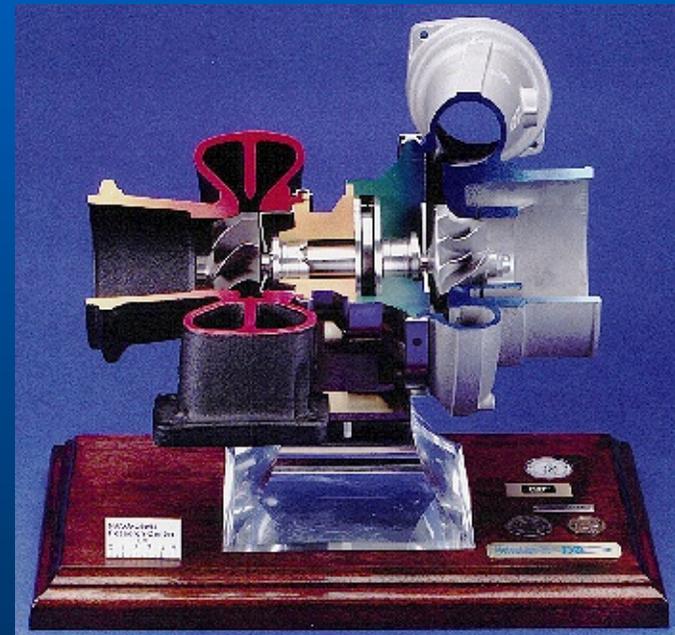
Oil-Free Turbo-Machinery (Cont.)

- **Advanced foil bearings**



Oil-Free Turbo-Machinery (Cont.)

- **Technology demonstrators**
 - **Oil-free turbocharger**
 - a 150 hp motor at 95,000 rpm, 1 lbm/s flow
 - **test parameters:**
 - a maximum turbine inlet temperature of 1,200°F
 - over 5 hours of operating time



Part III – Internet Resources