ENGINE NAME - EUROPROP TP400
ENGINE TYPE - TURBOPROP
AIRCRAFT APPLICATION - USED IN CARGO
AIRBUS A400M ATLAS

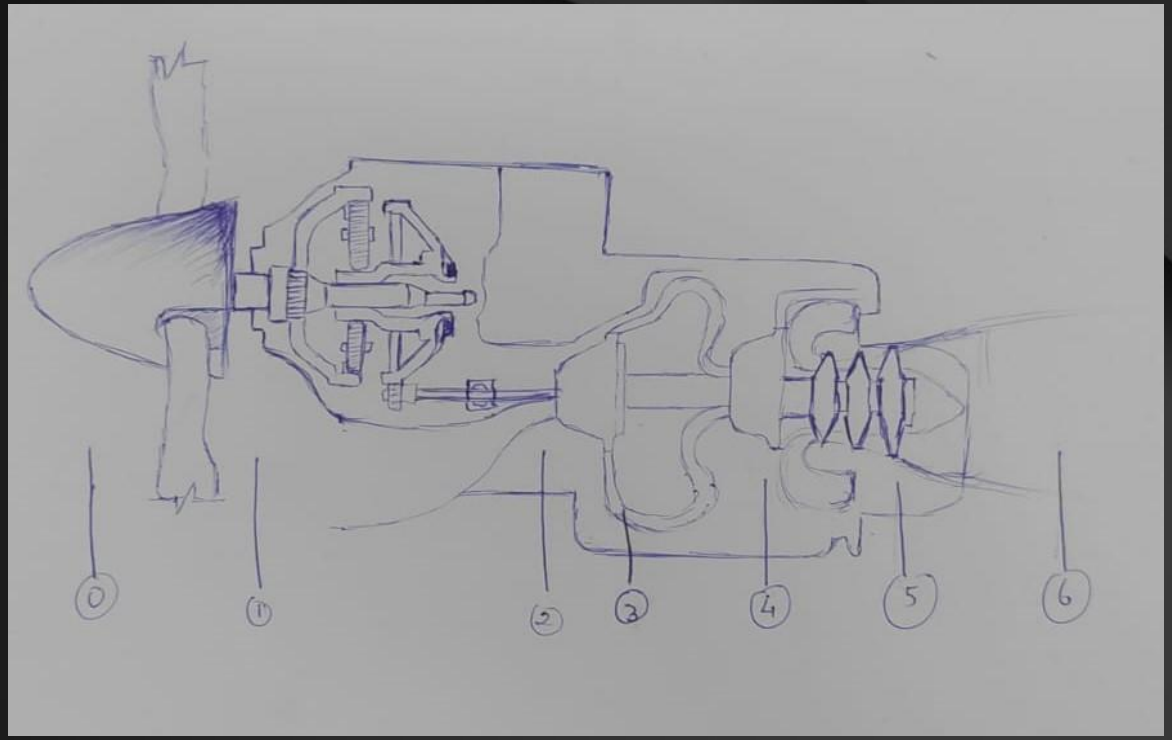
SPECS

- Type: 3-spool axial flow turboprop
- Length: 4.18 m (13 ft 9 in)
- Diameter: 1.218 m (4 ft 0 in)
- Propeller diameter: 5.334 m (17 ft 6.0 in)
- Dry weight: 1,938.1 kg (4,273 lb) for baseline engine (propeller clockwise); 1,965.1 kg (4,332 lb) for handed engine (propeller anti-clockwise)
- Propeller weight: 683 kg (1,506 lb)

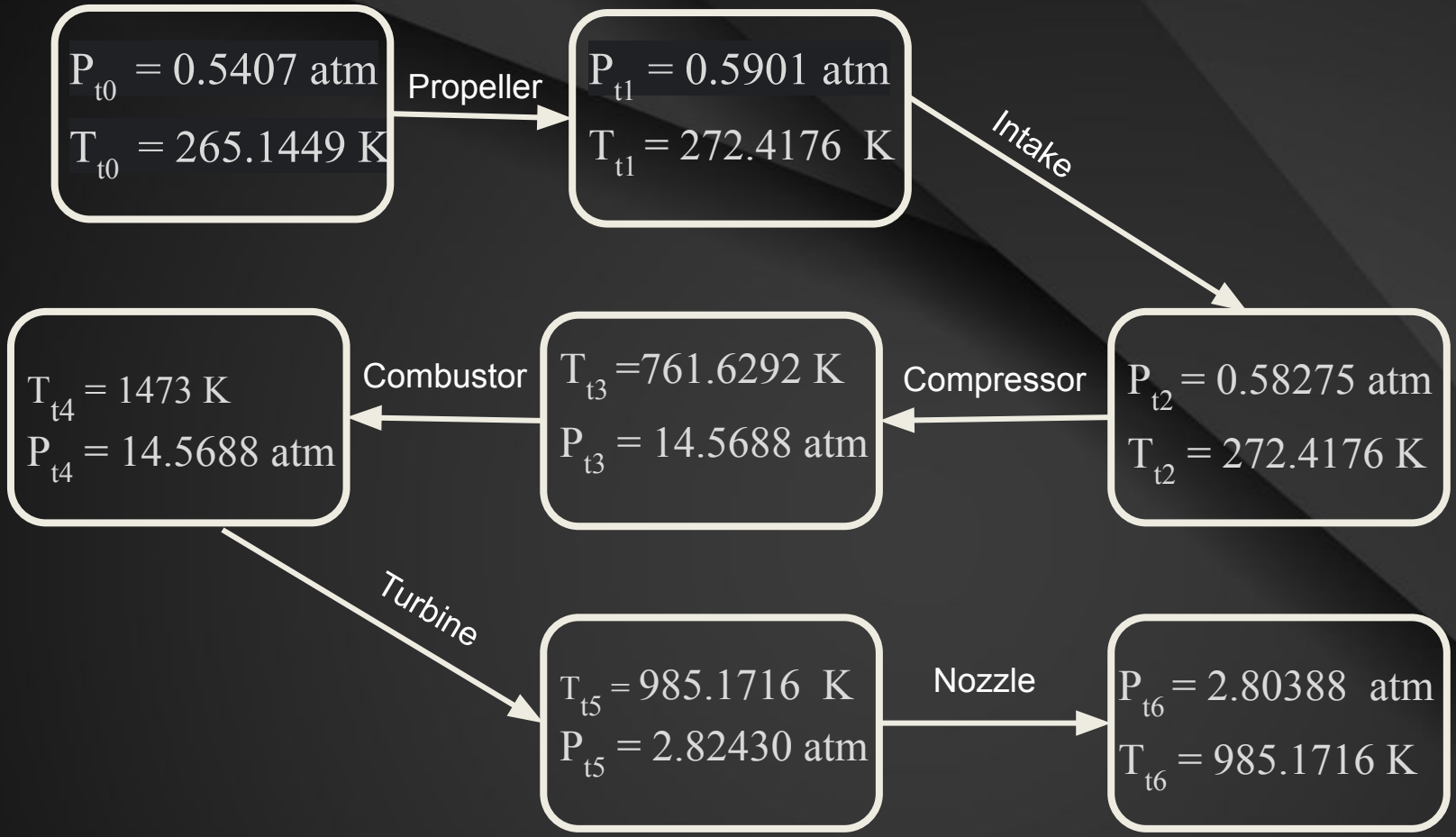
- Overall pressure ratio = 25
- M_0 = 26.3 kg/s
- Turbine inlet temperature = 1200 °C
- Specific fuel consumption = 210 g/kWh
- Diameter of propeller = 5.33 m
- Thrust by propeller = 110 kN
- Rotational speed of propeller = 730 rpm

SPECIALITY OF AIRCRAFT

- The Europrop International TP400-D6 is an 11,000 shp (8,200 kW) powerplant, developed and produced by Europrop International for the Airbus A400M Atlas military transport aircraft.
- The TP400 is the most powerful turboprop in service using a single propeller; only the Kuznetsov NK-12 using contra-rotating propellers is larger.
- Airbus decided that the A400M design would have the pair of propellers on each wing would turn in opposite directions known as rotating "down between engines".



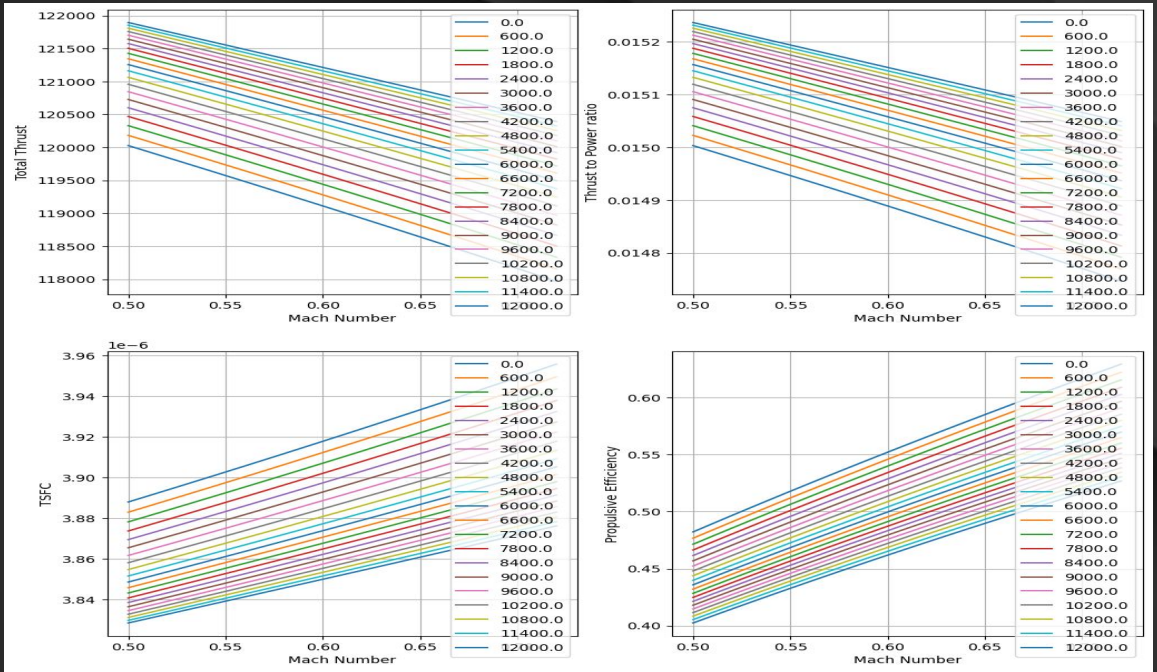
- $M_0 = 0.68$
- Alt = 7 Km
- $P_0 = 0.41$ atm
- $T_0 = 242.7$ K
- $a_0 = 321.3$ m/s
- $\rho_0 = 0.58$ kg/m3
- $M_0 = 0.68$
- Diffuser Efficiency = 0.965
- Compressor Efficiency = 0.84
- Heat of reaction = 42 MJ
- $C_p = 1005$ kJ/kg.K
- Turbine Efficiency = 0.885
- Nozzle Efficiency = 0.965


P_{t0} = 0.5407 atm
T_{t0} = 265.1449 K
Propeller
P_{t1} = 0.5901 atm
T_{t1} = 272.4176 K
Intake
P_{t2} = 0.58275 atm
T_{t2} = 272.4176 K
Compressor
T_{t3} =761.6292 K
P_{t3} = 14.5688 atm
Combustor
T_{t4} = 1473 K
P_{t4} = 14.5688 atm
Turbine
T_{t5} = 985.1716 K
P_{t5} = 2.82430 atm
Nozzle
P_{t6} = 2.80388 atm
T_{t6} = 985.1716 K

Final Values of Engine

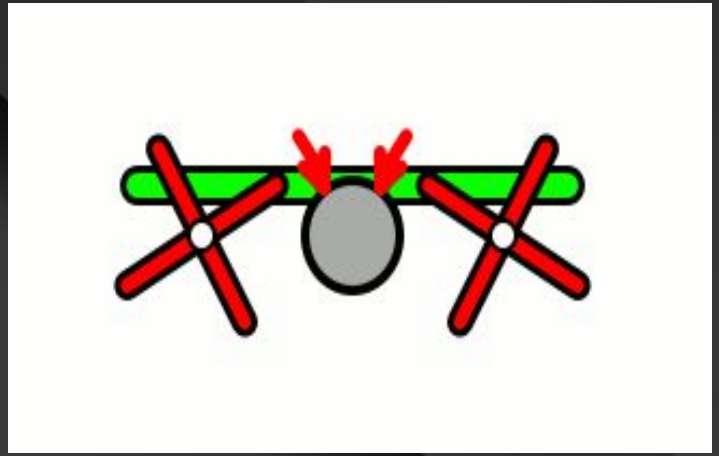
Thrust by propeller = 110 kN
Thrust by core flow = $(m_0 + m_f)v_e - m_0v_0$ = 10.407 kN
Total thrust = 120.407 kN
TSFC = 3.8757-6
Thrust/Power = 0.01505
Propulsive Efficiency = 0.5244484
Combustor Efficiency = 0.99456

Final Values for different Mach number and Altitude



COUNTER ROTATING BLADE

- Airbus decided that the A400M design would have the pair of propellers on each wing would turn in opposite directions known as rotating "down between engines".
- Counter-rotating propellers generally turn clockwise on the left engine and counterclockwise on the right. These propellers balance the effects of torque and P-factor, meaning that such aircraft do not have a critical engine in the case of engine failure.



DRAWBACKS OF COUNTER ROTATING BLADES

- Drawbacks of counter-rotating propellers come from the fact that, in order to reverse the rotation of one propeller, either one propeller must have an additional reversing gearbox, or the engines themselves must be adapted to turn in opposite directions.

NK-12MV v/s TP 400

Maximum power output:	11,000 kW	8000 kW
Air mass flow:	65 kg/s	26.3 kg/s
Pressure Ratio:	13	25

- NK-12MV has the more max power output because the mo is almost thrice as that of the TP 400 along with a great difference in pressure ratio so the total thrust produced will be more than TP 400
- The NK-12 drives two large four-bladed contra-rotating propellers, 5.6 m (18 ft) diameter (NK-12MA), and 6.2 m (20 ft) diameter (NK-12MV). That's why It is the most powerful turboprop engine to enter service.

THANK YOU

Team members:
Parsana Vivek Navinbhai (210010047) - did calculation and python code and ppt
Saurabh Prajapati (210010057) - did calculation and python code and ppt
Tingne Yashodhan Atul (210010065) - come up with engine, what's new in engine, how it is different and ppt
Arjun Bora (210010015) - Came up with wikipedia page of engine