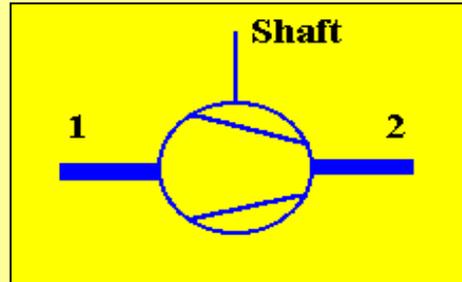


Compression Process

This document shows how Thermo Utilities, MS Excel Add-ins can be used for calculation of compression process.

Air at 1.013 bar and 25 C with 0.005 specific humidity enters to a compressor with a pressure ratio of 10/1. The isentropic efficiency of the compressor is 0.82.

Calculate the temperature, specific enthalpy, and specific entropy of air at the outlet.
If the air intake is 5 kg/s, what is the compressor work on the fluid?



Inputs		Units	Error ?
Inlet Pressure	1.013	bar	
Inlet Temperature	25.000	C	
Specific Humidity (moisture content)	0.005		
Isentropic Efficiency	0.820		
Pressure Ratio	10.000		
Mass Flow	5.000	kg/s	

Equations:

$$\gamma = \frac{C_p}{C_p - R}$$

$$\eta_c = \frac{H_{2s} - H_1}{H_2 - H_1} \quad \text{Isentropic Efficiency}$$

$$\frac{T_{2s}}{T_1} = \left(\frac{P_2}{P_1} \right)^{\frac{\gamma-1}{\gamma}} \quad \text{Isentropic Process}$$

Outputs			
Inlet Enthalpy	37.759	kJ/kg	
Inlet Entropy	0.088	kJ/(kg.K)	
Inlet Specific Heat Capacity	1.009	kJ/(kg.K)	
Gas Constant	0.288	kJ/(kg.K)	
Gamma	1.399		
Kelvin	273.150	C	
Outlet Pressure	10.130	bar	
Ln(P2/P1)	2.303		
(1-1/Gamma)**Ln(P2/P1)	0.657		
T2s/T1=....	1.929		
T2s	575.142	degree K	
T2s	301.992	C	
H2s	321.712	kJ/kg	
Outlet Enthalpy	384.043	kJ/kg	
Outlet Temperature	360.970	C	

Compression Process

Outlet Entropy	0.197	kJ/kg	
Compressor Work on Fluid	1731.421	kW	
<p>Taftan Data Email: support@taftan.com</p> <p>If you want to know more about "Taftan Data" or other software developed by this company please visit our website:</p> <p>http://www.taftan.com</p>			