**LAB 12 BRAYTON PROJECT**

**ME1101L VBA**

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Ideal Brayton Cycle Program:

NOTE: <http://en.wikipedia.org/wiki/Brayton_cycle> This website may help you with the principles.

Variable Description Required units

rp Pressure ratio

P1,P2,P3,P4 pressure kPa

T1,T2,T3,T4 temperature K

Subscript s isentropic temperatures K

Subscript a actual temperatures K

 compressor efficiency

 turbine efficiency

Wout power output of turbine kW

Qin heat input to combustion chamber kW

Win Power input to compressor kW

 thermo efficiency of cycle

rbw back work ratio = Win/Wout

k = 1.4 given isentropic expansion factor

Using constant specific heat assumption:

Here are the following equations associated with each device:



Compressor: from point 1 to 2

h1 = 1.005\*T1

  

See figure below:

Wout

T

Burner

Qin

Win

1

2

3

4

C

Burner: from point 2 to 3

h2a = 1.005\*T2a Thermal efficiency Backwork Ratio

  

Turbine: from point 3 to 4

H4a = 1.005\*T4a

  

PROGRAM REQUIREMENTS:

1. Design a userform that will allow the user to :
   1. Enter values for T1, T3, P1, pressure ratio (rp) , turbine and compressor efficiencies ( and  respectively)
   2. Make sure all entered values are numbers USE A SEPARATE SUBROUTINE OR FUNCTION TO ACCOMPLISH THIS TASK. Use of Isnumeric(some value) helps. It yields a True or False result depending on whether the data is numeric or not.
2. Use equations given to find the following Parameters:
   1. T4s, T4a, T2s, T2a, P2, Wout, Win, Qin, nth, r bw, h1, h2a, h4a
   2. Display all parameters computed in the form
   3. You should combine these computed parameters on the input userform
3. Solve for this case:

T1=300K, T3=1300K, P1=100kPa, Pressure Ratio =8, turbine and compressor efficiencies 100%

FIND: The parameters in 2a Ans: P2=800, nth = .4479, r backward = .418 etc

1. Solve for this case:

T1=300K, T3=1300K, P1=100kPa, Pressure Ratio =8, turbine efficiency =85% and compressor efficiency =80%

FIND: The parameters in 2a Ans: P2=800, nth = 0.274, r backward = .6147 etc