"Turbo HW5"
"Zhaoyi Jiang (.1364)"
"Problem 3"

"Given"
c1=6
w2=15
alpha_1=0
alpha_2=65
N=1800 [1/min]
r1=6.5*convert(cm,m)
r2=15*convert(cm,m)
eta_p=.75
rho=997.1
u1=(pi*2*r1*N)/60[s/min]
u2=(pi*2*r2*N)/60[s/min]
cz=c1
c2=cz/cos(alpha_2)
cu2=cz*tan(alpha_2)
wu1=u1
beta_1=arctan(wu1/c1)
w1=c1/cos(beta_1)
Q=pi*(r1^2)*c1
W=u2*cu2*convert(J,kJ)
W_dot=Q*rho*W*(1/eta_p)
ap=(rho*W)*1000*convert(Pa,bar)
ap0=ap-(rho*(c2^2-c1^2)/2)*convert(Pa,bar)
keabs=(c2^2/2)-(c1^2/2)
kerel=(w2^2/2)-(w1^2/2)
kecent=(u2^2/2)-(u1^2/2)
ratioabs=keabs/W
ratiorela=kerel/W
ratiocent=kecent/W

SOLUTION
Unit Settings: SI C kPa kJ mass deg

α_1 = 0 [degree]
ap = 3.628 [bar]
β_1 = 63.91 [degree]
c2 = 14.2 [m/s]
cz = 6 [m/s]
keabs = 82.78 [kj]
kerel = 19.44 [kj]
Q = 0.07964 [m^3/s]
r2 = 0.15 [m]
ratiocent = 892.4
ρ = 997.1 [kg/m^3]
u2 = 28.27 [m/s]
w1 = 13.64 [m/s]
wu1 = 12.25 [m/s]

α_2 = 65 [degree]
ap0 = 2.802 [bar]
c1 = 6 [m/s]
cu2 = 12.87 [m/s]
η_p = 0.75
kecent = 324.7 [kj]
N = 1800 [1/min]
r1 = 0.065 [m]
ratioabs = 227.5
ratiorela = 53.44
u1 = 12.25 [m/s]
W = 0.3638 [kJ/kg]
w2 = 15 [m/s]
$\dot{W}$ = 38.52 [kW]

7 potential unit problems were detected.