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**Lab No.11**

**Evaluate Factors Effecting the Performance of Rankin Cycle**

Factors Affecting the efficiency of Rankine cycle

Following are the thermodynamic variables which effect the efficiency and work output of a Rankine cycle.

**(1) Super heating of steam,**

**(2) Boiler pressure or inlet steam pressure to turbine**

**(3) Exhaust steam pressure or condenser below**

**(1) Effect of super heating of steam**

1. The heat supplies to steam is also increased.
2. However, the ratio of increase in work output to increase in heat supplied to steam is more than the ratio of work done to heat supplied. Which the cycle efficiency increases.
3. Due to the superheating of steam the average temperature of heat addition to the cycle increases while the average temperature of heat rejection from the cyle remains same. So there should be an increase in the thermal efficiency compared to the cycle using dry and saturated steam.

**(2) Effect Increase in Boiler pressure**

1: Due to increase in maximum pressure, the net-work increases.

2: The both works done are approximately the same but the heat rejected in the condenser decreases.

3: Since heat rejection is reduced in the case of increasing boiler pressure, so the Rankine cycle efficiency increases with the increase in the maximum pressure of the cycle.

**(3) Effect of condenser pressure**

1: With reduce condenser pressure have the same boiler pressure.

2: Net work done is increased due to the reduced condenser pressure and the heat supplied during the cycle increases.

3: So, the net result is an increase in the cycle thermal efficiency. It should be expected because the thermal efficiency increases with decreases in exhaust pressure because the average temperature of heat rejection decreases with decreases of exhaust pressure.

**Determination of torque, power and specific steam consumption in Rankin Cycle:**

**Torque:**

**Torque = Force x Radius**

1. Force=1.32 N

Radius= 0.023 m

T= 1.32 x 0.023

**T= 0.03036 Nm**

1. Force= 0.77 N

T= 0.77 x 0.023

**T= 0.0177 Nm**

**Power:**

**Power= Torque x angular velocity**

P= T x 2 x pi x N/60

N= 6.6 x 103

P= 0.030362 x 3.1416 x 6.6 x 103/60

**P=20.98 W or 0.02098 kW**

**Mass Flow rate:**

**Mass flow rate= m/t**

density=mass/volume

m=V x d

m=200 x 10-3liter x 1000kg/m3 1 m3=1000 liter

m=200 x 10-3 x 10-3 x 1000

m=0.2 kg

mass flow rate= 0.2/117

**mass flow rate=0.0017 kg/s**