

**AIM:**

To analyse and study the best performance point of Reciprocating pumps using Pandas.

**PROCEDURE :****1. Dataset Creation:**

Create a hypothetical dataset containing information about actual discharge(m<sup>3</sup>/s), input power(W), and output power(W).

**2. Correlation Analysis :**

Calculate the correlation matrix to examine the relationships between actual Discharge, input power, and output power using pandas''corr()' function.

**3. Efficiency calculation :**

Calculate the efficiency for each input value using the given formula: Efficiency(%)  
$$= \text{Output\_power} / \text{Input\_power} * 100$$

**4. Head calculation:**

Calculate the total head for each performance using the given formula : Head (m) =  
$$\text{output\_power} / \text{actual discharge} * \rho g$$

**5. Best Efficiency Point (BEP) :**

Identify the Best Efficiency Point of the reciprocating pump from the efficiency by selecting the highest index values using the pandas' 'nlargest()' function

## PROGRAM:

```
import pandas as pd
data={
    'Actual Discharge':[40,50,60,70,80,90],
    'Input Power':[1,2,3,4,5,10],
    'Output Power':[70,30,90,100,140,170]
}

density=1000 gravity=9.81

a=pd.DataFrame(data)

a['Efficiency']=(a['Output Power']/a['Input Power'])*100
a['Head']=(a['Output Power']/a['Actual Discharge'])/(density*gravity)
corr_matrix=a.corr()

print(corr_matrix)

max_efficiency=corr_matrix['Efficiency'].nlargest(2).iloc[1]

print("\nParameter with the highest correlation with efficiency=",max_efficiency)
```

## OUTPUT:

```
Actual Discharge  Input Power  Output Power  Efficiency  \
Actual Discharge    1.000000    0.922018    0.901611   -0.614487
Input Power         0.922018    1.000000    0.881684   -0.533271
Output Power        0.901611    0.881684    1.000000   -0.227847
Efficiency          -0.614487   -0.533271   -0.227847    1.000000
Head                0.466245    0.489913    0.797480    0.391574

      Head
Actual Discharge  0.466245
Input Power      0.489913
Output Power     0.797480
Efficiency       0.391574
Head            1.000000

Parameter with the highest correlation with efficiency= 0.3915744643953921
```

## Result:

The programs were run successfully