# Pump Power & Efficiency

Power input to the pump by the shaft driven from mechanical or electrical engine

$$P_{in} = \tau * \omega$$

Where is

$P_{in}$ is the input power to the pump

$\tau$ is the torque measured on the shaft ( N.m )

$\omega$ is the angular velocity of the driven shaft ( Rad/Sec)

The power output by the pump measured by its performance parameters

$$P_{out} = \gamma * Q * H_m$$

Where is

$P_{out}$ is the output power by the pump ( watts )

$\gamma$ is the fluid specific gravity ( $\rho * g$ ) for water $\gamma = 9810$ kg /m². sec.

Q is the flow rate of the fluid at the outlet of the pump ( $m^3$ / sec.)

$H_m$ is the manometric head at the outlet of the pump ( meter of water ).

Also, we can get the power output in KW or Horse Power

As

$$P_{out} = \gamma * Q * H_m / 1000 \qquad \text{(Kw)}$$

$$P_{out} = \gamma * Q * H_m / 745.7 \qquad \text{(Horse Power)}$$

The pump efficiency is

$$\zeta = P_{out} / P_{in} * 100\%$$