

Paper #KE-32**Effect of Blade Shape on the Characteristic of Unshrouded Centrifugal Pump****Nur Kaliwantoro & Sutrisno**

Abstract

Effect of blade shape on the flow patterns, performance and pressure distributions along the shroud of centrifugal pump has been studied. Five unshrouded impellers having different inlet and outlet angle: 30° - 20° , 30° - 30° , 30° - 40° , 30° - 50° and 40° - 40° , each, were employed six flow capacities. Flow patterns on the impeller were investigated using wet paint while the pressure distributions were measured using simple pitot tubes that was mounted on the shroud surface.

It is found that among the impellers having the same inlet angle of 30° , impeller with configuration of 30° - 40° has the best efficiency 50.04% when employed at condition of 273 lpm and the ratio of tip clearance to blade height of 1.89/17, while impeller with configuration 30° - 50° has the highest of pressure coefficient, 0.393, when employed at the same condition. In the visualization, there are traces of horseshoe vortex around the blade. This vortex separates its self into the pressure side leg of the horseshoe vortex and the suction side leg of the horseshoe vortex. Along the blade this suction side vortex increases its dimension and becomes the passage vortex which at last interferes the path of mainflow. Whereas the measurement of pressure distribution shows that the static, radial and tangential pressures increase as the distance of measurement from the center of the shroud is increased. It is also investigated that impeller with long passage causes lower tangential, meridional and static pressures along the shroud than those of the impeller with shorter passage. Although the pressures is lower, but the value of (PT-Ps) and (Pm-Ps) of long passage impeller are greater than those parameters of the impeller with short passage. Indirectly, it indicates that the leakage capacity of long passage impeller is greater than that of shorter passage impeller.

Keywords: unshrouded impeller, blade shape, pressure distributions

flow visualization