ABSTRACT

The present study considers the improvement of pump performance using shorted blades. Shorted blades are used to break dawn the circulation near the impeller exit.

In present work, effect of different position of optimum shorted blade length on pump performance is performed experimentally, and flow pattern through the impeller is investigated numerically.

Flow analysis is done on five impellers of well known from the experimental work.

A hybrid mesh is created using FLUENT's pre-processor GAMBIT. First, the impeller is generated. One impeller channel is meshed and is then rotationally copied the necessary number of times. The impeller is completely three-dimensional. The mesh is made in a completely unstructured way, mainly using tetrahedral, but other cell forms like pyramids, hexahedra and wedges also occur. The total numbers of calculation nodes are about 40000 nodes for each case.

Numerical results showed a reduction in flow circulation for all shorted blade impeller as compared with standard impeller, especially for the impeller with mid way shorted blade position. Static pressure value increase and more uniform distributions at impeller exit for impeller with Mid way shorted blade and impeller with two shorted blades.

Five impellers are manufactured using the optimum length of shorted blades and different positions of the shorted blades are considered, namely mid way, near suction, near pressure and both suction and pressure side.

The experimental results for five different impeller configurations showed that, Mid way shorted blades at impeller exit improve the efficiency

along pump performance and reached to 30% increase of the best efficiency point of standard impeller at 2900 rpm.

Impeller with shorted blade near pressure side showed improvement of pump efficiency at all speeds comparing to standard impeller (without shorted blades) but lower than the improvement of mid way shorted blade impeller. On the other hand impeller with shorted blade near suction side has no effect in improving pump efficiency; even at low rotating speeds the performance is lower than the standard impeller.