Cairo University

# CFD STUDY OF THE EFFECTS OF FLUID VISCOSITY AND IMPELLER GEOMETRY IN RADIAL CENTRIFUGAL PUMPS

By

Mahmoud Essam Mahmoud Mohamed Youssef

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the Requirements for the Degree of
MASTER OF SCIENCE
In
MECHANICAL POWER ENGINEERING

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of


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Approved by the
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**Title of Thesis:**

CFD study of the effects of fluid viscosity and impeller geometry in radial centrifugal pumps

**Key Words:**
Centrifugal pump; blade angle; number of blades; specific speed; fluid viscosity

**Summary:**

A parametric study was made to study the effect of changing the leading edge blade angle and number of blades for low specific speed (8.25 Specific Speed EU) centrifugal pump with respect to three different pumped fluids viscosity (i.e. water with 1 centipoises cP, fuel oil with 48 centipoises cP and engine oil with 80 centipoises cP) and it was found that increasing the number of blades and leading edge blade angles leads to increase in pump head significantly and limited increase in the total efficiency but this geometrical modification was more obvious for the more viscous fluid (80 cP) where the head increased for 7 blades by 10.88% form 5 blades while for the water (1 cP) the increasing was only 5.26% from 5 blades to 7 blades, the study was made using CFD ANSYS ® 16.0 edition with an independent mesh size.

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