M Ű E G Y E T E M 1 7 8 2

ASSIGNMENT

BSc FINAL PROJECT (BMEGEÁTA4SD)

Title:	**Numerical investigation of axial clearance effects in an axial flow motor cooling fan**
Author's name (code):	**Alexandre Masot SOTO (SNOXDT)**
Curriculum:	BSc in Mechanical Engineering
Supervisor's name, title: Affiliation, address:	Csaba HORVÁTH, assistant lecturer Department of Fluid Mechanics / BME H-1111 Budapest, Bertalan L. 4-6.
Advisor's name, title: Affiliation, address:	Dr. János VAD, associate professor Department of Fluid Mechanics / BME H-1111 Budapest, Bertalan L. 4-6.

Description of the project:

1. Overview the technical literature related to axial flow fans, with special regard to axial clearance effects in electric motor cooling fans. Use Vad *et al.* (ETC'2011 paper), the Final Thesis by G. Kiss (2012), and Vad *et al.* (ETC'2013 paper) as starting point.
2. Develop a simplified CFD model for the axial clearance involved in the case study: fan cover as a steady solid plane surface; shroud inlet as a rotatable solid surface; motionless air with constant pressure upstream and downstream of the clearance; possibility for prescribing various pressure differences for the clearance inlet and outlet; possibility for prescribing various rotational speeds for the shroud inlet; possibility for setting various clearance sizes (as in the Final Thesis by G. Kiss).
3. Carry out a CFD campaign for investigation of leakage flow rate through the clearance, for various clearance sizes and pressure differences, for irrotational shroud. Deduce the clearance loss coefficients for the various cases.
4. Repeat the CFD campaign for shroud rotating at various speeds. Make a comparison with the results in 3). Make a correlation how the rotation of the shroud reduces the "effective" pressure difference driving the leakage flow. (Using the normal component of Euler equation; and considering the fluid in the clearance as fluid of solid body rotation of X times the shroud rotational speed.)
5. Based on the CFD studies, make recommendations for refinements in the semi-empirical leakage flow model outlined in Vad *et al.* (ETC'2013 paper).
6. Make a summary on the results.

Handed out / Deadline: **3rd of September 2012. / 7th of December 2012.**

Budapest, 3rd of September 2012.

	……..	…….
(L.S.)	supervisor	Dr. János VAD, associate professor Head of Department

Approved by:
Budapest, 3rd of September 2012.

(L.S.)

…….
Prof. Tibor CZIGÁNY
Dean of Faculty

Received by:
Budapest, 3rd of September 2012.

The undersigned declares that all prerequisite subjects of the Final Project have been fully accomplished. Otherwise, the present assignment for the Final Project is to be considered invalid.

…….
student

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Supervisor's declaration of acceptance:	The submitted Thesis fulfils all requirements of the Department of Fluid Mechanics, Budapest University of Technology and Economics. The Thesis is accepted for review process and public defence.
Supervisor's proposal for final grade of the thesis:	The proposed final grade* of the BSc Thesis: ……..... * *Please, select one:* excellent (5), good (4), medium (3), acceptable (2), fail (1)
Date:	Budapest, 7th of December, 2012.
Name / Signature:	…… supervisor

Reviewer's proposal for final grade of the thesis:	The proposed final grade* of the BSc Thesis: ……..... * *Please, select one:* excellent (5), good (4), medium (3), acceptable (2), fail (1)
Date:	
Reviewer's name / signature:	…… reviewer

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