



Subdepartment **Engineering Fluid Dynamics - CTW**
 Department **Mechanical Engineering**

As part of his / her masterassignment

Faizan Habib Vance

will hold a speech entitled:

Flow Simulation of a Dry Gas Seal Failure Scenario

Date: 21-08-2015

Time: 10:00 hr

Room: N109

Summary:

Dry gas seals are widely used in the Oil and Gas industry and are of particular interest to centrifugal compressor manufacturers. Failure of the dry gas seal occurs when the sealing elements do not offer any resistance to the flow and the casing of the dry gas seal acts as a fluid path. Knowledge on the effects of the failure of the dry gas seal is of great importance, as failure could result in blow out of the compressor, safety hazards and damage to the surroundings.

The present study, performed at Siemens Hengelo, presents a Computational Fluid Dynamics (CFD) based investigation of dry gas seal in failure condition, using Ansys CFX. Benchmarking of the numerical study has been carried out using the flow through a pipe as a benchmark case. As part of the benchmarking process, a selection of turbulence, discretization and energy models in combination with a grid size optimization has been carried out for the dry gas seal.

The complex geometry of the dry gas seal, in combination with the high compressibility and turbulence of the flow, presents a challenge for the simulation of the flow in the dry gas seal. Subsequently, using both the CFD settings from the benchmarking study and the results from the grid convergence analysis, ten different steady state simulations have been performed based on two geometries. As a post-processing step, static pressures have been calculated at critical locations and these were then compared with the safety limits. The grid convergence analysis shows that the CFD simulations of the dry gas seal in failure conditions are well within the industrial requirements for numerical accuracy.

Finally, the flow resistance coefficients and the discharge coefficients have been calculated for the different sections along the dry gas seal. An initial parameter correlation study has been performed, using these coefficients. These correlations and coefficients will be used in order to implement an in-house one-dimensional flow resistance model currently being developed at Siemens Hengelo.

Assessment committee:

chairman,

Prof. dr.ir. C.H. Venner

(chairman)

Dr.ir. N.P. Kruyt

(mentor)

Ir. Chiel Schoeman (Siemens Hengelo)

(mentor from company)

(Signature)

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d.d.

