

COLLOQUIUM

Group: Engineering Fluid Dynamics

As part of his MSc thesis assignment

E.J. Beld

will give a presentation, entitled:

Optimization of an Ultra-High-Speed, Low-Specific-Speed Pump for Organic-Rankine Cycles

Date: Thursday June 12, 2014

Time: 14:00

Room: Horst Building C.101

Summary:

At a time in which the demand for renewable energy becomes larger every day, Organic-Rankine-Cycle (ORC) technology has proven to be an excellent solution for the recovery of waste heat. Often research on ORC technology is focussed on optimizing its thermodynamic process and components like heat exchangers and turbine. In order to obtain a satisfying cycle efficiency, a highly pressurized working fluid is required. Together with a relatively low mass flow rate, the efficiency of the pressurization step also becomes a challenge.

Triogen is a manufacturer of ORC units in the mid electrical power range (~150 kW). Triogen uses an ultra-high-speed pump, which is driven by the turbine. The pump's efficiency required further optimization. Hence, this pump is studied and analyzed and its efficiency is improved.

Following a literature study, suitable pump types were selected based on the required duty, while disregarding the operating speed. The performance of these pump types was compared for three possible drive types. The currently used drive and pump type (Barske pump) were found to be best choice. Furthermore, it has been shown that the observed limited pump efficiency is the result of mismatching pump dimensions. Since available literature does not provide design rules for these pumps, a set of design rules has been formulated. Applying these new design rules, the main pump dimensions have been corrected. The corresponding pump designs have been tested in the field, with satisfying results.

Assessment committee:

Prof.dr.ir. H.W.M. Hoeijmakers (chairman)

Dr.ir. N.P. Kruyt (mentor)

Prof.ir. J.P. van Buijtenen

Prof.dr.ir. G. Brem

Chairman,

d.d. _____