Faculty Engineering Technology
Program Industrial Design Engineering

University of Twente.

COLLOQUIUM

Group: **Engineering Fluid Dynamics**

As part of his MSc thesis assignment

J.P. Avezaat

will give a presentation, entitled:

Risk Analysis of Swimming Pool Water Circulation Systems

Developing safety measures and design requirements to exclude entrapment risk

Date: Thursday March 28, 2013

Time: 14.00u

Room: Spiegel 3

Summary:
Annually dozens of sometimes fatal accidents occur in European swimming pools. A major cause of these accidents is that the body of a swimmer blocks a drain cover. Due to the suction force exerted on the body a pressure difference results on the swimmer which is then trapped in the drain opening. The suction force can be of such magnitude that the victims are no longer able to free themselves and drown or suffer serious injuries. Furthermore, accidents are caused by the entrapment of hair, small limbs and clothing on the drain cover.
The present study, performed at the Blue Cap Foundation, presents a qualitative risk assessment of the risks of entrapments in swimming pools. The risks are evaluated employing models to determine the relation of the risks with various system properties. Accurate modelling of the exposure to entrapment hazards is not always feasible in practice. Therefore for a reliable assessment of risks, the measurement of risks is a necessity. The measurement of the local pressure downstream of a drain cover is used as a method to determine the magnitude of the suction force. Tests have been conducted to validate the influence of the rate of flow through a drain cover on the tensile force required to pull hair from a drain cover.
The use of aeration tubes is explored as a low-cost concept solution. By supplying air to the system the local gauge pressures behind a drain cover can be released. Experiments have validated that the aeration tube can reduce and, once applied with other regulatory safety measures, even exclude suction entrapment. Additional design requirements for aeration tubes, drain covers and water circulation systems allow all entrapment risks to be excluded in new pools as well as in existing pools.

Assessment committee: **Chairman,**

Prof.dr.ir. H.W.M. Hoeijmakers	(chairman)
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Dr.ir. W. Eggink	(member IDE)
Prof.dr.ir. A. de Boer	(external member)
J. Jonker	(internal mentor)

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