

# Internship: Empirical Study of Rarified Gas Flow Induced Heat Loads

## Introduction

Are you a master student Mechanical Engineering or Applied Physics with experience in Thermo-fluids? Then we are looking for you!

## Job Mission

### Background Information:

Our latest generation of EUV lithography machines uses reflective optics in a vacuum environment. To maintain the required cleanliness and vacuum, high velocity jets of low pressure gas are used to push contamination away from the sensitive modules in the machine.

These gas flows can result in a heat load on those same sensitive modules. Due to the nature of rarified gas physics, it takes significant numerical effort to estimate these heat loads. Therefore a test rig is required to measure the effects.

## Job Description

### Your assignment:

You will design, test and validate a setup that can measure small heat fluxes ( $\sim 0.1 \text{ W/m}^2$ ) on a surface over which a rarified gas flow is forced. You will use the test rig to determine the peak heat flux on two parallel plates for various flow rates, distance between the plates and travel length of the gas. You are expected to:

- Design a test rig within existing hardware constrains
- Formulate and execute your test plan
- Analyze the obtained data
- Report and present your findings

## Education

### Your profile:

You are a student in Applied Physics, Aerospace or Mechanical Engineering, with an affinity for thermo-fluids including heat transfer mechanisms. You are able to design and test with a pragmatic approach, and to work in a research environment with shared resources. Experience with mechanical design is a plus, but not required. This is a fulltime graduation or apprentice assignment with duration of 9 to 12 months. The preferred start date is September 2015.

Please keep in mind that we can only consider students who are enrolled at a school during the whole internship period for our internships and graduation assignments.

## Other Information

### What ASML offers

You will receive an internship monthly allowance of 500 euro maximum. Plus a possible housing allowance or travel allowance. Terms and conditions can be found on the website. In addition, you will get expert, practical guidance and the chance to work in and experience a dynamic, innovative team environment.

### Join ASML

ASML is leading in the worldwide development, production and sales of high-end lithography systems for the semiconductor industry. Almost 14,000 people worldwide work at ASML at offices in the United States, Asia and at the corporate headquarters in Veldhoven. ASML employees share a passion for technology with a customer focus. At ASML, we work collectively to further develop and implement complex and high-quality technological systems. Working at ASML is therefore challenging and dynamic, with ambitious objectives and high standards key to our continuing success. But hard work here pays off: ASML invests in the development of its people and successes are shared. ASML promises mutual commitment to our growth and yours.

**More information: Arjan Frijns and/or Silvia Gaastra-Nedea**