

A young woman with long dark hair is sitting on the grass, leaning against a large tree trunk. She is wearing a black sleeveless top and blue jeans, and is focused on her laptop. The background shows a modern university building with a sign that says "READY FOR TAKEOFF?" and "horst". Several people are walking in the distance. The scene is set outdoors on a sunny day with green foliage.

ENGD PROGRAMME MAINTENANCE

UNIVERSITY OF TWENTE.

ENG D PROGRAMME MAINTENANCE

Have you finished your master's programme and are you ready for a new challenge? Would you like to continue studying and get paid while doing that? Are you interested in technological designs and would you like to jump-start your career?

The EngD programme Maintenance at the University of Twente might be just the ticket! It's a two-year post-masters programme with a focus on design.

The EngD (Engineering Doctorate) programme Maintenance will educate you to develop high-quality, creative and innovative designs for complex issues in maintaining products/assets. As a technological designer specialising in the field of maintenance, you will be perfectly capable to link and integrate various disciplines to produce effective and creative solutions to complex maintenance issues. The EngD programme combines state-of-the-art technical expertise with professional development to result in an inspiring learning process.

THE PROGRAMME

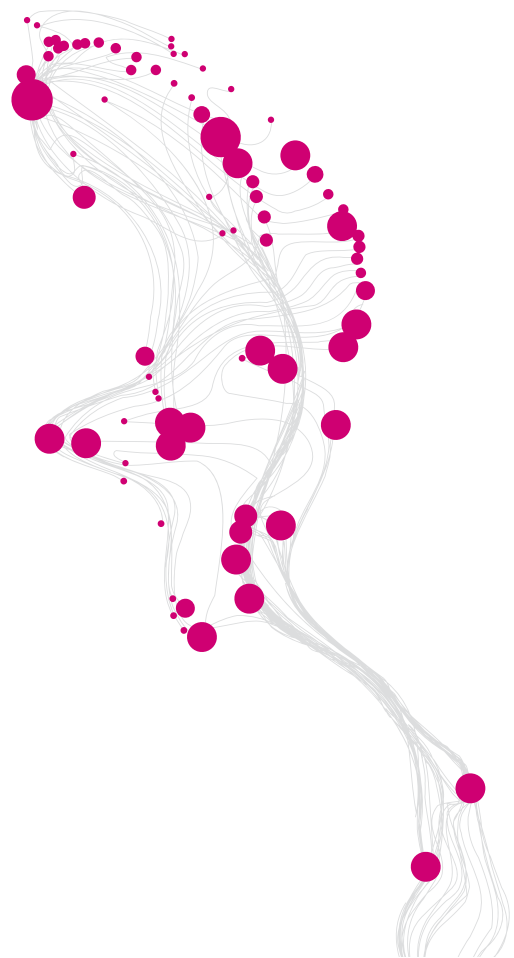
The postgraduate EngD programme combines academic research in a professional context with education in a range of related subjects. It involves course work and ultimately results in a design project carried out in close cooperation with the industry. Depending on the type of contract, as a trainee, you will be employed either by the University of Twente or by the industrial partner involved. In either case, you will receive a salary. The two-year programme comprises of three main components: professional development, course work and a technological design project. The educational component and the design project can be scheduled in parallel or sequentially (here flexibility is key). For each EngD trainee, the educational programme is tailored to the specific design project, which will be realised for a company. The EngD programme is built up as follows:

1. **Professional development** (~10% of the programme), including the compulsory course in professional effectiveness, and a number of elective courses such as technical writing, project management, interviewing skills, and conflict management;
2. **Post-graduate education** (~40% of the programme), comprising generic courses such as Systems Engineering and Design methodology, but also project-specific courses such as Multi-scale & Micromechanics and Tribology. See www.utwente.nl/go/engd-maintenance-courses for an elaborate overview of the courses;
3. **A technological design project** (~50% of the programme). This project in the field of Maintenance focuses on producing a design (either a product or a

process/methodology) that complies with technical, financial, logistics and organisational specifications set for the problem at hand. During the design project, you will directly apply your newly acquired knowledge, while searching for a pragmatic solution for the problem stated by an industrial partner. The ultimate goal of the design project is that your solution is implemented by the industrial partner.

DIPLOMA AND DEGREE

After successful completion of the programme, you will receive a certified diploma. You will be entitled to use the academic degree Engineering Doctorate (EngD) and you will be registered as a Technological Designer in the register kept by the Royal Institute of Engineers in the Netherlands (KIVI). The quality of the programme is assured by an assessment and certification procedure carried out by the Netherlands Certification Committee for Technological Designer Programmes (CCTO, Nederlandse Certificatie Commissie voor Opleidingen tot Technologisch Ontwerper).



ENG D IN MAINTENANCE

Maintenance is an essential part of daily life. This is reflected in the economic importance that maintenance has: € 400 billion of invested capital, annual cost of € 18 billion and more than 150,000 workplaces (in the Netherlands). In practice, maintenance is often carried out on the basis of empirical approaches and experiences from the past. As a result, maintenance is a static process, which currently heavily relies on empirical data. Therefore, a leap forward in terms of efficiency and effectiveness must be made. This requires the right awareness among both the designer of the system as well the designer of the maintenance process regarding the physical principles behind the necessity of doing maintenance.

The EngD programme Maintenance educates technological designers who are capable to design efficient and effective maintenance processes from a multidisciplinary perspective. For a design to comply with an integral maintenance-aware solution, technical, financial, logistics and organisational specifications need to be set and fulfilled. A major challenge in this comes from the fact that maintenance is a dynamic process, where the process should continuously be adjusted based on changes in the system and its environment. In this, a sound understanding of the physical mechanisms is key, as the basis for failing systems and components is in nature physical. To be able to predict the performance of a design in highly dynamic (undefined) situations requires a theoretical (based) approach. Currently there is a large gap in maintenance approach between technical specialists and operations managers, originating from different perspectives on maintenance. By addressing both technical and operations aspects during the EngD programme, a necessary, clear (however missing) link is established between these two fields of expertise. Examples of designs include:

- The redesign of the texturing process in steel mills;
- A decision tool for determination of failure mechanism;
- The redesign of a butterfly valve with reduced operating torque based on a physical model including degradation of material;
- The development of efficient monitoring strategies enabling condition based maintenance.

STUDYING AFTER YOUR MASTER'S: ENG D OR PHD?

Although the EngD and PhD are both recognised as postgraduate titles, the EngD programme and the PhD process are not equivalent. The EngD is a practical oriented professional doctorate in engineering which is better suited to the direct needs of industry, whereas the PhD focuses on scientific research. The three most pronounced differences between a PhD and EngD programme for you as a trainee are:

- The EngD has a duration of 2 years whereas the PhD has a duration of 4 years;
- The EngD trainee is engaged with the professional field, the PhD trainee is directly engaged with the university;
- The EngD focuses on (technological) designs, the PhD focuses on research.

In short: if you are an ambitious student who has completed a master's degree and would like to focus on design and applications, the EngD programme Maintenance might be the perfect opportunity for you!

INTERESTED?

The EngD programme is the perfect step for talented students with a master's degree in Mechanical Engineering, Industrial Design Engineering, Industrial Engineering & Management or a related specialisation (both national and international) who are interested in designing solutions for complex issues in the field of maintenance engineering. If you would like to apply for this EngD programme, please send us an email containing the following information and attachments:

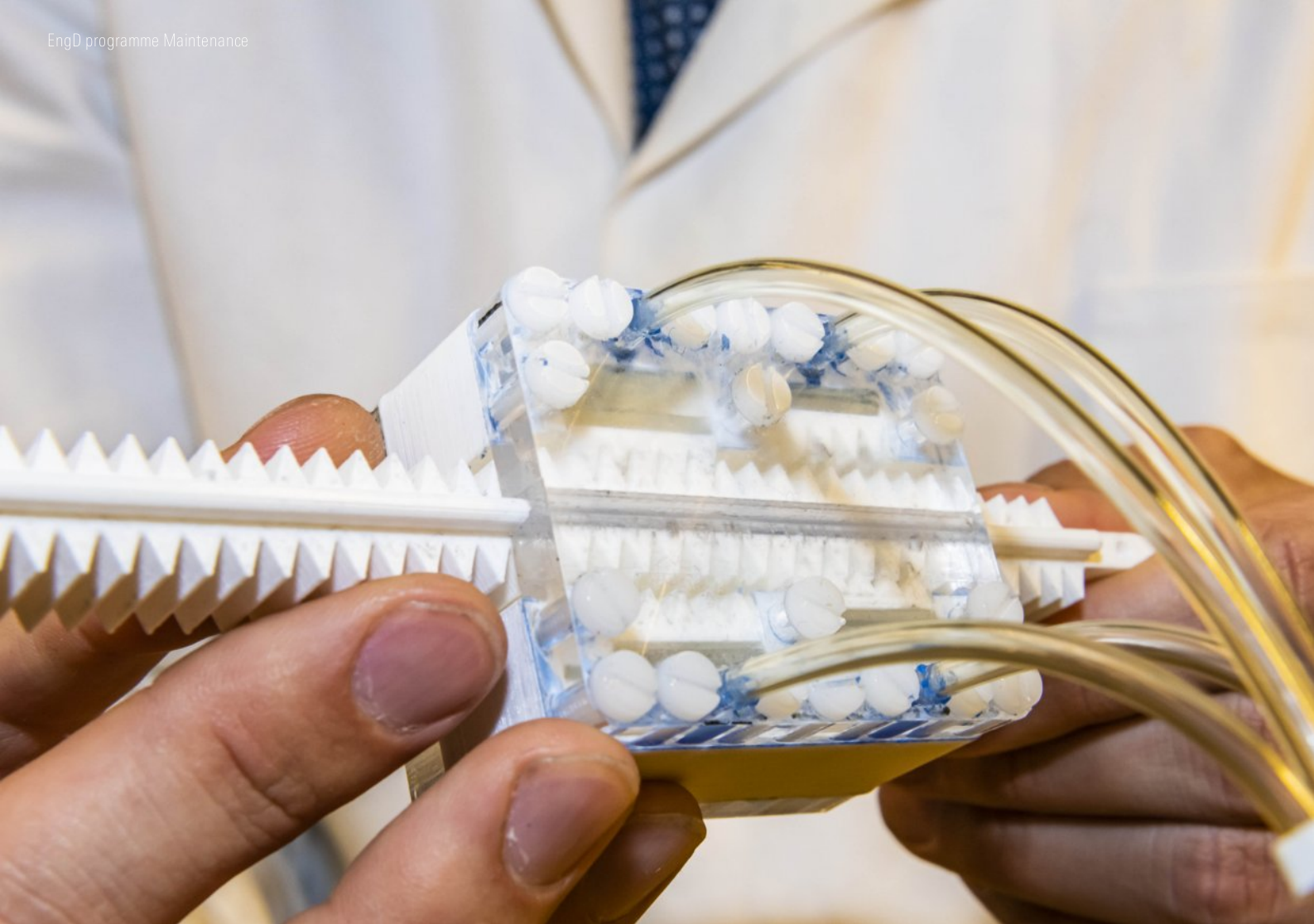
- A short curriculum vitae (1 A4 page max);
- A letter of motivation (1 A4 page max)
- The grade of the final assignment from your master's programme;
- A transcript of your master's courses (including grades);
- Letters of recommendation (max. 3).

An EngD selection committee is responsible for admitting new trainees to the programme.



"What I like the most about the programme is the tailor made character of it. There is a lot of freedom in choices for all parties. Another big advantage - compared to a PhD - is that the EngD programme is shorter. In additio"

- Niels Vossebeld -



THE UNIVERSITY OF TWENTE

High tech, human touch. That is the University of Twente, located centrally in Europe in the east of the Netherlands in the city Enschede. The University of Twente is where talent can best realise its full potential. Students and staff are the key. Together, 3300 scientists and professionals carry out ground-breaking research, bring about socially relevant innovation, and provide inspiring teaching for more than 9000 students. To us, entrepreneurship comes as second nature. The campus is home to around 100 businesses, including student-run businesses. The University of Twente has also generated more than 700 successful spin-off companies. The university's business park, Kennispark Twente, encourages and assists entrepreneurs to start new companies. But there's so much more than that happening on our wonderful, green campus. Our sports and cultural facilities are unique and we host events such as the world's largest student think tank, Create Tomorrow.

ENG D, AN INITIATIVE OF THE 4TU FEDERATION

Hundreds of companies have already had good experiences with the EngD programmes that are offered at the four universities of technology in Netherlands.

The universities of Delft, Eindhoven, Twente and Wageningen are responsible for the joint post-master's design programmes offered under the auspices of the Stan Ackermans Institute, 4TU School for Technological Design. For more information: www.4tu.nl/sai

INFORMATION ABOUT THE PROGRAMME

- Prof.dr.ir. M.B. de Rooij
- Director of the EngD programme Maintenance
- **T** + 31 53 489 1178
- **E** m.b.derooij@utwente.nl
- **Website:**
<https://www.utwente.nl/en/education/tgs/interested-in/engd/programmes/maintenance>

GENERAL INFORMATION

- B.B. Kroeze
- Support officer of the EngD programmes at the University of Twente
- **E** engd@utwente.nl