Jobbnorge ID: 233191
Deadline: 10/23/2022
Website: http://www.ntnu.no
Scope: Fulltime
Duration: Temporary

The Department of Marine Technology has a vacancy for a

PhD Candidate in Combustion of ammonia and hydrogen fuel mixtures in marine engine

This is NTNU

NTNU is a broad-based university with a technical-scientific profile and a focus in professional education. The university is located in three cities with headquarters in Trondheim.

At NTNU, 9,000 employees and 42,000 students work to create knowledge for a better world.

You will find more information about working at NTNU and the application process here.

Video: https://youtu.be/Xt-yHCN5QS0

About the position

For a position as a PhD Candidate, the goal is a completed doctoral education up to an obtained doctoral degree.

The Department of Marine Technology at the Norwegian University of Science and Technology (NTNU) has a vacancy for a PhD Candidate to join the Marine Machinery group to work with the HYDROGENi. The main topic of the PhD is a detailed experimental and numerical study of the combustion of hydrogen and ammonia in an internal combustion engine.

As the world makes the transition to a low carbon society, industrial sectors are examining which energy carriers should be invested in. The marine sector options include batteries, zero carbon green fuels, synthetic fuels, and biofuels. The large variety of vessel types in the marine sector means that one technology is unlikely to be applicable to all. For some vessels batteries seem like a sensible option but for larger, long-range vessels, it is likely that the internal combustion engine (ICE) will be used for many years into the future. Therefore, it is critical that zero carbon fuels with favourable operational and emissions characteristics must be used. There are several candidate fuels gaining attention in this area, including ammonia and hydrogen. Ammonia (NH_3) may be thought of as a hydrogen vector, essentially a molecularly bound method to store and transport hydrogen.

To utilize ammonia as a fuel it may need to be mixed with hydrogen to ensure efficient and complete combustion. The PhD project will focus on the ignition and emissions formation processes when an ammonia and hydrogen mixture is burnt inside an internal combustion. The main objective of the work will be to determine suitable fuel mixtures which achieve high combustion efficiencies and low emission of nitrogen oxides and nitrous oxide. To meet the objectives a mixture of experimental and numerical work will be conducted. The project will be used to develop new engines and support new numerical models describing combustion of the fuel mixture.

The successful candidate will conduct the project over a 3-year period under the supervision of Associate Professor David Emberson and Professor Eilif Pedersen.

Duties of the position

- Development of the laboratory equipment to handle the ammonia and hydrogen mixtures working closely with other researchers to complete an experimental campaign
- Conduct fundamental experimental work examining ammonia and hydrogen combustion in an engine environment. The work involves combustion experiments, conducted in two different combustion chambers, one designed to rapidly examine ignition delay and heat release, the other designed to provide optical access to allow high speed optical techniques to be applied
- Development of models (zero- dimensional stochastic reactor or CFD) that describe the ignition and combustion processes

Required selection criteria

- You must have a professionally relevant background in combustion, fuels, or internal combustion engines

- Completed a master's degree or second degree (equivalent to 120 credits) with a strong academic background in mechanical, chemical or marine engineering (or equivalent) with a minimum of a grade B (NTNU's grading scale)
- If you do not have letter grades from previous studies, you must have an equally good academic basis. If you have a weaker grade background, you may be assessed if you can document that you are particularly suitable for a PhD education
- You must meet the requirements for admission to the faculty's doctoral program (https://www.ntnu.edu/studies/phiv)
- Experience working in an engine, combustion or more general mechanical engineering type lab is a prerequisite
- Strong theoretical background in mathematics, physics and/or combustion
- Good written and oral English language skills, including academic writing

The appointment is to be made in accordance with Regulations concerning the degrees of Philosophiae Doctor (PhD) and Philosodophiae Doctor (PhD) in artistic research national guidelines for appointment as PhD, post doctor and research assistant

Preferred selection criteria

- Programming skills in MATLAB, Python, LabView or similar
- Basic skills in combustion simulation (Cantera or similar)
- Some experience designing and managing manufacturer of component parts for experimental rigs

Personal characteristics

- Good communication skills
- Positive attitude and confidence in working independently and in teams
- Able to communicate well with academic staff and technical support staff
- Ability and willingness to work in inter- and transdisciplinary teams
- Scientifically curious- breadth of knowledge
- Appreciation of safe working practises

Motivation for fundamental scientific research of practical relevance is essential, with an interest in experimental and empirical methods.

In the evaluation of which candidate is best qualified, emphasis will be placed on education, experience and personal suitability, in terms of the qualification requirements specified in the advertisement.

We offer

- exciting and stimulating tasks in a strong international academic environment
- an open and inclusive work environment with dedicated colleagues
- favourable terms in the Norwegian Public Service Pension Fund
- employee benefits

Salary and conditions

As a PhD candidate (code 1017) you are normally paid from gross NOK 501 200 per annum before tax, depending on qualifications and seniority. From the salary, 2% is deducted as a contribution to the Norwegian Public Service Pension Fund.

The period of employment is 3 years.
Appointment to a PhD position requires that you are admitted to the PhD programme in Engineering (https://www.ntnu.edu/studies/phiv) within three months of employment, and that you participate in an organized PhD programme during the employment period.

The engagement is to be made in accordance with the regulations in force concerning State Employees and Civil Servants, and the acts relating to Control of the Export of Strategic Goods, Services and Technology. Candidates who by assessment of the application and attachment are seen to conflict with the criteria in the latter law will be prohibited from recruitment to NTNU. After the appointment you must assume that there may be changes in the area of work.

It is a prerequisite you can be present at and accessible to the institution daily.

About the application

Publications and other scientific work must follow the application. Please note that your application will be considered based solely on information submitted by the application deadline. You must therefore ensure that your application clearly demonstrates how your skills and experience fulfil the criteria specified above.

The application and supporting documentation to be used as the basis for the assessment must be in English.

- CV and certificates
- Transcripts and diplomas for bachelor's and master's degrees. If you have not completed the master's degree, you must submit a confirmation that the master's thesis has been submitted
- A copy of the master's thesis. If you recently have submitted your master's thesis, you can attach a draft of the thesis
- Documentation of a completed master's degree must be presented before taking up the position
- Name and contact information of minimum two referees
- If you have publications or other relevant research work

If all, or parts, of your education has been taken abroad, we also ask you to attach documentation of the scope and quality of your entire education, both bachelor's and master's education, in addition to other higher education. Description of the documentation required can be found here. If you already have a statement from NOKUT, please attach this as well.

We will take joint work into account. If it is difficult to identify your efforts in the joint work, you must enclose a short description of your participation.

In the evaluation of which candidate is best qualified, emphasis will be placed on education, experience and personal and interpersonal qualities. Motivation, ambitions, and potential will also count in the assessment of the candidates.

NTNU is committed to following evaluation criteria for research quality according to The San Francisco Declaration on Research Assessment - DORA.

General information

Working at NTNU

NTNU believes that inclusion and diversity is our strength. We want to recruit people with different competencies, educational backgrounds, life experiences and perspectives to contribute to solving our social responsibilities within education and research. We will facilitate for our employees' needs.

NTNU is working actively to increase the number of women employed in scientific positions and has a number of resources to promote equality.

The city of Trondheim is a modern European city with a rich cultural scene. Trondheim is the innovation capital of Norway with a population of 200,000. The Norwegian welfare state, including healthcare, schools, kindergartens and overall equality, is probably the best of its kind in the world. Professional subsidized day-care for children is easily available. Furthermore, Trondheim offers great opportunities for education (including international schools) and possibilities to enjoy nature, culture and family life and has low crime rates and clean air quality.

As an employee at NTNU, you must at all times adhere to the changes that the development in the subject entails and the organizational changes that are adopted.

A public list of applicants with name, age, job title and municipality of residence is prepared after the application deadline. If you want to reserve yourself from entry on the public applicant list, this must be justified. Assessment will be made in accordance with current legislation. You will be notified if the reservation is not accepted.

If you have any questions about the position, please contact David Emberson, email david.r.emberson@ntnu.no. If you have any questions about the recruitment process, please contact Marit Gjersvold, e-mail: marit.gjersvold@ntnu.no.

If you think this looks interesting and in line with your qualifications, please submit your application electronically via jobbnorge.no with your CV, diplomas and certificates attached. Applications submitted elsewhere will not be considered. Upon request, you must be able to obtain certified copies of your documentation.

Application deadline: 23.10.2022

NTNU - knowledge for a better world

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The Norwegian University of Science and Technology (NTNU) creates knowledge for a better world and solutions that can change everyday life.

Department of Marine Technology

We develop methods and technology related to the blue economy: oil and gas extraction at sea, ship technology and the equipment industry, fisheries and aquaculture. We also have a strong commitment to the development of sustainable solutions for offshore renewable energy, coastal infrastructure, and marine robotics. Marine technology helps to solve major global challenges related to the environment, climate, energy, food and efficient transport. The Department of Marine Technology is one of eight departments in the Faculty of Engineering.

Additional information

Place of service:

Department of Marine Technology 7050 Trondheim (Trondheim Municipality)