Jobbnorge ID: 296677
Deadline: 4/27/2026
Website: http://www.ntnu.no
Scope: Fulltime
Duration: Temporary

The Department of Structural Engineering has a vacancy for

Two PhD positions in “Micromechanics-based modelling of ductile failure in high-strength aluminium

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 43,000 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

At the Department of Structural Engineering, NTNU, we have two vacant PhD positions in “Micromechanics-based modelling of ductile failure in high-strength aluminium alloys”. The positions are linked to the research groups SIMLab(Structural Impact Laboratory) and Nanomechanics.

Are you motivated to take a step towards a doctorate and open up exciting career opportunities? As a PhD Candidate with us, you will work to achieve your doctorate, and at the same time gain valuable experience that qualifies you for a further career in higher education and research, in and outside academia.

Context and motivation

Age-hardenable aluminium alloys are important in the design of modern electric vehicles, forming critical crash structures and battery enclosures that ensure passenger safety. These alloys offer an outstanding combination of strength and low weight, but achieving the optimal balance between strength and ductility remains a major challenge.

Why? Because the very mechanisms that make these alloys strong also introduce weak spots. During artificial aging, nano-sized precipitates strengthen the material, but precipitate-free zones (PFZs) form along grain boundaries. These PFZs become hotspots for strain localization, and coarse grain-boundary precipitates may trigger void nucleation. The result is intergranular fracture that compromises ductility, especially in high-strength alloys where the contrast between grain interiors and PFZs is severe.

This project addresses a fundamental question that is still poorly understood: **How do transgranular and intergranular fracture compete in aluminium alloys?** Answering this question is key to designing safer and more reliable lightweight components for electric vehicles and beyond.

To tackle this challenge, two PhD positions are announced within the same research project, addressing complementary aspects of fracture in age-hardenable aluminium alloys.

PhD position 1 - Intergranular fracture mechanisms

This position will focus on **intergranular fracture**, with particular emphasis on the role of precipitate-free zones (PFZs) and coarse-grained boundary precipitates on fracture. The work will combine advanced experimental characterization with modelling to understand strain localization, void nucleation, and crack initiation along grain boundaries.

The team of supervisors consists of Professor Odd Sture Hopperstad (immediate leader), Professor Jianying He and Associate Professor Lars Edvard Blystad Dæhli. All supervisors are affiliated with the Department of Structural Engineering at NTNU.

PhD position 2 - Transgranular fracture modelling

This position will focus on **transgranular fracture**, with an emphasis on physics-based computational modelling. Key activities include crystal-plasticity-based finite-element (CPFE) simulations, unit-cell and microstructure-resolved models, and the development of modelling frameworks to capture ductile damage initiation and crack evolution in polycrystalline materials.

The team of supervisors consists of Associate Professor Lars Edvard Blystad Dæhli (immediate leader) and Professor Odd Sture Hopperstad, both affiliated with the Department of Structural Engineering at NTNU.

As a PhD candidate, you will:

- Explore the physics of fracture across length scales by combining cutting-edge computational modelling with advanced experimental techniques.
- Develop a multiscale modelling framework that captures the interplay between microstructure and fracture mechanisms.
- Contribute to improving materials design and performance predictions for crash-relevant loading conditions, enhancing crashworthiness and structural integrity in lightweight automotive components.

Your work will bridge theory and application, providing insights that could redefine how we predict and enhance the performance of aluminium alloys under extreme conditions. If you are passionate about materials science, computational mechanics, and research with real-world impact on sustainable transportation, this project offers an exciting opportunity to push the boundaries of knowledge.

Duties of the position

- Contribute towards excellent research at the Department of Structural Engineering.
- Conduct and publish high-level research in peer-reviewed journals and at international conferences.
- Disseminate relevant parts of the research to a wider audience.
- Participate and contribute to activities in the research group SIMLab, including mentoring and supervising MScs.

Be prepared for changes to your work duties after employment.

Required selection criteria

- You must have a professionally relevant background in solid mechanics.
- Your education must correspond to a five-year Norwegian degree program, where 120 credits are obtained at master's level.
- You must have a strong academic background from your previous studies and an average grade from the master's degree program, or equivalent education, which is equal to B or better compared with 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 doctoral program from the Faculty of Engineering (https://www.ntnu.edu/studies/phiv)
- You must be fluent in spoken and written English.

PLEASE NOTE: For detailed information about what the application must contain, see paragraph “About the application”.

The appointment is to be made in accordance with NTNUs guidelines for recruitment positions and Regulations for the degrees philosophiae doctor (ph.d.) and philosophiae doctor (ph.d.) in artistic development work at the Norwegian University of Science and Technology (NTNU)for general criteria for the position.

Preferred selection criteria

- Knowledge of constitutive modelling of materials.
- Knowledge of non-linear finite element methods.
- Knowledge of computational micromechanics.
- Knowledge of aluminium alloys.
- Experience using non-linear finite element software, e.g., Abaqus.
- Experience with programming using Python and Fortran.
- Experience with conducting experimental work and data analysis.

Personal characteristics

To complete a doctoral degree (PhD), it is important that you are:

- Highly motivated.
- Able to work independently.
- Curious and enthusiastic.
- Strong ability to systematically carry out goal-oriented work.
- Enjoy and contribute to interdisciplinary research.
- Keen interest in learning and working in teams.
- Good skills to deliver oral and written presentation of research results.

Emphasis will be placed on personal qualities.

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.

Diversity

Diversity is a strength, and at NTNU we aim to be an employer that reflects the diversity in society and that makes use of the potential of the population's collective skills. Our vision is Knowledge for a better world and our values are creative, critical, constructive and respectful. We believe that an organization that is equal, diverse and gender-balanced is essential for us to achieve our goals.

We strive to attract employees with different skills, life experiences and perspectives to contribute to even better problem solving of our societal mission in research and education.

If you think this position is relevant and interesting, we encourage you to apply, regardless of gender, functional ability and cultural background, or whether you have been out of work for a period of time.

At NTNU we want to increase the proportion of women in scientific positions. We have a number of measures to promote equality.

Salary and conditions

In the position of PhD Candidate, code 1017, your gross salary will normally be NOK 550 800,-per annum depending on qualifications and seniority. A 2% statutory contribution to the State Pension Fund is deducted from the salary.

The employment period is 3 years.

For employment as a PhD Candidate, it is a prerequisite that you gain admission to the PhD programme in Engineering within three months of your employment contract start date, and that you participate in an organized doctoral programme through out the period of employment.

As an employee at NTNU, it is important that you keep yourself up to date with academic and organizational changes and adapt to them.

For the necessary professional and social interaction, it is a prerequisite that you are physically present and available to the Department on a daily basis.

The appointment is carried out in accordance with the principles of the State Employees Act, and Export control (legislation that regulates the export of knowledge, technology and services). Candidates who, after assessment of the application and attachments, are considered to bein conflict with the criteria in the latter act, will not be able to be employed.

About the application

The attachments (including a description of your scientific work) must accompany the application as these documents form the basis of the application assessment. The documents must be in Norwegian/a Scandinavian language or English.

Please note: the application will only be assessed on the basis of the information we have received by the application deadline. Therefore, make sure that your application clearly shows how your skills and experience meet the criteria described above. The application and all attachments must be sent electronically via Jobbnorge.no. If you are invited to an interview, you must bring certified copies of certificates and diplomas upon request.

The application must include:

- Transcripts and diplomas for Bachelor's and Master's degrees
- CV
- Short letter of motivation (400 words/1 page)
- Possibly publications etc. other relevant research work
- Names and contact information of three relevant referees

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. If your institution uses “diploma supplement” (normal for most European institutions), you must attach this. A description of the documentation required can also be found here. If you already have a statement from Norwegian Directorate for Higher Education and Skills (HK-dir), please attach this as well.

Joint work will be considered. If it is difficult to identify your contribution to joint work, you must attach a brief description of your participation.

When assessing the best qualified, we emphasize necessary qualifications such as education, experience and personal suitability. Motivation for the position, ambitions, and potential for research will also count when assessing the candidates.

NTNU recognizes a wide range of academic contributions and has committed itself to The San Francisco Declaration on Research Assessment and CoARA (responsible assessment of research and recognition of a greater breadth of academic contributions in accordance with NTNU's social mission).

General information

A public list of applicants with name, age, job title and municipality of residence is prepared after the application deadline. If you wish to be exempt 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 exemption is not granted.

If you think this position looks interesting and in line with your qualifications, you are welcome to apply.

If you have any questions about the position, please contact Professor Odd Sture Hopperstad, e-mail: odd.hopperstad@ntnu.no or Associate Professor Lars Edvard Blystad Dæhli, e-mail: lars.e.dahli@ntnu.no

If you have any questions about the recruitment process, please contact HR Consultant June Hovde, e-mail: june.b.hovde@ntnu.no.

Application deadline: 27.04.2026

For practical information about working at NTNU, please visit this webpage.

The city of Trondheim is a modern European city with a rich cultural scene. Trondheim is the tech 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.

NTNU - knowledge for a better world

NTNU - knowledge for a better world

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

Department of Structural Engineering

We teach mechanical engineering, engineering and ICT, and civil and environmental engineering. The Department conducts internationally leading research and participates in several large national research projects. The Department of Structural Engineering is one of eight departments in the Faculty of Engineering.

Additional information

Place of service:

Høgskoleringen 1 7491 Trondheim (Trondheim Municipality)