Mechanical Engineering
Multi-Machine Engineering

MSc Programme

Society faces tremendous challenges to meet demands on efficiency, sustainability and safety of complex processes. In the logistics and production domain Multi-Machine Engineering address these challenges with an integrated perspective that combines core (mechanical systems') design with real-time operation and distributed machine-machine interactions. In the track MME (former TEL) you develop the skills necessary to design such integrated systems of machines, combining science-based methodologies, with state-of-the-art tools, and hands-on lab and industrial case experience.

Degree	Master of Science in Mechanical Engineering
Starts	September
Credits	120 ECTS, 24 months
Language	English
Application deadline	April 1st: international students July 1st: Dutch degree
Tuition fee	€ 18.750 (non EU) € 2.083 (EU)
Scholarships	scholarships.tudelft.nl

Industry requires that all kinds of processes become more efficient, sustainable, and safe than ever before, in particular related to logistics and production processes. To achieve this, flexibility is needed by designing mechanical systems as large groups of interacting systems, viz., multi-machine systems. At the same time, economies of scale challenge the larger and larger physical scale at which the individual subsystems/equipment in such distributed systems can be designed. The advances in robotization, computation technology, connectedness, higher degrees of autonomy, and new energy technology are key technologies that enable new innovative design solutions for such multi-machine systems.

In the track Multi-Machine Engineering you develop those skills necessary to design the integrated multi-machine systems to face tomorrow's machine design, operation, maintenance, and interaction challenges. You will grasps the fundamental ideas of widely applicable generic techniques, such as mechanical analysis, drive & energy system design, finite / discrete element modelling, mathematical optimization, distributed control, large-scale vehicle routing, dynamic and multi-agent simulation, and (industrial) systems process analysis and improvement. You will learn how to master specific tools for modelling, designing,

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First Year		Second Year	
Mechanical Engineering courses	Total: 16 ECTS	Literature Assignment	10 ECTS
Physics and Measurement	6 ECTS	Research Assignment	15 ECTS
Control System Design	3 ECTS	Graduation Project	35 ECTS
Heat Transfer	3 ECTS		
Nonlinear Mechanics	4 ECTS		
Compulsory courses for all students in the MME track	Total: 31 ECTS		
Drive & Energy Systems	3 ECTS		
Dynamics of Material and Equipment Interaction	3 ECTS		
Intelligent Control for Transport Technology	3 ECTS		
Coordination for Real-time Logistics	3 ECTS		
Structural Design with FEM	4 ECTS		
Integration Project Large-scale Equipment	5 ECTS		
Quantitative Methods for Logistics	5 ECTS		
System Analysis and Simulation	5 ECTS		
Elective courses	Total: 13 ECTS		

See website and study guide for more information.

operating, and maintaining individual machines, as well as analysing in a structured way the impact of design choices on interactions between groups of machines. Optimising the design for operational performance of multi-machine systems, taking into account human limitations in the management of complex systems, and interactions between environment, material properties, and equipment/machinery is hereby the main objective.

There is a strong emphasis on solving current and foreseen challenges in industry, using both scientific, practical, and applied knowledge. Specific application cases in which you gain hands on experience with the skills developed come from ongoing scientific research and industrial practice, in particular related to challenges faced in (port) logistics, container and bulk terminals design, off-shore floating platform design, autonomous ground and ship vehicles, intelligent material handling systems, and production and distribution systems. Analytical models, detailed and validated simulation models, as well as newly developed lab facilities and on sight experiments can all be part of your studies. These types of case studies and experimental facilities are directly relevant for preparing you to optimally anticipate the currently seen developments in industry: Industry 4.0.

Graduation project

Graduation projects are often carried out in cooperation with an industrial partner or directly linked to one of the ongoing scientific research programmes. Examples of recent graduation topics are ”Logistics of the world’s largest heavy lifting cranes”, “Analyses of Throughput times of passengers and baggage on Schiphol Airport”, “Analysis of the increased maximum load occurrences of bulk cranes”, “Redesign of the lifting arrangement of a pipe transfer crane on board Solitaire”, “Modeling of operational processes at intermodal container terminals”, “Vessel routing for sweeping of marine litter in port areas” and “In-wheel and In-drum motors for crane applications”.

Career prospects

Graduates can find positions in a wide variety of jobs, from engineering to management as project engineers and as project and process managers. They can become researchers in the private sector and at research institutes, or conduct PhD research at universities to specialise further in their areas of interest. They can work in engineering consultancy positions and move into jobs as organisation experts, automation consultants, and operational managers. Businesses where our alumni can be found include, for example, Allseas, BAM, EMO, EECV, Huisman-Itrec, Tebodin, Shell, Unilever, Procter and Gamble, General Electric, Marin, Stork, IHC, NEMAG, Schiphol Group, Damen, ECT, ESI/Eurosilo, Heerema, Port of Rotterdam, Vanderlande Industries, NEMAG, Tata Steel, KLM, Royal Haskoning, DHV, Albert Heijn and Friesland Campina.

120
students

5%
international students

Career perspective

95%
graduates within the industry

90-95%
job within 1 month