

Virtual reality

The use of virtual reality in a (product) development process offers new possibilities to improve interdisciplinary communication, stimulate cooperation and advance concept testing. In this way fast insights into the design choice consequences, for instance on the interaction between product and user, can be obtained. The challenge is often to introduce and implement new techniques into (existing) processes.

Synthesis based engineering tools

Computers can solve design problems. The new-generation CAD software generates many possible solutions and designers choose the best candidate(s). This approach shortens the design process and increases the design quality.

Physics in design

Multidisciplinary design can be improved by a thorough understanding of the underlying physics. Innovative technologies are developed by mapping physical phenomena (knowledge acquisition). This knowledge is subsequently transformed into design knowledge and integrated into possible realization principles. For example, thermal management solutions through two-phase heat transfer principles or a no-moving-parts pump through heat injection.

Lean design engineering

As today's consumer markets have become both more difficult to satisfy and more susceptible to rapid changes, effective design engineering methods are required to balance the search for innovative solutions with very a short time to market in order to keep a competitive edge. In this context, lean design engineering researches how existing concepts from lean manufacturing can be implemented into a design environment and the development of new tools to achieve the same effect: reduction of waste.

System design

For complex products (like airplanes, medical equipment and ships) insight and oversight at all design levels is imperative. This requires both knowledge of technical details as well as comprehension of the complex coherence. Focus area in this research is facilitating knowledge communication between the different disciplines. Also, the question how system thinking leads to a better design is studied.

Supporting sustainable design

Sustainable technologies, sustainable life cycles and energy efficiency are becoming more important for products enter-

ing the market. To facilitate product development in this area, it is important to gain insight into innovation processes, design and analysis tools, materials, logistics and alternative (functional) solutions. Projects focus on design methods and/or sustainable product development.

Additive manufacturing (3D printen)

Additive fabrication methods are increasingly seen as full-fledged production techniques for the part fabrication of e.g. medical applications, consumer products and directly printed electronic components. Within and outside the UT research is done into printing of food, green 3D printing, printing of ceramic membranes and micro pumps for space application. Also, new printing techniques are developed.

Optimus



Optimus is the study association of the DPM Chair. The goal of the association is to foster relations between students and staff. Optimus does this in two ways. On the one hand study-related industrial excursions and lectures are organized. For instance, recently VDL and the waste processing company Twence were visited. On the other hand enjoyable social activities, like BBQs, gaming events or a movie night in the VR-lab, are organized.

Also, the drinks at this track presentation are organized by Optimus. You can get to know DPM students, staff and the Optimus board. They will be able to tell you more about the Chair, associated master tracks and Optimus itself. For more information you can have a look at www.utwente.nl/ctw/opm/optimus.

Contact DPM

In case you have any further questions about the DPM Chair in general or the Design Engineering specialization, have a look at www.utwente.nl/ctw/opm or contact us.

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Design Engineering master track

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Welcome to the *Design Engineering* master track information presentation. This flyer gives some background information on our (and possibly your future) master track, the course list, internship and thesis assignment, research possibilities, and *Optimus* our department's study association.

Chair of DPM



DPM stands for Design, Production and Management, and this is exactly what it is all about in our Chair. Because of the breadth of this research area our Chair is divided into several tracks.

One of the tracks is the **Design Engineering (DE)** master track. Heading this track is Prof. Dr. Ir. F.J.A.M. van Houten, and he will therefore be your thesis professor at the time of graduation.

Next to the thesis professor, there is also a master track coordinator with whom you will discuss your study progress, your course list, and your personal interests regarding the internship and thesis assignment. The track coordinator is also a staff member of our Chair (see Contact on the back).

Design Engineering

Design Engineering studies the processes that are related to part and product design. The entire design process is regarded from conceptual design to manufacturing & maintenance. The research areas primarily focus on the development of design support tools and techniques. This can

for instance be design methodologies, but also CAD tools. Methods help to structure the chaotic and complex design process, while other methods aim to stimulate creativity. Software design support tools are all around us, as for instance Matlab or finite element method packages, but also increasingly more customer-specific design applications are being developed.

Within our Chair we develop the use of Virtual Reality as a full-fledged design tool. Also Additive Manufacturing techniques, as 3D printing, are utilized when it comes to quickly realizing a visual mock-up or even an entire product. The Chair's ultimate goal is to make design more efficient and effective.

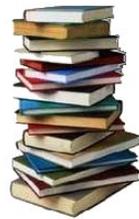
Course list

The first year of the master, you will follow courses from a self-composed course list. Part of the course list contains courses that belong to the chosen competence profile (Parts 1a & 1b). For the Design Engineering track this is usually the Design & Construction profile, but the Research & Development and Organization & Management profiles are also possible.

The second part of the course list contains Design Engineering courses (Parts 2 & 3). Finally, you are allowed to choose a number of free electives within your course list (Part 4). An exemplary course list is presented at the end of this section. The list can also be viewed online on www.utwente.nl/ctw/opm/education/de. Your final course list is completed in consultation with the track coordinator.

A range of design courses is offered at the UT. Next to that there are many deepening and broadening courses. The composition of the course list Parts 2, 3 & 4 leaves much room for individual interest and specialization. You are therefore advised to come up with a substantiated concept for your Design Engineering course list.

More information about the courses can be found online in the Osiris course catalog. Discuss your desired course list with the track coordinator. Contact details are found on the back of this flyer.



1a. Compulsory subjects Design & Construction

From this list you must select a minimum of 4 courses.

Course code	course name
191102031	Product design*
191121720	Design, production and materials
191131360	Design principles for precision mechanisms
191150700	Integrative design of biomedical products
191157710	Numerical methods in mechanical engineering
201300155	Process equipment design

* will be renamed to 'Modelling of Technical Design Processes'

1b. Profile elective Design & Construction

You must select 1 course of another profile. Some possibilities are:

Course code	course name
191124720	Design of production and inventory systems
191131700	System identification and parameter estimation
191141700	Transport phenomena
191154710	Fluid dynamics
191155700	Solids and surfaces
201200146	Maintenance engineering & management
201400037	Linear solid mechanics

2. Core subjects Design Engineering

From this list you must select a minimum of 3 courses.

Course code	course name
191100010	TRIZ - fundamentals
191102010	Life-cycle strategy
191102041	Manufacturing facility design
191211080	Systems engineering
201000201	Virtual reality

3. Specialization courses Design Engineering

From this list you must select a minimum of 2-3 courses. You may also select courses from Parts 1b & 2.

Course code	course name
191124310	CAD/CAM 3 - research
191127520	Lean six sigma green belt
191131730	Dynamics of machines
191157730	Computational structural optimization
191158510	Programming in engineering
192850840	Sources of Innovation
192850960	Intellectual property in product development
201400103	3D Printing; Processes and use

4. Free electives

Free electives are to complement your course list. Some possibilities are given below, but there is much more on offer.

Course code	course name
191210910	Image processing and computer vision
191211060	Modern robotics
191820180	Reverse logistics & Re-manufacturing

Internship and thesis assignment

When you have successfully completed the courses of your course list, you may start your internship. You are free to find a suitable company yourself, but we can of course help you. The most important is that you find an interesting assignment and that you obtain some industry experience. Moreover, it is the ideal opportunity to familiarize yourself with your study specialization in an industrial setting.

The track's capstone project is the master thesis. Together with the track coordinator you will find a suitable, challenging thesis assignment. Within our Chair many running research projects can facilitate your assignment either internally or with an external party. The next section briefly presents the current research possibilities. When you start your thesis assignment, there may be new possibilities so keep in touch with the track coordinator. Possibly other staff members of our Chair, e.g. the teacher of that interesting course you followed, also have attractive possibilities.

Research possibilities

Currently, the following research projects are ongoing within our Chair. An assignment for one of these project is a possibilities for your thesis assignment.

Management of product development

The quality of product development relies on a thorough understanding and mastery of the processes and information playing a role. For instance the relations between design methods and methodologies, knowledge and information management, life-cycle engineering and design(er) support are defining. From different application areas (like decentral/networked manufacturing, virtual reality, knowledge-based design and packaging development) this research focuses on generic methods to improve product development processes.