UNIVERSITY OF TWENTE.

INDUSTRIAL DESIGN ENGINEERING

INDUSTRIEEL ONTWERPEN

BSC PROGRAMME

MSC PROGRAMME

CRITICAL REFLECTION

2013

Critical Reflection

Industrieel Ontwerpen | Bachelor's programme

Industrial Design Engineering | Master's programme

UNIVERSITY OF TWENTE.

Colophon

Text:	Thonie van den Boomgaard, Eric Lutters, Hiske Schuurman-Hemmer
Contributions and layout:	Berte van de Weerd, Eric Lutters, Hiske Schuurman-Hemmer, Monique Parfitt, Nathalie Bekkering, Winnie Dankers
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Preface

The Bachelor's programme in Industrial Design Engineering started in September 2001 only four months after permission from the Dutch government in April 2001. This quick response is a clear indication of the entrepreneurship of the University of Twente and the enthusiastic and creative atmosphere in which the staff members of the Faculty of Engineering Technology were operating. The first student completed the study in July 2004. The Master's programme in Industrial Design Engineering started in September 2003 and the first Master's student graduated in May 2005.

Today this entrepreneurial, creative and enthusiastic atmosphere is still present. It is therefore our pleasure to present the results of the critical reflection of the Bachelor's and Master's programmes in Industrial Design Engineering, in order to obtain re-accreditation by the Accreditation Organisation of the Netherlands and Flanders. Successfully completed, these programmes provide students with the degree of Bachelor of Science (BSc.) or Master of Science (MSc.).

This report was written on behalf of the programme by dr.ir. A. van den Boomgaard MBA, programme director; dr.ir. D. Lutters, associate professor and ir. H.M. Schuurman – Hemmer, study advisor, with contributions by ir. M.J.B. Duyvestijn (quality assurance), drs. E.M. Gommer (faculty educational adviser), ir. I.F. Lutters – Weustink (secretary Examination Committee), E.D. Oosterzee – Notenboom (Bachelor graduates), A.M. Klijnstra (administration) and L. de Vos BSc. (alumni).

A draft version of the report was submitted to the Disciplinary Council, Examination Board, Educational Committee and all professors and staff members. The report was revised according to their comments, after which the Faculty Board approved the text of the report. Subsequently the Board of the University of Twente approved the text as well and it was submitted to the QANU.

The teaching and support staff as well the students who were involved are hereby acknowledged for their comments and contributions to this report.

On behalf of the entire team,

» Prof.dr. F. Eising
  Dean of the Faculty of Engineering Technology (till 1 September 2013)
» Prof.dr. G.P.M.R. Dewulf
  Dean of the Faculty of Engineering Technology (from 1 September 2013)
» Dr.ir. A. van den Boomgaard MBA
  Programme Director Industrial Design Engineering

September 2013

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Graduation project (MSc.; Design & Styling)

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Appendices

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Z Academic results of the BSc and MSc graduates in technical or scientific journals

AA IDE Publication on education

BB Strategy of the Faculty of Engineering Technology

Teamwork in the study-landscape

Tutoring in the study-landscape

1. Introduction

The programmes in Industrial Design Engineering teach students to think and work at the academic level. Graduates are able to design new products and processes. These products should be considered from a broad perspective, including tangible products as well as product related services and systems. The programmes deal with the fundamentals of Industrial Design Engineering and emphasise applying that knowledge to general solutions or ways of working. The programmes also encourage and foster the students' ability to learn. The main focus of the programmes is the integration of knowledge from various domains.

In 2007 the programmes were accredited for the first time. As a result of the self evaluation process in 2007 a revision of the Bachelor's programme was introduced in September 2008.

So far, this has resulted in more than 400 Bachelor (in the original and revised programme) and nearly 300 Master graduations.

1.1 Further developments

In September 2012 the "BSA" (binding recommendation to continue or leave the programme) was introduced, in order to increase the overall performance of the Bachelor's programme.

In 2012 the Board of the University of Twente decided to implement an educational reform called TOM (Dutch abbreviation for Twents Onderwijsmodel) starting in September 2013. This University wide reform recognises that the style of learning and the way in which students deal with information today is totally different from that of earlier generations. The objective of this new programme is to provide a future-proof education and educational organisation.

1.2 Previous accreditation

The following steps have been taken since the previous accreditation in 2007; the comments of the Assessment Committee 2007[1] are included between brackets:

- The student-counselling system has been strengthened with the appointment of a study advisor in September 2008;
  ("... students do not keep up with the programme ...", page 31)
- The Bachelor's programme has been revised, starting in September 2008, with the following characteristics:
  - Strengthening of project led education in the curriculum;
  - Strengthening of design courses;
  - Creating individual projects for each study year;
  - Making the learning objectives of the different courses explicit;
  - Bringing the Bachelor's programme in line with the quarter structure to enable exchanging courses with other Bachelor's programmes;

  ("... uneven distribution of technically oriented and design oriented courses ...", page 30)
- Co-operation with the newly started Bachelor's programme in Creative Technology (started in September 2009);

1 *Rotte, A.C. "Assessment of Degree Courses Industrial Design Engineering", Quanu Utrecht, December 2007*

Bachelor’s student presenting his work at the graduation ceremony

(“… provided the potential synergy between the different programmes and the link with Eletronic and Computer Sciences is recognised …”, page 26)

- Evaluation, adjustment and improvement of the (formulation of) learning goals for all courses, based on the final qualifications of the Bachelor’s and Master’s programmes;
- Formulation of test plans for all courses (to assure the transparency, validity and reliability of course assessments), based on the final qualifications of the Bachelor’s and Master’s programme and the learning objectives of all courses;
- Improving the teaching quality of staff members by having them obtain a University Teaching Qualification;
- Expansion and professionalisation of the student-counselling system by implementing a study advisory team starting August 2011;
  (“… students do not keep up with the programme …”, page 31)
- Improving the quality control system with clear and formalised responsibilities for all persons and committees involved;
  (“… Bachelor’s evaluation is repeated and executed in full and its effectiveness is proven …”, page 37)
- Introduction of quarterly panel evaluations, leading to a more systematic monitoring of the quality of teaching and learning environment;
  (“… Bachelor’s evaluation is repeated and executed in full and its effectiveness is proven …”, page 37)
- Expansion of the Examination Board with two members to anticipate new regulations and work to be done, as well as to establish a more strategic perspective;
- Revision of procedures and workflow for the admission to the pre-Master’s programme, resulting in a more structured and transparent approach;
- Monitoring and assessment of the results of individual pre-Master students by the Examination Board;
- Revision of the admission procedure for international students and students with a non-standard application, resulting in a more structured and transparent approach.

1.3 Institutional quality assurance assessment

The University of Twente has applied for the institutional quality assurance assessment by the NVAO, which will take place in November 2013. Therefore no information can be included in this report.

1.4 Review period

The review period of the present critical reflection ran from 1 September 2006 until 1 September 2012.

Technology and atmosphere behind the work of the designer: the Virtual Reality Lab

1.5 Outline

This report contains the integrated critical reflection of two degree programmes.

As Dutch law prescribes the standards of quality that are to be considered in the reflection of the Bachelor's and Master's programmes, these standards will be used for the structure of this report.

The report consists of five parts. Part 1 contains general information.

Parts 2, 3 and 4 follow the standards set by the NVAO. In each of these three parts, attention is paid to the two degree programmes. Part 2 deals with intended learning outcomes. Part 3 describes the teaching-learning environment, and Part 4 presents the assessment and achieved learning outcomes.

The appendices (Part 5) contain the required documents; some of the information is presented in printed form, some in electronic form. For privacy reasons some information will only be made available to those who are authorised to this end.

CROHO	56955
Name	Industrieel Ontwerpen
Orientation	Academic
Level	Bachelor
Load	180 EC
Variant	Full-time
Degree	Bachelor of Science
Expiry date of accreditation	31 December 2014

The Bachelor's programme

CROHO	66955
Name	Industrial Design Engineering
Orientation	Academic
Level	Master
Load	120 EC
Variant	Full-time
Degree	Master of Science
Expiry date of accreditation	31 December 2014

The Master's programme

2. Data of the IDE programmes

2.1 Administrative data

Institution:
» University of Twente

Location:
» Enschede, the Netherlands

Type of Institution:
» 'bekostigd'

Re-accreditation status institution:
» Planned for November 2013

Tracks within the Master's Programme IDE:
» Design and Styling;
» Emerging Technology Design;
» Management of Product Development;
» Architectural Building Components Design Engineering;
» Cradle to Cradle.

Previous on-site review:
» 8 and 9 May 2007

Date decision NVAO:
» 28 July 2009 (NVAO/20095958/LL)

Contact person:
» Dr.ir. A. van den Boomgaard MBA (Programme Director)
phone: +31-53-489 4756
e-mail: a.vandenboomgaard@utwente.nl

Administrative contact:
» Ms. A.M. Klijnstra
phone: +31-53-489 5607
e-mail: a.m.klijnstra@utwente.nl

Faculty Dean
» Prof.dr. G.P.M.R. Dewulf

Internet:
» http://www.utwente.nl/io/
» http://www.utwente.nl/ide/

Address:
» University of Twente
Industrial Design Engineering
Faculty of Engineering Technology
P.O. Box 217
7500 AE Enschede
The Netherlands

The campus of the University of Twente; in the foreground the Horst building that hosts the Faculty of Engineering Technology

2.2 The Faculty of Engineering Technology

2.2.1 General overview

The profile of Industrial Design Engineering at the University of Twente corresponds with the 'High Tech Human Touch' profile of the UT. Both the Bachelor's programme and the Master's programme focus on the integration of technical aspects and societal context.

» The three-year Bachelor's programme in Industrieel Ontwerpen (Industrial Design Engineering) consists of a combination of basic courses (18%), design courses (14%), engineering courses (14%) and social science courses (13%). Noteworthy within the Bachelor's programme are the design projects (30%). In close alignment with the courses, such projects contextualise the courses, while also ensuring the integration, application and deepening of the acquired knowledge. In the third year, the Bachelor's programme is brought to a conclusion with the minor (individual programme for every student, 11%) and the individual Bachelor's assignment (roughly one third of the design project time).

The annual enrolment of high school graduates into the Bachelor's programme has been -on average - 85 students, with a slow but steady increase over the years. About a quarter of these students drop out, mainly in the first year. After finishing their Bachelor's programme, nearly 85% continue in a Master's programme; the majority of these (90%) enrol in the UT Master's programme Industrial Design Engineering.

The two-year Master's programme offers five so-called tracks: Design & Styling (D&S), Emerging Technology Design (ETD), Management of Product Development (MPD), Architectural Building Components Design Engineering (ABCDE) and Cradle to Cradle (CTC). The latter two are relatively new and attract a minor sub-set of the inflow. The different tracks have considerable synergy in their courses, while offering the students ample room for personal specialisation.

Together these five tracks have an inflow of 60 students (nearly entirely from the Bachelor's programme Industrieel Ontwerpen at the UT).

The dispersion of the students over the tracks is about 40% D&S, 25% MPD, 25% ETD, 8% ABCDE and 2% CTC.

After graduating from the Master's programme, the average student finds a job in about 3 to 4 months[1]. The majority of the students find a job within the field of Industrial Design Engineering in organisations such as engineering firms or public organisations. A small number of graduates starts their own business; an even smaller number opts for a scientific career and start a PhD at the UT or at another university.

2.2.2 Organisational setting

2.2.2.1 History

The University of Twente was founded in 1961. Starting as a University of technology, the third in The Netherlands after Delft and Eindhoven, the University broadened its scope and profiled itself more and more as an entrepreneurial University with a pronounced profile in interdisciplinary

1 *Monitor 2011 (internal communication: http://www.utwente.nl/fez/ir/onderwijs/onderwijs_gerelateerde_onderzoeken/)*

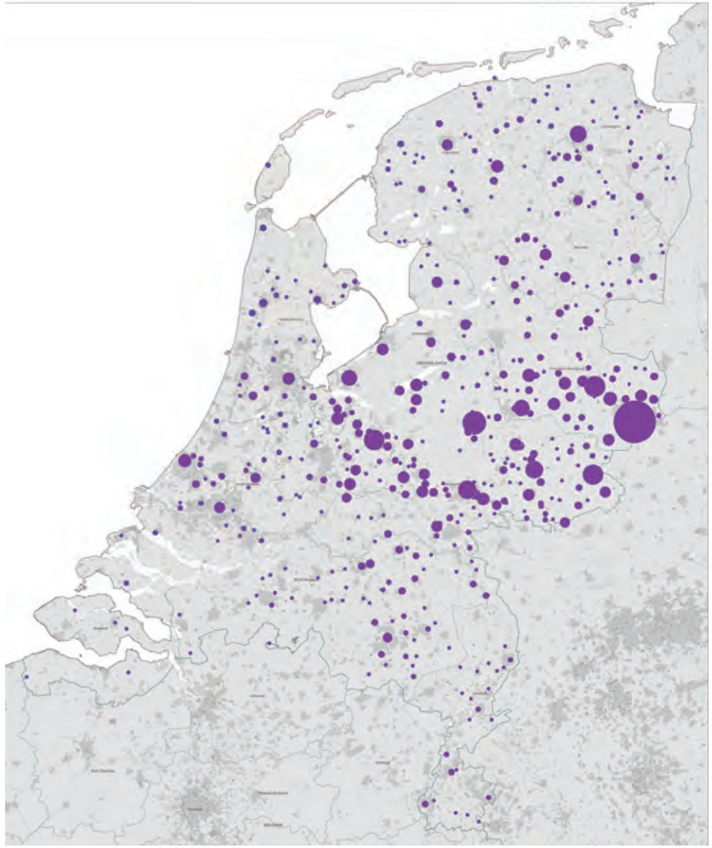


Figure 2.1 Original residence of the Bachelor's students

research and education[2]. In education, the current focus is on the triad 'Research, Design and Organisation'[3].

In the year 2000, the Bachelor-Master structure was introduced at the University. At the same time, the Faculty of Mechanical Engineering was transformed into the Faculty of Engineering Technology and a new five-year educational programme in Industrial Design Engineering was initiated, which was accredited in 2001. This faculty hosts the engineering sciences; its trademark is the interdisciplinary approach to engineering problems in research and education. In this newly formed faculty, the Bachelor's programmes in Civil Engineering and Mechanical Engineering were clustered with the Bachelor's programme in Industrial Design Engineering. Additionally, the Faculty of Engineering Technology accommodates five Master's programmes, one of them being Industrial Design Engineering.

2.2.2.2 Mission Faculty Engineering Technology

The mission of the faculty is: to provide high-quality academic education and research in the field of engineering technology, with a particular focus on interdisciplinarity and on development of specific competences in addition to only technical knowledge. As such, this mission aligns with the High Tech Human Touch profile of the University of Twente.

2 *Figure 2.1 gives an overview of all students that started the IO Bachelor's programme in relation to their home addresses.*

3 *http://www.utwente.nl/sb/en/policy/international/090507_Strategische_%20visie_%202009-2014_%20ENG.pdf*

2.3 Organisational structure IDE

The University of Twente has six faculties. Next to the Faculty of Engineering Technology (as described in section 2.2), the other faculties are:

» TNW - Science and Technology;
» EWI - Electrical Engineering, Mathematics and Computer Science;
» MB - Management and Governance;
» GW - Behavioural Science;
» ITC - International Institute for Geo-Information Science and Earth Observation.

The Bachelor's and Master's programmes Industrial Design Engineering are carried by the following four co-operating chairs (referred to as the 'cluster of Industrial Design Engineering') in the Faculty of Engineering Technology[4]:

» Design Engineering (Prof.dr.ir. F.J.A.M. van Houten);
» Product Design (Prof.dr.ir. A.O. Eger);
» Product Market Relations (vacancy);
» Packaging Design and Management (Prof.dr.ir. R. ten Klooster).

Next to the efforts of these primary contributors, many other chairs in the faculty contribute to both the Bachelor's and the Master's programme:

» Surface Technology and Tribology (Prof.dr.ir. D.J. Schipper);
» Skin Tribology (Prof.dr.ir. E. van der Heide);
» Production Technology (Prof.dr.ir. R. Akkerman);
» Applied Mechanics (Prof.dr.ir. A. de Boer);

4 *The situation at the University of Twente is unique compared to the other two universities of technology in Delft and Eindhoven in the sense that three educational (and research) programmes are embedded in one Faculty of Engineering Technology*

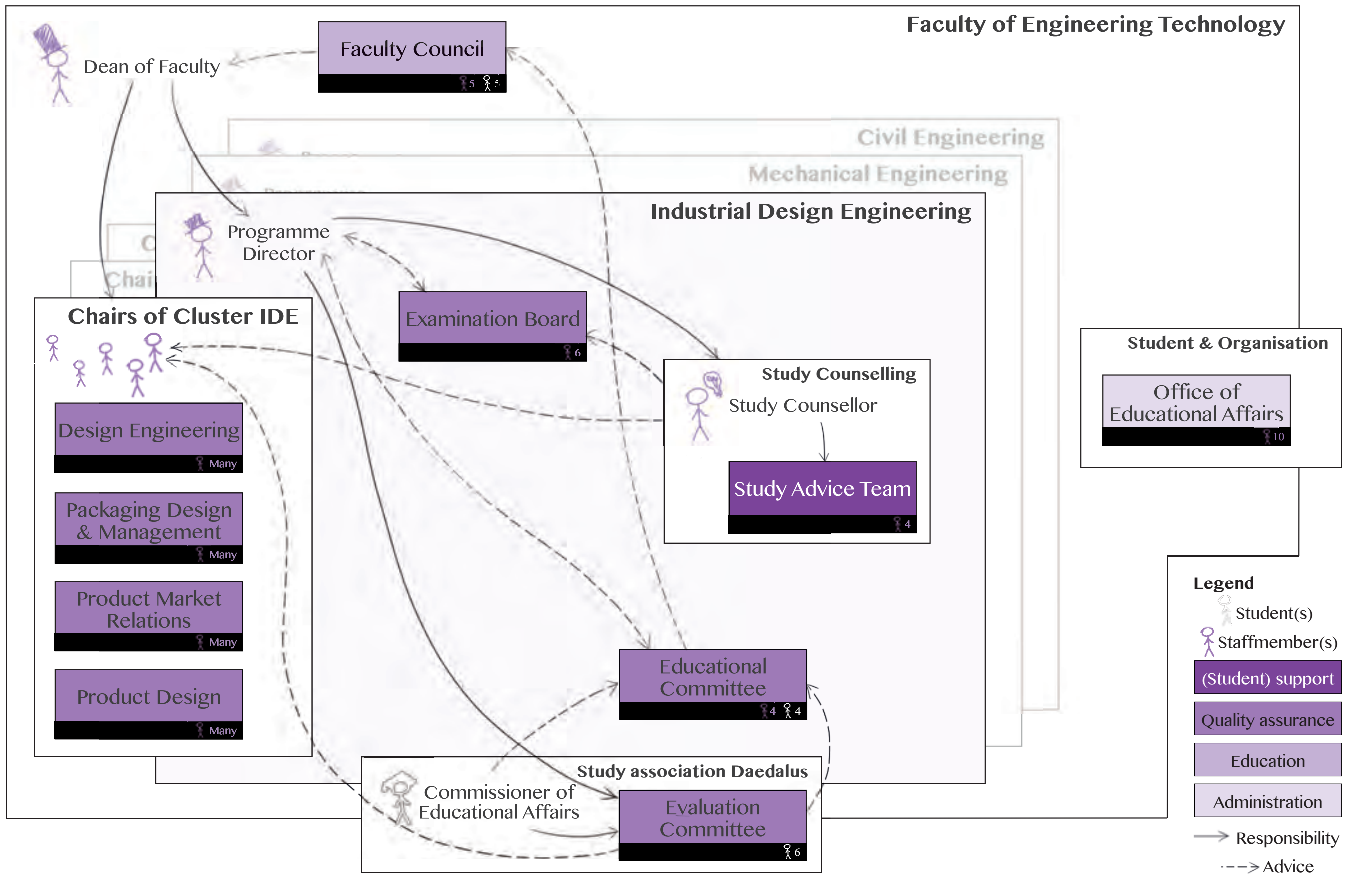


Figure 2.2 Organisational structure

- Maintenance Engineering (Prof.dr.ir. L.A.M. van Dongen);
- Biomechanical Engineering (Prof.dr.ir. H.F.J.M. Koopman);
- Design of Biomedical Products (Prof.dr.ir. G.J. Verkerke);
- Thermal Engineering (Prof.dr.ir. T.H. van der Meer);
- Market Dynamics (Prof.dr.ir. A.G. Dorée);
- Design, Engineering and Innovation Management (Prof.dr.ir. J.I.M. Halman).

Despite the active participation of many groups, the number of co-operating chairs available for IDE is still rather limited. Therefore, the faculty strives to extend the tenured staff to obtain a better balance between teaching and research.

The IDE programmes are embedded in the Faculty of Engineering Technology, which houses three clusters. Next to the cluster of Industrial Design Engineering, there is a cluster for Civil Engineering and one for Mechanical Engineering. See figure 2.2 for an overview of the organisation.

The faculty employs four programme directors (one for the Bachelor's and Master's programmes in IDE).

The Management Team (MT) of the faculty comprises the dean, one of the programme directors, the director of business operations, two representatives from clusters and the secretary. The management team meets once every two weeks.

The chairholders involved in the educational and research programmes of one cluster together with the dean and the programme director constitute the Disciplinary Council of the cluster. The Disciplinary Council of Industrial Design Engineering meets monthly and discusses educational and research matters.

The three disciplinary councils and the management team meet monthly in the Chamber of Professors to discuss strategic and organisational issues. All full professors and programme directors of the faculty are members of the chamber.

The Faculty Council is the highest advisory body in the faculty; the dean requires the approval of the faculty council for strategic and budget matters. It consists of staff members and students of all the faculty's programmes. The members are elected by the staff, respectively by the students. The faculty has regular meetings twice a month and meets with (representatives) of the management team once a month.

For both the Bachelor's programme as the Master's programme, a combined Educational Committee and an Examination Board is instituted according to Dutch legislation[5].

Two staff members and three professors constitute the Examination Board for Industrial Design Engineering, which is chaired by one of the full professors. The examination board safeguards the proper execution of performance assessments in accordance with the regulations. The frequency of the regular meetings has been increased to four times a year. The daily activities have been delegated to the secretary of the board.

The educational committee is the primary advisory body for education. A substantial change of the programmes requires positive recommendations

5 *Higher Education and Research Act (in Dutch Wet op het Hoger onderwijs en Wetenschappelijk onderzoek, abbreviated WHW), Paragraph 11.11 (in short: WHW §11.11)*

The Board of S.G. Daedalus (2013-2014)

from this legal body. A programme director may ignore this advice, but only if the decision is well argued and documented.

The educational committee consists of four students and four staff members and meets eight times a year. The staff members represent the different disciplines of Industrial Design Engineering.

The programme director and the education commissioner of the Industrial Design Engineering study association 'Daedalus' are advisors of the educational committee, without voting rights.

Members of the educational committee and examination board are appointed by the dean.

The Evaluation Committee consists of Bachelor's and Master's students, appointed by the programme director. This committee evaluates all courses in both programmes on behalf of the programme director.

The study association (Daedalus) represents the interest of students in the field of Industrial Design Engineering and organises a wide range of activities such as field trips, lunch lectures, international trips, symposia and various leisure activities. It sells books and drawing materials to student members at a reduced price. One of the association's important tasks is monitoring the quality and content of the programme(s). The association addresses complaints from individual students or groups of students to the programme management.

The organisation and quality assurance of both IDE programmes are responsibilities of the programme director. The programme director is supported by a study counsellor, a faculty educational advisor and an international exchange coordinator. The administration of the programmes rests with the Office of Educational Affairs (BOZ-S&O).

Fernand de Wolf, PenWeld

Graduation project (BSc.)

Nina Tuinte, FairTrade

Graduation project (MSc.; Management of Product Development)

3. Intended learning outcomes of the IDE programmes (Standard 1)

The final qualifications of the Bachelor's and Master's programmes match the desired profiles of IDE graduates.

3.1 Objectives of the IDE programmes

In line with the mission of the Faculty of Engineering Technology, the IDE programmes'[1] aim to educate academic professionals that are capable of addressing multi-disciplinary design challenges and tasks in the societal context, while continuously integrating acquired learning and know-how with unremitting attention for extending both the professional's practical experience and theoretical and methodological abilities.

3.1.1 Bachelor's programme

The Industrial Design Engineering ("Industrieel Ontwerpen", IO) programme aims to provide academic knowledge, understanding and skills in the domain of Industrial Design Engineering at a level that qualifies the graduate for:

1. Independent professional practice at the Bachelor level in the field of Industrial Design Engineering;
2. Enrolment in educational programmes at the Master level in the field of Industrial Design Engineering.

3.1.2 Master's programme

The IDE programme aims to provide academic knowledge, understanding and skills in the domain of Industrial Design Engineering at a level that qualifies the graduate for:

1. Independent professional practice at the master level in the field of Industrial Design Engineering;
2. Research in the field of Industrial Design Engineering;
3. Enrolment in PhD programmes in the field of Industrial Design Engineering;
4. Enrolment in post-Master's design programmes (PDEng programmes) in the field of Industrial Design Engineering.

3.2 Domain-specific reference framework

The goals of the programmes are too abstract to assess the knowledge, skills and attitudes that students must have acquired after completing the Bachelor's or Master's programme. Therefore, the goals are captured in the final qualifications, which are derived from the domain-specific reference framework. This framework has jointly been established by the three Dutch universities of technology, initially in 2006. In 2012, this domain-specific reference framework was reassessed; with some minor revisions, the three universities confirmed[2] its validity and applicability. One of the specific

1 *Appendix K*

2 *Meeting at TU Eindhoven, December 6, 2012*

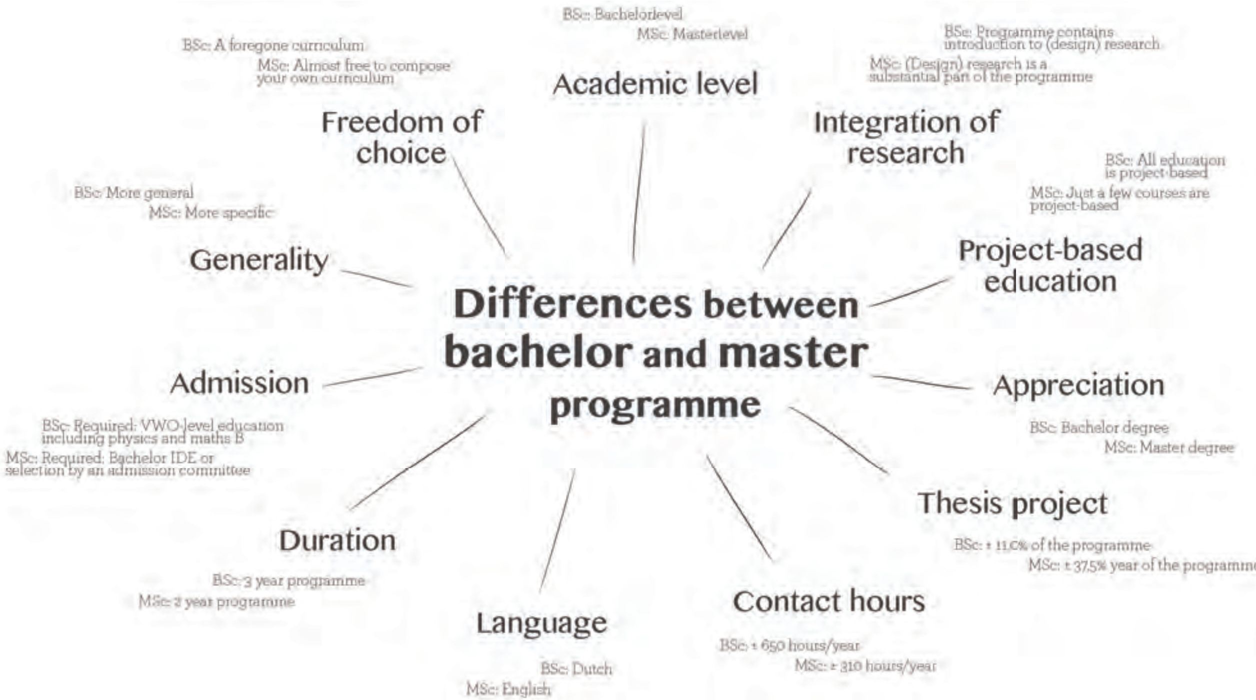


Figure 3.1 Differences in Bachelor's and Master's programmes

touchstones in evaluating the framework is the alignment with relevant Industrial Design Engineering programmes worldwide.[3]

The domain-specific reference framework describes the profile of the IDE graduates, together with the domains of knowledge and skills that are relevant for the IDE curriculum. It also depicts the labour market perspective for IDE graduates. Moreover, it specifies the differences between a Bachelor's and a Master's graduate. The integral text of the domain-specific reference framework is given in Appendix A.

3.3 Final qualifications of the IDE programmes

The three Dutch universities of technology have developed criteria for Bachelor's and Master's programmes, the so called ACQA (Academic Competences and Quality Assurance)[4]. These criteria have an academic orientation and are based on the Dublin Descriptors[5].

The final qualifications of the IDE programmes, defined according to ACQA, are phrased in terms of competence descriptors, which are a combination of knowledge, skills and attitude. These final qualifications are formulated in the Student Charter[6], as follows:

1. Designing:
   A graduate can realise new or modified artefacts, products or systems, with the aim of creating value in accordance with predefined needs and requirements.
2. IDE-relevant disciplines:
   A graduate is familiar with contemporary knowledge and has the ability to increase and develop this through study.
3. Research:
   A graduate is able to acquire new scientific knowledge through research. In this respect, research entails the development of new knowledge and insight according to purposeful and systematic methods.
4. Scientific approach:
   A graduate has a systematic approach characterised by the development and use of theories, models and coherent interpretations, has a critical attitude and has insight into the nature of science and technology.
5. Intellectual skills:
   A graduate is able to adequately reason, reflect and form a judgment. These abilities are acquired or refined within the context of a discipline, and then become generically applicable.
6. Co-operating and communicating:
   A graduate is able to work with and for others. This not only requires adequate interaction and a sense of responsibility and leadership, but also the ability to communicate effectively with colleagues, clients, (end) users, suppliers, experts and laymen. All graduates are also able to participate in scientific or public debates.

3 *'International Benchmark in IDE', S.R.C. Romph, TU Delft, part 1 2005 and part 2 2006*
4 *Meijers, A.W.M., Overveld, C.W.A.M. van, and Perrenet, J.C.; '-Criteria for Academic Bachelor's and Master's Curricula, TU Eindhoven 2005 (http://alexandria.tue.nl/repository/books/570523E.pdf)*
5 *http://www.nvao.net/page/downloads/Dublin_Descriptoren.pdf*
6 *Appendix K*

The IDE graduate ...

is competent in designing	The bachelor graduate is able to apply knowledge in standard situations, to tackle complex problems; the master graduate is able to apply knowledge in new, non-standard situations, to tackle more complex and ill structured problems
is competent in the IDE-relevant disciplines	The bachelor graduate is recognised as a junior generalist; the master graduate is recognised as a specialist in one of the sub-disciplines of the domain
is competent in research	The research of a bachelor graduate is marked out within the problem context (leading to the demands or needs), while a master graduate is able to acquire new scientific knowledge and contribute to the body of knowledge of the discipline
has a scientific approach	The master graduate is mature in choosing and applying a scientific approach and to validate the method chosen
has basic intellectual skills	The IDE programmes emphasise the development of self-reflection as the prime competence for individual development and life-long learning; this process starts immediately after starting the bachelor programme, and never ends
is competent in co-operating and communicating	The difference between bachelor and master graduates relates to handling complexity of a situation; a master graduate can contribute more to, and is more confident in participating in a scientific debate
takes account of temporal, social and personal context	The bachelor graduate develops a general style; a master graduate develops his own style, in which contextual aspects are integrated in a consistent manner

Figure 3.2 Differences in Bachelor's and Master's programme outcomes

7. Addressing temporal, social and personal contexts:
Science and technology are not isolated, and always have temporal, social and personal contexts. Beliefs and methods have their origins; decisions have social consequences in time. A University IDE graduate is aware of this, and has the competence to integrate these insights into his or her scientific work.

3.3.1 Differences between Bachelor's and Master's graduates

The difference between Bachelor's and Master's graduates can be defined in terms of orientation and level. Figures 3.1 and 3.2 illustrate the differences between the final qualifications of Bachelor's and Master's graduates in relation to the final qualifications.

3.3.2 Evidence of the level of the final qualifications

To ensure that the final qualifications of the programmes are in line with the expectations and requirements of the professional field, the following actions have been taken:

» Review of academic results of the BSc and MSc graduates in technical and scientific journals[7];
» Survey of the external coaches of thesis projects[8];
» Panel discussions with alumni[9] based on the outcomes of the WO – monitor 2011;
» Unremittingly observing and monitoring the industrial (and academic) networks that are accessible via the members of the discipline council and the associate and assistant professors.

Inspired by the expectations and requirements of the professional fields, the surveys and consultations aim to determine the achieved quality level of the graduates. Based on the various types of input, the expectation that the final qualifications of the BSc and MSc programme do indeed satisfy the desired profile of IDE graduates is justified.

7 *Appendix Z*
8 *Appendix Q*
9 *Appendix P*

Students presenting their coffee machine design (project K)

Students visiting design agency during study tour

4. Strengths and weaknesses of intended learning outcomes of the IDE programmes

4.1 Strengths

- The programmes are well balanced;
  The final qualifications of the IDE programmes reflect a good balance between the scientific basis, skills, and design and problem solving abilities.
- The programmes are innovative both in terms of didactics and content;
  The programme goals match the mission of the Faculty Engineering Technology and take the lead in new developments. The programme goals constitute a good balance between design and engineering qualifications, which fits well within the 'High Tech Human Touch' profile of the University of Twente.
- The Master's programme is research-oriented;
  Within the Master's programme, a student can focus on a particular discipline and can follow a tailor-made programme.
- The Master's programme adequately prepares students for the professional field;
  Master's graduates find jobs easily. Many thesis projects result in products that actually make it to the market.
- Graduates are able to act in academic and professional environments;
  Students are exposed to multiple viewpoints, interests and stakes that play a role in projects and organisations.

4.2 Weaknesses

- It is difficult to maintain the multidisciplinary character;
  It is a considerable challenge to find a good balance between the broad, multidisciplinary character of the IDE programmes and the academic and professional goals in the programmes of individual students.
- The internal communication can be improved;
  The strength of the programmes and the possibilities available to students within the programmes are badly communicated to students.

4.3 Opportunities

- The Bachelor's programme prepares students for the professional field;
  The objectives of the Bachelor's programme do not explicitly cover the students' disposition towards careers in professional environments. However, the number of Bachelor's students that is offered a position (often as a result of their final Bachelor's assignment) is an implicit acknowledgement of the adequate preparation of the students for a professional career.

4.4 Threats

- The Master's programme can be too fragmented;
  The goals of the Master's programme in IDE address a large variety of aspects, related to different disciplines. Students can either gain more in-depth knowledge on a sub-set of those disciplines or on a particular

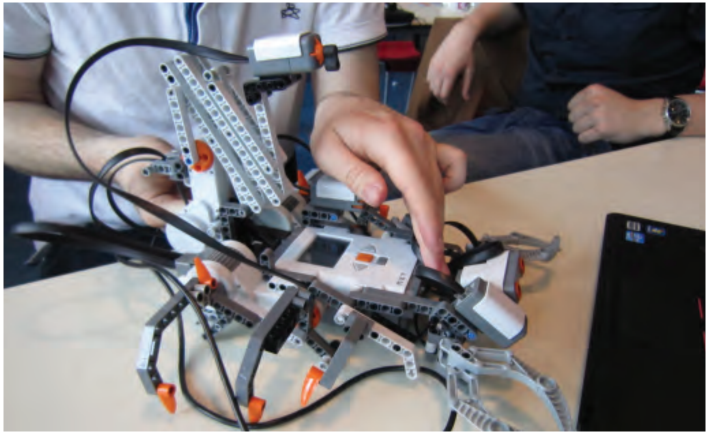
Virtual tools for making a collage

Prototype in the making

cross-disciplinary aspect. Individual students definitely see this as a benefit of the programme. However, it also entails variations in the appraisal of the width and depth of individual programmes; it therefore leads to appreciable variations in the specific interests and aptitudes of graduates.

» Maintaining a balanced combination of academic and professional goals can be difficult;
The IDE programmes have both academic and professional goals. In some cases, however, it is difficult to combine these goals, and they may even conflict. For example, the industry prefers a hands-on problem-solving approach that results in tools, guidelines and checklists. From a scientific perspective, it is preferable to focus on discovering new knowledge and publishing in internationally renowned academic journals. In some cases (e.g. the Master's thesis project), these two viewpoints produce differences with regard to the products that students are expected to deliver. Ultimate goal for each Master's thesis project is to describe scientific or generic aspects, and not only solve a practical problem.

Students working on a Lego model



Testing the programmed Lego model

5. Teaching and learning environment: Bachelor's programme

The contents and structure of the Bachelor's curriculum IDE enables the enrolled students to achieve the intended learning outcomes. The educational quality of the teaching staff is above the target as set by the University. The programme-specific facilities are adjusted to the educational concept (PLE). Curriculum, staff, services and facilities constitute a coherent teaching-learning environment for the students.

5.1 Programme structure

The Bachelor's programme provides students with basic knowledge and skills and a broad view of the field of industrial design engineering. As reflected in the mission and intended learning outcomes (Chapter 3), industrial design engineering is a strongly interdisciplinary domain. This forms the basis for the interdisciplinary setup of the Bachelor's programme and led to the final qualifications for the programme. These qualifications have been translated into a set of coherent courses with individual objectives and learning outcomes. Information about the courses, and objectives and learning outcomes, can be found in the information systems[1] that are established in line with proposals by the examination board.

1 *Appendices J and Y*

The Bachelor's programme is structured around four disciplines: basics, styling, humanities & business and engineering. Knowledge is built up in theory courses; assignments and projects aim at deepening, implementing, familiarising and generalising that knowledge. These projects implicitly and explicitly train professional skills. To ensure that the students can justify and underpin their results and reasoning, the projects also directly contribute to the academic goals of the programme. To provide students with the underlying practical skills that allow them to execute projects at the adequate levels of abstraction, creativity and integration, projects usually link up with workshops, laboratory practicals, computer courses and dedicated lectures. Moreover, students are challenged to acquire technical and practical skills in extracurricular activities, like workshops provided by student association 'Daedalus'.

5.2 Educational concept

In the Bachelor's programme, the leading educational approach is project-led education. This forms a good preparation for the multidisciplinarity of the professional practice. Relevant characteristics of project-led education are the following:

- A substantial part of the programme is devoted to real-life design engineering projects. The complexity of the project assignments increases during the programme.
- Projects are underpinned and supported by dedicated lectures and workshops. Projects aim at the integration of professional and communication skills within the various disciplines.

Students co-oporating in a lecture room

Study materials

- A group project assignment is executed by a group of four to sixteen students, depending on the educational aim of the project. Every course year contains at least one individual project and several individual assignments.
- A group project is formulated in such a way that team members can only adequately complete the project if they co-operate effectively. Therefore, team members have different tasks and responsibilities. This implies that each team member needs to have access to the results of all group members to achieve personal aims, but also to be able to help complete the group project assignment. In the various projects, students are encouraged to change roles (in the groups' organisation) in order to become acquainted with all aspects of project work.
- Project groups are supervised by a staff member (tutor), who provides feedback on the progress of the team. A tutor is not an expert in all subjects – by definition. The tutor will refer a project group to experts in the staff when needed. Generally, the tutor of a group also participates in the assessment of the project.
- Within a quarter, project-supporting courses are preferably offered 'just in time' (at the moment the students need the theoretical input). The aim in planning the courses is to ensure that the theoretical input can instantaneously be employed in the project; by putting the shoulder to the wheel, the students can easily familiarise themselves with the knowledge.
- Theory and skills that are not directly applicable are organised in parallel to the project work (e.g. the consecutive development of mathematical competences).
- Students are admitted to a project team, if they have demonstrated adequate study progress. Moreover, students are not allowed to execute two project assignments at the same time.

In this educational concept, students start designing from the first day onwards. They experience the need for theory and skills, and learn how to acquire them. Students are introduced to, and guided in, coping with ill-defined problems or situations, to the peculiarities of group interactions and to presenting (intermediary) products to different audiences.

In the first and second year, the project-led education concept is embedded in the multifunctional learning and working environment. This implies that students have unrestricted access to a shared workspace, with wireless access to the network. In this environment, the vast majority of all learning activities can take place.

The project-led education is well documented; references (including from our own staff members) are given in Appendix AA.

5.3 Programme content

The Bachelor's programme consists of three study years. An academic year is divided in four quarters of ten weeks each. In line with the European Credit Transfer and Accumulation System (ECTS), the study load for a quarter is 15 EC (= 420 hours), adding up to 60 EC per year, and to 180 EC for the entire Bachelor's programme. To enable the adequate embedding of the concluding individual Bachelor's project, the final semester of the programme is split into a block of 10 EC (3rd quarter) and a block of 20 EC (4th quarter). Appendix B contains a diagram giving an overview of the Bachelor's programme. The programme is full-time, for all enrolled students.

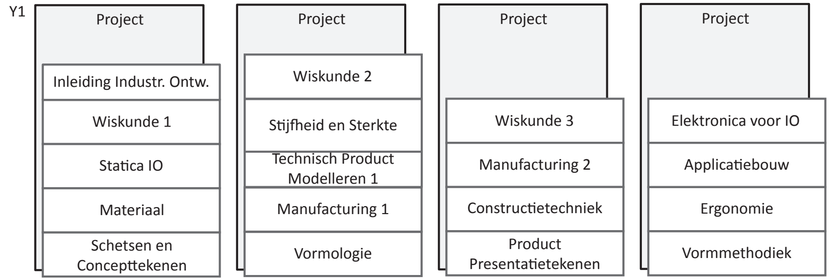


Figure 5.1 Overview of the first year programme

		Design	Engineering	Basics	Humanities and Business	Projects	Minor
B1-1	Wiskunde 1			o			
	Schetsen en Concepttekenen	o					
	Materiaal		o				
	Inleiding Industrieel Ontwerpen				o		
	Statica IO			o			
	KOP Project					o	
B1-2	Wiskunde 2			o			
	Stijfheid en Sterkte			o			
	Manufacturing 1		o				
	Technisch Product Modelleren 1		o				
	Vormologie	o					
	Project IDEE					o	
B1-3	Wiskunde 3			o			
	Constructietechniek		o				
	Manufacturing 2		o				
	Product Presentatietekenen	o					
	Project Productrealisatie					o	
B1-4	Elektronica voor IO			o			
	Ergonomie				o		
	Vormmethodiek	o					
	Applicatiebouw			o			
	Project Smart Products					o	

Figure 5.2 Overview of the different learning themes in the first year programme

To explicate the different cores of the Bachelor's programme, four disciplinary learning themes are defined; each of them combines disciplinary knowledge and skills, while continuously being visible over the three years of the programme. These themes are the following:

» Styling (sketching, designing,...);
» Engineering (manufacturing, material sciences, ...);
» Humanities and business (ergonomics, human factors, marketing, ...);
» Basics (mathematics, mechanics, electronics, ...).

A fifth – implicit and non-disciplinary - theme aims at integrating the disciplinary themes by means of project work and assignments.

From a broad perspective, the first year of the programme offers both orientation and selection. This allows students to experience whether they fit into the programme, and to find out whether they can meet the required level of abstraction. Students are informed about their progress, and they are explicitly confronted with their success rate and the likelihood of successfully completing the studies.

The second year offers a broadening and contextualisation of the content; the third year combines deepening of understanding and insight in the core disciplines as well as a widening in addition to these disciplines (the 'minor' part of the programme).

The language of the programme is Dutch, although many textbooks and other study materials are written in English. We train students in English, e.g. as preparation for the Master's programme, by offering some of the Bachelor's courses in English. Also, the students have to deliver (parts of) some assignments in English. In the third year of the programme, students receive explicit feedback on their communication skills in the English language.

The following sections discuss the content of the individual years.

5.3.1 First year (B1)

The first year provides the student with an orientation of the field of industrial design engineering and the programme as a whole (figure 5.1).

The theme of the first quarter is 'overview'; it starts with a small design problem ('klein ontwerpprobleem'). In this project, every phase of the design process is briefly touched upon, from idea and manufacturing to testing. In this way, students become acquainted with the profession of industrial design engineering. In teams, students design and produce a product like a barbecue, umbrella stand, coat hooks, a small stove for backpackers or a laptop stand.

All educational lines start in this quarter (sketching, mathematics 1, statics, material science and introduction to industrial design engineering; see figure 5.2).

With the experiences and skills from the first quarter, students individually develop a number of concepts for products like a juicer or dispenser in the second quarter. Theoretical courses in mathematics and mechanics of materials are provided together with engineering courses in manufacturing and technical product modelling and a course in form morphology.

In the third quarter, project teams of eight students each aim to convert a concept of one of the team members - developed in the second quarter, and selected in consultation with the tutor - into a working prototype

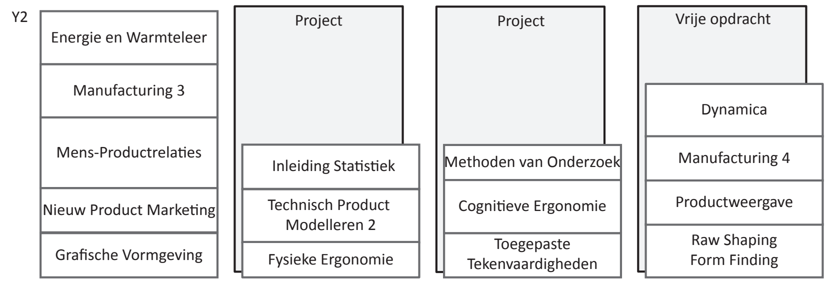


Figure 5.3 Overview of the second year programme

		Design	Engineering	Basics	Humanities and Business	Projects	Minor
B2-1	Energie en Warmteleer			o			
	Mens-Productrelaties				o		
	Manufacturing 3		o				
	Grafische Vormgeving	o					
	Nieuw Product Marketing				o		
B2-2	Fysieke Ergonomie				o		
	Inleiding Statistiek			o			
	Technisch Product Modelleren 2		o				
	Project K					o	
B2-3	Cognitieve Ergonomie				o		
	Toegepaste Tekenvaardigheden	o					
	Methoden van Onderzoek				o		
	Project O					o	
B2-4	Productweergave	o					
	Raw Shaping Form Finding	o					
	Manufacturing 4		o				
	Dynamica			o			
	Vrije Opdracht					o	

Figure 5.4 Overview of the different learning themes in the second year programme

and a proposal for a mass-produced product. Courses in mathematics (mathematics 3), engineering (construction techniques and manufacturing) and designing (product presentation drawing) are also part of the third quarter.

In the fourth quarter, teams of four students work on a 'smart' product, integrating mechanics, electronics (sensors, actuators and control units) and software solutions. In this quarter, courses in electronics, human factors, the meaningful shaping of products and software engineering are provided.

5.3.2 Second year (B2)

The second year incorporates two group projects and one individual project (figure 5.3). The first quarter is considered the (theoretical) preparation for the projects in the other quarters and anticipates on tiredness of (group) projects. All educational lines are continued in this quarter (energy and heat transfer, human – product relations, manufacturing 3, graphic design and new product marketing; see figure 5.4). In the second and third quarter, half of the study load is devoted to a project. A complex and broad project (six students per team), instigated by and in direct collaboration with an industrial partner is organised in the second quarter[2]. Courses in physical ergonomics, statistics and technical product modelling (part 2) complete the quarter.

In groups of six students, a product or a service for a prescribed target group has to be developed in the third quarter. Courses in cognitive ergonomics, applied drawing skills and research methods accompany the project in this quarter. The fourth quarter includes the programme's second individual project. Students are challenged to formulate and execute a project for which they determine the design requirements. Courses in product presentation, raw shaping form finding, manufacturing 4 and dynamics complete the second year.

5.3.3 Third year (B3)

In the third year, students follow a minor of their own choice (20 EC) (figure 5.5). The student is relatively independent and unrestricted in choosing a minor as long as it does not overlap with other courses of the programme and results in a coherent programme of sufficient quality. All selected and composed minors are subject to approval by the Examination Board.

The minor programme extends over the first semester. This leaves room for the courses in designing interactive products and an engineering course in finite element methods (both in the first quarter). In the second quarter, the major programme covers website design and an engineering course in product complexity. The third quarter has a study load of 10 EC and is a preparation for the thesis project (4th quarter), by means of an obligatory preparation course. The third quarter consists of a project that combines several basic and engineering courses devoted to mechatronics. The project time is short, the theme is complex and the project team is large (up to sixteen students), requiring considerable planning and organisational skills from the students. Courses in philosophy of technology and design and meaning complete the series of courses. The learning lines are shown in figure 5.6.

2 *Appendix AA: Dankers, W., Schuurman-Hemmer, H., Boomgaard, A. van den and Lutters, D. (2013). Bringing practice to the theory: Project-led education in Industrial Design Engineering. DRS // Cumulus 2013. Oslo (N).*

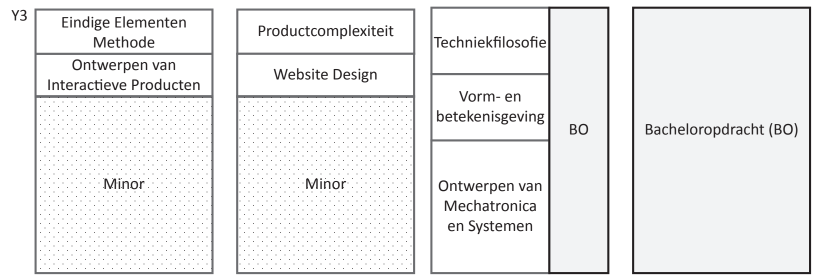


Figure 5.5 Overview of the third year programme

		Design	Engineering	Basics	Humanities and Business	Projects	Minor
B3-1	Ontwerpen van Interactieve Producten				o		
	Inleiding Eindige Elemente Methode		o				
	Minor 1 & 2						o
B3-2	Website Design	o					
	Productcomplexiteit		o				
	Minor 3 & 4						o
B3-3	Techniekfilosofie				o		
	Vorm- en Betekenisgeving	o					
	Ontw. van Mechatronica en Systemen			o		o	
B3-4	Bacheloreindopdracht IO					o	

Figure 5.6 Overview of the different learning themes in the third year programme

The Bachelor's programme is concluded with the individual final Bachelor's project of 20 EC. In general, the assignment is carried out externally, at a company or a public organisation (sometimes outside the Netherlands). This way, students become acquainted with and obtain professional experience in the field of industrial design engineering in (industrial) practice, while being guided by a coach from the University.

5.3.4 Additional programmes

Besides the regular programme Industrial Design Engineering the University offers two additional honours programmes for students who are talented, interested and motivated. These programmes count as 30 EC extra in addition to the 180 EC of the standard programme. There is one programme for mathematics[3] and one for the scientific and academic environment[4].

For the honours programmes, suitable candidates are invited for an interview (mathematics) or can apply (scientific and academic practice). About 1% of the students of the IDE Bachelor's programme take part in these additional programmes.

Some students in the IDE Bachelor's programme prefer to participate in design competitions or courses at summer schools in addition to the standard programme.

3 *www.utwente.nl/excellence*
4 *http://www.utwente.nl/honours/en/*

5.4 Cohesion of the programme

The educational concept of project-led education (described in Section 5.2) demonstrates the cohesion of the programme. The themes of the projects help to establish and ensure the balance between engineering and designing. The cohesion of the programme also results from the positioning of the independent courses in the different learning themes in the programme (figures 5.2, 5.4 and 5.6). Moreover, an important measure to secure the cohesion and integration in the programme is the fact that almost all staff members not only participate in individual courses, but also function as tutors in at least one of the projects.

Courses with increasing subject complexity, requiring prerequisite knowledge from other IDE courses, or courses in which integration of previous knowledge and skills is necessary, are placed later in the programme (e.g. second and third year).

As an example, the cohesion within the learning theme 'design' is presented in Appendix T. Section 5.6 depicts the relationship between the final qualifications and the programme content in more detail.

5.5 Feasibility of the programme

The implementation of the programme is characterised by a mix of instructional methods and learning activities, such as lectures, tutorials, combined lectures and tutorials, group work, (with and without guidance by staff members), individual assignments, etc.

Figure 5.7 shows how the contact hours of the Bachelor's programme are spent. The contact time for the three years can be derived from the total of

	B1		B2		B3	
	hrs.	%	hrs.	%	hrs.	%
Lectures	394	23.5%	394	23.5%	128	7.6%
Tutorials	40	2.4%	54	3.2%	38	2.3%
Practicals	352	21.0%	148	8.8%	32	1.9%
Group with guidance	70	4.2%	37	2.2%		
Examinations	70	4.2%	38	2.3%	24	1.4%
Subtotal contact time	926	55.1%	671	39.9%	222	13.2%
Group without guidance	210	12.5%	288	17.1%	52	3.1%
Individual study	544	32.4%	721	42.9%	286	17.0%
Final project					(560)	(33.3%)
Minor study					(560)	(33.3%)
Subtotal non-contact time	754	44.9%	1009	60.1%	1458	86.8%
% contact hours	(1680)	55.1%	(1680)	39.9%	(560)	39.6%

in the B3, the hours for the minor and final project are not taken into account

Figure 5.7 Contact hours in the Bachelor's programme

	B1	B2	B3
Contact hours per week	23 = 55.1%	17 = 39.9%	17 = 39.6%

in the B3, the hours for the minor and final project are not taken into account

Figure 5.8 Average number of contact hours per week in the Bachelor's programme lectures, tutorials, practicals, guidance of project groups and examinations together. There is an increasingly strong focus on the students' ability to work autonomously throughout the programme. As demonstrated in Figure 5.7 and Figure 5.8, the plenary contact hours of the first year gradually convert into individual consulting hours (upon request) at the end of the programme during the Bachelor's final assignment.

The contact hours are in line with University policy; the University's target figure for the first year of the Bachelor's programmes is 50% in 2015[5]. For the Bachelor's programme Industrial Design Engineering, this figure was already realised in the reported period.

The experienced study load is evaluated on a regular basis, for the courses, projects as well as for the quarters in their entirety, by means of course evaluations and panel discussions. The majority of the students indicate that the cohesion and structure of the programme are good. This evaluation is confirmed by the results of the National Student Survey (NSE 2012[6]). Occasionally, students indicate a certain lack of balance in the study load, meaning that some courses bear a heavier study load and others a lighter than average study load. However, overall the programme is in balance. The evaluations are a recurring item on the agenda of the Educational Committee.

The weekly meetings with the teaching staff enable quick feedback and identification of potential imbalances, risks and disturbances in the execution of the educational programme. This can lead to rapid, decisive and effective actions, both by the teaching staff and the programme director.

5 *Performance indicator; Appendix U*
6 *National Student Survey 2012 (http://nse2012.kiwi.qdelft.nl/)*

Moreover, in the case of reported or observed problems, the Educational Committee directs the Programme Director to take action, and report back in the next meeting.

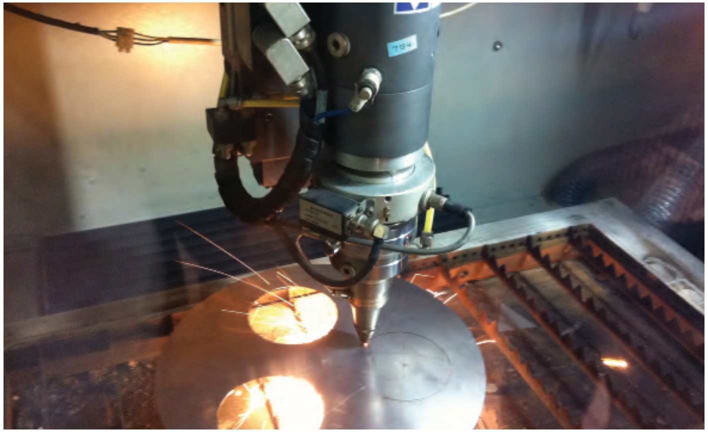
The evaluations make evident that the students, staff, programme director and educational committee are generally satisfied with the balance of the overall Bachelor's programme[7].

5.6 Relation between final qualifications and teaching methods

The students acquire a wide variety of knowledge and skills in the programme, as reflected in the final qualifications[8]. This variety entails the need for a variety of teaching and assessment methods. This section focuses on the different teaching methods; the assessment methods are elaborated in Chapter 8.

The courses in the programme adopt a variety of teaching methods, such as oral lectures, instruction hours, combinations of oral lecturing and instruction, individual and group assignments, discussion meetings, individual or independent study, workshops or computer practice hours. For the individual projects such as the Bachelor's final assignment, individual coaching is the obvious method. Such coaching is also available in specific (personal) situations. Noteworthy regarding the projects is that the teaching methods are always based on the fact that students apply (and generate) knowledge within a realistic (and possibly industrial) context.

7 *Exit interviews (Appendix R) and notes of the staff meetings*
8 *Survey Final Qualifications bachelor programme Industrial Design Engineering, May 2013*



Laser cutting sheet metal

Students spot welding sheet metal

5.6.1 Scientific orientation

The scientific character of the programme originates from the following aspects:

- Content of the programme;
- Teaching methods;
- Interactions between education and research.

In the Bachelor's programme, this is reflected in the following:

- Attention is paid to general academic knowledge such as philosophy (Philosophy of Technology is a compulsory course) and ethics (this is apparent in courses such as Human Factors).
- Students are encouraged to develop a critical and independent attitude towards theories, methods, tools, etc.; moreover, if such theories, methods and tools are not available, students must have the attitude to make appropriate assumptions or invent new solutions.
- Many of the theoretical courses in the first and second year are an introduction to a field that is new for students. The content of these courses is well-defined. However, because nearly all teaching staff is involved in research projects or have research assignments, new theories will surface in lectures, in projects, in tutoring and in the examples that are used to explain theory. In projects, students are gradually exposed to new insights and developments in engineering science; they are able to incorporate research findings in their project work when relevant. Before starting the Bachelor's final assignment, students carry out (desk) research on the state of the art and new developments in the field that is the topic of their projects.

One of the approaches employed to obtain the objective of the scientific orientation of the programme was recently published[9].

5.6.2 Design projects

Prominent in the curriculum are the design projects. Roughly 30% of the curriculum consists of projects; about half of them are group projects and half of them are individual projects, among which the Bachelor's thesis of 20 EC. The teaching staff considers group projects to be an adequate preparation for the multi-disciplinarity of the professional environment. In the group projects, students collectively find solutions for particular industrial design engineering problems.

Projects can be more complex if they involve a large group of students. Students learn how to collaborate and achieve a result that is more than the sum of the individual parts. This is also in a way true for their learning curve: students need to be aware of, and understand what their group members did, without having performed these activities themselves. That provides advanced learning opportunities (both in understanding and in teaching each other). In the same way, students become aware of their performance in the project group relative to the performance of their group members. This enables them to reflect on their own performance.

Hence, group projects offer an excellent opportunity for students to develop scientific as well as organisational and professional skills (collaboration, project approach, planning, communication etc.). In that same complex environment, students are also challenged to develop design capabilities in

9 *Appendix AA: Gommer and Van der Voort (2013); "Integrating research into Project Led Education" PAEE conference, August 2013, Eindhoven, The Netherlands*

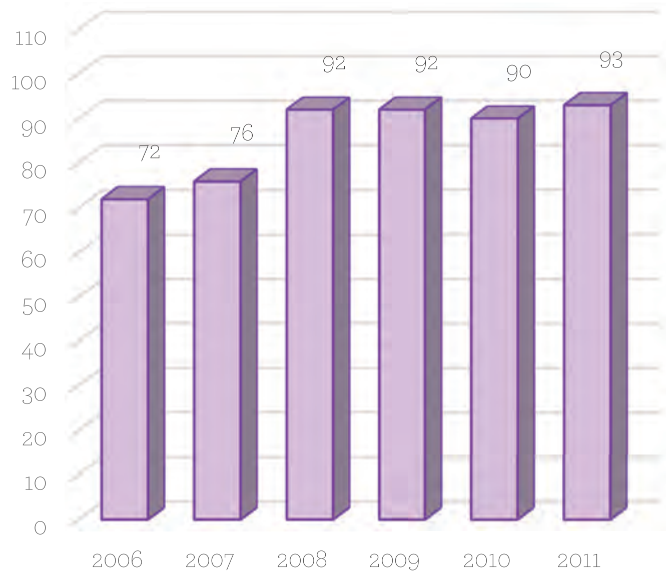


Figure 5.9 Bachelor intake 2006-2011 (VSNU data)

Cohort	2006	2007	2008	2009	2010	2011
Inflow VWO	72	76	92	92	90	93

Figure 5.10 Bachelor intake
(Management information system UT; (MISUT), VSNU data)

Cohort	2006	2007	2008	2009	2010	2011
Inflow VWO	72	76	92	92	90	93
Dropout after 1 year	10%	13%	11%	18%	16%	11%*
Dropout after 2 years	13%	18%	18%	21%	17%*	
Dropout after 3 years	17%	21%	21%	27%*		

* *preliminary data; October 2012*

Figure 5.11 Cumulative dropout rates 2006-2011
(VWO inflow, VSNU data)

individual projects. In all projects (group projects and individual ones), one or more staff members coach the student or the group, focusing on both the content and organisation of the project. The main aim of the coach (tutor) is to guide the student(s) in finding, combining and applying knowledge. All staff members involved in a particular project are jointly responsible for the supervision and assessment of that project.

5.6.3 Professional orientation

As the preparation of the graduates as independent professionals, is a goal of the programme, a strong relationship with the professional field is important. Several ways are employed to reach this goal. A number of staff members involved with teaching duties have ties with related industries or have an industrial background. Many innovations of the University are brought on the market by over 800 spin-off companies. Some of them are initiated by graduates of these programmes. In some of the courses of the programme, guest lecturers from industry are invited. Field trips are a mandatory in some courses. Appendix F presents data of these relations.

5.7 Student influx

Admission requirements for each type of student enrolling into the programme are clearly established in the Dutch Higher Education and Research Act[10] and are made accessible to prospective students via e.g. the UT's web-site and Student Charter[11].

Selection of students is not allowed for the Bachelor's programme. Students who graduated from the appropriate Dutch secondary schools (VWO) with the profile Nature and Technology or the profile Nature and Health including Physics and Mathematics B are admitted without any restrictions.

Before 2010, these VWO students were less well prepared as they suffered a lack of mathematical skills. Therefore, the faculty offered extra classes to remedy the deficiencies at the start of the first year at the University. The programme at the secondary schools was revised and the problem disappeared; consequently, the faculty terminated the extra courses. However, a summer school on mathematics has been established, targeting – on a voluntary basis – those freshmen that graduated high school (VWO) with a mark for mathematics lower than 7 out of 10. The summer school consists of an introduction test, a strenuous mathematical programme, a final test and a non-binding advice on starting the Bachelor's programme.

As the Bachelor's programme is in Dutch, foreign students have to master Dutch at the NT2 level. Given the enrolment numbers of German students, the University offers a special Dutch language programme for German students in a summer school prior to enrolment. The NT2 level of the Dutch language course exceeds the requirements of some other UT Bachelor's programmes. This is a consequence of the educational concept, in which students work in groups from day one and have to be able to communicate in the same language. Besides mastering the Dutch language, German freshmen need English language, mathematics and physics on 'Abitur'- level. Candidates without the required certificates can acquire special permission to start in the programme after passing the so-called colloquium doctum examination.

10 *WHW § 7.24, § 7.25, §7.28 and §7.29*
11 *Appendix K*

Cohort	2006	2007	2008	2009	2010	2011
# after 1 year	65	66	82	77	76	
after 3 year (n)	0%	0%	2%	3%		
after 4 year (n+1)	26%	17%	39%			
after 5 year (n+2)	58%	56%				
after 6 year (n+3)	78%					

Figure 5.12 Bachelor's programme efficiency (VWO inflow re-enrolled)

Cohort	2006	2007	2008	2009	2010
Re-enrolment after 1 year	67	67	84	82	83
Completion after 3 years	0%	0%	1%	4%	
Completion after 4 years	27%	18%	34%		
Completion after 5 years	58%	57%			
Completion after 6 years	79%				

Figure 5.13 Completion rates of total inflow (cumulative in %) per cohort based on re-enrolment after the first year

Figures 5.9-5.13 give official VSNU data of the Bachelor's intake as specified by the NVAO[12].

A gradual increase over the years can be seen. Figure 2.1 gives an overview of all students that started the IO Bachelor's programme in relation to their home addresses. Most of the IO students come from the Provinces of Overijssel and Gelderland.

5.8 Study success rate

This section presents the quantitative data for the study success rates. These data are specified and defined by the NVAO[13] and according to the VSNU standards.

Figure 5.11 lists the cumulative dropout rate of the Bachelor's programme for the intake of VWO students. The dropout rate measured over the first year is below the average of the Bachelor's programmes of the University of Twente. However, the dropout rates in the subsequent years are reason for concern. With the introduction of the BSA[14] in 2012, it is expected that the dropout rate after the first year will increase (performance indicator is set at no more than 20%), yet that the dropout rate after two or more years will decrease.

Figure 5.12 shows the performance of the Bachelor's students (the percentage of students who complete the programme relative to the number of former VWO students who are still enrolled after the first year). The performance indicator after four years is 39% for the UT's Bachelor's programmes. The figure of our Bachelor's programme is far below that level. By introducing the BSA in 2012 and the new educational model for the Bachelor's programmes, we intend to raise this figure considerably.

5.9 Coaching and counselling

The University of Twente provides Student Counselling Service, which is responsible for the support of students enrolled at the University of Twente. Student Counselling Service can be consulted in relation to study delays, choice of study, motivational problems, issues involving family matters or personal circumstances, etc. Students in need of personal contact about e.g. personal problems (concerning relatives, relationships or fellow students) can contact the students' psychologists.

More information about this coaching and counselling for the University in general is given in the report on the institutional quality assurance assessment.

A mentor system was introduced at the start of the programme's establishment to assist students in the Bachelor's programme. All first-year students had a member of staff as mentor. Each mentor looked after ten students and met with them individually (at least three times during the first year). Mentors were coached by the study advisor, and mentors referred students to the study advisor in case of more serious problems. In the subsequent years, students could still appeal to their mentor or could go directly to the study advisor with their questions.

In the reporting period, starting in the academic year 2011 – 2012, the mentor system was changed in view of the introduction of the BSA. The

12 *http://www.nvao.net/page/downloads/Definities_basisgegevens_opleidingsbeoordelingen_11_sept_2012.pdf*
13 *http://www.nvao.net/page/downloads/Definities_basisgegevens_opleidingsbeoordelingen_11_sept_2012.pdf*
14 *BSA: "Bindend Studieadvies"; Binding recommendation to continue or leave the programme.*

Function	#	fte	%
Full professor	3	0.35	3.5%
Associate professor	8	1.50	14.8%
Assistant professor	21	4.40	43.5%
Lecturer	10	3.65	36.1%
Information specialist	1	0.03	0.3%
PhD. student	3	0.19	1.9%
Total	46	10.12	100%

Figure 5.14 Teaching staff involved in the Bachelor's programme (1 March 2013)

mentors have been replaced by a study advisory team, headed by the study advisor. This team consists of four experienced staff members. During the first week of the first academic year, every student meets with a member of the advisory team. During this meeting, a quick scan of risks, challenges, limitations, and preferences is made, while simultaneously bringing essential rules and regulations to the attention of the student. If required, successive actions are discussed. During the studies, a student bears the responsibility for approaching a member of the study advisory team if the need arises. However, the study progress is monitored in detail in the first academic year; based on this, the student receives intermediate advice and members of the advisory team may approach individual students for consultation.

Depending on the study progress, consultation activities decrease (good progress) or continue (less progress). Of course, students can always consult members of the study advisory team on their own initiative.

At the end of the first year, an advisory board of the Examination Board considers results of all individual students enrolled in that year. Based on this advice, the Programme Director sends every student a study advice. Until 1 September 2012, this annual advice was non-binding. All annual advice given to students enrolled after that date is binding[15].

5.10 Teaching staff

Most of the Bachelor's programme is taught by scientific staff members from the various chairs of the Faculty of Engineering Technology. Because of the interdisciplinary nature of the programme, staff from other faculties of the UT contributes as well.

15 *http://www.utwente.nl/io/onderwijs/ssnsregelingen/bsa_2013.doc/*

As students are free to choose their minor programme, no information can be given about the teaching staff of the minor[16]. The responsibility of operating a minor programme is delegated by the Examination Board to a Validation and Accreditation Committee. This committee is set up by the University and is headed by one of the programme directors. Therefore, the minor programme is the responsibility of the institution. Additional information is provided in the report on the institutional quality assurance assessment (Appendix M).

For participating in a Bachelor's assessment committee, new members have to attend (and prepare for) at least two sessions to observe the assessment. This includes PhD students as well, when they are asked to participate. However, teaching duties of PhD students are always under supervision of staff members. The teaching contribution of PhD students is limited to a maximum of 10% of their work time (practically less than 160 hours per annum).

Faculty members are expected to spend 10 to 20% of their working hours on management support tasks. This ensures that staff members take part in, and contribute to, committees and projects for quality improvement and organisational projects. Faculty committees such as the Educational Committee, Examination Board and the Faculty Council depend on the active participation of staff members. The teaching staff of Industrial Design Engineering meets weekly to discuss educational topics. The meeting is headed by the programme director and minutes are drawn up. The goal of this involvement is to improve the quality of the programmes and administrative processes.

16 *http://www.utwente.nl/majorminor/*

Student/staff	29.1

Figure 5.15 Student-staff ratio of the Bachelor's programme (1 March 2013)

MSc.	89%
PhD.	50%
UTQ	63%
UTQ started	28%

Figure 5.16 Academic quality of teaching staff in the Bachelor's programme (1 March 2013)

5.10.1 Teaching staff quantity

Figure 5.14 provides an overview of the available work force involved in teaching in the Bachelor's programme, at different functional levels. This table does not include the amount of manpower involved in the minor. Appendix D contains a full overview of staff with names, positions, scope of appointment, level and expertise.

The exact amount of time each of the staff members devotes to the industrial design engineering programme cannot be determined, because many of them also contribute to other Bachelor's or Master's programmes of the University or elsewhere. Therefore, an estimate is made of the percentage of time that staff members and members hired from other faculties spend on teaching.

Several courses involve senior students who assist teaching staff by supervising or helping students during instruction hours or practical assignments. Since student assistants do not have a formal teaching role, they are not included in Figure 5.14. The number of student assistants is estimated to be approximately equavalent with 1 fte.

Based on the numbers in Figure 5.14 and adding the amount of lab and workshop supervising (1.2 fte), tutoring (2.0 fte) and coaching of the thesis project (1.0 fte), the teaching time can be calculated[17]. Together with the number of registered Bachelor's students[18] the estimated student- staff ratio can be calculated and is given in Figure 5.15.

17 *Appendix D*
18 *As reference date 1 March 2013 is taken*

Setting aside the inaccuracy of the student-staff ratio, it is clear that the organisation of the programme is vulnerable. This is all the more true, because the pressure on staff to deliver results in research and in project acquisition is increasing. However, according to the students, this does not seem to harm the educational environment. If students have questions, they feel free and confident to consult staff members. In evaluations, exit interviews and panel discussions[19], (former) students indicate that they experience(d) an encouraging and friendly atmosphere in the faculty. Moreover, they specifically mention the advantages of the open-door policy of staff members for the students' education.

Even though no explicit problems have arisen as concerns the breadth of the educational support in the Bachelor's programme, the high value of the student-staff ratio might cause vulnerabilities and might draw heavily on the loyalty and enthusiasm of staff members.

5.10.2 Teaching staff quality

The staff and education policy of the faculty aims to improve the educational qualities as well as the academic achievement of individual staff members. The Executive Board of the University decided[20] that all staff members involved in teaching must obtain the University Teaching Qualification (UTQ) within three years. All newly appointed staff have to qualify within three years after their appointment as well. An assessment of educational skills is always incorporated in the application procedure for new staff. Teaching tasks are explicitly included in the annual performance reviews

19 *Appendix O, Appendix P, Appendix R*
20 *Decree Executive Board 27 February 2012*

Students working in the project room

Students working in the study landscape

of every staff member. Course evaluations may give cause to initiatives to improve teaching skills. Next to these formal approaches, there are several other ways to include (an evaluation of) the teaching experience in the career path of individual staff members to enhance the quality of the programmes. Figure 5.16 lists the academic qualifications of the teaching staff.

The educational qualities of staff members involved in the Bachelor's programme are in line with University policy, the target figure for staff members is 45% in 2015 and 70% in 2020[21]. For the Bachelor's programme we expect to realise 70% in 2014.

5.11 Programme-specific facilities

5.11.1 Physical space

Project-led education attempts to expose students to the practical applicability of the theoretical knowledge they are confronted with. Executing a project with realistic assignments is only possible if the circumstances are comparable to those in the industry. Project teams cannot function well in traditional lecture halls. On the other hand, it is practically impossible to provide each project team with a fully equipped office space. Therefore, it is essential to arrange an environment that allows professional group work and is equipped with adequate ICT and meeting facilities. The environment must facilitate group work (in relative) isolation and lecturing for a larger group.

21 *Appendix U*

This wide variety of facilities is made available for students in the building that hosts the Faculty of Engineering Technology; this includes lecture halls, working spaces, meeting rooms, studios, workshops, laboratories, but also a canteen that doubles as assembly room and a room for the student association. The entire building is equipped with excellent ICT facilities; including an ICT help-desk. The majority of all teaching activities in the Bachelor's programme take place in the Oosthorst wing of the building. Here, two adaptable lecture halls are at the disposal of the first two cohorts (B1 and B2) of the Bachelor's programme.

These lecture halls are equipped with mobile tables and chairs, making the rooms adaptable for different types of education (even within one lecture). Besides the scheduled contact hours (lectures and project meetings) the lecture halls are available for project work, individual study, et cetera. In addition, more workspaces equipped with sockets to charge laptops are made available in e.g. the corridors, hall and canteen of the building. Fully equipped with wireless internet and providing each student with a private locker, the building facilitates every type of educational activity during the entire working week and even at night or during weekends.

5.11.2 Workshops and laboratories

The cluster of Industrial Design Engineering shares a number of facilities with the cluster of Mechanical Engineering (ME) such as the mechanical workshop, assembly workshop, modelling workshop, laser-cutting facilities, rapid prototyping facilities etc. Students have access to these facilities; obviously this is essential in the project-led education concept. Students are often required to convert their own designs into actual (functional)

Lecture Design Sketching

A result of the lecture Design Sketching prototypes, thus confronting them with both the feasibility and quality of their designs. Moreover, students gain additional insights on practical skills while working together with experts in the workshop.

5.11.3 Information and communication technology facilities

The University of Twente aims to provide its staff and students with a fast computer network, covering the educational and research buildings, but also the student dormitories on the campus. Each year, the University selects two or three types of laptops that students can purchase at a discount and under a special University warranty. This warranty ensures that students receive an immediate replacement if there is a problem with the laptop that cannot be solved within the hour. This service is provided by the Notebook Service Centre[22]. The selected laptops are suitable for the educational software that is used in the courses (e.g. CAD/CAM). This educational software is available for downloading to students enrolled in the Industrial Design Engineering programmes. For practical assignments or workshops using software programmes that do not come with (individual) educational licenses, collective facilities (like a mobile laptop cart) are made available.

Organisational information concerning the educational programme and individual courses is provided and managed by various web-based applications. Examples include the following:

- Osiris allows students to register for courses and tests/exams;
- Osiris Educational Catalogue provides general information on individual courses[23];
- Blackboard[24] provides information management for students enrolled in a specific course;
- The Student Mobility System (SMS[25]) manages information on students that are abroad for their minor or final assignment.

5.11.4 Quality assurance

The quality is evaluated continuously, as part of the quality policy of the University[26]. Quality assurance is an inherent part of the accreditation of the entire institute, therefore, only the activities regarding the programmes themselves will be discussed here.

The programme director is responsible for the quality assurance. On behalf of the programme director, the quality assurance coordinator is in charge of operational affairs. An evaluation committee consisting of student assistants, evaluates the courses by means of a standard planning. Every course is evaluated every two years by means of a standard questionnaire which is handed out to students during the exam. This has shown to yield the largest response. Students are requested to give values to different aspects and to assign an overall value. If the overall value drops below the target value of 6, the course will be evaluated during the next year as well. Results of the evaluations are discussed with the lecturer responsible for the course; the lecturer formulates suggestions for improvements. Results of the evaluations,

22 *http://www.utwente.nl/icts/en/nsc/*

23 *https://osiris.utwente.nl/student/OnderwijsCatalogusZoekCursus.do*
24 *http://www.utwente.nl/onderwijssystemen/en/*
25 *http://www.utwente.nl/onderwijssystemen/onderwijssystemen/sms/*
26 *Appendix M*

Adriaan Goossens, Kees van der Westen

Graduation project (BSc.)

Bart Schuring, BMA Ergonomics

Graduation project (BSc.)

suggestions for improvements and results of exams are analysed by the quality assurance co-ordinator. There are quarterly panel meetings with groups of students from each year. These panels are organised by the quality assurance coordinator. Students who follow the programme without nearly any delays are invited to take part in these panels. Objectives of these meetings are to discuss the cohesion and possible bottlenecks in the quarter. All results and suggestions for improvement are discussed with the educational committee once per semester. Subsequently the educational committee advises the programme director regarding actions to be taken. In addition the educational committee can put forward problems in the educational programme and advise on possible improvements. All results (report on course evaluation and panel meetings) are placed on a web-site (Blackboard) that is only accessible to students and staff members. Peer-to-peer evaluation of courses takes place as well. Lecturers are invited to present their course to their colleagues in the weekly lecture meetings on the basis of a collection of standard questions. Objectives of these presentations are to keep everyone informed and to enable everyone to gear all courses to one another. Besides formal evaluations in which the Educational Committee is fully involved, informal evaluations play an important role. The organisation around the programmes is set up in such a way that the threshold to approach teaching staff and other staff members about educational matters is very low.

Students co-oporating in the Virtual Reality Lab

Serious Gaming Table in the Virtual Reality Lab

6. Teaching and learning environment: Master's programme

The Master's programme IDE broadens and elaborates the basis acquired in a Bachelor's programme. It enables enrolled students to achieve the intended learning outcomes. The educational quality of the teaching staff is above the target as set by the University. The programme specific facilities are adjusted to the programme. Curriculum, staff, services and facilities constitute a coherent teaching-learning environment for the students.

6.1 Programme structure

The mission and intended learning outcomes (see Chapter 3) of the Master's programme purposefully position Industrial Design Engineering as a strongly interdisciplinary domain. The interdisciplinary setup and final qualifications of the Master's programme are a direct result of that positioning.

The Master's programme is academically focused, with the emphasis on design methodologies and problem-solving strategies underpinned by a solid theoretical foundation. Therefore, extending and reinforcing the understanding of design principles, theoretical concepts, and the relation between products and product development processes is a deliberate goal of the Master's programme. Information about the courses, and objectives and learning outcomes can be found in the information systems[1].

The Master's programme focuses on the field of Industrial Design Engineering from five different perspectives, each of which is translated into a so-called track. Whereas some overlap between the tracks is possible (and stimulated), students are encouraged to express their own accents by selecting a track and elective subjects. The five tracks are the following:

» Design and Styling (DS);
» Emerging Technology Design (ETD);
» Management of Product Development (MPD);
» Architectural Building Component Design Engineering (ABCDE);
» Cradle to Cradle (CTC).

The different tracks are not equally popular. As some of the tracks focus on particular application areas (ABCDE and CTC), they attract a limited but specific student population.

6.2 Educational concept

In comparison with the Bachelor's programme, the Master's programme adopts an educational concept with an increased focus on autonomous study and the attitude this requires. As a consequence, the Master's programme is a more individualised programme in which the student has more freedom of choice than in the Bachelor's programme, with a lower number of lectures, tutorials etc. Project-led education is not the explicit and enforced educational concept of the Master's programme, as the ability to

1 *Electronic course information system (Osiris) and electronic learning environment (Blackboard)*

Kim van Renswouw, Philips AVENT

Graduation project (MSc.; Design and Styling)

Jeroen Wijnholds, Smurfit Kappa

Graduation project (MSc.; Management of Product Development)

discern, plan, prioritise, monitor, execute and evaluate work is assumed to be an implicit and obvious capability of a Master's student. Consequently, many courses include design assignments related to realistic and topical challenges. Depending on the specifics of a course, these assignments are executed individually or by groups.

6.3 Programme content

In accordance with the organisation of the Bachelor's programme, the Master's programme is divided into four quarters of ten weeks each. The study load for each quarter is 15 EC (= 420 hours). The total study load for the two-year Master's programme is therefore 120 EC. The programme is full-time.

The first five quarters of the Master's programme consist of courses (75 EC); the final three quarters (45 EC) are spent on the Master's project (thesis).

Each track contains a number of characteristic and core courses and a Master's project in line with the track's specialisation. Furthermore, a student can participate in a selection of Industrial Design Engineering courses (see Appendix C) and some optional courses. This enables the Master's students to personalise their programmes, if they want.

In each of the tracks, the Master's thesis is an individual problem-oriented project, which takes the form of an in-depth research or design project.

The language of the Master's programme is English. In some cases, the language of a Master's thesis is Dutch; this depends on the industry party commissioning the (external) Master's project.

The following sections discuss the content of the individual tracks.

6.3.1 Design and Styling (D&S)

In the Master's track Design and Styling, students are trained to address product and services development with accents on the historical context of products, consumer concerns and emotional benefits.

Appendix C/D&S contains an overview of the D&S track. The track programme consists of 35 EC track-specific courses, 30 EC elective IDE courses and 10 free elective courses.

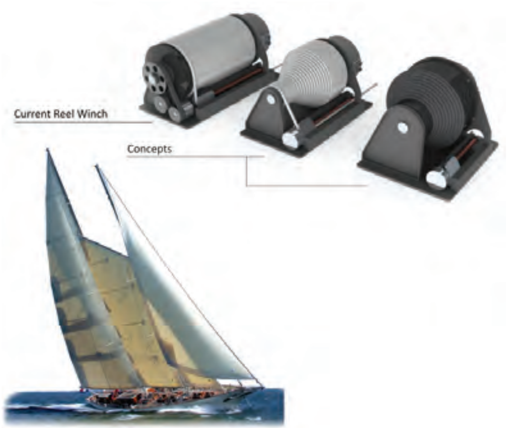
6.3.2 Emerging Technology Design (ETD)

The Master's track Emerging Technology Design focuses on the introduction of new technologies onto the consumer market. New technologies adapted for the consumer market become cheaper when they can be mass-produced. Graduates of this track are able to modify consumer products by using new technologies. As technologies can differ considerably, various (individual) programmes exist within this track.

Appendix C/ETD gives an example of an ETD track programme, namely Product and Surface (PS). In this case, the programme load consists of 25 EC PS courses, 25 EC ETD courses, 15 EC IDE courses and 10 EC free elective courses. All ETD sub-tracks have similar study loads.

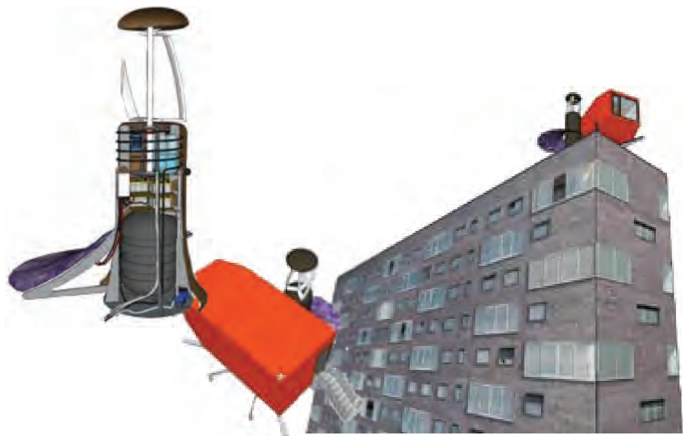
6.3.3 Management of Product Development (MPD)

In the Master's track Management of Product Development, students aspire to manage the product creation process effectively and efficiently, while communicating with a variety of stakeholders (ranging from target groups and clients to suppliers, agencies and experts), both internally and externally,



Paul van Ettinger, Rondal/Royal Huisman

Graduation project (MSc.; Emerging Technology Design)



Hugo Rinsema, University of Twente

Graduation project (MSc.; ABCDEA)

A graduate can purposefully select from a broad range of design methods and techniques in order to adequately lead multi-disciplinary design teams.

Appendix C/MPD gives an overview of the MPD track. The MPD track programme consists of 35 EC track-specific courses, 15 EC elective track courses, 10 EC elective IDE courses and 10 free elective courses.

6.3.4 Architectural Building Component Design Engineering (ABCDE)

Modern society needs designs for (flexible) buildings that can be transformed for different purposes and of which the systems and components can be reconfigured and reused. The track Architectural Building Component Design Engineering aims to train students for these new building practices.

Appendix C/ABCDE shows an overview of the ABCDE track. This track's programme consists of 35 EC track-specific courses, 20 EC elective IDE courses and 20 EC free elective courses.

6.3.5 Cradle to Cradle (CTC)

One of the key issues covered in the track Cradle to Cradle is to develop a strategy that maximises the industrial ability to turn used materials into new products. Graduates have been educated in the principles of re-usability and cutting-edge approaches, in order to apply these in industrial environments. This track is a co-operation between the municipality of Venlo and the University of Twente.

Appendix C/C2C includes an overview of the CTC track. The track's programme consists of 35 EC track-specific courses, 20 EC elective track courses, 10 EC elective IDE courses and 10 free elective courses.

6.4 Cohesion of the programme

Each of the Master's tracks contains a carefully designed cluster of core courses. The breadth and depth as well as the quality, applicability and feasibility of individual student programmes are vouched for by the holder of the research chair that does pioneering work in the related topic. Every individual programme contains a set of IDE Master's courses[2]. Although this is not a fully predetermined set of courses, this ensures that the broad field of Industrial Design Engineering is adequately covered. The Disciplinary Council is responsible for a balanced offer of Master's courses, while it is the responsibility of the Examination Board that each individual Master's programme draws from this offer in a balanced and deliberate manner.

Because of the interactions between the student and the track co-ordinator in the context of the programme as structured by the Disciplinary Council and Examination Board, all individual programmes are well embedded in the field of Industrial Design Engineering, while doing justice to the specific interests and qualities of the individual students.

From the monitoring of students during the academic year, exit interviews after graduation, and weekly discussions with staff members, it is clear that

2 *Appendix C*

	M1		M2 (quartile 5)		M2 (Thesis)	
	hrs.	%	hrs.	%	hrs.	%
% contact hours	504	30.0%	126	30.0%	45	3.5%

Figure 6.1 Contact hours in the Master's programme

	During courses *first 5 quartiles in M1/M2*	During thesis project *3 quartiles of M2*
Contact hours per week	12 = 30%	1 = 3%

Contact hours during the thesis project are an estimate.
There is an open-door policy to enable timely, individual, personal guidance.

Figure 6.2 Average number of contact hours per week in the Master's programme students as well as staff members are satisfied with the coherence of the Master's programme. This is also clear from the 'Keuzegids Masters 2013'[3].

6.5 Feasibility of the programme

In the Master's programme, contact times can depend on the individual student's programme. On average, students have 12 contact hours per week when they are taking courses (Figure 6.1 and Figure 6.2). While working on their Master's thesis externally, the number of contact hours is obviously low. During this period, students are coached by (selected) staff members of the external organisation that hosts the Master's project. University staff members act as study leaders and coach the students, while allowing them to act relatively autonomously. Supporting the students in their work is done through face-to-face meetings, e-mail, video-conferencing, conversations over the phone and other means.

6.6 Relation between final qualifications and teaching methods

The final qualifications describe a variety of knowledge and skills that graduates of the Industrial Design Engineering programme internalise. This variety requires different teaching and assessment methods. The latter are described in detail in Chapter 9. Courses in the programme make use of a variety of teaching methods, such as oral lectures, instruction hours, combinations of oral lecturing and instruction, individual and group assignments, discussion meetings, individual or independent study, workshops or computer practice hours, and individual coaching (for the individual projects such as the Master's final assignment).

6.6.1 Scientific orientation

The scientific character of the programme is embedded in the following aspects:

» Content of the programme;
» Teaching method;
» Integration of education and research.

In the Master's programme, students are encouraged to develop a critical and independent attitude towards theories, methods, tools, etc. Moreover, if none of these are available, the students are presumed to have the natural attitude to make appropriate assumptions or devise new approaches and solutions. The emphasis on the scientific orientation is much more pronounced in the Master's programme than in the Bachelor's programme. Each member of the teaching staff also has a research responsibility, expressed in the organisation of teaching staff in research groups, covering the broad field of Industrial Design Engineering. The content of the Master's courses strongly depends on the research responsibilities of the staff members. This implies that the content of Master's courses is frequently adjusted to reflect the state of the art of the research area. This enables students to be in touch with contemporary and relevant research questions; it can also expose them to scientific research publications (as course materials) and to scientific practices like peer review. In selected courses, students write a scientific essay/publication as the (final) assignment.

3 *Keuzegids Masters 2013, wo industrieel ontwerpen, ISBN: 9789087610470 (http://www.keuzegids.org/ol/gidsen/ma13/artikelen/j05.php)*

Cohort	2006	2007	2008	2009	2010	2011
Inflow	40	45	56	55	59	72

Figure 6.3 Master intake (Management information system UT; MISUT)

6.6.2 Professional orientation

As one goal of the programme is the preparation of the students as independent professionals, it is important to maintain a strong relationship with the professional field. Several ways are employed to reach this goal.

Appendix F gives an overview of the structural contacts with the professional field, such as a list of staff members with an industrial background, spin-off companies, courses with lectures by industry speakers, courses with field trips to industries.

In the Master's programme, students are encouraged to express personal interests. This enables them to explore the attractiveness of fields of expertise or industries in regular courses or in 'selected topics' courses. Co-operation with industry is also more common in the Master's programme than it is in the Bachelor's programme. This allows students to align themselves better with industry needs and practices, while also ensuring that assignments in Master's courses have adequate industrial relevance.

In this respect, it is also relevant to emphasise the research responsibilities of the teaching staff; the research projects they are involved in as a rule also have industrial organisations in their consortia. Consequently, the students are regularly exposed to the characteristics of the triangle 'education – professional environment – research'.

6.7 Student influx

Admission requirements for each type of student enrolling into the programme are clearly established in the Dutch Higher Education and Research Act[4] and are made accessible to prospective students via e.g. the UT's web-site and the Student Charter[5].

For the Master's programme, selection of students is allowed; however, selection does not apply for graduates holding a University Bachelor's degree in Industrial Design Engineering. All other applicants are selected by an admission committee appointed by the dean of the faculty.

The Executive Board of the University of Twente introduced the so-called 'clear – cut' in September 2012. This policy implies that students from the Bachelor's programme are only allowed to enrol in the Master's programme after having graduated (having completed all assignments and course work for the Bachelor's). Simultaneously, fixed dates for admission (September 1st and February 1st) to the Master's programme will be introduced.

In the reported period (1 September 2006 – 1 September 2012), students without a completed Bachelor's degree were allowed to take a few courses in the Master's programme. Formally, these students are not seen as participants in the Master's programme.

Figure 6.3 gives the data for the Master's intake.

6.7.1 Study success rate

As indicated in § 6.7, students without a Bachelor's degree could already take a few courses of the Master's programme in the period 1 September 2006 to 1 September 2012. Therefore, it is difficult to establish the success rate of those students, and an approximation has to be used. This approximation assumes that a student has started the Master's programme at the moment

4 *WHW § 7.24, § 7.25, §7.28 and §7.29*
5 *Appendix K*

Cohort	2006	2007	2008	2009	2010	2011
Inflow	40	45	56	55	59	72
after 2 year (n)	23%	56%	41%	47%	39%	
after 3 year (n+1)	73%	84%	77%	87%		
after 4 year (n+2)	93%	89%	91%			
after 5 year (n+3)	95%	91%				

Figure 6.4 Master's programme efficiency

Function	#	fte	%
Full professor	9	0.70	18.0%
Associate professor	6	0.72	18.5%
Assistant professor	15	2.17	55.8%
Lecturer	4	0.25	6.4%
PhD. student	1	0.05	1.3%
Total	35	3.89	100%

Figure 6.5 Teaching staff involved in the Master's programmes (1 March 2013)

the first Master's course exam is passed. This date also determines the student's cohort of the student. The time between this starting date and the final exam date is calculated as the duration of the Master's programme of this student. This calculation overestimates the actual study duration and underestimates the programme efficiency, as the student initially only participates in the Master's programme marginally while still finishing the Bachelor's programme. Aggregating the results for all students yields the Master's efficiency per cohort. Results are given in Figure 6.4.

The performance indicator for the UT Master's programmes is not known. The programme sets a target of a 90% success rate after three years of enrolment in the programme. The Master's programme's success rate is below that level. By introducing the 'clear – cut', and the new educational model for the Bachelor's programmes, the percentage will increase. However, additional measures such as better selection criteria (introduced in September 2011) and coaching facilities will be necessary as well.

6.8 Coaching and counselling

Besides the Student Counselling Service provided by the University, the coordinator of the chosen Master's track is the primary contact for students in the Master's programme. In addition, the programme director is a good source of advice on, for example, study prospects. Obviously, the study advisor or staff members will also have a role in advising and assisting students. For Master's students, contact with staff members is often a valuable means of exploring the state of the art in specific fields of expertise that goes hand in hand with recognising talents, preferences, perspectives and prospects. Students from abroad can consult the Faculty's student exchange office or staff from the international office.

6.9 Teaching staff

In view of the interdisciplinary nature of the Master's programme, staff from other faculties of the UT contributes to it as well. As students are partly free to choose their Master's programme, only an estimate can be given of the total teaching staff of the Master's programme. However, the responsibility of every Master's programme belongs with the Examination Board. Teaching, coaching and supervisory tasks in the Master are more often performed by full professors than in the Bachelor's programme. Faculty members are occasionally expected to be a member of Master's assessment committees not belonging to their own chair. This ensures that staff members are aware of research projects of other chairs, and safeguards the quality of the assessments within the faculty. Teaching staff of the Master's programme joins the weekly meeting on educational topics.

6.9.1 Teaching staff quantity

Figure 6.5 provides an overview of the available work force involved in teaching in the Master's programme, at different functional levels. This table includes only the manpower involved in the IDE courses.

The exact amount of time each of the staff members devotes to the Master's programme cannot be determined, because research and educational activities can overlap. Therefore, an estimate is made of the percentage of time that staff members and members hired from other faculties spend

Student/staff	21.0

Figure 6.6 Student-staff ratio of the Master's programme (1 March 2013)

MSc.	94%
PhD.	69%
UTQ	60%
UTQ started	29%

Figure 6.7 Academic quality of teaching staff in the Master's programme (1 March 2013)

on teaching. The teaching time can be calculated[6] based on the data in Figure 6.5 and adding lab and workshop supervision (1.2 fte) and coaching time of the Master's thesis projects (2.33 fte). Together with the number of officially enrolled Master's students[7] the estimated student- staff ratio can be calculated as given in Figure 6.6.

It may be also clear that the organisation of the Master's programme is vulnerable. This is all the more true because pressure on staff to deliver results in research and in project acquisition is increasing.

However, students indicate that this does not harm their study programme (evaluations, exit interviews and panel discussions[8]).

6.9.2 Teaching staff quality

The introduction of the University Teaching Qualification (UTQ) also applies to staff members teaching in the Master's programme. Since 2010, the University's policy is to attract scientific staff into tenure track positions. In such cases, agreements are made about the educational objectives that the tenure tracker has to achieve during the appointment. The programme director is a formal assessor in the tenure track committee. Teaching tasks are explicitly included in the annual performance reviews between each staff member and the supervisor. Evaluations, also of courses, may give cause to initiatives toward improving teaching skills. Figure 6.7 contains the academic qualifications of the teaching staff of the Master's programme.

6 *Appendix E*
7 *As reference date 1 March 2013 is taken*
8 *Appendices O, P and R*

The educational qualities of staff members involved in the Industrial Design Engineering programmes are in line with University policy; the target figure for staff members is 45% in 2015 and 70% in 2020[9]. The Industrial Design Engineering programmes will realise 70% in 2014. The percentage of teaching staff with a doctorate is relatively low in the Master's programme. The staff and education policy of the faculty aims to improve the academic achievements of individual staff members by supporting them in obtaining a doctorate. Newly appointed staff should have a doctorate.

Appendix E gives a full overview of staff with names, positions, scope of appointment, level and expertise.

6.10 Programme-specific facilities

6.10.1 Physical space

The building that hosts the Faculty of Engineering Technology includes a wide variety of facilities that are made available to students; this includes lecture halls, working spaces, meeting rooms, studios, workshops, laboratories, but also a canteen that doubles as assembly room and a room for the student association. The entire building is equipped with excellent ICT facilities; including an ICT help-desk. In addition, more workspaces equipped with sockets to charge laptops are made available in e.g. the corridors, hall, canteen, etc. of the building. Fully equipped with wireless internet, the building facilitates every type of educational activity during the entire working week and even at night or during weekends.

9 *Appendix U*

Wouter Dijkstra, Vredestein

Graduation project (MSc.; Design & Styling)

Joop Douma, OrganAssist

Graduation project (MSc.; Management of Product Development)

6.10.2 Workshops and laboratories

The cluster of Industrial Design Engineering shares a number of facilities with the cluster of Mechanical Engineering (ME), such as a mechanical workshop, assembly workshop, modelling workshop, laser-cutting facilities, rapid prototyping facilities etc. Students have access to these facilities. Students are often required to convert their own designs into actual (functional) prototypes, thus confronting them with both the feasibility and quality of their designs. Moreover, students gain additional insights on practical skills while working together with experts in the workshop. In elaborating and assessing their designs, students also have access to the virtual reality laboratory of the faculty. Although this is mainly aimed at research projects; students sometimes can participate in such projects, but they can also define their own project in the lab. This laboratory hosts a wide variety of video and audio equipment, which – together with elaborate interaction possibilities (e.g. haptics) – allow students to really think out of the box.

6.10.3 Information and communication technology facilities

The University of Twente aims to provide its staff and students with a fast computer network, covering the educational and research buildings as well as the student dormitories on the campus. Educational software is available to students for downloading. For practical assignments or workshops using software programmes that do not come with (individual) educational licenses, collective facilities (like a mobile laptop cart) are made available.

Organisational information concerning the educational programme and individual courses is provided and managed by various web-based applications. Examples include the following:

- Osiris allows students to register for courses and tests/exams;
- Osiris Educational Catalogue provides general information on individual courses;[10]
- Blackboard[11] provides information management for students enrolled in a specific course;
- The Student Mobility System (SMS[12]) manages information on students that are abroad for their minor or final assignment.

6.10.4 Quality assurance

The quality is evaluated continuously, as part of the quality policy of the University[13]. Quality assurance is an inherent part of the accreditation of the entire institute; therefore, only the activities regarding the programmes themselves will be discussed here.

The programme director is responsible for quality assurance. On behalf of the programme director, the quality assurance coordinator is in charge of operational affairs. An evaluation committee consisting of student assistants evaluates the courses by means of a standard planning. Every course is evaluated every two years by means of a standard questionnaire which is handed out to students during the exam. This has shown to yield the largest response. Students are requested to give values to different aspects and

10 *https://osiris.utwente.nl/student/OnderwijsCatalogusZoekCursus.do*
11 *http://www.utwente.nl/onderwijssystemen/en/*
12 *http://www.utwente.nl/onderwijssystemen/onderwijssystemen/sms/*
13 *Appendix M*

A view on Horst; the building that hosts the IDE courses

The passage where most offices of IDE's staff are located assign an overall value. If the overall value drops below the target value of 6, the course will be evaluated during the next year as well.

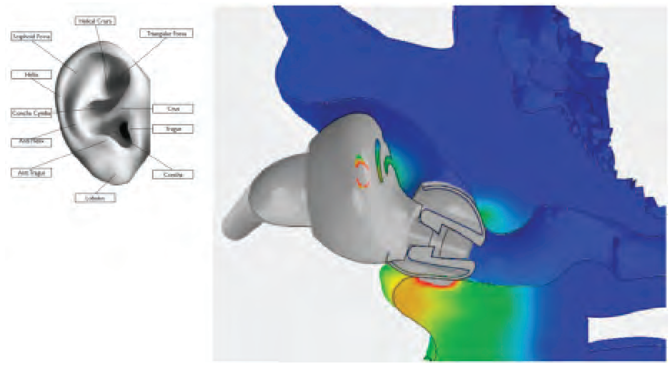
Results of the evaluations are discussed with the lecturer responsible for the course, who also formulates suggestions for improvements. Results of the evaluations, suggestions for improvements and results of exams are analysed by the quality assurance coordinator. Because of the individual nature of the programmes in the Master, panel meetings are not considered to contribute much to quality assurance. Therefore, only course evaluations are held. After their graduation, former students are invited for an exit interview with either the faculty educational advisor or the quality assurance coordinator to give input on the quality of the programme beyond the level of individual courses. All results and suggestions for improvement are discussed with the educational committee once per semester. Subsequently the educational committee advises the programme director regarding actions to be taken.

In addition, the educational committee can put forward problems in the educational programme and advise on possible improvements. All results are placed on a web-site (Blackboard) that is only accessible by students and staff members. Peer-to-peer evaluation of courses takes place. Lecturers are invited to present their course to their colleagues in the weekly lecture meetings, on the basis of certain standard questions. Objectives of these presentations are to inform teaching staff and enabling them to gear all courses to one another. Besides formal evaluations in which the Educational Committee is fully involved, informal evaluations play an important role.

The organisation around the programmes is set up in such a way that the threshold to approach teaching staff and other staff members about educational matters is very low.

Vincent Geraedts, Hema

Graduation project (MSc.; Design and Styling)



Rik de Konink, Philips

Graduation project (MSc.; Management of Product Development)

7. Strengths and weaknesses of teaching and learning environment (Standard 2)

7.1 Strengths

- The programmes are based on explicit educational concepts:
  The structures are well balanced, with a transparent path for the development of knowledge, attitudes and skills.
- The Bachelor's programme has a clear strategy concept:
  The Bachelor's programme contains well balanced combinations of styling and engineering courses, which ensures that students develop different important competences.
- The Bachelor's programme offers an active and high-effort learning environment:
  Having a challenging variety of learning activities guarantees active learning and a relatively high effort, while the concentration on a theme in each term ensures a learning approach directed towards a real understanding and the application and evolution of what was learned.
- The Master's programme offers a well balanced variety of courses:
  This ensures that students develop their own interests at a high academic level.
- The educational quality of staff is good:
  The didactic qualities of staff members involved in IDE programmes, expressed in percentage UTQ, are good and above the UT targets.
- The teaching and learning environment contains a short feedback loop:
  Students are actively involved in the programme (Educational Committee) and evaluations (Evaluation Committee), the open and constructive atmosphere ensures that students can easily approach staff members with questions and requests for feedback, and the organisational and educational quality are open to improvements.
- Thesis projects are well balanced concluding pieces of the programmes:
  Thesis projects carried out externally give students an excellent opportunity to apply their knowledge and to develop new knowledge within the academic and professional field of Industrial Design Engineering, which turns out to have a stimulating and motivating effect on students.

7.2 Weaknesses

- The Bachelor's programme requires a high study load:
  The participation rates decline in the course of the programme; this puts pressure on the coherence and effectiveness of the programme. The main cause is that many students tend to study less than the expected (required) 42 hours a week.
- The percentage of teaching staff with a doctorate is relatively low.

Puck Veugelers

Students help to solve (packaging) design problems of companies

Haske Rasser

Students help to solve (packaging) design problems of companies

7.3 Opportunities

- Increasing the time spent in study guidance counselling for a selected group of Bachelor's students will increase the study success rate:
  The coherent structure of the Bachelor's programme is an advantage for all students who are able to keep up with the time schedule of the programme, but a disadvantage for students who are not keeping up. To improve this, the programme increased the amount of time spent in study counselling for the latter group of students.
- Stimulating individual Bachelor's students to follow special programmes:
  The marks for group projects do not always reward the individual talents and diligence of the top students as a substantial proportion of the mark is based on the performance and results of the group as a whole. However, overemphasising the individual performance would have repercussions for group dynamics and the attainment of other learning objectives. In order to distinguish himself, the Bachelor's student has the possibility to graduate cum laude, to qualify for and participate in the so-called Excellence Stream (a mathematical programme with a high level of abstraction intended to deepen a student's mathematical level, only available to the best and motivated students), or to follow an honours track.
  In the Master's programme, students have the opportunity to follow an individual programme, in which the individual performances are measured.
- Adaptation of project-led education (PLE) as leading concept for all Bachelor's programmes will enhance the strength of the IDE programme:
  The University adopted PLE as the leading concept for all Bachelor's programmes. Teaching staff of the IDE (and ME) programme have already become very experienced in applying PLE in their daily teaching practice. They are able to pass this experience on to other colleagues at the University. This will reinforce and challenge the IDE staff to ensure their position as role models.
- Introduction measures by the government will increase study success rate:
  Several measures taken by the government such as the BSA, 'clear-cut', and changing the system of student grants are considered to have a positive effect on study success rate. These measures will have positive effects on the steps taken by the faculty such as more supervision, summer courses in mathematics, scheduling extra mentoring hours and more attention for the efforts students must make during the study, and better scheduling of courses.

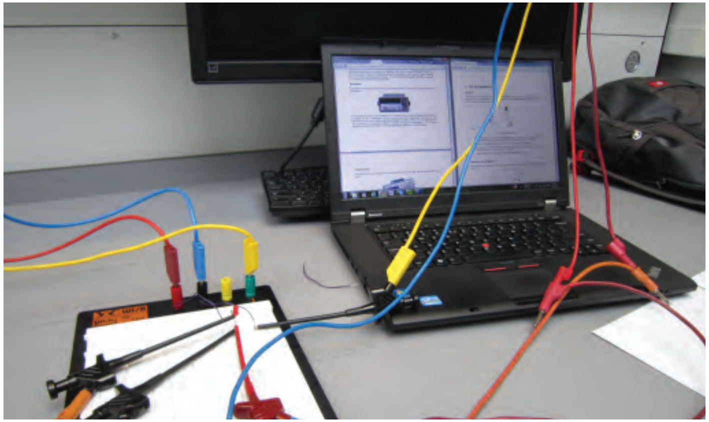
7.4 Threats

- The Bachelor's programme prepares students for an academic career, less for a professional career:
  Although the Bachelor's programme stands on its own, it has also to prepare students for an academic career. On the one hand, the Bachelor degree qualifies the graduate for enrolment in a Master's programme and on the other hand, the Bachelor degree is evidence that its holder is able to function in the relevant professional environments. These

Students visiting Motorola (Malaysia) during study tour

Students visiting Proton (Malaysia) during study tour two different conditions cannot be realised for all students in one programme. For this reason, students can opt for an internship in the professional field instead of taking minor courses.

- Formalisation can be harmful for the effectiveness of the programmes:
  The faculty's culture is focused on direct solutions to problems. The thresholds are low; actions are undertaken immediately in a collegial atmosphere. As a consequence, many problems are already solved before they are formally identified. However, the process of action is only noticeable for the persons directly involved. Therefore, reporting and justifying the endeavours to an external body is more difficult than it would be in a more formalised structure. Further formalisation might be detrimental to effectiveness. Therefore, the emphasis in the quality assessment system is on the signal function rather than on the report function.
- Inflow of international students remains low:
  Despite the overall ambition of the University to have international Master's programmes, the inflow of international students in the IDE Master's programme has remained low. Even though a few international exchange students join part of the programme each year, the exchange of experiences among students from different international backgrounds is limited, unfortunately. There are no easy ways to increase the inflow of international students if the financial budget for scholarships remains at the same level.
- Limited number of teaching staff:
  The number of teaching staff for the IDE programmes is limited and the pressure on the staff to deliver results in project acquisition and research is increasing. This makes the organisation of the educational programmes difficult and vulnerable.



Breadboard and laptop: Electronics for Industrial Design

Working on Electronics for Industrial Design

8. Assessment and realised academic level: Bachelor's programme

A mix of assessment methods is used that matches the different types of educational methods related to the different learning objectives, implying an effective assessment system for the Bachelor's programme IDE.

8.1 Assessments in the Bachelor's programme

Since 2010, an assessment policy is compulsory for every programme as stated in the new version of the WHW[1]. The position of the Board of Examiners has been strengthened and the assessment requirements have been raised. In this Chapter it is demonstrated that the Bachelor's programme has an effective assessment system.

The applied assessment system aligns with the framework of the University[2] as presented in August 2011. In this framework the final qualifications, the educational programme and the assessment of the final qualifications form a coherent unit. A checklist has been developed to verify which aspects of the assessment policy need attention. The checklist for the Bachelor's programme has been completed[3] (October 2012). The results of this inventory have been summarised in terms of actions to be taken. Almost all of these actions have been completed. As a result of this inventory, the need arose to document the assessment policy which has been implemented since the start of the programme[4].

The following sections discuss the assessment methods, the assessment quality and policy, and the Bachelor's regulations.

8.1.1 Assessment methods

The Bachelor's programme does not have one single examination session for the programme as a whole; all courses are examined separately. A course assessment is called an examination or exam. The total of the results of the examinations is submitted to the Examination Board for verification as to whether the graduation requirements have been met.

The programme uses the following types of assessment methods:

- Written examination: written text;
- Oral examination: oral interrogation;
- Project examination: examination on the basis of a written report, which is the result of an assignment carried out by a group of students; a presentation, defence and cross-questioning make up part of the project examination; the examination can be organised on either an individual basis or group basis; often this is a combination of both (e.g. individual mark for presentation, defence, contribution for participation in (practical) exercises;

1 *Higher Education and Research Act (in Dutch: Wet op het Hoger onderwijs en Wetenschappelijk onderzoek, abbreviated WHW)*
2 *http://www.utwente.nl/so/toetsing/Bestuur_beleid/Toetsbeleid%20UT/Kader%20Toetsbeleid%20UT%20-%20versie%20april%202011.doc/*

3 *Appendix V*
4 *Appendix X*

Coffee machine design, shown at project market

Coffee machine design, shown at project market

» Practical: (practical) exercises;
» Assignment: homework answers, (visual) essay, product, presentation, colloquium, problems, practicals and so on; the determining factor is that the student delivers an achievement which is to be assessed and often concluded with an oral examination; the examiner publishes further details.

The final mark of an examination is based on one of, or a combination of, these methods.

The exam schedule is published at the beginning of the academic year. A timetable with the dates of the written examinations is released at the start of each semester, together with dates of project examination sessions and of oral examinations for groups of students. An individual oral examination can be taken at a time determined by the student in consultation with the examiner(s).

As project-led education is strongly embedded within the programme, special attention is paid to the examination system. In projects, students combine knowledge and skills to achieve results in a certain context. In project examinations, group work and integrative aspects are judged, as well as the individual accomplishments of each student in the project, as each individual member of a project group must meet the final qualifications of the programme. Furthermore, the final qualifications include aspects of teamwork. The latter is crucial in the professional field of Industrial Design Engineering.

In addition to the assessment of projects, a mix of assessment methods matching the different types of educational methods related to the different learning objectives is used. This ensures that the basic knowledge, skills, attitude and more complex competences all are assessed, both separately and in combination. Experience has shown that this method of examination is effective and reliable.

To evaluate the validity and reliability of assessments, evaluations by the Evaluation Committee are a regular part of the quality assurance activities, and provide information about the students' perception of testing. Especially in project evaluations, students sometimes complain about the efforts of fellow students within the student team. However, contributions within a group effort are hard to judge individually. This part of the total project assessment could be improved by a more precise description of the division of tasks of each student in the project team, or by peer review among the students.

8.1.2 Assessment quality and assessment policy

Quality assurance regarding assessments takes place according to the assessment policy documents[5]. It is the responsibility of the Examination Board, of which the Rules and Regulations are part of the Student Charter. All members of the Examination Board have participated in training supervised by an expert on educational assessment.

Chair holders are responsible for the theory courses. Lecturers and project co-ordinators make plans for the assessment of their courses and projects. The assessment plans are discussed with one or more colleagues and with the secretary of the Examination Board and then reviewed by the faculty educational advisor. The revised (improved) learning goals and course

5 *Appendices W, and X*

Students visualizing ideas in one of the working spaces

Students working in one of the working spaces information are published[6]. The assessment matrices and scoring plans are made available to the Examination Board.

The assessment plan includes that students are informed through the electronic course information system (Osiris) and the electronic learning environment (Blackboard) about the learning goals, course materials, assessment methods and assessment criteria; projects are described in a project guide. Exams are cross-checked and verified by colleague lecturers. Lecturers make exercise materials available to students, enabling them to become familiar with the type and formulations of exam questions. After the exams, the lecturer checks the exams on the basis of a course assessment plan with a test matrix and grading plan. For a project, students receive marks for the project exam and for project reporting. At least two examiners are present at a project examination (in most cases the tutor who accompanied the project group and an examiner who was not involved in the group process, but only assesses the final results).

Afterwards, the quality of the exams is evaluated by both the lecturer and the students. The lecturer, for example, checks whether there are exceptionally high or low scores, or individual exceptional scores, and whether there may be a need for adjustment. If there is a need for adjustment, this is presented before the Examination Board. In addition to the course evaluations, students also have the right to discuss the results with the lecturer if they have a feeling that something did not go the way it should.

Lecturers use course evaluations to improve future assessments, under the supervision of the Examination Board. According to the verification procedure as described above, the lecturer is the one who can eventually implement improvements in the exams ('act'). The Education Committee then gives feedback on these improvement actions. For major changes, for example in the learning goals or the assessment method, a custom test plan is reviewed by the Examination Board. For advice or support, the lecturer can always contact a colleague who is in charge of educational aspects.

Recently, the Examination Board decided to collect all relevant data of separate courses in one overview, which includes the following elements:

- Description of the course;
- Learning goals and level;
- Test scheme;
- Recent tests or assignments;
- Standard elaboration of the test / criteria to judge tests;
- Pass / fail criteria;
- Analyses of examinations;
- Results (number of participants, pass rates);
- Course evaluation results;
- Peculiarities, complaints;
- Comments and actions to be taken.

This is published in VISIO[7] and accessible by all staff members

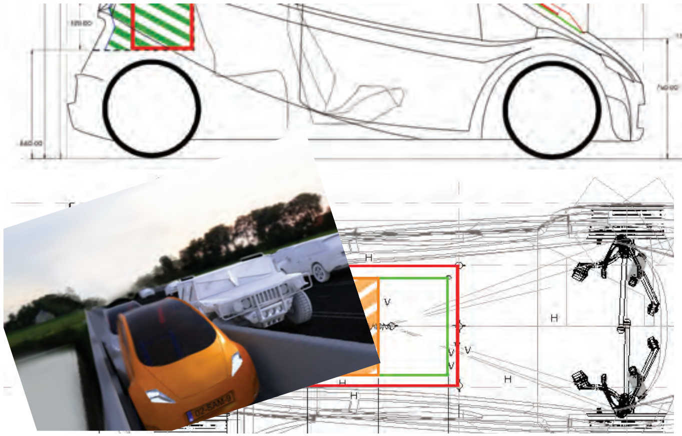
8.1.3 Rules and regulations

The Student Charter[8] contains information on the rules and regulations of assessment. This includes the number of times a student is allowed to take part in an examination and an explicit fraud policy. Each student is allowed

6 *https://osiris.utwente.nl/student/OnderwijsCatalogusZoekCursus.do*

7 *Appendix Y*

8 *Appendix K*



Ruud Claassen, Small Advanced Mobility

Graduation project (BSc.)

Rachel Kooper, Het Foodatelier

Graduation project (BSc.)

to take part in a written or oral examination twice. If a third (or higher) attempt is necessary, permission from the Examination Board is required. The fraud policy includes a description what is considered fraud, including plagiarism. The Examination Board supervises and ensures the correct procedures, guidelines and criteria of the examination rules. In addition, the Board receives individual requests from students and makes decisions on a case-by-case basis.

8.1.4 Thesis regulations

The Bachelor's programme is concluded with an individual Bachelor's thesis project of 20 EC. In general, the assignment is carried out externally, at a company or a public organisation within (or at times outside) the Netherlands. This way, students get acquainted with and obtain professional experience in the field of industrial design engineering in (industrial) practice.

It is worthwhile to mention that the Bachelor's thesis project should not be seen as the ultimate proof of all competences of the Bachelor's programme, but should also be considered an important learning project. The final project is the first opportunity for students to work individually on their own project in an external organisation, while being judged according to criteria set by the University. Still, several of the final Bachelor's qualifications are addressed in the Bachelor's thesis project.

During this final Bachelor's project, students are coached by (selected) staff members of the external organisation that hosts the Bachelor's project. University staff members act as supervisors, and coach the students as well. Before the start of the actual project, students write a project plan. This project plan has to be approved by the appointed University staff member. At the end of the project, students submit a final report which is assessed by the supervisor of the external organisation and the supervisor from the University. The latter decides whether the project's execution is of sufficient quality to be assessed by an assignment committee; however, this does not imply that the final judgement of the committee will be 'sufficient' as well.

The assessment of the Bachelor's thesis is the task of the Bachelor's assignment examination committee. It consists of the University staff member, who acted as internal supervisor, and a professor or senior staff member (UHD) who chairs the examination. The supervisor from the external organisation is invited to join the committee as an advisor.

The aspects of assessment are the following:

» Level of the contents of the work undertaken in the light of the aims of the Bachelor's programme;
» Demonstrated skills of an engineer in the Industrial Design Engineering field at Bachelor's level;
» Communication skills (report, presentation, communication with colleagues in the external organisation) at Bachelor's level;
» Ability to defend and discuss the obtained results and the design at Bachelor's level.

These aspects are tested with reference to the report (thesis), the (formal) presentation in presence of the members of the Bachelor's assignment examination committee, oral cross-questioning, problem-solving approach (of the final project) and mastering of the theory behind the problem. Marks for each component are used to substantiate decisions and to give feedback. The final mark is not necessarily the average of the component marks. The

Student working on models in the workshop weight is based on the examination form provided by the Examination Board. To complete the thesis project, the students have to deliver a short summary, a poster and a presentation for a public audience. A member of the Examination Board coordinates and supervises the procedure of the individual Bachelor's thesis projects.

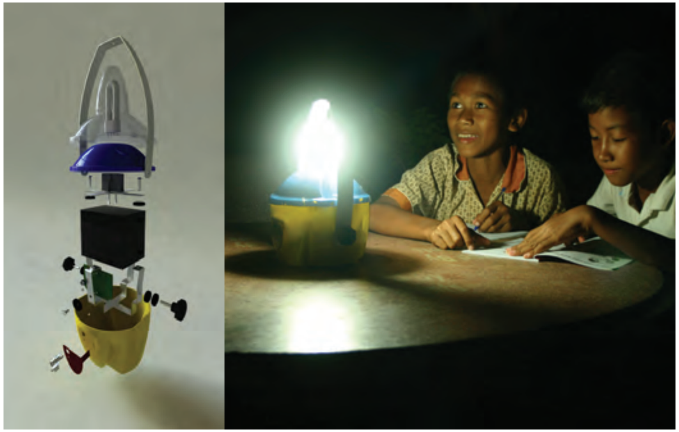
8.2 Realised academic level

The realised academic level can be assessed by evaluating the level of exams of the individual courses of the programme, in particular that of the (final) thesis project. The academic level of the Bachelor's programme evaluated based on how alumni perform in the following Master's programme, or (in a few cases) in the professional field. The achievement of the intended learning goals is assessed in different combinations of theory examinations, assignments and project work. Test plans set up for individual courses ensure the assessment of every learning goal at the right level of cognition.

In general, the realised academic level is adequate according to the exit interviews, WO monitor and discussions with alumni. However, over the years, there have been courses with a pass rate of less than 50% (percentage of students that pass the exam). This never automatically means that the level of the exam has to be adjusted, because of its high academic level. Rather, it is a signal for the lecturer to analyse (together with the programme director) the setup and content of the course as well as the exam. Moreover, it is a reason to analyse, for example, how much time students spent on the course, or how much the impact of other courses in the same quarter on the results of the course with the low pass rate is. The opposite, an analysis of courses with exceptionally high pass rates, can happen as well. It could be that, although the test plan is carefully drawn up, something is not working out well within the exam.

Somewhat to the contrary is the fact that exit interviews with Master's students indicate that, in general, courses in the Bachelor's programme are not deemed extremely challenging by students. However, courses often seem to be easier when looking back after three or more years than at the time when the courses were followed. This has to do more with the fact that students do not realise how much they have learned over the past period. The same happened when third year students, in the framework of the minor, followed a first-year course of another programme. Consequently, the Examination Board has strict rules for the approval of minor programmes. Moreover, the WO monitor shows that 90% of the alumni feel that the IDE programme provides a good basis for a professional or academic career. An explanation for this contradiction could be that perhaps the level of the courses at the beginning of the programme is (too) low, which might give students the impression that courses are (too) easy and that there is no need to study very hard. Then, in the end, the level of the courses and exams turns out to be higher than students anticipated and consequently they fail. This phenomenon, in addition to other reasons, is one of the driving forces behind the introduction of a new educational scheme at the University of Twente at the start of the academic year 2013 – 2014.

A relatively good indicator for the realised academic level of the Bachelor's programme is the level of the Bachelor's thesis projects. Appendix G contains a list of the Bachelor's thesis projects of the academic years 2010-2011 and 2011-2012. In order to further evaluate the performance of Bachelor's students, the outcome of the questionnaire for external supervisors in the



Martijn Kranen, Kamworks Cambodja

Graduation project (BSc.)

Laurens Kemp, PenWeld BV

Graduation project (BSc.)

Bachelor's thesis projects can be used. The vast majority of the external supervisors are very positive about the performance of the students and the results of the thesis projects[9].

This provides some confidence that the overall realised academic level in the Bachelor's thesis project and in the Bachelor's programme is more than satisfactory.

However, the real proof will be whether graduates are sufficiently equipped for their studies if they become students in a Master's programme. The fact that 90% of the new Bachelors enrol in a Master's programme at the University of Twente and other universities confirms that they are. So far, not enough Bachelors have graduated to be able to draw any conclusion about the level of their preparation for the professional field, as most of the Bachelors enrol in a Master's degree programme.

9 *Appendix Q*

A student shaping a model in the workshop

9. Assessment and realised academic level: Master's programme

The Master's programme IDE has an effective assessment system.

9.1 Assessments in the Master's programme

As stated in Chapter 8, an assessment policy is compulsory for every programme, including this Master's programme. The two programmes (Bachelor's and Master's) have a combined Examination Board. In this Chapter, it will be demonstrated that the Master's programme has an effective assessment system.

The applied assessment system for the Master's programmes aligns with the framework of the University[1,2]. In this framework, the final qualifications, the educational programme and the assessment of the final qualifications form a coherent unit. A checklist has been developed; and completed; to identify aspects of the assessment policy that needed attention[3]. The results of this inventory have been summarised in terms of actions to be taken. Almost all of these actions have been carried out. As a result of this inventory, the need arose to document the assessment policy which has been implemented since the start of the programme[4].

The following sections discuss the assessment methods, the assessment quality and policy, and the Master's regulations.

9.1.1 Assessment methods

Like the Bachelor's programme, the Master's programme does not have a single examination session for the programme as a whole; all courses are examined separately. The total of the results of the examinations of the courses is submitted to the Examination Board for verification as to whether the graduation requirements have been met.

The Master's programme uses the same types of assessment methods as described in Chapter 8 for the Bachelor's programme:

» Written examination;
» Oral examination;
» Project examination (only occasionally used in the Master's programme);
» Practical;
» Assignment.

The final mark of an examination is based on one or a combination of these methods.

The same exam schedule as used for the Bachelor's programme is published at the beginning of the academic year for the Master's programme. At the start of a semester a timetable with the dates of the written examinations is

1 *http://www.utwente.nl/so/toetsing/Bestuur_beleid/Toetsbeleid%20UT/Kader%20Toetsbeleid%20UT%20-%20versie%20april%202011.doc/*
2 *Appendix W*
3 *Appendix V*
4 *Appendix X*

Students co-operating in a project room

released. Individual (oral) examination can be taken at a time determined by the student in consultation with the examiner(s). To evaluate the validity and reliability of assessments, evaluations by the Evaluation Committee are a regular part of the quality assurance activities, and provide information about the students' perception of the testing.

9.1.2 Assessment quality and assessment policy

Quality assurance regarding assessments in the Master's programme takes place according to the same assessment policy document[5] as used for the Bachelor's programme. It is the responsibility of the Examination Board, of which the Rules and Regulations are part of the Student Charter.

Chair holders are responsible for the theory courses. Lecturers make plans for the assessment of their courses. The assessment plans are discussed with one or more colleagues and with the secretary of the Examination Board and then reviewed by the faculty educational advisor. The revised (improved) learning goals and course information are published[6]. The assessment matrices and scoring plans are made available to the Examination Board.

The assessment plan includes that students are informed through the electronic course information system (Osiris) and the electronic learning environment (Blackboard) about the learning goals, course materials, assessment methods and assessment criteria. Exams are cross-checked and verified by colleague lecturers. Lecturers make exercise materials available to students to enable them to become familiar with the type and formulations of the exam questions. After the exams, the lecturer checks the exams on the basis of a course assessment plan with a test matrix and grading plan.

Afterwards, the quality of the exams is evaluated by both the lecturer and the students. The lecturer checks whether there are exceptionally high or low scores, or individual exceptional scores, and whether there may be a need for adjustment. If there is such a need, it is presented before the Examination Board. In addition to the course evaluations, students also have the right to discuss the results with the lecturer when they have the feeling that something did not go the way it should.

Lecturers use course evaluations to improve future assessments under the supervision of the Examination Board. According to the verification procedure as described above, the lecturer is the one who can eventually implement improvements in the exams ('act'). The Education Committee then gives feedback on these improvement actions. For major changes, for example in the learning goals or the assessment method, a custom test plan is reviewed by the Examination Board. For advice or support, the lecturer can always contact a colleague who is in charge of educational aspects.

Recently, the Examination Board decided to collect all relevant data of separate courses in one overview. This includes the following:

» Description of the course;
» Learning goals and level;
» Test scheme;
» Recent tests or assignments;
» Standard elaboration of the test / criteria to judge tests;
» Pass / fail criteria;
» Analyses of examinations;

5 *Appendix X*
6 *https://osiris.utwente.nl/student/OnderwijsCatalogusZoekCursus.do*

Virtual reality: combining 2D and 3D views

- Results (number of participants, pass rates);
- Course evaluation results;
- Peculiarities, complaints;
- Comments, and actions to be taken.

This is published in VISIO and accessible to all staff members

9.1.3 Rules and regulations

The Student Charter[7] contains information on the rules and regulations of assessment. This includes the number of times a student is allowed to take part in an examination and an explicit fraud policy. Each student is allowed to take part twice in a written or oral examination. If a third (or higher) attempt is necessary, permission from the Examination Board is required. The fraud policy includes a description of what is considered fraud, including plagiarism. The Examination Board supervises and ensures the correct procedures, guidelines and criteria of the examination rules. In addition, the Board receives individual requests from students and makes decisions on a case-by-case basis.

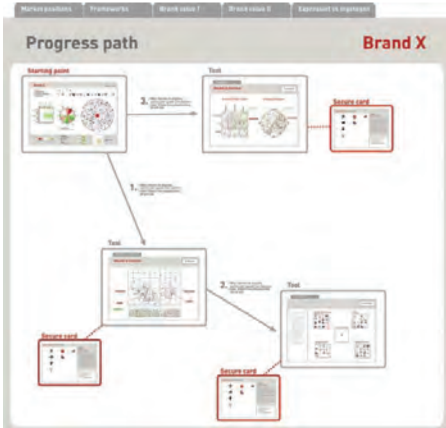
9.1.4 Thesis regulation

At the beginning of the Master's programme, the student discusses the courses of the individual Master's programme and the Master's project with the assigned track coordinator. Specific courses may be included in the Master's programme to enable the student to complete the Master's project successfully. The entire Master's programme (courses and final project) requires approval from the track coordinator and the programme director. The latter is responsible for the design and implementation of a systematic procedure for evaluating (parts of) the programme, in particular the elements 'quality', 'feasibility' and 'integrating elements'. The Master's programme is concluded with an individual Master's thesis project. The main objective of the Master's project is to carry out an individual research or design project, independently, in one of the sub-fields of Industrial Design Engineering. The level must be representative for a Master's programme, by applying state-of-the-art scientific knowledge of the sub-field. The size of the thesis project is 45 EC (3/4 of an academic year). In general, the assignment is carried out externally, at a company or a public organisation within the professional field. The entry requirements for the Master's thesis project are specified in the Student Charter[8].

The Master's assessment is at the same time the graduation event. Therefore, the Examination Board grants authority to a Master's graduation committee. This graduation committee consists of at least three members of the scientific staff of the University of Twente. The final responsibility for the supervision and assessment lies with the *chair* of the graduation committee, who is a professor at the Faculty of Engineering Technology. One of the members of the committee is appointed as *daily supervisor* of the Master's student, and is a scientific member of the chair of the graduation professor. The third committee member (the 'scientific assessor') is a scientific staff member from another specialisation area, and therefore from another chair of the faculty. The addition of a third committee member is one of the quality measures to assure the same level of grading across the different tracks involved in the programme. In almost all cases, the graduation committee

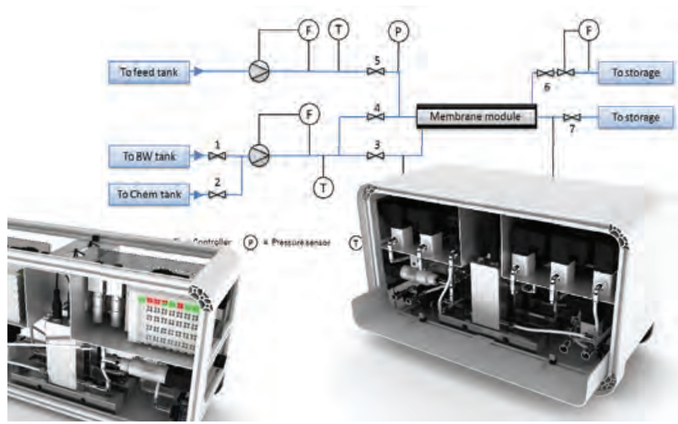
7 *Appendix K*

8 *Appendix K*



Thierry Cheval, Scope

Graduation project (MSc.; Management of Product Development



Jonathan Bennink, University of Twente

Graduation project (MSc.; Emerging Technology Design) is supplemented with external members, particularly if the Master's project is carried out externally, but occasionally also for internal projects. If the Master's project is performed externally, the student will have (at least) one daily supervisor from the external organisation. Members; from outside the University have an advisory role in the assessment of the Master's thesis project.

To complete the Master's thesis project (and the Master's programme), the student has to write a thesis; as well as to present the thesis work to an audience in a colloquium of 30 to 45 minutes. After the presentation the audience can ask questions. Next, the graduation committee engages in a critical discussion with the student regarding the project, and assesses the project in a closed session during about 60 minutes. Assessment is based on the following four main aspects:

» Level of the work undertaken in the light of the aims of the Master's programme;
» Demonstrated skills of an engineer in the Industrial Design Engineering field at Master's level;
» Communication skills (report, presentation, communication with colleagues in the external organisation) at Master's level;
» Ability to defend and discuss the obtained results and the design at Master's level.

These aspects are tested with reference to the report (thesis), presentation, oral cross-questioning, problem-solving approach (of the final project) and mastering of the theory behind the problem. Marks for each component are used to substantiate decisions and to give feedback. The final mark is not necessarily the average of the component marks. Weighting is based on the examination form provided by the Examination Board.

9.2 Realised academic level

The realised academic level can be assessed by evaluating the level of exams of the individual courses of the programme, in particular that of the (final) thesis project. In the case of the Master's programme, the performance of graduates in the professional field or (in a few cases) in a PhD. programme can be used as evaluation of the acquired academic level. For Master's students, the ultimate proof of quality is that graduates are well prepared and successful in their positions after graduation. The information about the quality of the graduates can be approximated on the basis of the exit interviews (shortly after graduation), positions secured after graduation, results of the WO monitor and results of the Master's programmes.

Given the target of 15% or less of the students receiving a mark of 6 for their Master's thesis, the results are very satisfying. In the period September 2010 to September 2012, only 4% of the students received a mark of 6, whereas 29% of the students received a mark of 7, 53% a mark of 8 and 14% a mark of 9 (of which 31% graduated cum laude).

The academic level is prominently present in the students' graduation projects. For these projects, the programme has carefully set up a list with learning outcomes which are part of the final mark. The Examination Board monitors these qualifications, which are required by the professional field. The positions held by Master's graduates show a large degree of variation, although most are within the broad range of Industrial Design Engineering.

A student working on a 3D model in the Virtual Reality Lab

In the Virtual Reality Lab many kinds of atmospheres can be created

10. Strength and weaknesses of assessment and realised academic level (Standard 3)

10.1 Strengths

- The mix of assessment methods is optimal;
  The mix of assessment methods is an optimal way of evaluating the various behavioural aspects of the progress of the students.
- A complete assessment system is used;
  A well defined and complete assessment system is used, with explicit targets, measuring procedures and follow-up arrangements.
- Graduates find jobs;
  Nearly all graduates (of the undivided programme) find jobs within six months after graduation, jobs that are appropriate with respect to their level of competence and for which they are well prepared, both according to the graduates themselves and their supervisors.

10.2 Weaknesses

- Quality assessment procedures have recently been implemented;
  Some elements of the quality assessment procedures were only recently implemented, such as the formalisation of the evaluation of the graduation exam and the new Course Information and Assessment Plan. Earlier, these elements were not documented, but according to the evaluation, this was never a problem area for students.
- The Bachelor's programme could be more challenging;
  Exit interviews with students indicate that the level of the Bachelor's programme could be more challenging. Attention to this aspect will be paid in the design of the new Bachelor's curriculum.

10.3 Opportunities

- It is difficult to maintain a balance between a scientific and a professional orientation of the individual Master's programmes;
  As students are, within a certain framework, free to choose their individual Master's programmes, it is hard to find the proper balance between the scientific and professional orientation. In exit interviews, some graduates indicate that they would have been more challenged by the programme if they had chosen a more balanced individual programme. However, the same graduates indicate that due to their academic education, they were enabled to adjust this in their present profession.

10.4 Threats

- It is difficult to maintain a good balance between the formally expected and realised time students spend on the programme;
  Some students take more time than the officially required time to complete their programme (Bachelor's or Master's), because they are interested in subjects within or outside the programme that they want to spend more time on. Attention will be paid to limiting the real duration of the programme.

Bicycles in the snow in front of the Horst building

11. Conclusions

This report presents a Critical Reflection on the Bachelor's programme 'Industrieel Ontwerpen' and the Master's programme 'Industrial Design Engineering'.

From this Critical Reflection, it is apparent that both programmes address the needs of the graduates in their professional careers, both in academia and in related industries. This conclusion is also substantiated by the evaluations by students, graduates and the professional field.

Chapter 3 demonstrates that the intended learning outcomes (Standard 1) of the Bachelor's and Master's programmes are well in line with the final qualifications for the Industrial Design Engineering programmes as set by the international scientific community. They also meet the expectations from the professional field.

The final qualifications reflect a good balance between scientific basis, skills, design and problem-solving abilities. The goals of the Bachelor's and Master's programmes represent a good balance between design and engineering qualifications. This balance aligns very well with the 'High Tech Human Touch' profile of the University of Twente.

The teaching-learning environment (Standard 2) of the Bachelor's programme is based on an explicit educational concept, Project-Led Education. Because this concept is implemented in a structured and comprehensive manner, it leads to a well-balanced and coherent curriculum (Chapter 5). The programme departs from the assumption that students engage themselves in their study full-time; the pass rates do not fully reflect this principle.

The teaching and learning environment of the Master's programme offers students the possibility to develop their own interests at a high academic level (Chapter 6).

The teaching staff of both programmes is well-qualified. However, the number of teaching staff is not very high, which could make the programmes vulnerable. So far, this has not affected the quality of the educational programmes.

For both programmes, the available facilities are excellent.

The assessments employed are based on an explicit assessment policy, which is well in line with the assessment framework of the University of Twente (Chapter 8, BSc. programme and Chapter 9, MSc. programme, Standard 3). The implemented mix of assessment methods adequately evaluates the various (behavioural) aspects of the progress of the students. The assessment system is well-defined, structured and complete. It has explicit targets, measuring procedures and follow-up arrangements.

Nearly all graduates find jobs within six months after graduation. These jobs are appropriate with respect to the students' ability to integrate the acquisition or engendering of new knowledge with effective and efficient problem solving expertise. Graduates are well-prepared for the labour market, both according to the graduates themselves and their supervisors.

Overall, the conclusion is that both the BSc. and the MSc. programme clearly meet the standards as set by the NVAO.

Quick feedback on group work

Bachelor’s student presenting his work at the graduation ceremony

12. Overview of strong and weak points

12.1 Strengths

12.1.1 Intended learning outcomes (Standard 1)

- The programmes are well balanced;
  The final qualifications of the IDE programmes reflect a good balance between a solid scientific basis, skills, and design and problem-solving abilities.
- The programmes are innovative both in didactics and content;
  The programme goals match the mission of the Faculty of Engineering Technology and take the lead in new developments; the programme goals constitute a good balance between design and engineering qualifications, which fits well within the 'High Tech Human Touch' profile of the University of Twente.
- The Master's programme is research-oriented;
  Within the Master's programme, students can focus on a particular discipline and study a tailor-made programme.
- The Master's programme adequately prepares students for the professional field;
  Master's graduates easily find jobs, and many thesis projects result in products that actually make it to the market.
- Graduates are able to function in an academic or professional environment;
  Students are exposed to multiple viewpoints, interest and stakes that play a role in projects and organisations.

12.1.2 Teaching and learning environment (Standard 2)

- The programmes are based on explicit educational concepts;
  The structures are well-balanced, with a transparent path for the development of knowledge, attitudes and skills.
- The Bachelor's programme has a clear strategy concept;
  The Bachelor's programme contains a well balanced combination of styling and engineering courses, which ensures that students develop different important competences.
- The Bachelor's programme offers an active and high effort learning environment;
  Having a challenging variety of learning activities guarantees active learning and a relatively high effort, while the concentration on a theme in each term ensures a learning approach directed toward a real understanding and the application and evolution of what was learned.
- The Master's programme offers a well balanced variety of courses;
  This ensures that students develop their own interests at a high academic level.
- The educational quality of staff is good;
  The didactic qualities of staff members involved in IDE programmes, as expressed in percentage UTQ, are good and above the UT targets.
- The teaching and learning environment contains a short feedback loop;
  Students are actively involved in the programme (Educational

Expert assistance in creating prototypes

Committee) and evaluations (Evaluation Committee) and the open and constructive atmosphere means that students can easily approach staff members with questions and requests for feedback and that the organisational and educational quality is open to improvement.

» The thesis projects are well balanced concluding pieces of the programmes;
Thesis projects carried out externally give students an excellent opportunity to apply their knowledge and develop new knowledge within the academic and professional field of Industrial Design Engineering, which turns out to have a stimulating and motivating effect on students.

12.1.3 Assessment and achieved academic level (Standard 3)

» The mix of assessment methods is optimal;
The mix of assessment methods is an optimal way of evaluating the various behavioural aspects of the progress of the students.

» A complete assessment system is used;
A well-defined and complete assessment system is used, with explicit targets, measuring procedures and follow-up arrangements.

» Graduates find jobs;
Nearly all graduates (of the undivided programme) find jobs within six months after graduation, jobs that are appropriate with respect to their level of competence and for which they are well prepared, both according to the graduates themselves and their supervisors.

12.2 Weaknesses

12.2.1 Intended learning outcomes (Standard 1)

» It is difficult to maintain the multidisciplinary character;
It is a considerable challenge to find a good balance between the broad, multidisciplinary character of the IDE programmes and the academic and professional goals in the programmes of individual students.

» The internal communication leaves to be desired;
It is difficult to convey the bigger picture behind the programmes to students who have not yet gained extensive experience with the programmes and the field of design engineering. Also, the available possibilities are badly communicated to students.

12.2.2 Teaching and learning environment (Standard 2)

» The Bachelor's programme has a high study load;
The interaction rates between students and teachers decline in the course of the programme. Many students tend to study less than the expected (required) 42 hours a week; therefore, the nominal course of the programme and the activities of individual students can go out of phase, endangering the coherence and effectiveness of the programme.

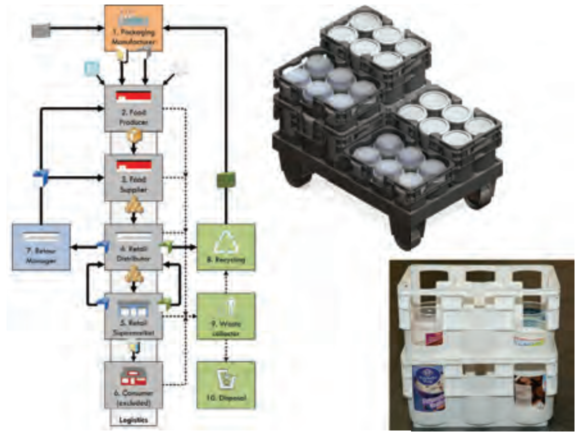
» The percentage of teaching staff with a doctorate degree is relatively low;

12.2.3 Assessment and achieved academic level (Standard 3)

» Quality assessment procedures have recently been implemented;
Some elements of the quality assessment procedures were only

Martijn Zwart, Donkervoort

Graduation project (BSc.)



Sander Nieuwboer, ContainerCentralen

Graduation project (MSc.; Management of Product Development)

recently implemented, such as the formalisation of the evaluation of the graduation exam and the new Course Information and Assessment Plan. Earlier, these elements were not documented, but according to the evaluation, this was never a problem area for students.

» The Bachelor's programme could be more challenging;
  Exit interviews with students indicate that the level of the Bachelor's programme could be more challenging. Attention to this aspect will be paid in the design of the new Bachelor's curriculum.

12.3 Opportunities

12.3.1 Intended learning outcomes (Standard 1)

» The Bachelor's programme can purposefully prepare students for the professional field;
  The programme objectives of the Bachelor's programme do not explicitly cover the students' disposition towards careers in professional environments. However, the number of Bachelor's students who are offered a position (often as a result of their final Bachelor's assignment), appears to be an implicit acknowledgement of the adequate preparation of the students for a professional career.

12.3.2 Teaching and learning environment (Standard 2)

» Increasing the time spent in study counselling for a selected group of Bachelor's students will increase the study success rate;
  The coherent structure of the Bachelor's programme is an advantage for all students who are able to keep up with the time schedule of the programme, but a disadvantage to students who are not keeping up. To improve this, the programme can increase the amount of time spent in study counselling for the latter group of students (and has already done so).

» Stimulating individual Bachelor's students to follow special programmes;
  The marks for group projects do not always reward the individual talents and diligence of the top students as a substantial proportion of the mark is based on the performance and results of the group as a whole. However, overemphasising the individual performance would have repercussions for group dynamics and the attainment of other learning objectives. In order to distinguish himself, the Bachelor's student can discuss additional challenges with the study advisory team, aim to graduate with the distinction 'cum laude', qualify for and participate in the so-called Excellence Stream (a mathematical programme with a high level of abstraction intended to deepen a student's mathematical level, only available to the best and motivated students), or to follow an honours track.
  In the Master's programme, students doing justice to their individual interest and capabilities are encouraged to individualise their programmes.

» Adaptation of project-led education (PLE) as leading concept for all Bachelor's programmes will enhance the strength of the IDE bachelor programme;
  The University adopted PLE as the leading concept for all Bachelor's programmes. Teaching staff of the IDE (and ME) programme have already become experienced in applying PLE in their daily teaching

Students in an interview with a prospective user

Bringing practice to the theory

practice. They are able to pass on this experience to other colleagues at the University. This will reinforce and challenge the IDE staff to ensure their position as role models, moreover consolidating the experience with PLE will bring the opportunity for additional, well considered, deliberated, and innovative developments in design education.

» Introduction measures by the government will increase the study success rate;
Several measures taken by the government such as the 'binding recommendation on continuation of studies', ' Bachelor's-before-Master's rule' and changing the system of student grants are observed to have a positive effect on study success rate. These measures will have positive effects on the steps taken by the faculty allowing for a stronger supervision, summer courses in mathematics, scheduling extra counselling hours and more attention for the efforts students must make during the study, and a better scheduling of courses.

12.3.3 Assessment and achieved academic level (Standard 3)

» It is difficult to keep a good balance between the scientific and professional orientation in individual Master's programmes;
With the increased experience of students graduating in (industrial) environments and related academic organisations, the network involved in reviewing the graduation process and the resulting grade, the possibilities to vouch for the quality extent and comprehensiveness of the educational programmes can be increased and can be made more transparent.

12.4 Threats

12.4.1 Intended learning outcomes (Standard 1)

» The Master's programme can be too fragmented;
The programme scope of the IDE Master's programme addresses a large variety of aspects, related to different disciplines. Students can either gain more in-depth knowledge on a sub-set of those disciplines or on a particular aspect across different disciplines. Individual students definitely see this as a benefit of the programme. However, it also entails variations in the appraisal of the breadth and depth of individual programmes; it therefore leads to considerable variations in the specific interests and aptitudes of graduates.

» Maintaining a balanced combination of academic and professional goals can be difficult;
Both IDE programmes have academic as well as professional goals. In some cases, however, it is difficult to combine these goals, and they may conflict. For example, the industry prefers a hands-on problem-solving approach that results in tools, guidelines and checklists. From a scientific perspective, it is preferable to focus on discovering new knowledge, underpinning the rationale of the selected approach, and publishing in internationally renowned academic journals. In some cases (e.g. the Master's thesis project), these two viewpoints produce differences with regard to the deliverables expected from the students. Ultimate goal for each Master's thesis project is to describe scientific and generic aspects, and not only to solve a practical problem.

Jesse van der Scheer, DGT

Graduation project (BSc.)

Ruud Elders, Ferm

Graduation project (MSc.; Management of Product Development)

12.4.2 Teaching and learning environment (Standard 2)

» The Bachelor's programme prepares for an academic career and less for a professional career;
Although the Bachelor's programme stands on its own, it has also to prepare students for an academic career. On the one hand, the Bachelor's degree qualifies the graduate for enrolment in a Master's programme and on the other hand, the Bachelor's degree is evidence that its holder is able to function in relevant professional environments. It is difficult to realise these two different conditions for every student within one programme. For this reason, students can opt for an internship in the professional field instead of taking minor courses.

» Formalisation can be harmful for the effectiveness of the programmes;
The faculty's culture is focused on direct solutions to problems. The thresholds are low; actions are undertaken immediately in a collegial atmosphere. As a consequence, many problems are already solved before they are formally identified. However, the process of action is only noticeable to the persons directly involved. Therefore, reporting and justifying the endeavours to an external body is more difficult than it would be in a more formalised structure. Further formalisation might be detrimental to effectiveness. Therefore, the emphasis in the quality assessment system, is on the signalling function rather than on the report function.

» The inflow of international students remains low;
Despite the overall ambition of the University to have international Master's programmes, the inflow of international students in the IDE Master's programme has remained low. Even though a few international exchange students join part of the programme each year, the exchange of experiences among students from different international backgrounds is limited, unfortunately. There are no easy ways to increase the inflow of international students if the financial budget for scholarships remains at the same level.

» The number of teaching staff is limited;
The number of teaching staff for the IDE programmes is limited and the pressure on the staff to deliver results in project acquisition and research, next to the efforts spent on (improving) education, is increasing. This makes the organisation of the educational programmes difficult and vulnerable as well.

12.4.3 Assessment and achieved academic level (Standard 3)

» It is difficult to maintain a good balance between nominal and actual time spent on the programme by students;
Some students need (or intentionally take) more time than the nominal required time to complete their programme (Bachelor's or Master's), because they dedicate more time to activities within or outside the programme than other students.

Faculty of Engineering Technology

13. Outlook

For a design engineer, it is quite uncommon to just sit by and watch a state of equilibrium in a product development trajectory. Any design engineer will always see (and look for) opportunities for further improvement as well as for paradigm shifts that allow for completely different solutions. Moreover, the ever-changing context of design projects will also urge the designer to be flexible, responsive and enterprising.

It goes without saying that this design attitude also applies to the educational programmes in Industrial Design Engineering. Both for the Bachelor's programme and the Master's programme, the staff (but also the students) are striving for more effective (and efficient) educational concepts and implementations thereof, while continuously seeing the opportunities and challenges presented by the changing environment that the programmes are embedded in.

To mention just a few, that environment will change at a rapid pace as the enlarged mobility of students and the increased possibilities of ICT technology are concerned. Together, such influences will call for different ways of learning. Currently, students already show a tendency towards more dedicate study behaviour, infused by (external) influences like BSA, 'clear-cut' and more dedicate study advice. At the same time, the increasing multiformity in the student population does justice to the multi-disciplinary character of the Master's programme. Moreover, the expectations and interests of students, teachers as well as researchers will change. Consequently, the flexibility, knowledge and decisiveness of the staff and the organisation of the programmes are called upon. For the educational programmes in Industrial Design Engineering, this adds the aim to render potential contrarieties instrumental in continuing to improve the structure and implementation of the programmes. The staff and students are convinced that the vision of the programmes is in line with both the interests of industry as well as of academia. Moreover, although limited in numbers, the staff is enthusiastic, flexible and decisive to actualise such improvements. The Faculty of Engineering Technology will, in the near future, allocate significant resources to strengthen both the educational capacity and the research capacity. This will be done by creating some new positions as well as by supporting current staff and facilities.

In order to strengthen the authenticity and expressiveness of 'Twents Design', the educational programmes see a number of opportunities. Firstly, the relation with (industrial) practice will be maintained and strengthened. This will, under the changing circumstances, secure that Industrial Design Engineers educated at the University of Twente are effectual and practical experts, combining excellent problem solving capacities with research abilities directed at value-adding projects in industry and academia.

Secondly, the grip on the Industrial Design Engineering field of expertise will be tightened by realising more collaboration and synthesis between the chairs of the Faculty of Engineering Technology that already participate in both programmes. By aiming at the integration of all disciplines in multi-disciplinary design engineering projects, the educational programmes can offer curricula that surpass the contribution of individual chairs and render a more coherent, structured and comprehensible educational programme.

The Virtual Reality lab, ready for the next session

Thirdly, existing collaboration between the different Faculties of the University of Twente will be strengthened. Already, there are quite some cross-links between educational programmes (e.g Creative Technology, Advanced Technology, Biomedical Engineering, Philosophy of Science, Technology and Society, etc.). Both for education and research, the Design Engineer can only benefit from such co-operations.

To further embed the educational programme in industrial and societal demands, Industrial Design Engineering strongly supports the implementation of TEM ('Twente Educational Model') over the full breadth of all University Programmes. Being a pioneer in project-led education and other characteristics of TEM, the experience gained in both Industrial Design Engineering programmes has provided the foundation for TEM. As a consequence, both educational programmes see the added value that TEM can bring to the University. In this, especially the inherent tendency to co-operate between teams, projects, educational programmes and faculties is appreciated.

Learning does not stop at the end of the Master's programme. At the University of Twente, PdEng. Degree programmes will be offered next to PhD. programmes. A wide variety of companies provide scholarships for such programmes. This will increase the career opportunities of alumni and it will also help to engage industry partners in academic research.

Appendices

Industrieel Ontwerpen | Bachelor's programme

Industrial Design Engineering | Master's programme

UNIVERSITY OF TWENTE.

A. Domain Specific Reference Framework

for the academic Industrial Design Engineering programmes

A.1 Introduction

The academic educational programmes of Industrial Design Engineering in The Netherlands conjointly specify the profile of IDE Graduates. In this document, the educational programmes in Delft, Eindhoven and Twente describe that profile, the labour market positions of IDE Graduates, a number of specific features of the IDE curricula and the distinction between the Bachelor's and the Master's level.

In the description of the profile and capabilities of the graduates, the knowledge and skills themselves are described independent of the distinction between the Bachelor's and Master's level. The difference between these levels is described in section 5, and addresses the width and depth of this knowledge and these skills.

The characterisations in this document reflect the common understanding between the three educational programmes as concerns the quintessence of IDE. In this, the document also elaborates on a number of underlying sources[1, 2, 3, 4].

1 *Dublin Descriptors (NVAO protocol).*
2 *The terms of reference of the last visiting committee "Assessment of Degree Courses Industrial Design Engineering", by A.C. Rotte et al., QANU Utrecht, The Netherlands, December 2007.*
3 *The descriptions of the profile and objectives of the three IDE programmes.*
4 *Reports like: Criteria for Academic Bachelor's and Master's Curricula (Joint publication by the three Technical Universities) (Meijers, e.a. TU/e, 2005); International Benchmark in Industrial Design Engineering (TU Delft, December 2005).*

A.2 Profile of the IDE graduates

The Industrial Design Engineer is an academically educated product[5] designer who can integrate knowledge from different fields of technology with human factors, can see signals from the market and can generate creative ideas with new solutions. In industry, the need for such versatile product designers is evident.

A Bachelor of Science/Master of Science in Industrial Design Engineering can operate in the field of Industrial Design as an interdisciplinary designer. The graduate is able to recognise the relevant disciplines and aspects, such as technology, manufacturing and logistics, market and user, business and marketing, aesthetics and functionality and is able to integrate these aspects into the development of solutions: products, systems and related services.

In the full development cycle of products, the IDE graduate:

- » is able to analyse market demands and user needs along with technological and social opportunities;
- » is able to generate a (personal) vision on the design problem;
- » is able to generate and select ideas and design concepts;
- » is able to transfer existing knowledge to new problems and to implement new knowledge;
- » can materialise a concept to the stage of a working model;
- » is able to take into account the marketing and the product life cycle.

Because the graduate is an academically educated designer, he has a thorough command of scientific methods and techniques related to the development of products as well as in conducting research. Based on having knowledge and skills in relevant disciplines and sciences, and being able to use these in reasoning and methodological reflection during/on the process of development, the graduate is able to contribute to research projects and to the development of new knowledge.

The graduate is a practiced engineer who proves himself by purposefully rendering added value for the organisation he works in. Moreover, he is self-steering, responsible, creative, is able to build on his own knowledge and skills, is able to develop his own signature and is able to deal with limited certainties. Moreover, he can communicate, can document, visualise and present his design, can structure and manage his projects, can function both individually as well in a multidisciplinary team. The context of his activities can be international and intercultural.

The basis for this IDE graduate profile is formed during the Bachelor's programme and the profile is further developed during the Master's programme.

A.3 Domains of knowledge and skills in the IDE curriculum

On the basis of the profile, seven dimensions are identified for academic graduates in the IDE programme. Graduates should have the ability to address all these dimensions:

- » Designing; A University IDE graduate can realise new or modified artefacts, products or systems, with the aim of creating value in accordance with predefined needs and requirements.

5 *In the context of the Industrial Design Engineering programmes, the notion 'product' is seen as any combination of physical product, system and (accompanying) services that together constitute a marketable entity.*

- IDE-relevant disciplines; A University IDE graduate is familiar with contemporary knowledge and has the ability to increase and develop this through study.
- Research; A University IDE graduate is able to acquire new scientific knowledge through research. In this respect, research entails the development of new knowledge and insight according to purposeful and systematic methods.
- Scientific approach; A University IDE graduate has a systematic approach characterised by the development and use of theories, models and coherent interpretations, has a critical attitude and has insight into the nature of science and technology.
- Intellectual skills; A University IDE graduate is able to adequately reason, reflect and form a judgment. These abilities are acquired or refined within the context of a discipline, and then become generically applicable.
- Co-operating and communicating; A University IDE graduate is able to work with and for others. This not only requires adequate interaction and a sense of responsibility and leadership, but also the ability to communicate effectively with colleagues, clients, (end-)users, suppliers, experts and laymen. He is also able to participate in a scientific or public debate.
- Addressing temporal, social and personal contexts; Science and technology are not isolated, and always have temporal, social and personal contexts. Beliefs and methods have their origins; decisions have social consequences in time. A University IDE graduate is aware of this, and has the competence to integrate these insights into his scientific work.

The IDE curriculum includes the following aspects/building blocks:

- Design Projects;
- Design Methods and Techniques;
- Engineering;
- Management and Market Studies;
- Design;
- Human factors;
- Socio-cultural awareness;
- Research Practices.

Furthermore, the IDE curriculum is a programme that provides a balance between the formation, processing, application, integration and contemplation of theory and skills. The Design Projects are the core of the curricula. The other building blocks are taught and integrated in the Design Projects.

A.4 Labour market perspective

Traditionally, prospects for designers in the labour market have been closely linked to the overall economic situation. In times of a booming economy, jobs were offered to graduates even before they had completed the IDE-programme.

In a declining economy, it can take graduates one or two years to find a suitable job. However, the enormous potential of current new developments (such as smart products, smart environments and portable products) means that new industrial designers are likely to be in great demand. More and more, governments and industry are convinced that innovation and smart design are set to play a very important role in future society.

Also, the fact that the domain of Industrial Design is widening its scope (for example to services, product-service combinations, the design of environments, the management of product development, brand design), means that the domain could soon become less dependent on the state of the economic situation.

So in the long run, the influence of design in society will increase, as will the demand for highly educated professionals in this field.

IDE graduates are found in jobs such as industrial designer, product designer, product engineer, design engineer, design manager, product manager, interaction designer, researcher, usability consultant, design-centred researcher, strategic designer, brand manager, New Product Development project leader, innovation consultant, design-brand consultant. Up until now, a relatively low number of Bachelors' graduates has directly entered the labour market.

A.5 Differences between a Bachelor's and a Master's graduate

The Bachelor's and the Master's degree differ in terms of orientation and level

A Bachelor's graduate	A Master's graduate
Can apply knowledge in various familiar situations	Can apply knowledge in new situations
Can work under supervision; average level of autonomy	Can work independently; high level of autonomy
Can approach/tackle and solve (relatively) basic (design) problems/questions	Can approach/tackle and solve (more) complex(design) problems
Can develop knowledge and skills/competencies from related disciplines	Can develop knowledge and skills/competencies from various disciplines
Can integrate and apply knowledge and skills/competencies in relatively basic (design) problems/questions	Can integrate and apply knowledge and skills/competences in more complex (design) problems
Can participate in the design and/or research process	Can adjust the design and/or research process to meet the demands of the task at hand
Has sufficient knowledge of the disciplines to judge the relevance of new developments, and can translate this to own domain	Has sufficient deep-seated knowledge of the disciplines to be able to form a (scientific) judgment, and can translate this to own domain
Can use scientific research findings in the design process and can perform a simple research project under supervision	Can plan and perform scientific research and can reflect on the phases of the research process
Can communicate opinions, ideas, information and results clearly	Can communicate conclusions, including the underlying knowledge, motives and deliberations, clearly, convincingly (and unambiguously)

B. Curricula 2012-2013: Bachelor's programme

	Q1	Q2	Q3	Q4
Y1	KOP Project Garde - 3,0 EC 192801231	Project IDEE Van der Bijl-Brouwer - 2,5 EC 192801210	Project Productrealisatie Vaneker - 5,0 EC 192801260	Project Smart Products Tragter - 5,0 EC 192801270
	Inleiding Industr. Ontw. Bonnema/Eger - 2,0 EC 192801231	Wiskunde 2 Kern (EWI) - 2,5 EC 191528020	Wiskunde 2 Still (EWI) - 2,5 EC 191528030	Elektronica voor IO Van der Zee (EWI) - 2,5 EC 191210381
	Wiskunde 1 Still (EWI) - 2,5 EC 191528010	Stijfheid en Sterkte Geijselaers - 3,0 EC 191157052	Manufacturing 2 Schuurman - 2,5 EC 192801350	Applicatiebouw Van Slooten - 2,5 EC 192801310
	Statica IO Loendersloot - 2,5 EC 191157202	Techn. Prod. Modelleren 1 Lutters-Weustink - 2,0 EC 192801240	Constructietechniek Vaneker - 2,5 EC 192801250	Ergonomie Voort/Bijl/Beukel - 2,5 EC 192801290
	Materiaal Schuurman - 2,5 EC 192801340	Manufacturing 1 Lutters - 2,5 EC 192801330	Product Presentatietekenen Van Passel - 2,5 EC 192801280	Vormmethodiek Garde - 2,5 EC 192801300
	Schetsen en Concepttekenen Van Passel - 2,5 EC 192801220	Vormologie Wendrich - 2,5 EC 192801320		

Y2

Q1

- Energie en Warmteleer – Oosterhuis/VdMeer - 3,0 EC – 192802200
- Manufacturing 3 – Beusenberg - 3,0 EC – 192802210
- Mens-Productrelaties – Garde - 4,0 EC – 192802220
- Nieuw Product Marketing – Van Reekum - 2,5 EC – 192802230
- Grafische Vormgeving – Eger/Vermaas - 2,5 EC – 192802310

Q2

- Project K – Lutters - 7,5 EC – 192802370
- Inleiding Statistiek – Van Doorn (EWI) - 3,0 EC – 191531101
- Techn. Prod. Modelleren 2 – Lutters-Weustink - 2,5 EC – 192802250
- Fysieke Ergonomie – Van der Belt - 2,0 EC – 192802280

Q3

- Project O – Van der Voort - 7,5 EC – 192802350
- Methoden van Onderzoek – Van der Voort - 2,0 EC – 192802260
- Cognitieve Ergonomie – Noordzij (GW) - 3,0 EC – 192802240
- Toegepaste Tekenvaardigh. – Mulder - 2,5 EC – 192802270

Q4

- Vrije Opdracht – Toxopeus - 4,0 EC – 192802360
- Dynamica – Geijselaers - 3,0 EC – 192802290
- Manufacturing 4 – Lutters/Vaneker - 2,5 EC – 192802320
- Productweergave – De Kogel-Polak - 2,5 EC – 192802340
- Raw Shaping Form Finding – Wendrich - 3,0 EC – 192802330

Y3

Q1

Reflectie op Vrije Opdracht
Toxopeus - 0,5 EC

Inl. Eindige Elementen Meth.
Perdahcioglu - 2,5 EC
201000019

Ontw. van Interactieve Prod.
Van den Beukel - 2,5 EC
201000020

Minor 1
5,0 EC

Minor 2
5,0 EC

Q2

Productcomplexiteit
Jauregui Becker - 2,5 EC
201000021

Website Design
vSlooten/Vermaas - 2,0 EC
201000018

Minor 3
5,0 EC

Minor 4
5,0 EC

Q3

Ontw. van Mechatronica en Systemen
Bonnema/Lutters-Weustink - 5,0 EC
201000016

Bache
Van

Techniek-filosofie
Verbeek (GW)
2,5 EC
201000023

Vorm- en Betekenisgeving
Van Rompay
2,5 EC
201000022

Q4

loreindopdracht IO
den Beukel - 20,0 EC
201000017

C. Curricula 2012-2013: Master's programme

For all five Master tracks, the overall structure is identical:

	Q1	Q2	Q3	Q4
Year 1	Obligatory courses, Recommended courses, Elective courses	Obligatory courses, Recommended courses, Elective courses	Obligatory courses, Recommended courses, Elective courses	Obligatory courses, Recommended courses, Elective courses
Year 2	Obligatory courses, Recommended courses, Elective courses	Thesis project		

On the following pages, the courses provided by the individual tracks are listed.

D&S

Q1/Q5	Q2	Q3	Q4
Design Management Ludden - 5,0 EC 192850700	Evolut. Prod. Dev. Research Eger - 5,0 EC 201100192	Evolut. Prod. Dev. Design Eger - 5,0 EC 201100194	Design Histories Eggink - 5,0 EC 201200137
Create the Future Eggink - 10,0 EC 192850830			Design & Emotion Van Rompay - 5,0 EC 192850790
			Graphic Language of Prod. Mulder - 5,0 EC 200900077

ETD

Q1/Q5	Q2	Q3	Q4
Source of Innovation Reinders - 5,0 EC 192850840	Biomechanics Koopman - 5,0 EC 191150390	Dur. of Consumer Prod. De Rooij - 5,0 EC 201000159	Surf. for Comf. and Touch Masen - 2,5 EC (of 5) 201000158
Technology Gate Keeping Beusenberg - 5,0 EC 201000164	Surf. Eng. for Look & Feel Masen - 5,0 EC 192850870	Surf. for Comf. and Touch Masen - 2,5 EC (of 5) 201000158	Smart Environm. Integr. Pjt Bonnema - 5,0 EC 201000212

MPD

Q1/Q5	Q2	Q3	Q4
Governing Prod. Developm. Lutters - 5,0 EC 192850730	Product Life Cycle Toxopeus - 5,0 EC 192850740	Product Life Cycle Manag. Dankers - 5,0 EC 192850750	Packaging Des. & Manag. 2 Ten Klooster - 5,0 EC 192851010
Packaging Des. & Manag. 1 Ten Klooster - 5,0 EC 192850910	Scenario Based Prod. Des. Van der Bijl - 5,0 EC 192850810	Intellect. Prop. in Prod. D. Damgrave - 5,0 EC 192850960	Virtual Reality Damgrave - 5,0 EC 201000201

ABCDE

Q1/Q5	Q2	Q3	Q4
Ind. Des. for Building: Intro Durmisevic - 5,0 EC 192855000		Build. Systems Design 1 Durmisevic - 5,0 EC 192855020	Building Systems Design 2 Durmisevic - 5,0 EC 192855030
Sust. Build. Manag. & Phys. Entrop - 5,0 EC 201100171		Des. of Load Bearing Str. Snellink - 5,0 EC 192855060	Industr. & Innov. Constr. Halman - 5,0 EC 201100173
		Indoor Climate Des. & Install Durmisevic -5,0 EC 201000021	

CTC

Q1/Q5	Q2	Q3	Q4
C. to C. Business Case Venlo Boomgaard - 15,0 EC 201200091	C. to C. Design Paradigm 1 Scheelhaase - 5,0 EC 201000079		C. to C. Design Paradigm 2 Scheelhaase - 5,0 EC 201000080

D. Allocated staff: Bachelor's programme

D.1 Staff involved in courses

Name	Job title	Fac.	MSc	PhD	UTQ[1]	fte
Beeloo, J.F.H.	Lecturer	ET	no	no	i.p.	0.50
Belt, dr.ir. D. van de	Lecturer	ET	yes	yes	i.p.	0.05
Beukel, ir. A.P. van den	Assistant Professor	ET	yes	no	yes	0.40
Beusenberg, ir. C.M.	Assistant Professor	ET	yes	no	i.p.	0.15
Bliek, drs. P	Lecturer	SMG	yes	no	yes	0.15
Bonnema, dr.ir. G.M.	Associate Professor	ET	yes	yes	yes	0.25
Boonstra, drs. T.A.	PhD Student	ET	yes	no	n.a.	0.05
Boxem, ir. A.A.K.	Information specialist	ET	yes	no	n.a.	0.03
Damgrave, ir. R.G.J.	Assistant Professor	ET	yes	no	i.p.	0.10
Dankers, ir. W.	Assistant Professor	ET	yes	no	yes	0.20
Doorn, dr.ir. E.A. van	Associate Professor	EEMCS	yes	yes	yes	0.10
Dorrestein, dr.ir. S.	Assistant Professor	BS	yes	yes	yes	0.10
Eger, Prof.dr. A.O.	Professor	ET	yes	yes	yes	0.10
Eggink, dr.ir. W.	Assistant Professor	ET	yes	yes	yes	0.10
Garde, ir. J.A.	Assistant Professor	ET	yes	no	yes	0.35
Geijselaers, dr.ir. H.J.M.	Associate Professor	ET	yes	yes	yes	0.15
Hoogt, dr.ir. P.M. van der[2]	Associate Professor	ET	yes	yes	yes	0.10
Jauregui-Becker, dr.ir. J.M.	Assistant Professor	ET	yes	yes	i.p.	0.30

1 *i.p. = in preparation'; n.a. = 'not applicable'*

Kern, dr. W.	Associate Professor	EEMCS	yes	yes	yes	0.20
Kogel-Polak, ir. W. de	Lecturer	ET	yes	no	yes	0.10
Loendersloot, dr.ir. R.	Assistant Professor	ET	yes	yes	yes	0.20
Lutters, dr.ir. D.	Associate Professor	ET	yes	yes	yes	0.20
Lutters-Weustink, ir. I.F.	Lecturer	ET	yes	no	yes	0.35
Meer, Prof.dr.ir. Th.	Professor	ET	yes	yes	yes	0.05
Meijer, ir. T.M.J.	Lecturer	EWI	yes	no	yes	0.10
Mulder Nijkamp, ir. M.	Lecturer	ET	yes	no	i.p.	0.30
Noordzij, dr. L.M.	Associate Professor	BS	yes	yes	yes	0.20
Oosterhuis, J.P.	PhD Student	ET	yes	no	n.a.	0.09
Passel, ing. P. van	Lecturer	ET	no	no	yes	0.90
Perdahcioglu, dr.ir. E.S.	Assistant Professor	ET	yes	yes	i.p.	0.10
Rompay, dr. T.J.L. van	Assistant Professor	ET	yes	yes	yes	0.20
Salm, dr.ir. C.	Assistant Professor	EEMCS	yes	yes	yes	0.10
Schuurman-Hemmer, ir. H.M.	Assistant Professor	ET	yes	no	i.p.	0.30
Slooten, ing. F.J. van	Lecturer	ET	no	no	no	0.60
Still, dr. G.J.	Assistant Professor	EEMCS	yes	yes	yes	0.30
Thalen, ir. J.P.	PhD student	ET	yes	no	n.a.	0.05
Toxopeus, ir. M.E.	Assistant Professor	ET	yes	no	yes	0.20
Tragter, ir. H.	Assistant Professor	ET	yes	no	yes	0.20
Vaneker, dr.ir. T.H.J.	Assistant Professor	ET	yes	yes	i.p.	0.30
Verbeek, Prof.dr.ir P.P.C.C.	Professor	BS	yes	yes	no	0.20
Vermaas, C.H.	Assistant Professor	ET	no	no	i.p.	0.30

[2] *deceased May 6th 2013*

Visser, dr.ir. H.A.	Assistant Professor	ET	yes	yes	i.p.	0.10
Voort, dr.ir. M.C. van der	Associate Professor	ET	yes	yes	yes	0.30
Wendrich, ing R.E	Assistant Professor	ET	no	no	no	0.30
Zee, dr. ir. R.A.R. van der	Assistant Professor	EEMCS	yes	yes	yes	0.10
Zwart, ir. M.	Lecturer	ET	yes	no	i.p.	0.60
					Subtotal 1	10.12

D.2 Staff involved with other educational activities

Activity						fte
Lab and workshop supervising						1.20
Tutoring						2.00
Coaching (final project)						1.00
					Subtotal 2	4.20

D.3 Staff involved with study advice

Activity						fte
Study advisory team						0.50
Study advisor						0.40
					Subtotal 3	0.90

D.4 Staff overview

number of staff	46		
fte BSc. education	14.3		
number of BSc. students	416		
student/staff	29.1		
Job title	#	%	fte
Professor	3	3.5%	0.35
Associate Professor	8	14.8%	1.50
Assistant Professor	21	43.5%	4.40
Lecturer	10	36.1%	3.65
PhD. student	3	1.9%	0.19
Information specialist	1	0.3%	0.03
total	46	100.0%	10.12
Master degree	41	89.1%	
PhD. degree	23	50.0%	
UTQ	27	58.7%	
UTQ in preparation	12	26.1%	
UTQ not applicable	4		
intended UTQ	42		

E. Allocated staff: Master's programme

E.1 Staff involved in courses

Name	Job title	Fac.	MSc	PhD	UTQ[1]	fte	TC[2] fte
Albert de la Bruheze, dr. A.A.	Assistant Professor	SMG	yes	yes	yes	0.10	
Beeloo, J.F.H.	Lecturer	ET	no	no	i.p.	0.10	
Beusenberg, ir. C.M.	Assistant Professor	ET	yes	no	i.p.	0.10	
Boer, Prof.dr.ir. A. de	Professor	ET	yes	yes	yes	0.05	
Bonnema, dr.ir. G.M.	Associate Professor	ET	yes	yes	yes	0.15	
Boomgaard MBA, dr.ir. A. van den	Programme Director	ET	yes	yes	yes		0.05
Braungart, Prof.dr. M.	Professor	ET	yes	yes	no	0.02	
Damgrave, ir. R.G.J.	Assistant Professor	ET	yes	no	i.p.	0.30	
Dankers, ir. W.	Assistant Professor	ET	yes	no	yes	0.30	
Durmisevic, dr. E.	Associate Professor	ET	yes	yes	no	0.17	0.05
Eger, Prof.dr. A.O.	Professor	ET	yes	yes	yes	0.20	0.10
Eggink, dr.ir. W.	Assistant Professor	ET	yes	yes	yes	0.22	
Entrop, ir. A.G.	Assistant Professor	ET	yes	no	yes	0.10	
Halman, Prof.dr.ir. J.I.M.	Professor	ET	yes	yes	yes	0.10	
Heide, Prof.dr.ir. E. van der	Professor	ET	yes	yes	no	0.05	
Hekman, ir. E.E.G.	Assistant Professor	ET	yes	no	i.p.	0.05	
Hoekstra, dr.ir. S.	Assistant Professor	ET	yes	yes	yes	0.15	

1 *i.p. = in preparation'; n.a. = 'not applicable'*
2 *TC = track coordinator*

Klooster, Prof.dr.ir. R. ten	Professor	ET	yes	yes	yes	0.08	
Koopman, Prof.dr.ir. H.J.F.M.	Professor	ET	yes	yes	yes	0.10	
Houten, Prof.dr.ir. F.J.A.M. van	Professor	ET	yes	yes	yes	0.05	0.05
Jauregui-Becker, dr.ir. J.M.	Assistant Professor	ET	yes	yes	i.p.	0.05	
Lange, ir. J. de	Assistant Professor	ET	yes	no	i.p.	0.20	
Ludden, dr.ir. G.D.S.	Assistant Professor	ET	yes	yes	i.p.	0.10	
Lutters, dr.ir. D.	Associate Professor	ET	yes	yes	yes	0.20	0.05
Masen, dr.ir. M.A.	Assistant Professor	ET	yes	yes	yes	0.20	
Meer, Prof.dr.ir. Th.	Professor	ET	yes	yes	yes	0.05	0.05
Mulder Nijkamp, ir. M.	Lecturer	ET	yes	no	i.p.	0.10	
Reinders, dr. A.H.M.E	Associate Professor	ET	yes	yes	yes	0.10	
Rompay, dr. T.J.L. van	Assistant Professor	ET	yes	yes	yes	0.10	
Rooij, dr.ir. M.B. de	Associate Professor	ET	yes	yes	i.p.	0.05	
Scheelhase, dr. T.	Lecturer	ET	yes	yes	no	n.a.	
Snellink, ing. G.H.	Lecturer	ET	no	no	yes	0.05	
Thalen, ir. J.P.	PhD student	ET	yes	no	n.a.	0.05	
Toxopeus, ir. M.E.	Assistant Professor	ET	yes	no	yes	0.10	
Vaneker, dr.ir. T.H.J.	Assistant Professor	ET	yes	yes	i.p.	0.10	
Voort, dr.ir. M.C. van der	Associate Professor	ET	yes	yes	yes	0.05	
					Subtotal 1	3.89	0.35

E.2 Staff involved with other educational activities

Activity						fte
Lab and workshop supervising						1.20
Coaching (final project)						2.33
					Subtotal 2	3.53

E.4 Staff involved with coordination or study advice

Activity						fte
Track coordinator						0.35
Study advisor						0.10
					Subtotal 3	0.45

E.5 Staff overview

number of staff	36		
fte MSc. education	7.4		
number of MSc. students	156		
student/staff	21.1		
Job title	#	%	fte
Professor	9	18.0%	0.70
Associate Professor	6	18.5%	0.72
Assistant Professor	15	55.8%	2.17
Lecturer	4	6.4%	0.25
PhD. student	1	1.3%	0.05
total	35	100.0%	3.89
Master degree	34	94.4%	
PhD. degree	25	69.4%	
UTQ	21	60.0%	
UTQ in preparation	10	28.6%	
UTQ not applicable	1		
intended UTQ	35		

F. Overview of contacts with the professional field

F.1 Staff members with an industrial background

Staff member	Background
Beukel, ir. A.P. van den	Johnson Controls GmbH | Ford GmbH
Beusenberg, ir. C.M.	Tecosim GmbH | Accell Group | TNO Automotive | Indes | Biokentics and Associates Ltd.
Boer, Prof.dr.ir. A. de	NLR
Bonnema, dr.ir. G.M.	ASML
Durmisevic, dr. E.	4D - architects
Eger, Prof.dr. A.O.	Van Dijk en Eger / Well Design | Space Expo
Eggink, dr.ir. W.	Thales | d'Andrea en Evers
Heide, Prof.dr.ir. E. van der	TNO
Jauregui-Becker, dr.ir. J.M.	GrupoTerra (Venezuela)
Klooster, Prof.dr.ir. R. ten	Plato Product Consultants
Kogel-Polak, ir. W. de	Philips | Power-packer | Ergo Design
Lange, ir. J. de	Koninklijke Euroma BV
Loendersloot, dr.ir. R.	Reden
Ludden, dr.ir. G.D.S.	Novay
Lutters-Weustink, ir. I.F.	Spekan Engineering | Kendrion IP&S
Masen, dr.ir. M.A.	Norsk Hydro
Mulder Nijkamp, ir. M.	Indes
Thalen, ir. J.P.	Invocate
Tragter, H.	Royal HaskoningDHV | I3P

Vermaas, C.H.	office of CC
Voort, dr.ir. M.C. van der	TNO Human Factors | Invocate
Wendrich, ing R.E	Möbius Design | Intesa Design Inc | RWD/xziid

F.2 Spin-off companies, companies of graduates

Spin-off Company	Founder	Founder	Founder
Daniël Franz	Daniël Poolen		
Demeneer	Matthijs Ariëns	Robbert de Vries	
Dyntec	Christiaan Haverslag	Rob Lenferink	
Exintec	Ron van Dongen		
Frontwise	Dennis de Beurs	Richard Jong	Welmer Helmich
Invocate	Jos Thalen	Mascha van der Voort	
Janneman Design Studio	Jan Tijssen		
KJ Industrial Transfer Design	Yusuf Kilic		
Nuts & Bold Design Studio	Bartjan de Bruijn		
Parachute	Ruud Wensink		
Pumpkinpi.es	Ming Xu		
Schelfhout Design & Media	Roeland Schelfhout		
ThingKit	Niels Hoogendoorn		
Tingle	Jonathan Bennink		
Typus	Martijn Zwart		

F.3 Courses with guest lectures from industry (Bachelor's programme)

Course		Person	Organisation	Location
Manufacturing 2	B1	Geert W.Reitsma Rein van de Velde	Sergem Technology vdVelde Consultancy	Den Haag Rotterdam
Toegepaste Tekenvaardigheden	B2	Ben Bulsink Robert de Rooij Robert Cobben Remko Waanders	DGT Skil Vencer D'Andrea & Evers	Enschede Breda Vriezeveen Enter
Project O	B2	Tilde Bekker Marieke ten Oever Anne Schoot Rob Wind Jasper Brands Robert Rasmussen	TU Eindhoven Diëtistenpraktijk Marieke ten Oever Kinderfysioteam Voedsel en Warenautoriteit Indes Lego Serious Play	Eindhoven Enschede Enschede Enschede Denmark
Project K	B2	Valeri Souchkov Dik van Harte	xTriz Agentschap NL Redbeans BV	Enschede Den Haag Almelo
Ontwerpen van Interactieve Producten	B3		Benchmark Electronics	Almelo
Vorm- en Betekenisgeving	B3	Marieke Sonneveld	Tactile Affairs	Rotterdam

F.4 Courses with guest lectures from industry (Master's programme)

Course		Person	Organisation	Location
Packaging Design & Management 1	M1	Matthijs Dekker	Wageningen University	Wageningen
		Lenneke Koopmans	Vaassen Flexible Packaging	Vaassen
		Jos Oostendorp	Grolsch	Enschede
Design Management	M1	Mark van Iterson	Heineken	
		Joffrey Wallonker	Royal VKB	Rotterdam
		Justien Marseille	Future Institute	Rotterdam
Create the Future	M1	Wouter Kaandorp	Philips lighting	Eindhoven
			Friesland Campina Foods	Amersfoort
		Arni Janssen, Bram Bos	Wageningen UR Livestock Research	Wageningen
		Iris Dijkstra	Atelier Licht en Kleur	Rotterdam
		Wouter Kets	Audi Design	
		Gijs Mom	European Centre for Mobility documentation	Helmond
		Miriam Vollenbroek	Roessing Research & Development	Enschede
Evolutionary Prod Dev. Research	M1	Huub Ehlhardt	Philips Group Innovation	Eindhoven
Graphic Language of Products	M1		Van der Veer Designers	Geldermalsen
			D'Andrea & Evers Design	Enter
			EGG Helmets	Den Haag
Cradle to Cradle Design Paradigm 1	M1	Willemijn Geijzendorffer	PEZY	Groningen
		Bas van de Westerlo	C2C ExpoLAB	Venlo
		Roy Vercoulen	C2C Products Innovation Institute	Venlo

Intellectual Property in Product Development	M1	Dik van Harte Jasper Groot Koerkamp Frank Bouman Peter Snel	Agentschap NL Zacco Inaday Vredestein	Den Haag Amsterdam Enschede Enschede
Evolutionary Prod Dev. Design	M1	Ferry Vermeulen	Fever Manualise	Amsterdam
Packaging Design & Management 2	M1	Allan Campbell Fons Koopmans	Paardekooper Group Marketing Matters	Oud-Beijerland Almere
Design & Emotion	M1		Philips Design Vacuvin	Eindhoven Delfgauw
Industralization & Innovation Const	M1	Chiel Bartels Hans Sluijmer	Bartels & Vedder Sluijmer en van Leeuwen BV	Bunschoten-Spakenburg Utrecht
Cradle to Cradle Design Paradigm 2	M1	Erik van Buuren Marleen Lodder Rinus van den Berg Frans Beckers	EPEA GmbH Erasmus University Rotterdam, RSM, DRIFT DSM EPEA Nederland	Berlijn Rotterdam Maastricht Eindhoven

F.5 Courses with industrial excursions (Bachelor's programme)

Course name		Organisation	Location
Manufacturing 2	B1	Various companies	Regional
Toegepaste Tekenvaardigheden	B2	DGT	Enschede
Project K	B2	Sometimes, dependent on topic	
Ontwerpen van Interactieve Producten	B3	Benchmark Electronics	Almelo

F.6 Courses with industrial excursions (Master's programme)

Course name	M1	Organisation	Location
Packaging Design & Management 1	M1	Grolsch Huuskes Zuivelhoeve SmithuisPrePain	Enschede Enschede Twekkelo Oldenzaal
Design Management	M1	Heineken	Amsterdam
Industrial Design for Building: Intr	M1	Twentebad	Hengelo
Cradle to Cradle Design Paradigm 1	M1	Van Houtum B.V.	Swalmen
Packaging Design & Management 2	M1	TOPA Testinstituut O-I Glasfabriek Nolet	Voorhout Schiedam Schiedam
Cradle to Cradle Design Paradigm 2	M1	C2CLab Auping	Venlo Deventer

F.7 Companies offering final assignments

Company / Organization	Town	Country	B-Assignment	M-Assignment
!pet BV	Hoogeveen	The Netherlands		○
3D Worknet	Ede	The Netherlands		○
Accell Fitness B.V.	Heerenveen	The Netherlands	○	
Actronics	Almelo	The Netherlands	○	
Aestron	Amsterdam	The Netherlands		○
Ahold	Zaandam	The Netherlands		○
Air Aroma International	Melbourne	Australia		○
Airfilms technologies	Den Haag	The Netherlands		○
Alfen BV	Almere	The Netherlands		○
Amsterdam Metallized Products	Amsterdam	The Netherlands	○	
APDS	Almere	The Netherlands		○
APPE	Brecht	Belgium		○
Archimedes Solutions	Diepenveen	The Netherlands	○	
Arla Foods Nederland	Nijkerk	The Netherlands		○
Ask4Me group	Guangzhou	China		○
ATAG Nederland BV	Dulven	The Netherlands		○
Attema	Gorinchem	The Netherlands	○	
Audi AG	Neckarsulm	Germany		○
Automaten Centrale	Neede	The Netherlands		○
Autonoom	Enschede	The Netherlands		○
Avions Voisin BV	Enschede	The Netherlands	○	○
Azor Bike	Hoogeveen	The Netherlands	○	
BAM	Bunnik	The Netherlands	○	
Bang & Olufsen	Struer	Denmark		○
Beacon Partners	Driebergen	The Netherlands		○
Benchmark Electronics	Almelo	The Netherlands	○	○
Bisscheroux & Voet	Amsterdam	The Netherlands		○

Bluedec	Heteren	The Netherlands	○	
Bollwerk Consulting	Den Haag	The Netherlands	○	
Bongo Innovations BV	Enschede	The Netherlands		○
Boom Design	Utrecht	The Netherlands	○	
Bosan B.V.	Haaksbergen	The Netherlands	○	
Brand New Design	Amsterdam	The Netherlands	○	
Brink Industrial	Hoogeveen	The Netherlands		○
Brinkman Special Products	Apeldoorn	The Netherlands	○	
Brok Interieurbouw	Hengelo	The Netherlands	○	
Budelpack	Poortvliet	The Netherlands		○
BuroMax	Beuningen	The Netherlands		○
Burton Car Company	Zutphen	The Netherlands	○	
C1000	Amersfoort	The Netherlands		○
Click Value	Amsterdam	The Netherlands		○
Container Centralen	Deventer	The Netherlands		○
Cosmos Sterrenwacht	Lattrop	The Netherlands	○	
Crown Packaging Ltd	Wantage	Great Britain		○
D\\	Enter	The Netherlands		○
Dahl TV	Amsterdam	The Netherlands		○
D'Andrea en Evers	Enter	The Netherlands	○	
Danone	Schiphol	The Netherlands		○
D-Box verpakkingen B.V.	Arnhem	The Netherlands	○	
De Groot Vroomshoop Bouwsystemen	Vroomshoop	The Netherlands		○
De Ruiter Graphics	Heino	The Netherlands	○	
DeMakersvan	Amsterdam	The Netherlands	○	
Demcon	Oldenzaal	The Netherlands	○	
Depa disposables & packaging B.V.	Beuningen	The Netherlands		○
Depron	Weert	The Netherlands	○	

Design Business Netwerk Winkelman & Van Hessen	Den Haag	The Netherlands		○
Diana Yacht Design	Alkmaar	The Netherlands	○	
Difrax VB	Bilthoven	The Netherlands		○
Dijkhuis Aannemersbedrijf b.v	Hardenberg	The Netherlands	○	
Dutchband	Amsterdam	The Netherlands		○
Ebretti	Huizen	The Netherlands		○
E-Core 3D & IT BV	Hattem	The Netherlands	○	
Empirex	Deventer	The Netherlands	○	
ENEA	Rome	Italy	○	
Enerdes Sustainable Energy Solutions	Almelo	The Netherlands		○
Energieonderzoek Centrum Nederland (ECN)	Petten	The Netherlands	○	
EQ Brands	Amsterdam	The Netherlands		○
Essent New Energy B.V.	Niet bekend	The Netherlands		○
Estivo Meubels	Barneveld	The Netherlands	○	
ETNA CT	Doetinchem	The Netherlands		○
EVA products	Valkenburg (ZH)	The Netherlands	○	
Fair Trade Original	Culemborg	The Netherlands		○
FLEX/the INNOVATIONLAB	Delft	The Netherlands		○
FloraHolland	Naaldwijk	The Netherlands		○
FoodDispense	Wageningen	The Netherlands	○	
Fox Industries	Dedemsvaart	The Netherlands	○	
Frank & Frens	Delft	The Netherlands	○	
Frank Bijsterbosch Interim Management	Baarn	The Netherlands		○
Friesland Campina	Wageningen	The Netherlands	○	○
gConcepts	Den Haag	The Netherlands		○
Grolsch	Enschede	The Netherlands	○	○
Grontmij	Waddinxveen	The Netherlands		○
H.J. Heinz, BV	Nijmegen	The Netherlands		○

Hakvoort Holding	Monnickendam	The Netherlands	○	
Handicare Accessibility	Heerhugowaard	The Netherlands		○
Heineken International	Amsterdam	The Netherlands		○
Het Foodatelier	Enschede	The Netherlands	○	○
Hexos Mysteries	Aalten	The Netherlands		○
Hodes Bouwsystemen	Enschede	The Netherlands		○
Hofman Dujardin Architecten	Amsterdam	The Netherlands		○
Home Automation Europe	Haaksbergen	The Netherlands	○	
Hortimotion	Oudeschild	The Netherlands		○
Huima Specials B.V.	Enschede	The Netherlands	○	
Hulshof business cases B.V.	Lichtenvoorde	The Netherlands	○	○
IAA - Architecten	Enschede	The Netherlands		○
IERC at the Nanyang Technological University	Singapore	Singapore		○
IJslander BV	Oldebroek	The Netherlands		○
Impress	Deventer	The Netherlands		○
InAlfa Roof Systems	Venray	The Netherlands		○
INDG digitale communicatie BV	Amsterdam	The Netherlands		○
Inertia Technology B.V.	Enschede	The Netherlands	○	
Infento	Den Dolder	The Netherlands		○
Intercue Video Equipment	Roosendaal	The Netherlands	○	
inVisua BV	Geldrop	The Netherlands	○	
Isolectra	Capelle a/d IJssel	The Netherlands		○
Kamworks / Pico Sol	Phnom Penh	Cambodia	○	
Keppel Verolme	Rotterdam-Botlek	The Netherlands		○
Kids Nautique	Burgh Haamstede	The Netherlands	○	
Klompenfabriek Nijhuis B.V.	Beltrum	The Netherlands	○	
Koninklijke Auping BV	Deventer	The Netherlands		○
Koninklijke Euroma	Wapenveld	The Netherlands		○
Koninklijke Gazelle NV	Dieren	The Netherlands		○

Koopmans Bouwgroep B.V.	Enschede	The Netherlands		O
Lantor BV	Veenendaal	The Netherlands		O
Leaf	Roosendaal	Ecuador		O
Lidl	Huizen	The Netherlands		O
Life & Mobility Development BV	Doetinchem	The Netherlands	O	O
Lightspeed Systems	Asten	The Netherlands	O	
Mars Food Europe	Oud Beijerland	The Netherlands		O
Melle Koot Ontwerpstudio	Groningen	The Netherlands	O	
Morskieft Ontwerpers	Enter	The Netherlands		O
Museon	Den Haag	The Netherlands		O
Nedap	Groenlo	The Netherlands	O	O
Nieuwe Weme	Oldenzaal	The Netherlands	O	
Nijha	Lochem	The Netherlands		O
Nimbus Group GmbH	Stuttgart	Germany		O
Noppies	Lelystad	The Netherlands		O
Norm-teq bv	Hengelo	The Netherlands	O	
OCE Technology NV	Venlo	The Netherlands		O
Otto Bock	Wenen	Austria		O
PANalytcal BV	Almelo	The Netherlands	O	
Panton	Deventer	The Netherlands		O
Partout Dental Interiors	Zeewolde	The Netherlands	O	
PBS	Tilburg	The Netherlands	O	
PenWeld b.v.	Enschede	The Netherlands	O	
People Creating Value	Enschede	The Netherlands		O
Philips	Drachten	The Netherlands	O	O
Philips Lighting	Eindhoven	The Netherlands	O	O
Pioneering	Enschede	The Netherlands		O
Plant-e B.V.	Wageningen	The Netherlands	O	
Promea Industrial Design	Breda	The Netherlands	O	

Pronova Medical B.V	Muiden	The Netherlands	○	○
Prosun		United States	○	
ProtoSpace	Utrecht	The Netherlands	○	
PVS N.V.		Begium	○	
QBTEC	Woerden	The Netherlands		○
Rebox BV	Haarlem	The Netherlands		○
Reedeco	Enschede	The Netherlands	○	
Re-Lion	Enschede	The Netherlands		○
Remon Waterbehandeling	Marum	The Netherlands	○	
Robertpack	Zwolle	The Netherlands	○	
Rondal BV	Vollenhove	The Netherlands		○
Royal Haskoning	Nijmegen	The Netherlands		○
Royal VKB	Zoetermeer	The Netherlands		○
RSFF Society	Enschede	The Netherlands		○
SAFETEA BV	Den Haag	The Netherlands	○	
Saker Sportscars	Etten-Leur	The Netherlands	○	
SaraLee H&BC Research	Utrecht	The Netherlands	○	
Schiphol Group	Schiphol	The Netherlands		○
SES Nederland BV	Enschede	The Netherlands		○
Skewiel Trynwalden	Bolsward	The Netherlands	○	
Small Advanced Mobility	Eindhoven	The Netherlands		○
Smiles AG	Aub	Germany		○
Smurfit Kappa (Development Centre)	Hoogeveen	The Netherlands		○
Spir-it	Utrecht	The Netherlands		○
Spyker Squadron	Zeewolde	The Netherlands	○	
Sri Toys International	Panadura	Sri Lanka	○	
Stevens Ide Partners	Enschede	The Netherlands	○	
Stichting HeartLive	Hilversum	The Netherlands	○	
Stichting The Blue Cap Foundation	Nieuw Vennep	The Netherlands		○

Stichting Twentse Hart Safe	Hengelo	The Netherlands	O	
Stichting Ubuntu	Asselt	The Netherlands	O	
Stichting Voedselbank	Enschede	The Netherlands	O	
Stijlapart	Deventer	The Netherlands	O	
Stodt	Hengelo	The Netherlands		O
Stork Thermeq	Hengelo	The Netherlands	O	
Strukton & Intergo	Utrecht	The Netherlands		O
Strukton Rail	Maarssen	The Netherlands		O
Studio Kaptein Roodnat	Amsterdam	The Netherlands	O	
Sunfire Solutions	Johannesburg	South Africa	O	
Swedish Match Lighters	Assen	The Netherlands	O	O
Synergie	Utrecht	The Netherlands		O
Tauw BV	Deventer	The Netherlands	O	O
Techmar	Hengelo	The Netherlands	O	
Technoplanning B.V.	Goor	The Netherlands	O	
Temmink Infra	Oldenzaal	The Netherlands		O
Texperium	Haaksbergen	The Netherlands	O	
Thales	Hengelo	The Netherlands	O	
TNO	Leiden	The Netherlands		O
To Innovate	Leeuwarden	The Netherlands		O
TomTom International BV	Amsterdam	The Netherlands		O
Twente Milieu	Enschede	The Netherlands	O	
Twentinox	Hengelo	The Netherlands	O	
Twinpack B.V.	Barneveld	The Netherlands	O	
T-Xchange	Enschede	The Netherlands		O
Tyco	Enschede	The Netherlands	O	
Unilever	Vlaardingen	The Netherlands		O
United Care Products	Winschoten	The Netherlands	O	
Univar Europe	Essen	Germany		O

Össur	Reykjavik	Iceland		○
Van der Veer Designers BV	Geldermalsen	The Netherlands	○	
Van Dijk Groep BV	Enschede	The Netherlands		○
Van Houtum	Swalmen	The Netherlands		○
Van Vloot B.V.	Rossum	The Netherlands	○	
Vanderlande Industries	Veghel	The Netherlands	○	○
VanderVeer designers	Geldermalsen	The Netherlands	○	
Velda BV	Enschede	The Netherlands	○	
Vendor BV	Tilburg	The Netherlands		○
VerdraaidGoed!	Delft	The Netherlands	○	
Verschuren Interieurbouw BV	Eindhoven	The Netherlands		○
Villeroy & Boch	Roden	The Netherlands	○	○
Vredestein	Enschede	The Netherlands	○	
Waaijenberg Mobiliteit BV	Veenendaal	The Netherlands		○
Waterkracht	Varsseveld	The Netherlands	○	
Win Equipment	Bunschoten-Spakenburg	The Netherlands	○	
Xsens Technologies B.V.	Enschede	The Netherlands	○	
Yalp	Goor	The Netherlands	○	○
Yelken	Istanbul	Turkey	○	

G. Graduates: Bachelor's programme

G.1 Academic year 2010-2011

Surname	Initials	Christian Name	Examination date	Abroad	Language	Organisation
Besten, den	G.J.	Gerben	27-05-2011		NL	Universiteit Twente
Bijkerk	J.	Jennifer	27-05-2011		NL	VanderVeer designers
Bijvank	J.	Jessika	24-09-2010		NL	Flextension
Bisschop	W.H.	Wouter	18-02-2011		NL	Bosan B.V.
Bloemhof	M.	Gea	25-03-2011		NL	Intercue Video Equipment
Bos	S.L.	Sandra	26-08-2011		NL	Universiteit Twente OPM
Brouwer	B.C.	Bas	10-12-2010		NL	Twinpack B.V.
Brouwer	M.T.	Marieke	29-10-2010		UK	Philips Drachten
Bruin, de	D.G.P.	Dymfi	26-08-2011		NL	Bluedec
Bussink	M.	Majorie	24-09-2010		NL	Demcon
Christiaanse	T.J.H.	Tessa	28-01-2011	Italy	UK	ENEA, Portici
Conradi	C.H.	Casper	26-08-2011		NL	Universiteit Twente VR-Lab
Couturier	I.A.	Isabelle	26-08-2011		NL	Universiteit Twente afdeling OPM
Deiman	J.	Joep	26-08-2011		NL	inVisua BV
Dongen, van	R.H.J.	Ruud	24-09-2010		NL	PBS Tilburg
Duijne, van	S.	Steven	26-08-2011		NL	EVA products
Eemeren, van	T.	Tjebbe	26-08-2011		NL	Home Automation Europe
Eising	T.	Tessa	24-06-2011		NL	Reedeco
Eisma	G.H.	Gerrit	27-05-2011		UK	Universiteit Twente

Engel	I.	Ivar	18-02-2011		NL	Techmar + D'Andrea & Evers
Essers	M.S.	Maarten	29-10-2010		NL	Universiteit Twente - CNC Worknet
Fikkert	R.C.	Rick	10-12-2010		NL	Swedish Match Lighters
Giesberts	R.B.	Bob	24-09-2010		UK	Universitair Centrum voor Medische Wetenschappen afd. Bio Medical Eng.
Grob	M.B.C.	Mark	24-06-2011		UK	Benchmark Electronics
Haas, de	W.	Wouter	29-10-2010		NL	Skewiel Trynwalden
Hilbolling	S.	Susan	28-01-2011		UK	Universiteit Twente; CTW Laboratory of Design, Production & Management
Hoek, van	E.	Elias	24-09-2010		NL	Norm-teq bv
Hurk, van den	A.	Anne	10-12-2010		NL	Promea Industial Design
Janssen	F.S.	Fenna	28-01-2011	South Africa	UK	Sunfire Solutions
Jong	R.I.	Richard	27-05-2011		NL	Stevens Ide Partners
Karsten	A.M.A.	Rianne	29-10-2010		NL	Van Vloot B.V.
Kemper	E.M.	Els	10-12-2010		NL	Cosmos Sterrenwacht
Kiliç	Y.	Yusuf	10-12-2010	Turkey	UK/Turkish	Yelken
Klooster, ten	P.	Peter	26-08-2011		NL	Saker Sportscars
Kolk	E.	Eline	24-09-2010		NL	Amsterdam Metallized Products
Konink, de	R.	Rik	10-12-2010		NL	Dutch Design House Demakersvan
Körber	M.	Matthias	26-08-2011		NL	Jan Kleinen
Korfage	B.G.J.	Bas	27-05-2011		NL	Cosmos Sterrenwacht
Kranen	M.	Martijn	29-10-2010	Cambodia	UK	Kamworks
Kreeuseler	A.	Aldo	26-08-2011		NL	Universiteit Twente - IO
Lange, de	J.	Jos	28-01-2011		NL	Hakvoort Holding
Lentink	E.S.	Erik	26-08-2011		NL	Robertpack
Linden, van der	B.	Brenda	28-01-2011		NL	Peoplefirst

Markerink	H.W.S.	Willem-Sander	18-02-2011		NL	Gea Berendsen
Molenaar	M.	Marijn	10-12-2010		NL/UK	SaraLee H&BC Research
Naeff	N.J.	Noortje	28-01-2011		UK	Philips Drachten
Nijman	H.	Hanke	26-08-2011	Italy	UK	ENEA Rome
Rammeloo	A.J.H.	Guus	24-09-2010		NL	Universiteit Twente OPMPR (IO)
Reijners	E.M.D.	Ellen	26-08-2011		NL	Friesland Campina
Sande, van de	W.W.P.J.	Werner	26-08-2011		NL	Energieonderzoek Centrum Nederland (ECN)
Schäffer	L.S.	Laura	28-01-2011		NL	Benchmark Electronics Almelo
Schoot Uiterkamp	J.D.	Judith	29-10-2010	NL/Cambodia	NL	Pico Sol
Schoustra	S.M.	Sjoukje	26-08-2011		NL	Stichting Voedselbank
Schouwenburg,van	R.G.	Richard	10-12-2010		NL	EVA Products
Spikker	L.J.	Léon	26-08-2011		NL	D'Andrea & Evers
Stemkens	K.	Kim	10-12-2010		NL	Depron
Verduijn	L.J.	Leendert	10-12-2010		NL	Estivo Meubels
Veurman	E.	Erik	26-08-2011		NL	Hulshof koffers, Lichtenvoorde
Vis	A.C.	Carlijn	28-01-2011		NL	Studio KapteinRoodnat
Voorend	M.J.B.	Mathijs	28-01-2011		NL	Diana Yacht Design
Vries, de	H.M.	Marleen	27-05-2011		NL	Universiteit Twente OPM
Vries, de	N.	Nico	25-03-2011		NL	Lightspeed Systems
Welle, ter	R.	Reinier	27-05-2011	Italy	UK	ENEA
Westerhof	H.A.	Harmen	28-01-2011		NL	Stork Thermeq
Wijma	J.A.	Jan	26-08-2011		NL	Twente Milieu
Wolf, de	F.I.	Fernand	10-12-2010		NL	PenWeld b.v.

G.2 Academic year 2011-2012

Surname	Initials	Christian Name	Examination Date	Abroad	Language	External Organisation
Bakker, de	L.L.M.	Lisanne	31-08-2012		NL	VerdraaidGoed!
Bakker	R.P.	Robbert	31-08-2012		NL	Burton Car Company
Barends	A.C.	Anne-Loes	31-08-2012		NL	BAM
Beitel, ten	J.W.T.G.	Jan Willem	27-01-2012		UK	Accell Fitness B.V.
Blankenvoort	H.G.H.	Hans	31-08-2012		UK	Villeroy & Boch te Roden
Boekema	M.J.	José	29-06-2012		NL	Texperium
Boelens	C.	Charlotte	30-09-2011		NL	Boom Design, Utrecht
Boer, de	B.	Bertus	25-05-2012		NL	Life & Mobility
Bolding	B.	Bianca	29-06-2012		NL	Brok Interieurbouw
Boonstra	J.J.	Judith	16-12-2011		UK	Grolsch
Braham	A.M.A.	Anniek	31-08-2012		UK	DeMakersvan
Buijs	A.J.	Amke	31-08-2012		NL	Vredestein
Dam, ten	C.A.M.	Chris	28-10-2011		NL	Tauw
Dantuma	A.	Anouk	16-12-2011		NL	Pronova Medical B.V
Dijkstra	J.	Jurriën	16-12-2011		UK	Universiteit Twente afdeling OPM/VR-lab
Donker	J.	Jacques	16-12-2011		NL	D'andrea & Ever
Driever	R.C.B.	Roel	31-08-2012		NL	Hibertad/Dijkhuis
Eckhardt	R.	Robert-Jon	25-05-2012		NL	Stichting Ubuntu
Egberts	F.	Frank	27-04-2012		UK	Philips Consumer Lifestyle
Endert	D.C.	Christiaan	30-09-2011		NL	Avions Voisin BV
Ettema	D.J.	Dirk	31-08-2012		NL	D-Box verpakkingen B.V.
Feenstra	W.P.	Wybe Pieter	30-09-2011		NL	Fox Industries

Felius, van	S.D.	Sophie	30-09-2011		NL	BrandnewDesign
Fennema	S.	Sander	31-08-2012		NL	Plant-e B.V.
Finkers	K.H.	Karlo	29-06-2012		NL	TPRC
Gommeren	W.A.P.M.	Martijn	30-09-2011		NL	Velda
Goutier	M.J.	Marijn	29-06-2012		NL	Nieuwe Weme
Graat	B.	Bob	16-12-2011		NL	SAFETEA BV, Den Haag
Haan, den	R.	Robert-Jan	30-09-2011		NL	Kids Nautique
Helling	G.A.	Frank	31-08-2012		UK	Xsens Technologies B.V.
Hengst, den	T.	Thomas	31-08-2012		NL	Melle Koot Ontwerpstudio
Hidding	J.	Jet	27-01-2012		NL	Stijlapart
Hollander	S.H.	Simon	31-08-2012		UK	Spyker Squadron
Horst, van der	M.T.J.	Tijs	30-09-2011		NL	Universiteit Twente OPM
Hovhannisian	A.	Ani	27-01-2012		NL	Benchmark Electronics BV
Jacobs	M.	Marten	31-08-2012		UK	PANalytcal BV
Jansen	P.H.	Philip	28-10-2011		UK	Benchmark Electronics BV
Jense	E.	Elmar	31-08-2012		NL	Philips Lighting Winterswijk
Kessel, van	P.	Pleuni	31-08-2012		NL	VanderLande Industries
Knook	E.	Eilien	29-06-2012		NL	Cosmos Sterrenwacht
Kodde	N.A.	Annet	27-04-2012		NL	Actronics
Koeijer, de	B.L.A.	Bjorn	30-09-2011		NL	Attema
Koevoets	Y.M.	Yolanda	31-08-2012		UK	Tyco
Korse	M.	Maurits	31-08-2012		NL	Tauw
Kruiper	R.	Ruben	31-08-2012		NL	Rawshaping Technology
Laan, van der	P.	Paul	30-09-2011		NL	E-Core 3D & IT BV
Labots	J.	Jeroen	31-08-2012		NL	PVS N.V.
Langen	P.S.	Sefrijn	16-12-2011		NL	Yalp

Leusink	Z.A.	Erna	31-08-2012		NL	Inertia
Leussen, van	J.	Jeffrey	31-08-2012		UK	Universiteit Twente - SOFIE Intelligent Assisted Bicyles
Luesink	C.G.A.	Christa	28-10-2011		NL	Hulshoff koffers
Maanen, van	F.	Frank	31-08-2012		NL	Actronics
Manen, van	J.W.	Jorn	31-08-2012		NL	Het Foodatelier
Martens	M.H.	Maarten	29-06-2012		NL	UT - c,m,m,n project
Martina	D.N.	Dennis	31-08-2012		NL	Techmar
Merks	D.K.B.F.P.	Donald	28-10-2011	United States	UK	Prosun
Merwe, van de	D.W.	Tjark	27-01-2012		NL/UK	UT/Pioneering
Mooij	S.H.	Sabine	25-05-2012		NL	Campina
Nijman	J.	Jeske	31-08-2012		UK	ENEA Rome
Offringa	J.M.	Marleen	31-08-2012		NL	D'Andrea en Evers
Ottow	J.B.	Joachim	29-06-2012	Cambodia	UK	Kamworks
Pas	M.B.	Mick	16-12-2011		NL	Huima Specials B.V.
Peters	K.A.	Kevin	31-08-2012		NL	Archimedes Solutions
Peuscher	O.F.	Olav	31-08-2012		UK	Benchmark Electronics BV
Plant	M.	Mark	31-08-2012		NL	Technoplanning B.V.
Ploos van Amstel	E.	Evelien	16-12-2011		NL	Universiteit Twente
Rasser	H.W.	Haske	31-08-2012		NL	ProtoSpace
Rassers	P.W.	Pierre-Yves	29-06-2012		UK	Philips Consumer Lifestyle
Roodink	W.	Wesley	31-08-2012		NL	Brinkman Special Products
Scholte	M.J.	Mark	31-08-2012		NL	Velda BV
Schut	K.J.	Joris	31-08-2012		NL	Stichting HeartLive
Siepel	A.N.	Anika	31-08-2012		NL	TwenteMileu
Smit	E.	Elsbeth	31-08-2012	Sri Lanka	UK	SriToys
Smulders	L.C.	Laura	28-10-2011		NL	United Care Products

Smulders	V.	Vera	31-08-2012		NL	Empirex
Spaans	T.M.	Thierry	31-08-2012		NL	Universiteit Twente
Spil	M.	Mark	31-08-2012		NL	Azor Bike
Spoor	P.G.	Pim	31-08-2012		NL	Bollwerk Consulting
Stam	L.M.	Liesbeth	29-06-2012		UK	Philips Research
Stortelder	T.	Teun	31-08-2012		NL	Waterkracht
Teuling	M.	Marijn	28-10-2011		NL	De Ruiter Graphics
Tibbe	A.J.	Annemarie	28-10-2011		UK	Universiteit Twente
Titsing	T.J.	Tineke	27-01-2012		NL	Remon Waterbehandeling
Veenstra	J.	Jelmer	31-08-2012		UK	Thales
Velde, ten	E.A.G.	Erwin	28-10-2011		NL	Stichting Twentse Hart Safe
Vette, de	A.F.A.	Frederiek	30-09-2011		NL	Klompenfabriek Nijhuis B.V.
Veugelers	P.T.E.	Puck	16-12-2011		NL	Van der Veer Designers BV
Visschedijk	M.	Manou	31-08-2012		NL	Twentinox:
Visscher	P.J.	Pim	16-12-2011		NL	PenWeld
Vos, de	L.	Heleen	31-08-2012		NL	Velda BV
Vries, de	G.	Gijs	29-06-2012		NL	Nedap
Vries, de	W.J.	Wessel	27-01-2012		NL	Partout Dental Interiors
Vriesen	M.	Maarten	31-08-2012		NL	Win Equiment
Waard, de	P.	Paul	31-08-2012		NL	Stijlapart
Wit, de	J.M.	Marlien	29-06-2012		NL	Frank& Frens
Witteveen	G.	Gerrit	31-08-2012		NL	Universiteit Twente -> OPM
Zande, van der	Y.	Youp	31-08-2012		NL	Inertia Technology B.V.
Zanten, van	J.W.W.	Julian	31-08-2012		NL	FoodDispense

H. Graduates: Master's programme

H.1 Academic year 2010-2011

Name	Examination date	Track	Report title
Oudehand, L.B.	30-09-10	MPD	The next generation Heinz Tomato Ketchup packaging.
Heuvel, L.C. van den	1-10-10	D&S	DayZone product family, design19 of LED luminaires for offices and hospitality.
Nijholt, J.V.	8-10-10	MPD	Workflow modeling for business process automation.
Beurs, D. de	15-10-10	D&S	Clean Living: Future Concepts for Philips Home Living
Prinsen, W.A.	20-10-10	D&S	Duurzaamheid & Industrieel Ontwerpen: mogelijkheden voor de industrieel ontwerper om een bijdrage te leveren aan duurzaamheid.
Koopmans, L.	21-10-10	MPD	Producing a Low Cost Universal Vacuum Release Mechanism Applicable to All Types of Metal Vacuum Closures.
Westdijk, M.J.	4-11-10	D&S	Being Inspired by Biology in Product Design: A Designer's Review of Biomimicry.
Bakker, A.J.	4-11-10	D&S	Emotion and packaging Development of Mars 'packaging design brief toolbox
Koelman, M.	5-11-10	D&S	Design of a hang out place for youth.
Wit, R.C. de	12-11-10	ETD	Richtlijnen voor de ontwikkeling van anti-decubitus producten voor rolstoelgebruikers.
Heeres, C.L.	18-11-10	MPD	The making of UT Heroes: Methods to create engaging & purposeful documentaries.
Balda Irurzun, U.	19-11-10	ETD	Implementation of Inkjet Printing in Emerging Textile based Smart applications.
Ettinger, P. van	9-12-10	ETD	Innoveren in Reel Winches.
Heezen, J.	16-12-10	D&S	De ontwikkeling van een flessenwarmer voor de S-fles: van analyse tot massaproductieklaar product.
Jonker, A.	16-12-10	MPD	Portfolio management of Lune.
Kneefel, J.	21-12-10	D&S	The practice and context of electric car design.

Oudhuis, W.	23-12-10	MPD	Climbing mountains: initiating organisational change by means of a roadmap design.
Bos, M.Y.	13-01-11	ETD	Tactile Experience: An Affective Framework for Packaging Design.
Kranen, M.	14-01-11	D&S	Design of a system to improve the social connectedness elderly.
Maatman, B.	27-01-11	D&S	The redesign of a glass-front vending machine.
Thung, T.K.M.	27-01-11	D&S	The restyling of PV modules by modified screen printed front contact patterns.
Biemans, B.M.	27-01-11	D&S	Improving bathing experience for Villeroy & Boch Wellness.
Groen, S.I.	4-02-11	MPD	Sustainable Aesthetics: identifying attributes of a sustainable appearance for Philips Consumer Lifestyle products.
Appelhof, H.	10-02-11	MPD	Practical Sustainability: A method for the development of usable and fitting sustainability solu-tions.
Uitert, A.F. van	15-02-11	MPD	User centred design approach to implement a multi-user touch screen at Industrial Design.
Jansma, S.H.	25-02-11	ETD	The feasibility and design of a piezo-electric energy harvester for civil applications.
Endeman, G.	4-03-11	MPD	Method for using product modularity to support the management of product variation.
Zweers, W.	4-03-11	D&S	Duurzame verlichting voor het nieuwe werken
Lange, J. de	16-03-11	MPD	Supporting concurrent development of products and packaging using information manage-ment as facilitator
Herder, R.G.	18-03-11	D&S	The elaboration of a transportable, eco-friendly and off-the-grid tourist acoommodation concept to a viable design.
Enserink, M.	18-03-11	MPD	Innovation management at Smurfit Kappa Corrugated Benelux.
Hartman, T.M.	23-03-11	D&S	Experience-gedreven ontwikkeling van tuinverlichting.
Groen, B.	11-04-11	ETD	Developing a user-friendly interface for a combined over, steamer and microwave
Crusius, S.F.	21-04-11	MPD	Taking the right path; creating a descriptive method that supports future packaging develop-ments.
Bos, R.	26-05-11	ETD	The Serious Gaming Experience; the design of a promotional game for T-Xchange.
Jong, R.I.	1-06-11	MPD	Development of a product roadmap; how to proritise product development and cope with future uncertainties.
Versteegh, C.D.	29-06-11	D&S	CityEL Redesgin

Buurman, J.W.M.	30-06-11	MPD	Packaging innovation, the area of tension between packaging, production and organisation
Molenaar, M.	1-07-11	D&S	Creating exceptional opportunities that drive successful innovation'; focus on consumer driven ideation methods.
Bruijn, A.A. de	12-07-11	D&S	Enriched Expresion of Smart Materials in Consumer Products
Wensink, R.	19-07-11	D&S	ChillOut
Leppers, J.P.	21-07-11	MPD	Utilizing new 3d visual technologies.
Vernhout, B.	21-07-11	MPD	Optimising Shelf Ready Packaging Designs; Development of Design Guidelines to Improve the In-store Performance of Shelf Ready Packaging Solutions.
Kerkhoffs, E.	12-08-11	D&S	Redesign of the BonGo electric freight tricycle for business applications.
Klazinga, R	12-08-11	MPD	User centred design approach to implement a multi-user touch screen at Industrial Design.
Schotman, H.	18-08-11	D&S	Redesign of the little red car.
Goossens, A.J.M.	25-08-11	ETD	Towards Self Healing Materials: Healing Damage in Fibre Reinforced Thermoplastic Products.
Huijing, S.V.S.	25-08-11	D&S	Applying Virtual Reality for Participatory Design: supporting end-users in the design process of an endoscopie operating theatre.
Berga, G	29-08-11	D&S	Commercial mosquito trap for indoor use
Kickert, V.M.	30-08-11	MPD	Ultra Clima: A Corridor Implementation.
Xu, N.	30-08-11	ETD	Social Serious Gaming - Sao Paulo's Plastic Soup
Steinebach, R.J.	31-08-11	MPD	Strategic alliance management model; enhancing chances of successful collaboration.

H.2 Academic year 2011-2012

Name	Examination date	Track	Report title
Emmens, P.A.	6-09-11	MPD	Sound Advice: improving acoustical knowledge and insight at Benchmark Electronics.
Kloppenburg, F.W.	8-09-11	ETD	Biocomposites for consumer products: Materials, production and design guidelines.
Noordhoff, L.	15-09-11	MPD	Increasing Effectiveness of Online Marketing by Implementing Offline tracking.
Heemst, R.D.R. van der	20-09-11	ABCDE	The message-board system, a product to influence the social interaction within cohousing communities for elderly.
Delden, R.W. van	28-09-11	ETD	Design of therapeutic TagTile games for children with unilaterial spastic .
Binnemars, S.	4-10-11	ETD	Guiding the Contruction Industry towards more Sustainable Building: Working towards a clear model for IDF Building Criteria.
Mooren, R.	11-10-11	D&S	A newLightrail experience: Exterior designs focussed on the user and its urban environment.
Tuinte, N.C.	17-11-11	MPD	Development of a sustainability strategy for food packaging of Fair Trade Original
Korteling, N.H.S.	22-11-11	D&S	Product Evolution: On the Origin of Artefacts.
Barelds, P	24-11-11	D&S	Emotion and packaging Development of Mars 'packaging design brief toolbox
Kok, W.J.F. de	30-11-11	ETD	Scenario based technology forecasting for mobility scooters.
Jonkman, M.	13-12-11	D&S	The development of Small Unit Immersive Trainer (SUIT)
Nieuwboer, S.W.	15-12-11	MPD	Development of an application to acquire optimal secondary packaging design specifications.
Konink, R. de	21-12-11	MPD	How can the comfort of a new design for a headphone be predicted and tested in an early stage of the development process.
Kiliç, Y.	20-01-12	D&S	Brand Conscious Innovating
Boswerger, M.P.	20-01-12	ABCDE	The development of a flexible building system is a competitive market.
Licht, L.	24-01-12	D&S	A transitional shelter solution for the Netherlands
Friso, T.	24-01-12	D&S	E-Mobility Manager - Planning and communication system for local EV-based mobility services.
Scholder, F.	26-01-12	D&S	Advanced electric vehicle for mobility sevice for elderly.
Nijkamp, M.	27-01-12	VP	Modeling the graphic language of products - Designing for Brand Recognition.

Lintsen, M.	2-02-12	MPD	The use of consumer experience in packaging validation - the improvement of a NBD model.
Kettler, S.	6-02-12	MPD	From Job Shop to Mass Production - Redesigning the Product Development Process.
Hurk, A. van den	9-02-12	D&S	A method to enable the company APPE to discover, develop and evaluate new opportunities … to be innovative.
Essers, M.S.	15-02-12	MPD	Designing an Intelligent Flexible Automated Manufacturing Environment.
Schol, H.A.	17-02-12	D&S	Design and engineering of a multifunctional garden machine.
Hermsen, K.	22-02-12	ETD	Integral foam concrete - The production process and design of a sound barrier.
Worm, B.H.H.	23-02-12	D&S	Bicycle of the future.
Reilink, D.	28-02-12	D&S	Design of an aroma diffuser for the B2C market.
Sprenkeling, E.	1-03-12	ETD	Towards a design tool for a sustainable shock absorbing material.
Renkens, A.M.	2-03-12	D&S	LivingBox, the development of a smart living unit.
Kothman, I.M.H.	6-03-12	MPD	Development of a Cross Selling Tool.
Kea, N.L.M.	8-03-12	MPD	The development of a framework for Amikasa.
Oude Luttikhuis, E.J.	22-03-12	MPD	Sustainable packaging: developing a more sustainable packaging for cheese.
Erkel, H.	29-03-12	D&S	Design of a new diaper waste service and product.
Henning, M.	30-03-12	D&S	Development of an interactive tool to assist snack kitchen teams in their work.
Peters, H.A.R.	17-04-12	MPD	Generating Design for Recyclability guidelines
Beer, M	10-05-12	D&S	The next generation Karvan Cévitam packaging - Introducing consumer insights into packaging development.
Körber, M	12-05-12	MPD	The design of a construction kit for a new outdoor toy
Galen, R.A. van	24-05-12	D&S	Apply development techniques to expand and innovate the range of products and markets of Cricket lighters.
Meijer, E.	30-05-12	ETD	A method for the assessment of product architecture at an early stage.
Groot, S.J.	31-05-12	MPD	Design decision making in packaging development.
Beens, A.	31-05-12	D&S	PV Diamond project; Improving the application of PV modules on double curved building envelopes.

Akker, D.A.J. van den	7-06-12	MPD	Differentiating structural packaging design for an international target group.
Léoné, N.A.M.	7-06-12	ETD	Motion capturing in Product Development - When is there added value for motion capturing in the design process?
Hoogendoorn, N.W.	8-06-12	D&S	The future of mobile products starts here.
Blom, Y.M.	22-06-12	D&S	Citybox 2.0; researching and redesigning the experience of a soccer court.
Germs, M.M.	29-06-12	ETD	WindUp - A mechanism that tightens an, in circumference adjustable, transfemoral socket.
Janssen, L.C.	13-07-12	D&S	Development of an innovative product line of mobile cases
Hoek, E. van	17-07-12	ETD	CupCollector: a green waste solution
Pas, M	19-07-12	MPD	Increasing Effectiveness of Online Marketing by Implementing Offline tracking.
Abbink, B.A.J.H.	20-07-12	D&S	Next generation consumer bed - The bed of the future is never finished
Doppenberg, F.A.	31-07-12	ETD	From Wedgie to Recliner: An Integral Feasibility Study Concerning the Realization of an Adapt-able Electric Bicycle to Both Upright and Recumbent Positions
Bosch, J. van den	16-08-12	D&S	Men, Machines & Food
Vis, A.C.	24-08-12	D&S	Creation of a Consumer Factbook for table grills, focussed on the French market.
Prinsen, N.	24-08-12	ABCDE	Improving the sustainability of existing office buildings.
Visbeek, M.	27-08-12	D&S	Design of a charging product for electric vehicles.
Voorde, P ten	27-08-12	D&S	A newLightrail experience: Exterior designs focussed on the user and its urban environment.
Grob, M	28-08-12	D&S	Usability extrapolation for a wearable advanced medical device
Verduijn, L.J.	28-08-12	ETD	Hybrid Design Tools: A Novel Approach to Intuitive HCI
Engel, I	29-08-12	ETD	Strategies to improve the sustainable product development in a corporate environment - A case study at Océ© technologies N.V
Poolen, D	30-08-12	VP	The World behind the Marketing of Sustainability in Consumer Products and Produce
Diepen, B.G.D. van	31-08-12	ETD	Stairlift interface redesign: Improving user interaction.
Dongen, R.H.J. van	31-08-12	MPD	Development of a semi-automatic baggage handling solution.

I. Alumni of the Master's programme

Alumnus name
Organisation | Location
Function

Wal, K.U. van der
MetrixLab | Rotterdam
Senior Research Manager NPD & Innovation

Peffer, S.
Royal Bammens BV | Den Haag
Technical Commercial Product Manager

Raven, A.
Eperium Business Solutions | Muiden
UX & Visual Designer

Wijnands, H.F.W.
Auping | Apeldoorn
Brand Developer

Kersten, E.
Van Sillevoldt Rijst | Papendrecht
Packaging coordinator & purchaser

Winden, E.E. van

Steenbrink, V.P.
Sensata Technology | Almelo
Project manager

Draijer, B.J.
Jan Kuipers Nunspeet | Nunspeet
Operational Manager

Scholman, M.R.
Arcadis | Arnhem
Adviser

Veeman, W.J.K.
Yacht Technology | Diemen
Interim Professional

Mulhof, H.A.F.
D'Andrea & Evers Design | Enter
Designer

Eekelen, V.J.J.J. van
WeLL Design | Utrecht
Senior Design Engineer

Dijkstra, W.
Fast & Fluid Management | Utrecht?
Research Project Manager

Muller, I.
HJ Heinz | Nijmegen
Brand Manager

Vliegen, J.M.E.
Be Informed | Apeldoorn
Senior Business Process Analist

Schijvens, R.M.
Hogeschool van Amsterdam | Amsterdam
Lecturer Technical Business Management

Bolscher, R.
Phillips | Amsterdam
System Architect

Pelgrum, R.
Witteveen+Bos | Deventer
Construction Management Consultant

Boiten, H.M.
BCD Travel | Utrecht
Senior Manager Product Planning and Portfolio Management

Garde, J.A.
University of Twente | Enschede
Assistant Professor

Capota, K.J.B.
L'Oréal | Hoofddorp
Group Product Manager Hair & Perfumes L'Oreal Paris

Timmermans, M.I.
Xsens Technologies BV | Enschede
Lead Industrial Design Engineer

Driessen, A.

Geraedts, V.P.J.
G-Star Raw | Amsterdam
Junior Industrial Designer

Elders, R.G.
Ferm | Zwolle
Product Manager

Bode, J.M.
HJ Heinz | Nijmegen
Packaging Developer

Berge, J.L.M. van den
Camtronics B.V., Dapper Industries | Eindhoven
Brand Marketing Developer

Olivier, F.G.
Van Dijk 3DE Design Engineering | Ermelo
Senior Product Design Engineer

Tijssen, J.
Janneman Design & Direction | Amsterdam
Owner

Haisma, A.
Albea Group | Amsterdam
Product Development Engineer

Boer, W. de
People Creating Value | Enschede
Product Designer Engineer

Bakker, J.
Goliath Games | Hattem
Industrial Designer

Helmich, W.E.
Frontwise | Utrecht
Designer / Developer / Partner

Rijkeboer, I.S.
- | -
Freelance Writer

Dijkstra, K.T.
Reggs Pilots | Amsterdam
Design Engineer

Steltenpool, M.A.
Grontmij | Utrecht
Adviser

Damgrave, R.G.J.
University of Twente | Enschede
Assistant Professor

Hemmer, H.M.
University of Twente | Enschede
Study Counsellor, Assistant Professor

Lenferink, R.H.M.
Dynteq | Enschede
Owner

Douma, J.W.
Berg Toys | Nijmegen
Project Leader

Tigchelhoff, R.J.
Vrije Universiteit Amsterdam | Amsterdam
Student

Fouw, E. de
Hapro International | Kapelle
Industrial Designer & Engineer

Praamstra, K.M.
Bronswerk Heat Transfer | Nijkerk
Desin Engineer

Dongen, R.F. van
EXINTEC | Elburg
Owner

Pepping, M.
Mobilly BV | Noordwijkerhout
Industrial Designer

Wullems, M.J.
Mulder Liftservice | Nuth
Sales Engineer

Haverslag, C.J.
Dynteq | Enschede
Owner

Goedheer, S.
Jungle Gym | Amsterdam
Product Designer

Aarnink, J.
VDL Enabling Technologies Group | Almelo

Groot, F. de
Goliath Games | Hattem
Industrial Designer

Vervoort, S.C.
Inalfa Roof Systems | Venray
Product Planner

Dooren, T.M.J.M. van
BERG Toys | Ede
Engineer

Hop, E.
Sensata Technology | Almelo
Design Engineer

Pruyssenaere de la Woestijne, R. de
Divardy | Driebergen Rijsenburg
Industrial Designer

Siahaya, P.L.
Dutch-shape b.v. | Rijssen
Project Manager

Frehe, S.P.
Connect 2 Pay | Lochem
Product Design Engineer

Helming, J.R.W.
The Reynolds and Reynolds Company | Zevenaar
Software Developer

Stralen, R.S. van
Meyn Food Processing Technology | Amsterdam
R&D Constructor

Mengerink, T.
Score B.V. | Tolbert
Product Developer

Claessen, M.H.J.
Philips Healthcare | Eindhoven
Design Engineer

Vliegen, S.J.C.
Bright Alley | Utrecht
E-learning Consultant

Brummelman, C.A.G.S.
Tegema Group | Eindhoven
Engineer

Müller, R.A.J.
IfTA GmbH | Essen, Duitsland
Early Stage Researcher

Thalen, J.P.
University of Twente | Enschede
PhD Student

Dankers, W.
University of Twente | Enschede
Assistant Professor

Veen, Z. van
Sensata Technologies | Almelo
Design Engineer

Vriezenga, C.
Itho Daalderop | Tiel
Industrial Design Engineer

Vaessen, P.W.J.
Julius Clinical | Zeist
Planning & Process Associate

Timmerman, M.B.
Deerns | Amsterdam
Experienced Technician

Jaasma, H.

Schuring, B.
Ergos Engineeringing & Ergonomics | Enschede
Designer / Human Factors Specialist

Oosterhuis, S.G.
Plasticon The Netherlands | Oldenzaal
Manufacturing Engineer

Wijnholds, J.M.
Pentas Moulding | Almelo
Project Manager

Steen, H.A.J.M. van der
VDL ETG Almelo | Almelo
Junior Accountmanager

Loeffen, G.A.W.
Sealed Air Corporation | Nijmegen
Package Design Centre Supervisor

Maljaars, J.C.
Educator | Almere-Stad
Scrum Product Owner

Vreede, M. de
FrieslandCampina | Amersfoort
Packaging Developer

Landman, R.B.
ErgoS | Enschede
Human Factors Engineer

Rinsema, H.K.
Colt technology service | Barcelona
Custom Engineer

Vekerdy, B.
Multicycle B.V. | Ulft
Product Manager

Zwakenberg, R.S.

Schelfhout, R.L.E.M.
Schelfhout Design & Media Consultancy | Groesbeek
Owner

Wiersma, J.
Donkervoort Automobielen BV | Lelystad
Industrial Design Engineer

Haveman, S.P.
University of Twente | Enschede
PhD Student

Land, J.G.
Legamaster International B.V. | Lochem
Product Developer

Schrijver, S.
Tingle | Enschede
Product Designer

Wams, K.K.W.
SC Johnson Europe BV | Mijdrecht
Packaging Engineer

Nijs, J.C.
Sensata Techologies | Almelo
Design Engineer

Gude, J.C.
Aimvalley B.V. | Utrecht
Product Developer

Kauw-A-Tjoe, R.G.
Studio Diip | Leerdam
Designer

Dijk, C.A. van
BeaconPartners | Driebergen-Rijsenburg
Project manager product innovation

Kolk, J.H. van der
First Consulting | Amsterdam
Business Consultant

Mansour, I.

Mud, R.J.
SC Johnson | Mijdrecht
Junior Packaging Engineer

Cheval, T.
Atos Worldline | Ridderkerk
Product Manager / Product Owner

Gorter, T.
University of Twente | Enschede
PhD Student

Jokker, J.
Informaat | Baarn
Interaction Designer

Kerkhoffs, E.
Philips | Drachten
Packaging Developer

Damhuis, M.J.M.
Sowecare | Almelo
Product Manager

Meinders, N.
Unilever, Nynqué Design | Vlaardingen
Packaging Developer Dressings, Owner

Pijpstra, R.
J. van Walraven Holding B.V. | Mijdrecht
Product Development Engineer

Endert, M.
Hillhout Bergenco B.V. | Zwolle
Industrial Product Designer

Knol, K.M.
Auping | Deventer
Product engineer

Haagsman, H.P.
Mindgame | Amsterdam
Junior Designer / Project Manager

Bos, M.J.
Cargill Cocoa & Chocolate | Schiphol
Production Planner Ghana & Cote d'Ivore

Joosten, C.F.
Panton | Deventer
Industrial Design Engineer Biomedical Products

Kuiper, E.M.
AWL Techniek | Harderwijk
Project Manager

Dijk, W. van
TU Delft | Delft
PhD Student

Tromp, C.A.
- | Sydney/Amsterdam
Freelance Pianist/Composer/Graphic designer

Renswouw, C.C.M. van
Babylonia | Antwerpen
Product Designer

Draisma, F.R.
SURFnet | Utrecht
Young Talent

Tiekstra, G.R.
Kenniscentrum Papier en karton | Arnhem
Programme Supervisor Final Products

Kienhuis, H.H.J.
Wila bv | Lochem (GLD)
Project Manager R&D

Arragon, C.W. van
BERG Toys | Ede
Project Leader

Ruiter, J.B.
Philips Consumer Lifestyle | Amsterdam
Packaging Engineer

Vos, O.

Grint, A. van de
Nijha b.v. | Apeldoorn
Strategic Product Developer

Everlo, M.

Peeters, N.
Warm Heart Worldwide | Thailand
Packaging Designer

Bosma, H.W.
Fabrique Public Design | Delft
Industrial Designer

Voorthuizen, J.M.S. van
HJ Heinz, Judith van Voorthuizen Design | Nijmegen
Packaging Development Technologist, Freelance Designer

Klaversma, M.
Heijmans | Utrecht
BIM Engineer

Boer, Z. van de
High Voltage Engineering Europe | Utrecht
Junior Mechanical Engineer

Weeda, H.N.
JAM visueel denken | Amsterdam
Visual Translater

Brandenburg, S.C.A.
Saxion University | Enschede
Project Leader New Media

Gorp, E.A.A. van
Quarantainenet BV | Enschede
Technical Writer

Smilde, B.A.
Stevens IDE Partners | Enschede
Industrial Designer

Bennink, J.B.
Tingle | Enschede
Director

Peters, J.

Kraaijvanger, H.M.
Koninklijke Gazelle N.V. | Dieren
Product Engineer

Davina, O.
Van Raam | Enschede
Junior Engineer

Sloot, S.

Oudehand, L.B.
Unilever | Rotterdam
Packaging Development Manager

Heuvel, L.C. van den
SES Creative | Enschede
Product Designer

Nijholt, J.V.
Frames | Alphen aan de Rijn
Project Engineer

Beurs, D. de
Frontwise | Utrecht
Designer / Partner

Prinsen, W.A.
JAM Visual Thinking | Amsterdam
Visual Translator

Koopmans, L.
Vaassen Flexible Packaging BV | Vaassen
Project Manager Innovation R&D

Bakker, A.J.
Google | Amsterdam
Associate accountmanager

Westdijk, M.J.
LuxperienceLab, Van Berge Henegouwen Installaties, Studio Mike Westdijk | Roelofarendsveen
Junior Designer

Koelman, M.

Wit, R.C. de
Baat Medical BV | Hengelo
Project Engineer

Heeres, C.L.
Essent | Den Bosch
Management Trainee IT

Balda Irurzun, U.

Ettinger, P. van
Zodiac Galley Europe | Amsterdam
Development Engineer

Jonker, A.
Kip Caravan B.V. | Hoogeveen
Marketing and Product Managemer

Heezen, J.

Kneefel, J.
Orlace Products B.V. | Barneveld
Product Designer / Constructor

Oudhuis, W.
Robert BOSCH GmbH / Skil Europe | Breda
Junior Product Manager

Bos, M.Y.
University of Twente | Enschede
Framework for Affective Engineering

Kranen, M.
Tieto | Amersfoort
User Experience Consultant

Biemans, B.M.
Villeroy & Boch | Mettlach
Project Manager Marketing Wellness

Maatman, B.
Automaten Centrale | Neede
Industrial Designer

Thung, T.K.M.
USG Innotiv | Eindhoven
Industrial Design Engineer

Groen, S.I.
People Creating Value | Enschede
Product Engineer

Appelhof, H.
Lely Industries NV | Maassluis
Product Engineer

Uitert, A.F. van
Nederlanse Spoorwegen | Zwolle
Shiftleader

Jansma, S.H.
University of Twente | Enschede
Researcher

Endeman, G.
Philips Consumer Lifestyle | Amsterdam
Moulding Engineer

Zweers, W.
FabLab Enschede | Enschede
Supervisor

Lange, J. de
University of Twente | Enschede
Assistant Professor

Enserink, M.
Imtech | Rotterdam
Management Trainee Young Capital Program

Herder, R.G.
Homestyle Bonaire | Bonaire
Stylist & Sales

Hartman, T.M.
Volito | Veenendaal
Developer / Engineer

Groen, B.
Remeha | Apeldoorn
Product Engineer

Crusius, S.F.
Danone Research | Amsterdam
Packaging Engineer

Bos, R.
T-Xchange | Enschede
Serious Game Designer

Jong, R.I.
Frontwise | Utrecht
Partner

Versteegh, C.D.
Brandes en Meurs Indstrial Design B.V. / WWINN | Bunnik
Industrial Design Engineer

Buurman, J.W.M.
Bel Leerdammer bv | Schoonrewoerd
Packaging Technologist

Molenaar, M.
PF Concept | Roelofarendsveen
Industrial Designer

Bruijn, A.A. de
Reinders Industrial | Almelo
Senior Project Engineer

Wensink, R.
Paruchute, RUWdesign | Amsterdam
Co-owner, Freelance Industrial Designer

Vernhout, B.
Bronswerk Heat Transfer/USG innotiv | Nijkerk
Mechanical Engineer/ Project Engineer

Leppers, J.P.
Nedforce | Enschede
Frontend Developer

Klazinga, R.
Robert Bosch | Shanghai city, Shanghai
Management Trainee

Schotman, H.
University of Twente | Enschede
PhD Candidate

Goossens, A.J.M.
University of Twente | Enschede
PhD Candidate

Huijing, S.V.S.
JCC Software | Oldenzaal
Interface and Interaction Designer

Domburg, S.D.
Valspar | Lelystad
Product Manager Americas

Berga, G.
Bollegraaf Recycling Machinery | Appingedam
R&D Employee

Xu, N.
Pumpkinpi.es, Gamification.org, Booking.com | Amsterdam
Owner, User Experience Researcher, Partner Translator

Kickert, V.M.

Steinebach, R.J.
Rademaker BV | Culemborg
Engineer

Emmens, P.A.
Pentair X-Flow | Enschede
Module Designer / R&D Engineer

Kloppenburg, F.W.
Fokker Aerostructures B.V. | Papendrecht
Junior Design Engineer

Noordhoff, L.
Ithaca Internet Marketing, JM Toolshop, Pantyfashion | Amsterdam
Internet Marketeer / Owner, Partner, Co-owner

Heemst, R.D.R. van der
MMID Full Service Design Team | Den Haag
Designer Productibility

Delden, R.W. van
University of Twente | Enschede
PhD Candidate

Binnemars, S.
Van Dijk Bouw en University of Twente | Hardenberg en Enschede
Concept Engineer

Mooren, R.
Paperfoam | Barneveld
Industrial Designer

Tuinte, N.C.
HJ Heinz | Nijmegen
Junior Packaging Development Technologist

Korteling, N.H.S.
CARTILS | Hilversum
3D Designer

Barelds, P.
Hygear, Petra etcetera | Arnhem
Marketing, Communication & Account

Kok, W.J.F. de
Emerson Valve Automation | Hengelo
Operations Excellence and Quality Assurance Manager

Jonkman, M.

Nieuwboer, S.W.
Smufit Kappa | Eerbeek
Management Trainee

Konink, R. de
Huisman Equipment B.V. | Schiedam
Junior Design Engineer

Boswerger, M.P.
Olde Hanter Bouwconstructies BV | Oldenzaal
Industrial Design Engineer

Kiliç, Y.
KJ Industrial Transfer Design | Haarlem
Owner

Licht, L.
TriMM | Enschede
Interaction Designer

Friso, T.

Scholder, F.

Nijkamp, M.
University of Twente | Enschede
Teacher and Researcher

Lintsen, M.
D.E Master Blenders 1753 | Utrecht
Packaging Technologist / NPD Project Manager

Kettler, S.
Nimbus Group | Stuttgart
Junior Process Manager

Hurk, A. van den
Lely Industries | Den Haag
Product Engineer

Essers, M.S.
University of Twente | Enschede
PhD Candidate

Schol, H.A.

Hermsen, K.
Tech2Sea | Alphen aan den Rijn
Project and Design Engineer

Worm, B.H.H.
SKEW Accessories B.V | Empe
Engineer

Reilink, D.
Air Aroma Group | Utrecht
Industrial Designer

Sprenkeling, E.
NLR | Marknese
Junior R&D Designer

Renkens, A.M.
Dutch Design Awards | Eindhoven
Intern

Kothman, I.M.H.
TCPM | Hengelo
Project Engineer

Kea, N.L.M.

Oude Luttikhuis, E.J.
University of Twente | Enschede
Researcher

Erkel, H.

Henning, M.
Nucletron Operations BV | Utrecht
Product Engineer

Peters, H.A.R.
Pezy Product Innovation | Groningen
Junior Product Engineer

Beer, M. de
Spanninga | Joure
Product Design

Galen, R.A. van
Annmar Engineering | Kraggenburg
Mechanical Engineer

Körber, M.
SES Creative | Enschede
Graphic Designer, Product Developer

Meijer, E.
PRé consultants | Utrecht
Junior LCA Consultant

Beens, A.
Brunel | Enschede
Constructor / Draughtsman

Groot, S.J.
Danone | Amsterdam
Packaging Engineer

Akker, D.A.J. van den
A-ware Packaging B.V. | Zeewolde
Assistant Packaging Specialist

Léoné, N.A.M.
Leoné Design, MusicReader | Enschede
Owner, Designer

Hoogendoorn, N.W.
ThingKit, Trendwat.ch, Ikbendiezijn | Enschede
Owner / Founder

Blom, Y.M.
MAX designers | Rotterdam
Intern

Germs, M.M.
Evalan | Amsterdam
Development Engineer

Janssen, L.C.
MMID | Den Haag
Designer Look & Feel

Hoek, E. van
People Creating Value | Enschede
Product Engineer / Designer

Pas, M.B.
Alliander | Arnhem
Management Trainee

Abbink, B.A.J.H.
- | Amersfoort
Freelance Product Design & Design Thinking Consultancy

Doppenberg, F.A.
Bugaboo | Amsterdam
Junior Product Engineer

Bosch, J. van den
Top-bv | Wageningen
Industrial Design Engineer

Vis, A.C.
Villeroy & Boch | Roden
Industrial Design Engineer

Prinsen, N.
SBR | Rotterdam
Project Manager

Visbeek, M.
Next Monday's Hangover, Overdose.am | Amsterdam
Co-founder & Creative Director (both)

Voorde, P. ten
Luminis | Apeldoorn
Interaction Designer

Verduijn, L.J.

Grob, M.B.C.
Benchmark Electronics | Almelo
Industrial Design Engineer

Engel, I.
Philips Consumer Lifestyle | Amsterdam
Packaging Developer

Poolen, D.F.
Daniël Franz | Amsterdam
Owner, Researcher & Consultant on Sustainability

Diepen, B.G.D. van
BDR Thermea | Apeldoorn
Product Engineer

Dongen, R.H.J. van
Vanderlande Industries | Eindhoven
Mechanical Development Engineer

Doorn, M.M. van

Wiggelinkhuizen, A.C.
J. van Walraven Holding B.V. | Mijdrecht
Product Development Engineer

Kemper, E.M.

Waegemaekers, L.M.
Paardekooper Group | Rotterdam
Technical Assistent

Zwart, M.P.J.
University of Twente,Typus | Enschede, Hoogeveen
Teacher, Co-founder

Faculty of Engineering Technology

Critical Reflection 2013
Bachelor's Programme Industrieel Ontwerpen
Master's Programme Industrial Design Engineering

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University of Twente
Faculty of Engineering Technology
Industrieel Ontwerpen (IO)
Industrial Design Engineering (IDE)
PO box 217
7500 AE Enschede
The Netherlands
T + 31 53 4892547

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