Vlindersingel 220
NL-3544 VM Utrecht
+31 30 87 820 87
www.AeQui.nl
info@AeQui.nl

BSc Industrial Design Engineering
MSc Industrial Design Engineering

Faculty of Engineering Technology
University of Twente

Report of the limited programme assessments
4-5 April 2019

Utrecht, The Netherlands
June 2019
www.AeQui.nl
Assessment Agency for Higher Education

Colophon

Programmes
University of Twente
BSc Industrial Design Engineering – Croho: 56955 – ECTS: 180 study points
MSc Industrial Design Engineering – Croho: 66955 – ECTS: 120 study points
Location: Enschede
Mode of study: full-time
Result of institutional assessment: positive

Panel
Prof. dr. em. Anton de Goeij, chair
Prof. dr. Saeema Ahmed-Kristensen, domain expert
Prof. dr. Jacob Buur, domain expert
Prof. dr. Ann Heylighen, domain expert
Carlijn Compen MSc, industry expert
Lianne de Jong BSc, student-member
Mark Delmartino MA, secretary and process co-ordinator

The panel has been approved by NVAO

The assessment was conducted under responsibility of AeQui VBI
Vlindersingel 220
3544 VM Utrecht
The Netherlands
www.AeQui.nl

This document is best printed in duplex

Table of contents

Summary

On 4 and 5 April 2019 an assessment committee of AeQui visited the Faculty of Engineering Technology at the University of Twente (UT). The visit is part of the cluster assessment of eight degree programmes in Industrial Design Engineering (IDE) at the universities of Eindhoven, Delft and Twente. This report presents the committee's findings, considerations and recommendations on UT's three-year bachelor programme and two-year master programme in Industrial Design Engineering. The assessment committee has used the NVAO framework 2018 for the limited assessment of existing programmes and judges that both programmes meet all NVAO standards. It therefore issues a **positive** recommendation on the quality of the bachelor programme and the master programme Industrial Design Engineering at UT.

Intended learning outcomes
The IDE bachelor and master programmes at UT are embedded in the Faculty of Engineering Technology, and their objectives align with the mission and vision of the University and the Faculty. Both programmes feature a comprehensive range of clearly formulated and properly differentiated competences and intended learning outcomes (ILO). The ILO are robust because they reflect not only the provisions of the domain-specific reference framework, the Academic Competences and Quality Assurance criteria and the Dublin Descriptors, but they also do justice to the specific vision on IDE of the University, Faculty and programmes. Both sets of learning outcomes bring about the UT-distinctive graduate profile of the *T-shaped* and *X-shaped designeer*. The committee judges that the bachelor and the master programmes Industrial Design Engineering **meet the standard.**

Teaching-learning environment
The teaching-learning environment of the IDE programmes at UT is adequate. The bachelor programme is set up according to the *Twente Educational Model (TOM)* and integrates learning and application in thematic and interdisciplinary modules. The master programme allows students to tailor their own curriculum around one of three tracks according to their own needs and interests. Both curricula do justice to the educational principles of research-oriented, project-based, self-directed and collaborative learning. The IDE programmes have sufficient and properly qualified staff at their disposition, which students describe as passionate, accessible and empowering. Most staff, moreover, have an adequate command of the English language. The IDE programme facilities are relevant. The committee judges that the bachelor and the master programmes Industrial Design Engineering **meet the standard.**

Student assessment
Student assessment in the IDE programmes at UT is organised adequately. Since the previous accreditation visit, a lot of developments have taken place with regard to student assessment and these changes are for the better. The Examination Board (EB) is functioning well. It is a small team that thrives on the expertise and commitment of the EB secretary. The bachelor and master programme now feature a comprehensive quality assured system for module and course assessments that involves IDE lecturers, educational experts and the EB. The existing assessment system can be further improved by revisiting the thesis evaluation forms, by paying attention to formative assessment and by enhancing the capacity of the Examination Board. The committee judges that the bachelor and the master programmes Industrial Design Engineering **meet the standard.**

Achieved learning outcomes
The intended learning outcomes of the IDE programmes are eventually achieved at the end of the bachelor and master curriculum. The sample of reviewed final bachelor projects fully meets the quality expectations. In almost all master theses, students deployed a solid methodology, coherent argumentation and an awareness of the limitations of their research. Surveys and testimonials from alumni, moreover, demonstrate that IDE students are well qualified to pursue a follow-up study or enter the

labour market. The committee judges that the bachelor and the master programme Industrial Design Engineering **meet the standard**.

Recommendations
Notwithstanding its positive conclusion that both programmes meet the four NVAO standards, the committee noticed that there is still room for improvement on individual components of the respective programmes. The committee therefore issues the following recommendations:

- to include more explicit reference in the ILO to the international dimension of/in the respective programmes;
- to clarify the three track profiles in the master programme;
- to complement the open-door policy with other forms of regular and systematic staff guidance for all students;
- to include in the thesis evaluation form the objectives of the bachelor/master thesis and the ILO of the respective programme;
- to revisit the scoring guidelines for the thesis and make the weighting of the respective assessment components more transparent;
- to include more systematically development-oriented student feedback in formative assessment throughout modules and courses;
- to strengthen the capacity of the EB by adding more resources and bringing in additional educational assessment expertise;
- to document more explicitly the validation of individual thesis plans and their relevance for the overall learning outcomes;
- to include elements of (people) management and entrepreneurial skills in the curriculum;
- to raise awareness among industry on what industrial design engineering (at UT) stands for.

In sum, both the bachelor programme and the master programme Industrial Design Engineering meet each of the four standards of the NVAO assessment framework. Hence, the panel recommends NVAO to issue a positive conclusion regarding the bachelor programme Industrial Design Engineering and the master programme Industrial Design Engineering of the University of Twente.

On behalf of the entire assessment committee,

Utrecht, June 2019

Anton de Goeij
Chair

Mark Delmartino
Secretary

Introduction

The bachelor and master programmes Industrial Design Engineering at the University of Twente are embedded in the Faculty of Engineering Technology. The IDE programmes reflect the mission and vision of both University and Faculty in their ambition to deliver so-called *designeers*, industrial design engineers with interdisciplinary competencies and in-depth technical expertise who can operate across technical and organisational boundaries in complex business environments. Both programmes are delivered in English language. The three-year bachelor programme is organised according to the *Twente Educational Model*; the two-year master programme is built around three specialisation tracks: *Management of Product Development*; *Human Technology Relations*; *Emerging Technology Design*. The programmes offer students considerable freedom in designing their individual curriculum.

The institute

The University of Twente (UT) was founded in 1961. Over the years UT has developed into a research university with an international outlook and strong connections with the region. Its core domains – technology, science, engineering and social sciences – invite students, scientists and educators to collaborate across disciplines. The UT research institutes address high tech with a human touch by connecting technology to human behaviour and social relevance. Important features of the UT are its innovative campus with high quality facilities, its engineering approach to societal challenges, its focus on core technology domains such as robotics and geo-information science, its attention to highly personal student-driven project-based education, and its track record in value creation. Nowadays education and research are organized in five faculties involving over 10000 students, 1750 research staff and 1300 support staff.

The Industrial Design Engineering (IDE) programmes are part of the Faculty of Engineering Technology (ET) together with three other education clusters: *Civil Engineering*, *Mechanical Engineering* and *Sustainable Energy Technology*. The Faculty's scientific staff are organised in five departments: *Biomechanical Engineering*; *Civil Engineering*; *Design, Production & Management*; *Mechanics of Solids, Surfaces and Systems*; and *Thermal & Fluid Engineering*.

The educational vision of the IDE programmes aligns with the missions of both University and Faculty: to let academic professionals shape their own set of design skills and critical attitude by providing high-quality academic education and research in the field of product design, development and engineering. The programmes focus on interdisciplinary competencies as well as on specific technical and non-technical knowledge that is relevant for industry and society at large.

The programmes

The industrial design engineering graduate at UT, also referred to as a *designeer*, is described as a young professional with in-depth technical expertise and know-how; a synthesizer and integrator who acknowledges and reflects, and who operates across technical and organisational boundaries in complex business environments. IDE students at UT are educated to become independent entrepreneurial self-directive *designeers* with a *T-shaped* and/or *X-shaped* profile who wish to pursue a career in science, technology and society. As *T-shaped designeers* bachelor graduates are great collaborators; master graduates develop into *X-shaped* professionals who focus on strategy and management in multi-disciplinary teams.

The accreditation assessment concerns a three-year full-time bachelor programme in Industrial Design Engineering (180 ECTS) that is organised according to the *Twente Educational Model* (*TOM*), a UT-specific teaching and learning framework for bachelor programmes. The IDE bachelor

programme teaches the basic IDE disciplines and provides a broad view on the domain. Since 2014 student enrolment has increased from 107 to 132; a total of 88 students graduated in 2017-2018.

Furthermore, the assessment committee evaluates the two-year full-time master programme in Industrial Design Engineering (120 ECTS). Master students all work towards the same set of learning outcomes yet have considerable freedom in organising their curriculum, which is built around one of three tracks: *Management of Product Development* (*MPD*), H*uman Technology Relations* (*HTR*), and *Emerging Technology Design* (*ETD*). Since 2014, student enrolment has been fluctuating between 101 and 80; in 2017-2018, 69 master students obtained an IDE master degree from UT.

In line with the University's ambitions regarding internationalisation of staff, students and curriculum, both IDE programmes are currently delivered in English: the bachelor programme switched to English as per September 2016; the master programme has been taught in English since 2007.

The assessment

The Faculty of Engineering Technology at the University of Twente assigned AeQui VBI to perform a quality assessment of its bachelor and master programmes Industrial Design Engineering. This assessment takes place in the framework of a broader exercise: in spring 2019 a cluster of eight IDE programmes from three universities (TU Eindhoven, TU Delft, U Twente) is assessed by a panel of domain and industry experts including an IDE student. In close co-operation with the three institutions, AeQui convened an independent and competent assessment committee that was eventually validated by NVAO. The assessment committee is presented in Attachment 1 to this report.

AeQui organised a preparatory meeting with representatives of the respective departments / faculties and degree programmes to exchange information on the organisation and implementation of the visit, as well as on the timing and contents of the supporting materials. The site visit to UT was carried out on 4 and 5 April 2019 according to the programme presented in Attachment 2.

In the run-up to the site visit, the assessment committee studied the self-evaluation report prepared by the programme management and reviewed for each IDE programme a sample of theses accepted during the last two years. The experts' impressions on the report and the results of the thesis review served as input for discussion during the visit. The materials put at disposition by the IDE programmes prior to and during the visit are listed in Attachment 5.

The committee has assessed the programmes in an independent manner; at the end of the visit, the chair of the assessment committee presented the initial findings of the committee to representatives of the programmes and the faculty. The underlying report was prepared after the site visit and contains in a systematic way the committee's findings, considerations and conclusions according to the 2018 NVAO framework for limited programme assessment. A draft version of the report was sent to the IDE programme management at UT; their reaction has led to this final version of the report.

The NVAO assessment framework includes a Development Dialogue. The three institutions involved in the Industrial Design Engineering cluster have decided that such dialogue will take place a few months after the site visit. The results of this development dialogue have no impact on the findings, considerations and recommendations expressed in this report.

1. Intended learning outcomes

The IDE bachelor and master programmes at UT are embedded in the Faculty of Engineering Technology, and their objectives align with the mission and vision of the University and the Faculty. Both programmes feature a comprehensive range of clearly formulated and properly differentiated competences and intended learning outcomes (ILO). The ILO are robust because they reflect not only the provisions of the domain specific reference framework, the Academic Competences and Quality Assurance criteria and the Dublin Descriptors, but they also do justice to the specific vision of the University, Faculty and programmes on IDE. Both sets of learning outcomes lead to the UT-distinctive graduate profile of the *T-shaped* and *X-shaped designeer*. Internationalisation is an important component of the endeavours at University, Faculty and programme level, and deserves to be included more explicitly in the ILO of both IDE programmes. According to the assessment committee, the bachelor and the master programmes Industrial Design Engineering meet this standard.

Findings

Mission and vision

The IDE bachelor and master programmes at UT are embedded in the Faculty of ET. The committee noticed in the materials and the discussions on site that the programme objectives align with the mission and vision of the University and the Faculty. The University wants to respond to demands from society by connecting technology (high tech) with human behaviour and social relevance (human touch). UT researchers and students enquire into the opportunities offered by technology and reflect on the dilemmas that technology entails. This approach requires researchers, professionals and students to be creative cross-disciplinary problem solvers and asks for an education model that connects across domains, focusing on both scientific education and on the application of scientific theories into practice.

In line with the mission of the Faculty, the IDE programmes cover the initiation, formulation, design and development of technical solutions for current and future societal problems and challenges. The programmes enable academic professionals to shape their own set of design skills and critical attitude by providing high-quality academic education and research in the field of product design, development and engineering. Both bachelor and master programmes focus on interdisciplinary competencies as well as on specific technical and non-technical knowledge that is relevant for industry and society at large.

The committee understood from the discussions on site that educating IDE students along the mission and vision of the University, Faculty and programme leads to a specific graduation profile: the UT *designeer* is a young professional with in-depth technical expertise and know-how, a synthesizer and integrator who acknowledges and reflects, and who operates across technical and organisational boundaries in complex business environments. IDE students at UT are educated to become independent entrepreneurial self-directive industrial design engineers with a *T-shaped* and/or *X-shaped* profile who wish to pursue a career in science, technology and society. As *T-shaped designeers* bachelor graduates have in-depth knowledge and are good at collaborating and communicating; master graduates develop into *X-shaped* professionals who combine in-depth knowledge with a focus on strategy and leadership in multi-disciplinary teams.

Domain specific reference framework

In the domain specific reference framework, the three universities that offer Industrial Design Engineering in the Netherlands (TU Delft, TU Eindhoven and U Twente) have described the profile

and labour market position of academic IDE graduates. According to this document, the labour market needs academically trained product designers who can integrate knowledge from different fields of technology with human factors, who can capture signals from the market and can generate creative ideas with new solutions. An IDE graduate is therefore able to operate as an interdisciplinary designer in the field of IDE. The committee gathered from the self-evaluation report and the discussions on site that the profile, competencies and labour market perspective of IDE graduates at UT are very much in line with the provisions of the domain specific reference document.

At the same time, however, the committee also noticed that the mission and educational vision of the Faculty of Engineering Technology at UT and the goals of its IDE education programmes add extra flavour to the IDE graduate profile of the domain specific reference framework. First and foremost, the *T-shaped* and *X-shaped designeer* profiles are specific for the IDE programmes from UT. Moreover, the intended learning outcomes for both bachelor and master programmes are defined in terms of the seven competencies for academic engineering programmes (the so-called *Meijers criteria*), which include particular attention to 'co-operating and communicating' and to 'addressing temporal, social and personal contexts'.

Intended learning outcomes

The intended learning outcomes of both bachelor and master programme are listed in Attachment 3 to this report. The committee acknowledges that the learning outcomes have been formulated in full alignment with the domain specific reference framework. In fact, the framework's fundamental topics and final qualifications are expressed and reflected as learning lines in the ILO of both bachelor and master programme. Moreover, the IDE programmes have used the Academic Competences and Quality Assurance criteria and the Dublin Descriptors to formulate the academic skills that have to be obtained in the bachelor and master programme, respectively. In this regard, the committee noticed that the level descriptors set by the Dublin Descriptors have been extended in the IDE programmes at UT to include: (i) knowledge, insight and understanding; (ii) applying knowledge and understanding, (iii) cognitive skills (critical thinking, analysis), making judgements; (iv) numeracy and communication skills; (v) autonomy, collaborative abilities and lifelong learning skills.

The committee learned from the self-evaluation report that the structure of both sets of learning outcomes is very similar, yet with a clear distinction in orientation and level between the final qualifications for a bachelor and a master student. Anticipating the next standards, the committee moreover noticed that the respective competencies are addressed throughout the bachelor and master curriculum and that the ILO criteria and sub-criteria are measured against the assessment plans of the individual courses.

When asked why the master programme features the same set of learning outcomes for three tracks, the IDE programme representatives indicated that only 30% of the courses are track-specific and that for the larger part of the curriculum, all master students select courses from the same pool. The learning goals of each course are matched with the learning outcomes at programme level. Moreover, the master track coordinator checks and validates for each individual student the proposed package of courses and master thesis subject. The committee also learned during the visit that all master students receive the same IDE degree; the track is not mentioned on the diploma, but the courses are listed on the transcript.

Considerations

Based on the written materials and the discussions on site, the committee considers that both programmes feature a comprehensive range of clearly formulated competences and intended learning outcomes. While the structure of the ILO is very similar, the formulation of the criteria and

sub-criteria are differentiated properly according to the bachelor and master level.

The committee thinks highly of the respective ILO because these reflect not only the provisions of the domain specific reference framework, the ACQA criteria and the Dublin Descriptors, but also do justice to the specific vision of the university, faculty and programmes on IDE. The ILO for both bachelor and master programmes address the comprehensive range of design competencies, (cross-)disciplinary know-how, methodological and academic approaches, professional and (inter-)personal skills and attitudes. According to the committee, these sets of ILO will bring about the UT-distinctive graduate profile of the *T-shaped* and *X-shaped designeer*.

The committee understood from the materials and the discussions that internationalisation is an important component of the mission and vision of the University, Faculty and IDE programmes. The committee acknowledges that internationalisation is embedded in the design and the implementation of both bachelor and master curricula. However, this international focus has not yet found its way into the ILO. The programme management may therefore want to include this important component, which is clearly present in the respective curricula, in the respective ILO.

Based on the interviews and examination of the underlying documentation, **the assessment committee concludes that the bachelor and the master programmes Industrial Design Engineering meet standard 1, intended learning outcomes.**

2. Teaching-learning environment

The bachelor and master programmes Industrial Design Engineering at UT are embedded in an adequate teaching and learning environment. The bachelor programme is set up according to the *Twente Onderwijs Model (TOM)* and integrates learning and application in thematic and interdisciplinary modules. The master programme allows students to tailor their own curriculum around one of three tracks and according to their own needs and interests. Both curricula do justice to the educational principles of research-oriented, project-based, self-directed and collaborative learning. The IDE programmes have sufficient and properly qualified staff at their disposition, which students describe as passionate, accessible and empowering. The programme facilities are adequate and relevant. In addition to inviting the programme management to address some of the student concerns, the committee suggests to improve the IDE teaching learning environment in two ways: by clarifying the three track profiles in the master programme, and by complementing the open door policy of staff with other forms of regular and systematic guidance for all students. According to the assessment committee, the bachelor and the master programmes Industrial Design Engineering meet this standard.

Findings

Programme

The IDE programmes form one of the four education clusters in the Faculty of Engineering Technology (ET). The faculty's scientific staff belong to one of five research departments and ensure that the most recent and relevant academic research results are integrated in the courses.

Both programmes under review have been running for some time: the bachelor programme was established in 2001 and the master programme in 2004. In line with the university's ambitions regarding internationalisation of staff, students and curriculum, both IDE programmes are currently taught in English: the bachelor programme switched to English as per September 2016; the master programme has been taught in English since 2007.

The committee noticed that both programmes are relatively small in terms of student numbers. This allows for easy contact between students and staff and a more personal approach, one of the distinctive features of the UT education approach.

Bachelor curriculum

The three-year full-time bachelor programme Industrial Design Engineering teaches the basic IDE disciplines and provides a broad view on the domain. Since 2001, the bachelor curriculum IDE has been entirely based on project-led education. In 2013, UT incorporated this approach in the *Twente Educational Model* (*TOM*). *TOM* is a UT-specific teaching and learning framework for bachelor programmes. It is based on thematic modular project education, promotes student-driven learning, and addresses the professional roles of researcher, designer and organiser. Every *TOM* curriculum consists of 12 coherent, self-contained modules of 15 ECTS. Attachment 4 to this report contains an overview of the IDE bachelor curriculum, which amounts to 180 ECTS.

Each IDE module has a theme, which includes a selection of topics and is completed by an integral project. Almost every module pays attention to five learning lines: *Basics*, *Humanities & Business*, *Design*, *Engineering*, and *Project*. Some topics such as *Mathematics and Electronics* are taught across modules together with bachelor students from other UT programmes. The programme structure for the first two years is identical for all IDE bachelor students, although they can determine -to a certain extent- the type of projects they work on. Moreover, students are part of regularly changing project teams that are assembled

by the programme coordinator to ensure sufficient diversity within the teams. The two elective modules in year 3 allow for deepening the students' knowledge or widening their horizon and can include a study period abroad. According to the self-evaluation report, about 40% of the third-year bachelor students perform a minor abroad. For the final modules, students design a complex system in a realistic situation and conduct an in-depth research.

The committee gathered from the materials and the discussions on site that the *STAR* excellence programme provides additional challenges for ambitious bachelor students in the first and second year. From modules 2 to 8, IDE students can sign up for a more challenging in-depth or interdisciplinary (project) assignment. Moreover, the top 10% bachelor students can also enrol in the UT-wide Bachelor Honours Programme of 30 ECTS to enrich their knowledge, skills, attitude, cooperation and experience outside their own discipline. In this honours programme, students choose among one of the multidisciplinary tracks that run for 1.5 years. The committee spoke to a few bachelor students who are involved in the STAR / Honours programmes. They appreciate the opportunity and underline the added value of these initiatives for their own development.

The student chapter in the report and the discussion with students on site revealed that bachelor students like the variation of courses and subjects, the integrated project work, and the balance between knowledge and skills. They see a continuous development across the modules with opportunities to apply in later modules what has been acquired previously. They find group work to be sufficiently diverse across modules and challenging in a positive developmental way.

Asked for improvement, students mentioned that there could be more attention to in-depth engineering courses and to technical knowledge in the projects. Moreover, they would appreciate more attention in the curriculum to the career perspectives of an IDE bachelor graduate. For instance, the virtual project development module could programme more guest lecturers. According to students, the study load is quite challenging: the particular structure of the curriculum (*TOM*-based integrated modules of 15 EC) means that there is a constant workload throughout the year, which enhances the pressure not to incur study delay and avoid re-sits as much as possible. Finally, students indicated that the transition to an English-language programme is not yet fully successful: the level of English of some teachers leaves to be desired, although everybody is catching up thanks to dedicated language courses; moreover, there is room for an environment that is more inclusive of non-Dutch students. While groups are mixed, there is still a lot of Dutch language actually spoken in workshops and projects.

Master curriculum

The two-year full-time master programme Industrial Design Engineering addresses the specialisations of IDE and features three tracks: *Management of Product Development* (*MPD*), *Human Technology Relations* (*HTR*), and *Emerging Technology Design* (*ETD*). The curriculum is spread over eight quarters of ten weeks each. Each quarter represents a study load of 15 ECTS. During the first five quarters students follow courses (three per quarter) for a total of 75 ECTS. The final three quarters are spent on the master thesis (45 ECTS). Attachment 4 to this report contains an overview of the master curriculum, which amounts to 120 ECTS.

The curriculum consists of obligatory courses (mandatory for all students), recommended courses (compulsory for a specific track), and selective courses which can be freely chosen. Based on the chosen track, each student puts together his/her own study programme: a combination of obligatory, recommended and selective courses, as well as a thesis project. The envisaged study programme is presented and discussed with the assigned track coordinator, who eventually approves the individual programme.

The committee gathered from the materials and the discussions on site that there is a good integration of technology, business, societal and human-centred approaches in the curriculum. It also acknowledges the self-directed character of the programme, which is shown in the many electives that students can choose when they tailor their individual study programme. Moreover, through the master thesis of 45 ECTS, the curriculum puts a considerable emphasis on students demonstrating their end level qualifications. Also, master students can spend a period abroad, preferably during the thesis assignment.

The student chapter in the report and the discussion with students on site revealed that master students like the self-directed character of the programme and the opportunity they get to create their own personalised study programme. Students also mentioned to the committee that staff is open, supportive and passionate about (their domain in) IDE. There is a special atmosphere of equality between staff and students, which students find particularly motivating. Several students, moreover, indicated that staff had encouraged them to think outside the box of IDE. They also appreciate that course coordinators provide support that is tailored to their own individual ambitions, whether this is in the field of research, design development or management.

Asked for elements of improvement, master students mentioned that not every course represents a similar study load, that there could be some more in-depth courses, that staff could assist more in deciding on the programme track and thus the career trajectory, and that industry (as potential work field employer) could be engaged more thoroughly in the different curriculum components. While students appreciate the efforts of the staff, they are also aware that staff is under considerable work pressure. During the site visit, master students suggested that either more staff should be hired or that existing staff should be allocated more time for student involvement.

Educational approach

The committee gathered from the written materials and the discussions on site that both the bachelor and the master programme are delivered in line with the principles that underlie the educational vision of the University and Faculty. Students are educated to design solutions and concepts for complex real-world problems and challenges in an interdisciplinary way. The *TOM* approach allows bachelor students to become result-driven learners that are able to work individually and in close collaboration with peers in teams. The master programme encourages students to become self-reliant and self-directed designers of their own study programme.

In this student-centred educational model, the total number of contact hours in the first and second year of the bachelor programme is close to 500 per year, which amounts to approximately 30% of each year's study load. Throughout the curriculum, students become more self-governing; as a result, the plenary contact hours decline in favour of individual consulting hours. In the master programme, students have about 12 contact hours a week during the first five quartiles.

The committee learned from several interviews that students can rely on several types of coaching and counselling. In addition to UT-wide services, bachelor students can contact the bachelor programme coordinator, as well as the respective module coordinators. The primary contact for master students is the track coordinator. The programme director is a useful source of advice on study prospects for all IDE students; the IDE study advisors are available for consult and counsel of both bachelor and master students.

Intake

The admission procedure for both programmes is described in good detail in the self-evaluation report. The intake of bachelor students has increased from 107 in 2014 to 132 in 2018. Admission is unrestricted for students with a Dutch VWO-diploma featuring a science profile and for

students with a *Mathematics and Natural Sciences* major. Every year, these students represent the biggest intake group. Recently, however, the number of non-Dutch students is growing. On average a quarter of the bachelor students drop-out of the programme.

IDE bachelor graduates from Eindhoven, Delft or Twente have direct access to the IDE master programme at UT. All other students must request permission from the Admission Board and may have to follow a pre-master programme. Students with a relevant bachelor degree from a University of Applied Sciences can enrol in the pre-master programme of 30 ECTS. Students who attended the pre-master programme indicated to the committee that they felt at par with the academic bachelor graduates when they started the master programme. This statement is confirmed in the self-evaluation report, according to which all students who entered the IDE master programme after obtaining a pre-master eventually graduate. Apart from a one-off drop in student numbers in 2015, student enrolment has been fluctuating between 101 in 2014 and 80 in 2017. The committee learned that master students can join the programme every month; by January 2019, 52 master students had enrolled in the 2018-2019 cohort.

Staff

According to the list of teaching staff, there are 67 scientific staff involved in the IDE programmes at UT. Most lecturers have a PhD degree in an IDE-relevant domain and are active as researchers linked to one of the five ET departments and fifteen research chairs.

The committee noticed that all teaching staff either have obtained the university teaching qualification, have more than 20 years of experience or are in the process of obtaining this UTQ. This means that all lecturers can demonstrate the necessary competences in teaching, testing, assessment and in developing teaching and testing materials. Students mentioned to the committee that they think highly of the domain specific know-how and the pedagogical skills of the lecturers.

The self-evaluation report indicates that 65% of the IDE lecturers can demonstrate English language knowledge of at least C1-level. This finding seems to be confirmed by the students who indicated that most but not all teachers have a sufficiently high level in English language.

Facilities

According to the self-evaluation report, UT offers an excellent study environment featuring a "green campus where living, studying and leisure come together and are harmoniously balanced." During the site visit, the panel was shown around the ET faculty and visited the *Virtual Reality Lab*. Moreover, it had a look at several facilities which the IDE cluster shares with the *Mechanical Engineering* programmes, such as the mechanical, assembly, and modelling workshops.

Students indicated that the facilities are good and that the workshops provide all required materials and equipment. However, when deadlines are approaching, workshops tend to be very crowded. Moreover, the Horst building that hosts the IDE programmes has a limited capacity for the many project groups; hence the workspaces are scarce and students tend to scatter in project groups around campus.

Considerations

Based on the written materials and the discussions on site, the committee considers that the teaching-learning environment is well developed at the Faculty of Engineering Technology in UT. This appreciation applies to the IDE bachelor and the master programmes, the quality of the IDE staff and the relevance of the IDE programme-specific facilities.

The committee considers that both programmes are built in a coherent way and in full respect of the requirements of the University. The curricula integrate design, technology, business, societal and human centred approaches. They do justice to the educational principles of research-oriented, project-based, self-directed and collaborative learning.

The bachelor programme is set up according to the *Twente Educational Model* and integrates adequately learning and application in thematic and interdisciplinary modules. The committee appreciates the build-up of the three-year programme and the requirement that in year three at least one module should take students out of their comfort zone, be it by focusing on another discipline or by going for a study period abroad. The UT-wide and/or IDE-specific honours trajectory cater nicely for the needs of more ambitious and talented students. The committee is positive about the continuous learning lines that run throughout the curriculum and about the fact that quality and relevance of individual modules are checked regularly by staff and students. It therefore comes as no surprise to the committee that students appreciate this IDE bachelor curriculum.

The master programme allows a lot of freedom for students to tailor their own curriculum around one of the three tracks according to their own needs and interests. The committee subscribes the positive appreciation of students regarding this self-directed approach, the small-scale delivery of the education and the personalised collaboration between students and staff. As an element of improvement, the committee considers that the track profiles can be clarified and fine-tuned in three ways: by communicating their respective selling propositions to students enrolling in the master programme, by revisiting the respective sets of recommended courses, and by monitoring the tracks' relevance for employability with young graduates in the field.

In line with its finding under the previous standard, the panel considers that the intended learning outcomes at programme level are covered adequately in the different learning goals at course level. This consideration therefore applies to bachelor modules 1 to 11 and for the master quartiles 1 to 5. Anticipating its findings under standard 4, it is less clear to the committee how the intended learning outcomes are reflected in the bachelor and master graduation projects.

According to the committee, the IDE programmes have sufficient and properly qualified staff at their disposition. Most staff, moreover, have an adequate command of the English language. The committee understands that students describe staff as passionate, open, accessible and empowering. While the open-door policy of staff is to be applauded, the committee thinks that there is room for other forms of regular and systematic guidance that address and involve all students, including those who by nature or culture are less inclined to take the first step in approaching lecturers.

Students and staff at UT enjoy an innovative campus. According to the committee, the IDE programmes have adequate facilities in terms of workshops and labs. The study association *S.G. Daedalus* plays an important role in advancing the educational activities.

Finally, the committee considers that both bachelor and master students have raised a number of issues that are worth addressing. It therefore invites IDE programme management to look into adding in-depth engineering courses, more technical knowledge in projects, career perspectives in the curriculum, a better scheduling of exams and re-sits, a more balanced study load of the master courses, more guidance on programme tracks, more staff time that can be dedicated to student follow-up, English language proficiency for all staff, more work spaces in the Horst building and a greater involvement of guest lecturers and industry representatives in the curriculum.

Based on the interviews and examination of the underlying documentation, **the assessment committee concludes that the bachelor and the master programmes Industrial Design Engineering meet standard 2, teaching learning environment.**

3. Student assessment

Student assessment in the IDE programmes at UT is organised adequately. Since the previous accreditation visit, many developments have taken place with regard to student assessment and these changes are for the better. The Examination Board (EB) is functioning well. It is a small team that is supported by a knowledgeable and committed EB secretary. As a result, both the bachelor and master programmes now feature a comprehensive quality assured system for module and course assessments that involves IDE lecturers, educational experts and the EB. Nonetheless, the review of thesis evaluation forms and the site visit discussions have shown that in terms of assessment there is room for improvement with regard to the thesis evaluation forms, as well as the weighting and scoring of the thesis assessment components. Moreover, the IDE programmes could pay more systematic attention to student developmental feedback through formative assessment. Finally, the capacity of the EB could be strengthened by allocating more resources and expanding their expertise as a team. The suggestions for improvement are likely to boost the quality of the current - adequate - system of student assessment. According to the assessment committee, the bachelor and the master programmes Industrial Design Engineering meet this standard.

Findings

Assessment system

The committee noticed that the programmes' vision on assessment is clearly described in the self-evaluation report. It constitutes an operationalisation of the overall university-wide framework and strategy for assessment and aligns with the UT-wide concept of thematic project education. Project examinations assess the ability of students to apply what was learned in the module components in an integrated way. From the first year onwards, assessment focuses on the application of knowledge and understanding to solve problems; throughout the bachelor and master programmes, the level of assessment increases to include analysis, design and critical evaluation.

For each bachelor module or master course an assessment plan is drawn up by the responsible lecturer(s). The committee has reviewed several assessment plans from both bachelor and master programme. Each plan contains among others learning goals, programme outcomes, assessment methods and grading plan. The committee noticed that these assessment plans make the relation of the module/course goals with the overall programme ILO explicit. Once the plans have been validated, they are made available for students. Every year, the assessment plans are refreshed by the lecturers, who are also expected to prepare practice assessments or assignments (including answers and scoring) for students.

Students indicated to the committee that they are indeed informed properly and timely about the module/course assessments and the assessment criteria. While most examinations are fully in line with the above-mentioned strategy and approach, students did voice concern that not all tests fulfil the requirements in terms of grading. Although there is always a second examiner involved, students found that their score for project work was not always adequate; in fact, they reported that individual tutors do not always calibrate their scores with fellow tutors assessing project work within the same module. In other cases, students receive a grade for a course report but no feedback to make the grade insightful.

The committee read in the materials that programmes mostly adopt summative assessment for grading purposes; in some cases, formative assessment is provided for diagnostic or development purposes. The discussions on site however revealed that there is little evidence of any systematic formative assessment; when students are

tested half-way through the module/course, lecturers provide little individual or collaborative feedback. In this respect, it seems that the IDE programmes at UT are not yet using assessment as a learning experience for students.

Thesis evaluation

IDE students demonstrate the achieved end level through their bachelor and master thesis projects. At the end of both bachelor and master projects, a thesis is delivered and presented during a graduation exam. This defence consists of a presentation, and a discussion. The examination is performed and judged by a thesis assessment committee, which is composed of a chairperson (professor), the thesis supervisor, and one external member. The committee learned that the third member is standard procedure for the master thesis and optional (e.g. a company supervisor) for the bachelor thesis.

Thesis assessment committee members are selected based on their qualifications. According to the list of IDE staff, most scientific staff can partake in the assessment committee as a member, while only a limited number of staff are allowed to chair the committee.

The thesis assessment covers all aspects of the graduation exam: thesis, presentation, defence, content and working processes. The final grade is based on the marks provided by every examiner but does not constitute the average of all marks. The committee noticed that there is no indication of the relative weighting of the individual exam components. According to the programme representatives, the motivation of the respective marks is taken into account when deciding on the final grade.

As part of its thesis review, the assessment committee studied a sample of bachelor and master thesis evaluation forms completed in 2016-2017 and 2017-2018. The forms are drawn up according to the above-mentioned description. The committee members noticed that for both bachelor and the master projects, the majority of evaluations were insightful. In most cases assessors made use of the free space in the evaluation form to provide additional comments to motivate the mark. According to the assessment committee, such feedback made the evaluation particularly insightful for external reviewers. Nonetheless, in a few cases such feedback was not informative or not added at all. Furthermore, the committee was surprised to notice that bachelor and master students are scored on general components of the graduation work without reference to the specific learning goals of theses or the intended learning outcomes of the programme. Moreover, it was not clear whether the marks on individual components were based on a pre-established set of rubrics.

Confronted with these findings, staff and Examination Board members subscribed to the committee's opinion regarding the added value of free-text feedback and indicated they would urge all final project assessors to provide such feedback in the evaluation form. Moreover, they confirmed that there is no direct relationship between the assessment form and the objectives of the bachelor/master final assignment or the overall programme learning outcomes. They did mention, however, that individual thesis components are marked according to a scoring matrix in the case of the bachelor thesis and of one of the master tracks. This matrix, however, was not part of the evaluation materials provided to the committee before the visit. Looking into the evaluation tool on site, the committee noticed that the matrix provided a useful framework for setting marks but did not refer to the thesis objectives or intended programme learning outcomes.

Furthermore, the committee members noticed in their thesis reviews that there was only one evaluation form per student while two or three examiners had signed off the form. This means that it was not possible to gather from the evaluation form whether each assessor had fulfilled his/her task individually. The panel learned from the dis-

cussion on site that the bachelor and master thesis assessment is organized in such a way that all assessors are actively involved in the assessment committee and in establishing the final score. Nonetheless, the extent to which this assessment has been done independently by two/three assessors and the final score is indeed the result of discussion among examiners, rather than the thesis supervisor taking the lead and the other assessor(s) confirming his/her opinion. This procedure should be reflected more explicitly in the evaluation form.

Examination Board

The Examination Board (EB) guarantees the quality of the examinations and the IDE degrees as described in the Law. The Dean appoints the members of the EB based on their expertise in the domain, in education and/or assessment. The EB consists of four IDE staff members, an EB secretary and an external member with professional expertise in IDE. The EB appoints the examiners of the IDE programmes. This appointment is reportedly not done automatically: all examiners have a university teaching qualification and are joining existing exam teams before they can operate individually.

Both programmes have an Assurance System for Assessment Quality (ASAQ) in place, which is based on the assessment policy document. It describes how assessment follows the plan-do-check-act cycle: drawing up an assessment plan for each module/course (plan), using answering models and scoring forms (do), evaluating courses and assessing modules (check) and counselling and supporting improvement and enhancement (act). The ASAQ system has been designed in co-operation with the EB of *Mechanical Engineering* and *Civil Engineering*, and with the support of educational experts linked to the faculty.

The panel understood from the session with representatives of the Examination Board that the individual members have their roots in IDE and that it is an explicit choice of the programme (and the university) to have an external member with domain expertise who is not linked to UT. EB members indicated that they have been involved in adjusting the assessment system following the transition to the *TOM*-based bachelor programme. Moreover, the EB has been overseeing and continues to oversee the individual assessment plans per bachelor module / master course. Throughout the academic year, the EB secretary is in regular contact with the IDE staff to discuss course-based innovations that have a bearing on the assessment (plan). It seems that over the past few years, most attention of the EB went to implementing and adjusting the assessment plans per module/course. Lecturers played an important role in this exercise as they gathered the larger picture of their own module / course in relation to the overall curriculum.

Confronted with the committee's findings on the thesis evaluation (form), the EB representatives indicated that the assessment process and the evaluation form were taken over from another programme cluster. They acknowledged that the form did not contain an explicit link to the ILO. However, for every thesis assignment it is checked beforehand – at the initial preparation stage when students get approval for the thesis project – whether the thesis plan is realistic and fulfils all learning outcomes. Moreover, the framework that underlies the evaluation form with the five assessment components takes into account the objectives of the thesis.

Considerations

Based on the written materials and the discussions on site, the committee considers that student assessment in the IDE programmes is adequate. It appreciates the efforts undertaken by the programmes and the Examination Board since the last accreditation visit to adjust the assessment system of the bachelor programme to fit the *TOM* approach. According to the committee, both bachelor and master programmes managed to improve the quality of their student assessment and align it with university-wide develop-

ments and requirements. As a result, both programmes now feature a comprehensive quality assurance system for module and course assessments.

The committee considers that the Examination Board is functioning well. Although it is a small team, it manages to fulfil its responsibility to assure the quality of the examinations. The committee thinks highly of the expertise and commitment of the EB secretary, who is instrumental in implementing the tasks of the EB and in supporting – together with the faculty educational expert – the IDE staff in getting the assessment plans right. As a result, the EB receives good information about the quality of the assessment in the respective courses and is able to act upon this information. Based on its review of the materials and the discussions, the assessment committee observed that the assessment is in place for the bachelor modules 1 to 11 and for the master courses organised in quartiles 1 to 5.

In addition to these positive considerations, the committee has identified a number of elements regarding the organisation and implementation of student assessment that require further improvement. First of all, when reviewing the bachelor and master thesis evaluations, the committee noticed that the assessment as presented in the thesis evaluation form needs improvement. In this regard, the committee suggests a critical reconsideration of the thesis assessment form, whereby the assessment components are matched with the ILO in an explicit way. Moreover, the weighting of the individual components should be more transparent. Furthermore, the committee noticed that in about 20% of the cases it had marked the bachelor and master thesis (considerably) differently than the assessment committee, and this in both ways, i.e. lower and higher. The IDE programmes may want to revisit the scoring guidelines and make these more robust. Following the discussions on site, the committee has noticed a considerable variability in the way students receive feedback on their assessment in courses, projects and thesis. The committee advises the IDE programmes to include feedback to students based on formative assessment and this throughout the bachelor modules and master courses in a more systematic way. Finally, while acknowledging that the members of the Examination Board are dedicated individuals, the committee also considers that the capacity of the EB in terms of number and expertise is limited, which in turn makes the EB vulnerable. According to the committee, the EB could be strengthened by allocating more resources and by bringing additional academic IDE and educational assessment expertise.

Based on the interviews and examination of the underlying documentation, **the assessment committee concludes that the bachelor and the master programmes Industrial Design Engineering meet standard 3, student assessment.**

4. Achieved learning outcomes

The intended learning outcomes of the IDE programmes are eventually achieved at the end of the bachelor and master curriculum. The sample of reviewed final bachelor projects fully meets the quality expectations. In almost all master theses, students deployed a solid methodology, coherent argumentation and an awareness of the limitations of their research. Surveys and testimonials from alumni, moreover, demonstrate that IDE students are well qualified to pursue a follow-up study or enter the labour market. Nonetheless, there is room for improvement. The reviewed sample of master theses in the *Management of Product Development* track shows that the programme can be more explicit in documenting the validation of individual thesis plans and their relevance for the overall intended learning outcomes. Moreover, it is worth following-up on the concerns of alumni regarding (people) management and entrepreneurial skills in the curriculum, and regarding the promotion and awareness of the IDE degree on the labour market, in particular among industry. According to the assessment committee, the bachelor and the master programmes Industrial Design Engineering meet this standard.

Findings

Final projects

IDE students demonstrate that they have achieved the intended learning outcomes through their bachelor and master thesis. In order to establish whether students do achieve these end level qualifications, the assessment committee has reviewed a sample of bachelor and master theses. In the run-up to the site visit, the programme management provided an overview of the theses that were accepted in the academic years 2016-2017 and 2017-2018. The project coordinator made a selection of the theses to be reviewed ensuring per programme a fair distribution across scores, date of acceptance and - where applicable - language or specialisation track.

The committee chair, domain and industry experts were each allocated a number of theses and their respective evaluation forms. For each set of products, the committee answered four questions: (i) Is the thesis of sufficient quality to pass? (ii) Do you agree to the score given by the assessors? (iii) Based on the evaluation form, is the assessment clear and insightful? (iv) Are there any particularly strong or weak elements in the execution of the thesis? Moreover, having reviewed their sample of theses, the committee members provided an overall appreciation at programme level on the quality of the theses and on the quality/transparency of the assessment. The committee findings on the assessment of the bachelor and master theses have been described in the previous section on student assessment.

The final stage of the **IDE bachelor programme** is the graduation module, which amounts to 15 ECTS. In this module, students carry out an individual assignment through which they demonstrate their proficiency in the field of IDE at bachelor level. Usually thesis assignments are performed in a company, but students can also opt for alternative assignments: in an external organisation, a research group of the university, an in-house research assignment or a thesis project abroad. The assessment committee reviewed 15 bachelor theses. In all cases the committee found the quality of the thesis to be in line with what can be expected of a final academic deliverable at bachelor level. Having established that each thesis was of sufficient quality, the committee members did not always agree on the final score: in six cases the committee thought the student deserved a higher or a lower score. Although most evaluation forms provided useful feedback, the motivation of the assessors did not convince the committee when it had a different score in mind. One committee member for instance reported

that although the three assigned theses had obtained rather similar scores, the difference in focus and quality seemed quite large.

Looking at individual strengths and weaknesses of the bachelor theses, committee members noticed that there was considerable diversity and originality in the topics, and that most theses were solid in their contents, structure and argumentation. Most theses in the sample were produced as an in-company assignment. While such theses have the benefit of addressing real-world issues with real-world clients, the committee found that in certain cases, the students were working towards the expectations of the client rather than exploring design opportunities freely or providing a critical stance towards the client's brief. Moreover, the committee found several theses to have a narrow focus.

Once all courses have been followed during the first five quartiles of the **IDE master programme**, students dedicate three quartiles to the preparation and completion of the master thesis, which amounts to 45 ECTS. Depending on the profile and preference of the student and in conjunction with the chosen master track, the thesis project can be a more design-, design engineering-, or research-oriented assignment. The thesis assignment is usually performed externally although students may also opt for an internal assignment with one of the research chairs. The assessment committee reviewed 15 final master projects. In all but one case the committee found the quality of the thesis to be in line with what can be expected of a final academic deliverable at master level. In four cases the committee thought the student deserved a higher or a lower score. Although all evaluation forms provided at least some useful feedback, the motivation of the assessors did not convince the committee when it had a different score in mind.

Considering individual strengths and weaknesses of the master theses, committee members noticed the diversity in research questions, the very often solid methodology (data collection and analysis) and coherent argumentation across the different master theses. In most cases students showed an awareness of the limitations of their research and outlined directions for future research. In addition to these findings that demonstrate the adequate level and orientation of the reviewed sample, the committee also noticed that there was a discrepancy in the way thesis assignments had been executed in the different tracks. Whereas topics and theses were in line with what one could expect in the tracks *Human Technology Relations* and *Emerging Technology Design*, the committee was surprised by several assignments in the *Management of Product Development* track. Given the absence of clear thesis objectives or assignment briefs on the evaluation form, the committee wondered in a few cases to what extent the thesis demonstrated proficiency in IDE. Confronted with this finding, the programme representatives informed the committee that each thesis addresses all learning outcomes and that each thesis plan of approach is validated by the track coordinator on its coverage of the ILO.

Employability of graduates

In addition to verifying the quality of the final deliverables, the labour market performance of graduates is another way to establish whether students achieve the intended learning outcomes upon completion of the programme. The committee gathered from the materials and from the discussions on site that overall students do not only have a positive opinion on their ability to pursue a follow-up study or a professional career but are also effective in their education or employment career.

In the run-up to the assessment visit, IDE programme management organised an online survey among master graduates. Most alumni are working in the field of IDE and often start their career as project leader in a multinational, a healthcare or an IT company. About 10% are freelancers and started their own company.

In the dedicated session with alumni, IDE graduates indicated to the committee that they have

been educated well during their studies for the technical and domain-specific tasks of the jobs that are awaiting junior IDE staff. In several cases there was a direct connection between the object of the master track and the first job. Moreover, alumni were employed rather easily. If anything, junior graduates did not always have the management and people management skills that their jobs entailed. Hence their suggestion to incorporate this employability competence more explicitly in the curriculum. Alumni who had set up their own company acknowledged the existence of the university-wide Novelty initiative but would appreciate if the IDE curriculum could also pay attention to the practicalities of entrepreneurship. Finally, graduates recommended to involve more companies in real-world projects. This would not only benefit students, but also companies as many industry representatives have not a clear idea of what industrial design engineering is all about.

Considerations

Based on its thesis review and the discussions on site, the committee considers that students who graduate from the IDE bachelor and master programmes are adequately prepared for a follow-up study or a position on the labour market. It is fair to state that the intended learning outcomes of the respective programmes are eventually achieved at the end of the bachelor and master curriculum.

Taking the thesis as a key performance indicator for this standard, the panel considers that in so far as the **bachelor programme** is concerned the thesis quality meets the expectations. The committee appreciates in particular the diversity and originality on the topics and – in most cases - the solid structure and argumentation. If anything, the committee encourages thesis supervisors to ensure that students adopt and maintain a critical stance towards the clients of their thesis assignments.

In so far as the **master programme** is concerned, the committee found that almost all students deployed a solid methodology (data collection and analysis), coherent argumentation and an awareness of the limitations of their research. Following the discussion with programme staff and the Examination Board, the committee maintains some of its doubts with regard to the content relevance (not the quality) of several theses within the *Management of Product Development* track. According to the committee the IDE programme can be more explicit in documenting the validation of the individual thesis plans and their relevance for the programme track and the overall ILO.

With regard to the other key performance indicator for this standard, the assessment committee considers that both bachelor and master graduates are well qualified to pursue a follow-up study or enter the labour market. The discussion with alumni confirmed the data in the self-evaluation report that there is a good match between the competencies of the IDE master graduates and the needs of the IDE industry. The committee invites the programme management to look into the concerns of the alumni with regard to (people) management and entrepreneurial skills in the curriculum and the promotion and awareness of the IDE degree among industry.

Based on the interviews and examination of the underlying documentation, the assessment committee concludes that **the bachelor and the master programmes Industrial Design Engineering meet standard 4, achieved learning outcomes.**

Attachments

Attachment 1. Assessment committee

Anton de Goeij, panel chair
Anton is emeritus professor Curriculum Development at Maastricht University. He has an extensive track record in international consulting and implementing curriculum development trajectories.

Saeema Ahmed-Kristensen, domain expert
Saeema is Head of Design Products, and a Professor of Engineering Design at Royal College of art, she was the deputy-head of the Dyson School of Design at Imperial College London.

Jacob Buur, domain expert
Jacob is Research director of SDU Design at the University of Southern Denmark. He studied Electrical Engineering at the Technical University of Denmark and obtained a PhD from that same institution.

Ann Heylighen, domain expert
Ann is full professor at the faculty of Engineering Science, Department of Architecture at KU Leuven (Belgium).

Carlijn Compen, industry expert
Carlijn is Head of Design at Océ Technologies in Venlo.

Lianne de Jong, student-member
Lianne is studying Industrial Design at TU Eindhoven.

Attachment 2. Programme of the assessment visit

Venue: Horst building, room Z203, UT campus

Thursday 4 April 2019

11.30 Arrival panel

11.45 Internal panel meeting and lunch

14.00 Meet & Greet
- Guided tour of Industrial Design Engineering facilities
- Faculty and panel introduction in Virtual Reality Lab
- Presentation student video
- Informal meeting panel and interviewees

15.30 Session with programme management

16.30 Session with Examination Board

17.30 Session with alumni

18.30 Internal panel meeting (until 19.30)

Friday 5 April 2019

08.30 Open consultation hour

09.30 Session with master students

10.15 Session with master programme staff

11.15 Session with bachelor students

12.00 Session with bachelor programme staff

12.45 Internal panel meeting and lunch

14.45 Session with programme management

15.30 Internal panel meeting

17.00 Plenary Feedback

17.30 End of assessment visit

Attachment 3. Final qualifications

Both IDE programmes have seven final qualifications. For each qualification, sub qualifications have been defined, which are positioned in between the final qualifications and the learning objectives.

BSc Industrial Design Engineering

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.
   Sub qualifications:
   - The graduate understands the structure of IDE and can integrate the different sub fields/disciplines that are relevant to industrial design.
   - The graduate develops his creativity and can use several creative techniques.
   - The graduate can apply the rules and steps of product design and relevant to its type of product.
   - The graduate can take the conditions of the user into account and act on that.

2. **IDE-relevant disciplines**
   A graduate is familiar with contemporary knowledge and has the ability to increase and develop this through study.
   Sub qualifications:
   - The graduate understands the knowledge base for the industrial designer, consisting of:
     - Graphic design and sketching
     - Constructing and manufacturing
     - Ergonomics
     - Electrical engineering
     - Marketing
     - Interactive design
     - Mathematics

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.
   Sub qualifications:
   - A graduate is able to select appropriate research methods.
   - A graduate is able to formulate basic research problems, taking possible requirements (of users) into account.
   - A graduate is able to carry out a basic research plan, analysing its process during the period and make the necessary adjustments (under supervision).
   - A graduate is able to evaluate produced products, by an user research.
   - Interpret and analyse data from different sources (such as mathematical, electronic, etc.)

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.

Sub qualifications:
- A graduate can make (design) decisions based on solid arguments.
- A graduate can apply a systematic approach and analyse during the design/research process (systematically and methodologically).
- A graduate can make several choices in design (for materials, construction, electronics, etc.).

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.
   Sub qualifications:
   - A graduate is able to give constructive (peer) feedback on the work of others.
   - A graduate is able to continue and go more in depth with already existing work.

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. He is also able to participate in a scientific or public debate.
   Sub qualifications:
   - A graduate can work in a team, he can organise, coordinate and evaluate teamwork.
   - A graduate can properly present his work (orally, in paper and/or as a sketch), including underlying choices and considerations, to colleagues and a broader public.
   - A graduate can think of alternatives of its produced work.
   - A graduate is able to select relevant information and determine whether the information is reliable.

7. **Addressing temporal, social and personal contexts**
   Science and technology are not isolated, and always have a temporal, social and personal context. 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.
   Sub qualifications:
   - A graduate can connect a design to a specific context
   - A graduate can (as a member of a team) isolate a target group
   - A graduate can describe the development of technology and design throughout the centuries
   - A graduate can identify different roles of professionals in society.

MSc Industrial Design Engineering

The final and sub-qualifications of the Master are almost identical to the Bachelor qualifications. Because the Master programme builds on the Bachelor programme. The Master qualifications are more in depth, these additions have been added in *italics*.

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.

Sub qualifications:

- The graduate *has expert knowledge* of IDE and can integrate *appropriate theories* the different sub fields/disciplines that are relevant to industrial design.
- The graduate develops his creativity and can use several *complex* creative techniques.
- The graduate can *independently* apply the rules and steps of product design and relevant to its type of product.
- The graduate can *define and act on* the conditions of the user.

2. IDE-relevant disciplines

A graduate is familiar with contemporary knowledge and has the ability to increase and develop this through study.

Sub qualifications:

- The graduate *has expertise in* the knowledge base for the industrial designer, consisting of:
    - Graphic design and sketching
    - Constructing and manufacturing
    - Ergonomics
    - Electrical engineering
    - Marketing
    - Interactive design
    - Mathematics
    - *Packaging*
    - *Cradle to Cradle*
    - *Management/governance*
    - *(Bio)mechanics*
    - *Future and sustainable design*
    - *Design histories*

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.

Sub qualifications:

- A graduate is able to select *scientific* research methods.
- A graduate is able to formulate research problems, taking possible requirements (of users) into account *independently*.
- A graduate is able to carry out a research plan, analysing its process during the period and make the necessary adjustments *independently*.
- A graduate is able to evaluate produced products, by an user research.

- Interpret, analyse *and connect* data from different sources (such as mathematical, electronic, *scientific literature* etc.) *and make decisions based on the outcomes*.

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.

Sub qualifications:

- A graduate can *predict possible outcomes and* make (design) decisions based on solid arguments.
- A graduate can apply a systematic approach and analyse during *complex* design/research *processes* (systematically and methodologically).
- A graduate can make *well substantiated* choices in design (for materials, construction, electronics).

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.

Sub qualifications:

- A graduate is able to give constructive (peer) feedback on the work of others.
- A graduate is able to continue and go more in depth with already existing *scientific* work.
- *A graduate is able to critically reflect his own work and position in the field.*

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. He is also able to participate in a scientific or public debate.

Sub qualifications:

- A graduate can work in a team, he can *lead,* organise, coordinate and evaluate teamwork.
- A graduate can properly present his *scientific* work (orally, in paper and/or as a sketch), including underlying choices and considerations, to colleagues and a broader public.
- A graduate can think of alternatives of its produced work.
- A graduate is able to select relevant *scientific* information and determine whether the information is reliable.
- *A graduate can support collaboration between different stakeholders.*

7. Addressing temporal, social and personal contexts

Science and technology are not isolated, and always have a temporal, social and personal context. 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.

Sub qualifications:

- A graduate can connect a design to a specific context or adapt the design to the specific context.
- A graduate can isolate a target group and knows how to communicate with relevant stakeholders.
- A graduate can describe the development of technology and design throughout the centuries and predict future developments.
- A graduate can identify different roles of professionals in society and choose his own position as a professional.

Attachment 4. Overview of the programmes

Bachelor programme Industrial Design Engineering

Year 1 – 60 ECTS
Module 1 – Industrial Design Engineering (15)
Module 2 – Ideation (15)
Module 3 – Realisation of Products (15)
Module 4 – Smart Products (15)

Year 2 – 60 ECTS
Module 5 – Human-Product Relations (15)
Module 6 – Consumer Products (15)
Module 7 – Design for Specific Users (15)
Module 8 – Virtual Product Development (15)

Year 3 – 60 ECTS
Module 9 – Minor (15)
Module 10 – Minor (15)
Module 11 – Systems in Context (15)
Module 12 – Bachelor Final Assignment (15)

Master programme Industrial Design Engineering

3 tracks:

- Management of Product Development (MPD)
- Human Technology Relations (HTR)
- Emerging Technology Design (ETD)

3 types of courses:

- Compulsory courses to all MSc IDE students
- Recommended courses, mandatory for specific tracks
- Selective courses, freely chosen by all MSc IDE students

Year 1 + quartile 5 – 75 ECTS (track MPD)

- Brand Management (5)
- Governing Product Development (5)
- Packaging Design & Management 1 (5)
- Internal Life Cycle Management (5)
- Packaging Design & Management 2 (5)
- Product Life Cycle (5)
- Safety by Design (5)
- Intellectual Property in Product Development (5)
- Product Life Cycle Management (5)
- Advanced Modelling (5)
- Design Histories (5)
- Empirical Methods for Designers (5)

- Lean Six Sigma Green Belt (5)
- Virtual Reality (5)
- Distributed Product Development (5)

Year 1 + quartile 5 - 75 ECTS (track HTR)

- Create the Future (10)
- Science and Technology Studies (5)
- Graphic Language of Products (5)
- Multisensory Design (5)
- Design and Behaviour Change (5)
- Scenario Based Product Design (5)
- Design & Emotion (5)
- Embodied Interaction (5)

Year 1 + quartile 5 – 75 ECTS (track ETD)

- 3D Printing (5)
- Integrative Design of biomedical (5)
- Maintenance Engineering & Management (5)
- Source of Innovation (5)
- Systems Engineering (5)
- Biomechanics (5)
- Electric Vehicle System Design (5)
- Surface Engineering for Look & Feel (5)
- Design for Maintenance Operations (5)
- Durability of Consumer Products (5)
- Design of Surfaces for Comfort and Touch (5)
- Industrialisation & Innovation (5)
- Smart Environments Integration (5)
- Hybridity XD (5)
- TRIZ Assignments (2)
- TRIZ Fundamentals (3)

Year 2 (quartiles 6-8) – 45 ECTS

Master thesis (45)

Attachment 5. Documents

Information Report
Critical Reflection 2019, BSc & MSc Industrial Design Engineering, Faculty of Engineering Technology, University of Twente, February 2019. The report contained a Student Chapter with recommendations by a student delegation. Moreover, IDE students made a film for the 2019 IDE accreditation, which was presented to the panel during the Meet & Greet session.

Materials made available electronically and/or on site
- Appendices to Critical Reflection 2019:
    A. Recommendations accreditation IDE 2014
    B. Organisational setting
    C. Domain specific reference framework
    D. Final qualifications
    E. Assessment plans
    F. Overview curricula bachelor and master programmes
    G. Contact hours
    H. Teachers list and teaching staff qualifications
    I. Rules and Regulations IDE – UT
    J. Assessment Framework IDE – UT
    K. Quality Assurance System IDE-UT at educational level
    L. Information and Statistics Alumni IDE-UT 2012-2018
- STAR Excellence Programme BSc Industrial Design Engineering
- Leaflet BSc programme IDE – three years, twelve modules
- Examination Board – minutes and annual report
- Programme Committee – minutes and annual report

Bachelor Thesis Projects
15 bachelor theses and their evaluations from students who graduated in 2016-2017 and 2017-2018

Master Thesis Projects
15 master theses and their evaluations from students who graduated in 2016-2017 and 2017-2018