# Avans University of Applied Sciences

## B Technische Bedrijfskunde vt Breda (Industrial Engineering & Management) + BK DHO

**Limited programme assessment**


October 2024

# Summary

The Bachelor's programme in Technische Bedrijfskunde (TBK) at Avans University of Applied Sciences consists of the full-time programme TBK in Den Bosch, the full-time programme TBK in Tilburg, the part-time programme TBK in Tilburg and the English-taught full-time programme Industrial Engineering & Management (IEM) in Breda. The differences and similarities between the TBK programmes within Avans have been briefly described by the institution in an appendix to the self-evaluation. Each programme (variant) was visited by the panel and assessed separately.

In September 2024 the English-taught full-time programme Industrial Engineering & Management in Breda has been visited by the NQA visitation panel. The audit panel assesses the quality of the study programme as **positive**.

As a result of choices made in the ATIx Academy, the full-time courses (course variants) in Tilburg and Breda have merged, per September 2024. This is the last year that the programme will start on two locations. As of September 2025, the first year of the merged programme will only be offered in Breda. Students can complete the study programme in which they started already in the location and language they have chosen from the start. The English taught programme will phase out in the following years.

**Standard 1: Intended Learning Outcomes**
The audit panel assesses that the bachelor's study programme IEM **meets** the generic quality requirements for standard 1. The maintenance profile chosen by the programme is highly valued by both students and companies. The panel advises the programme to actively and periodically validate the IEM-qualifications with key parties in the field and colleagues from other programmes involved in maintenance engineering. Additionally, the programme can highlight its unique profile even more to attract students and establish partnerships with companies. The panel also recommends reconsidering the choice to assess the competency 'consult' at proficiency level 3 and clarifying why a maintenance professional needs a higher proficiency level in this competency compared to other TBK-professionals.

**Standard 2: Teaching-Learning Environment**
The audit panel assesses that the bachelor's study programme IEM **meets** the generic quality requirements for standard 2. The programme offers a solid and carefully composed curriculum that supports students in achieving the intended learning outcomes. Although somewhat traditional, the programme is expected to adjust due to the merger and Avans' broader ambitions. The panel advises the programme to follow the technical developments closely and adapt the curriculum accordingly and also to offer more guest lectures, company visits, and practical projects, as these are highly appreciated by students. Additionally, the panel commends the lecturers for creating a safe learning environment, especially for international students, and recommends maintaining the balance between technical and softer aspects such as communication and management skills.

**Standard 3: Student Assessment**
The study programme **meets** the generic quality requirements for standard 3. The programme has a balanced assessment system that supports learning and emphasises both individual and

group evaluations. Individual components in group assessments ensure a fair evaluation of each student's contribution. The panel appreciates the programme's move towards a balanced combination of formative assessment and summative testing and recommends organising assessments in such a way that both assessors have the necessary expertise to evaluate student work content-wise. The panel is confident that this can be achieved in the short term through the merging of teaching teams.

**Standard 4: Achieved Learning Outcomes**
The audit panel assesses that the bachelor's study programme IEM **meets** the generic quality requirements for standard 4. The panel concludes that the final projects of the IEM programme meet the intended learning outcomes, that assignments are sufficiently complex and are carried out independently. The panel appreciates the reflection of the maintenance profile in the final projects. Furthermore alumni are very well satisfied with the programme's alignment with the professional practice. The panel advises to involve external experts annually for their opinions on the graduation process and the programme, in order to close a relevant feedback loop.

**Distinctive Feature of Sustainable Higher Education**
The programme **meets** the criteria of Distinctiveness, Concretisation and Relevance. By focusing on sustainability within maintenance engineering, students are encouraged to consider all relevant aspects when deciding for repair or replacement. The panel suggests that the programme more explicitly demonstrates how sustainability can be achieved within the context of maintenance. The programme effectively integrates sustainability within its curriculum. It emphasizes sustainability in learning outcomes, in teaching methods, and in student assessments. The programme is praised for its focus on sustainability, encouraging students to become critical thinkers on the subject. While it has made significant strides, the panel suggests the programme should strengthen the link between asset management, maintenance, and sustainable development even further, aiming to balance profit with social and environmental costs and concerns. The sustainability feature is seen as essential and relevant, especially given the programme's unique maintenance profile and the ambitious plans to advance sustainability, benefiting those regional companies that are seeking more sustainable operations.

# Contents

# Introduction

This is the assessment report of the full time English-taught bachelor's programme Industrial Engineering & Management offered by Avans University of Applied Sciences in Breda.
This programme is phasing out as of September 2024. At an earlier stage, the ATIx management decided to merge this programme with the Dutch-taught full-time bachelor's programme Technische Bedrijfskunde offered by Avans University of Applied Sciences in Tilburg. This newly merged Dutch-taught programme started in Breda on September 1st 2024 with a fresh class of first year students. All students that previously started the English-taught IEM-programme are enabled to complete their studies under the original conditions.

The assessment was conducted by an audit panel compiled by Netherlands Quality Agency (NQA) commissioned by Avans University of Applied Sciences. Prior to the assessment process the audit panel has been approved by NVAO.

A few days before the visitation, the student member that was approved by the NVAO for this visitation withdrew from the panel due to personal circumstances. NQA has been able to find a replacement in the person of Y. T. Bergsma, who was also involved as a student member in the visitation of the other three TBK programmes at Avans earlier this year.

In this report NQA gives account of its findings, considerations and conclusions. The assessment was done in accordance with the *Assessment Framework for the Higher Education Accreditation System of the Netherlands* of NVAO (September 2018) and the NQA Manual limited study programme audit (2022).

The site visit took place on September 17th 2024.
The audit panel consisted of:

| *Name* | *Role* | *Brief job description* |
|---|---|---|
| Ir. F.J. van Oostrum | Chair, Domain Expert | lecturer in the Engineering programmes of Windesheim University of Applied Sciences, including TBK, Chair of the Board of Examiners of Engineering and Design and intensively involved in educational development. |
| Dr. Y.E.M. Kirkels | Domain expert | Lecturer and senior researcher in Industrial Engineering and Management, at Fontys University of Applied Sciences. |
| J.A.A.M. Verbeeten Bsc | domain expert, Expert Sustainability | owner of Catamaran Communications, and Communications Advisor Technology & Sustainability at Holland High Tech Top Sector of the Ministry of Economic Affairs. |
| Y.T. Bergsma | student member | Bachelor student in Technische Bedrijfskunde at HAN University of Applied sciences. |

Drs. D.J. Oolbekkink LLB, NQA auditor, acted as secretary of the panel.

The Bachelor's programme IEM was part of the audit cluster Technische Bedrijfskunde West. The audit panels of this cluster have been aligned with each other, in the first place through the instruction of the panel members about the NVAO assessment framework. From the start this alignment was guaranteed by the overlap between the composition of all the panels. In addition, taking into account that each assessment of a study programme is an individual assessment, as a result of the overlap between the composition of the panels, there has been progressive reflection on previous site visits within the audit cluster whenever relevant. Furthermore, the alignment among panels is guaranteed by the support of the same panel secretary as often as possible, from NQA and other quality agencies, and by employing well-trained panel chairpersons.

*Method of working of the panel and process*
As a basis for the assessment, the study programme offered a Self Evaluation Report with appendices. For the assessment of the achieved learning outcomes, the panel has studied all sixteen available graduate products of graduates who recently finished their studies. These graduate products have been selected from the list of alumni of the last two academic years. In this selection, the variety in grading, modes of study and learning paths have been taken into account.

Central to the assessment was the site visit by the panel, consisting of expert peers. Two weeks before the site visit, a preliminary meeting was held, together with document study at the location of the study programme, where the panel already met with some representatives of the study programme, the so-called 'preparatory audit'. In this preliminary meeting the panel members have been instructed about NQA's method of working and about the *NVAO-Assessment Framework*. In this meeting the panel members also discussed their tentative findings. During both the preliminary meeting and during the site visit, the panel members shared their findings with each other continuously. During the site visit the panel spoke with various stakeholders of the study programme, such as students, lecturers (assessors) and representatives of the professional field and it studied several documents, see Appendix 2. At the end of the site visit the panel incorporated all the information it had obtained in an overall picture and in a tentative substantiated assessment. In the final oral feedback session the panel chairperson communicated the conclusive assessment and the major findings of the panel. The site visit was finished with a so-called 'development dialogue' between the panel and representatives of the IEM study programme in Breda as well as representatives of the full-time TBK study programme in Tilburg. These are the two programmes that are now merging into one new programme. Before the site visit, staff members and students of the study programme had the opportunity to approach the panel (via mail) in confidence to bring to the attention of the panel those matters they deem of importance to the assessment. This has not been used.

After the site visit a draft report was formulated, which was presented to the panel. On the basis of the panel's input a second draft was made, which was presented to the study programme for a check on factual inaccuracies. The panel members have taken note of the reaction of the study programme and adapted the report where necessary. Subsequently, the report was declared

final. With all information provided (both verbally and in writing) the panel has been able to make a deliberate judgement.

The audit panel declares that the assessment of the study programme was carried out independently.

Utrecht, *October 28, 2024*

| Panel Chair | Panel Secretary |
| --- | --- |
| Ir. F.J. van Oostrum | Drs. D.J. Oolbekkink LLB |

# Characteristic Features of the Study Programme

IEM is part of the Academy of Technology and Innovation (ATIx). The Academy consists of eight study programmes that are divided into three so-called 'fundamenten' (foundations). The TBK programme, together with the Industrial Engineering & Maintenance (IEM) and Business IT & Management (BIM), form the Fundament Business Improvement.

The IEM programme is somewhat more technical in nature than the other Avans-TBK programmes and focuses primarily on maintenance. For this purpose, a separate profile description was chosen that differs from that for TBK. The programme was developed to address a specific need in the professional field for maintenance and asset managers. Initially, the International Maintenance Manager programme was launched in collaboration with HZ. After this partnership ended (2016) the English-taught IEM programme has continued in Breda.

The programme has a relatively small number of students, about half of whom are international. According to management the number of students enrolled this academic year is similar to previous years.

| Year | Intake | Dutch | Non-Dutch |
|---|---|---|---|
| 2023 | 24 | 12 | 12 |
| 2022 | 25 | 12 | 13 |
| 2021 | 28 | 11 | 17 |
| 2020 | 22 | 13 | 9 |
| 2019 | 24 | 17 | 7 |
| 2018 | 22 | 18 | 4 |
| **Average** | **25** | | |

Table 1: enrolment numbers of 1st year students

As a result of choices made in the ATIx Academy, the full-time courses (course variants) in Tilburg and Breda have merged, per September 2024. This is the last year that the programme will start on two locations. As of September 2025, the first year of the merged programme will only be offered in Breda. Students can complete the study programme in which they started already in the location and language they have chosen from the start. The English taught programme will phase out over the following years.

# Basic Data of the Study Programme

| | |
|---|---|
| Name of study programme as in CROHO (Central Register of Study Programmes in Higher Education in the Netherlands) | Bachelor of Industrial Engineering & Management |
| ISAT-code | 34421 |
| Orientation and level study programme | Higher professional education (hbo) |
| Level study programme | Bachelor |
| For study programmes in higher profession-oriented education, the addition which is used for the degree. | BSc |
| Number of study credits | 240 EC |
| Location(s) | Breda |
| Variant | fulltime |
| Teaching language | English |
| Distinctive feature | Sustainability |

# Retrospective View of the Previous Accreditation

In 2018, IEM was visited by an audit panel. At that time, several recommendations and suggestions were made, which the programme has followed up.

*"Put more emphasis on the managerial component in your profile, programme and student assignments, including the graduation reports;" [General].* The programme has continuously integrated managerial components in the Business & Management development line. In the first year, students demonstrate their acquired knowledge. In the second year, students apply this in various projects, and from there, this topic is continuously part of the curriculum until graduation.

*"Pay more attention to the research skills in your programme, and start with research skills in year one;" [standard 2].* The programme shows that research methods are addressed as of the first-year projects, culminating in a research report in the graduation phase. The current panel notes that the programme pays sufficient attention to research skills in the curriculum. The panel elaborates on this topic under standard 2.

*"Increase the attention on a holistic organisation view and strategic importance of maintenance in the whole of the organisation;" [standard 2].* The programme writes in response to this recommendation that the holistic organisation view is gradually built up throughout the curriculum. To make this more tangible, the programme added a diagram showing how students are provided with this holistic view of the organisation. They learn about the operational, tactical, and strategic consequences of proposals and solutions within a business context.

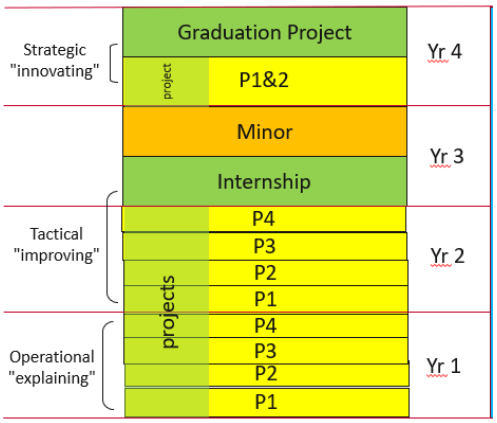


*Figure 1 graph of the programme*

*"Implement the proposals of the test and examination committees, especially concerning the assessments and the content of the graduation reports;" [standard 3].* The programme mentions that the test forms and rubrics were completely revised shortly after the 2018 site visit and since then have been further developed. The recommendation to implement calibration around graduation works has been followed up.

*"Strengthen both the methodological and the managerial components in the graduation reports". [standard 4].* The assessment forms and rubrics for graduation have been revised. Since 2019-2020, ten percent of the final grade is determined by the problem analysis and the associated research methodology. Data collection and analysis are now part of the evaluation of the research report. Managerial components are addressed in the main research report, where students are assessed on their implementation plan, change management strategies & level of acceptance, the PDCA cycle, as well as a financial business case.

# Standard 1 Intended Learning Outcomes

*The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline and international requirements.*

**Conclusion**

Based on the considerations mentioned below, the audit panel assesses that the bachelor's study programme IEM **meets** the generic quality requirements for standard 1.

The maintenance profile that the programme has chosen, is a valuable asset that is appreciated by students as well as companies in the professional field. The panel has noticed that the programme derived six IEM-qualifications from the eight nationally established domain competencies. The rationale for this is well-founded. The panel advises the programme to actively and periodically validate these IEM-qualifications with key parties in the field and with colleagues from other programmes involved in maintenance engineering.

The programme has a substantial focus on technology with a more detailed knowledge of assets and their functionalities, and on English language proficiency as well. The panel advises the programme to more prominently highlight its unique technical profile in order to both attract students and establish partnerships with companies as (operational) partners, also in the newly merged programme.

The panel has noticed that the programme made a choice to deviate from the proficiency levels of the eight national domain competencies. IEM chose to assess the competency 'consult' at proficiency level 3, in addition to the usual TBK competencies 'analyse' and 'professionalise'. The panel recommends reconsidering this choice and clarifying why a maintenance professional needs a higher proficiency level in the competency 'consult' compared to another TBK-professionals who, for instance, manage a complex change process in sustainability.

**Substantiation**

*Professional orientation*

The programme was formerly known as International Maintenance Management and was initially offered in collaboration with Hogeschool Zeeland. Over time, the programme merged with another existing TBK programme at Avans and was subsequently offered in English in Breda, using the name Industrial Engineering and Management. Traditionally, there has been a strong connection between the programme and the surrounding professional field of maintenance. This includes both larger companies in various sectors (including the manufacturing, chemical and defence industries) that have their own maintenance divisions, as well as often smaller companies specialised in providing maintenance services.

In addition to the focus on asset management and maintenance, the programme emphasises its use of the English language in teaching, coaching, tutoring, and the more in-depth technical approach. Within at least a significant part of the future workfield for the students, English is the primary language and the language used for professional communication. In addition, the panel sees that IEM has clearly chosen a more technical approach in education and the panel appreciates this profiling choice. Knowledge and skills in both English language and technology provide a good starting position for the newly qualified professional.

*Final qualifications*

In their self-evaluation document, the IEM programme indicates that it is based on the eight domain competencies as laid down in the HBO Engineering Bachelor Profile. This document describes these eight competencies in detail. For the TBK cluster, it has been nationally agreed that six competencies must be mastered at level 2, and Analysis and Professionalisation at proficiency level 3. The IEM programme has chosen to also require the 'Consult' competency to be at level 3 (see figure 2). As a reason for this, the programme states that emphasis on the required advisory and coaching skills (described in the 'Consult' competency) is necessary because of the different roles  starting maintenance professionals may fulfill as organiser, advisor, technician, and coach.

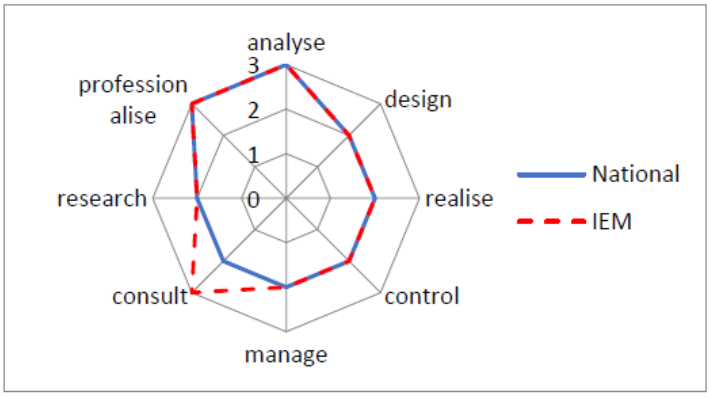


*Figure 2 spider web Engineering competences for IEM, source ZER*

The panel finds this explanation insufficient and believes that the same can be said of a starting technical business professional who has specialised in, for example, (re)designing processes. Therefore, it is recommended to substantiate it more accurately and coordinate it within the national consultation in the TBK cluster (in Dutch: landelijk opleidingsoverleg); since that is the platform where competencies are determined.

The domain competencies mentioned above have been applied by the IEM programme in consultation with the professional field in the area of maintenance and asset management. The programme utilised a professional profile previously created by the International Maintenance Association (IMA). Based on this IMA-Profile, the programme designed six qualifications of the IEM Major. These six qualifications are related to the eight national domain competencies Engineering and form the foundation for the learning objectives throughout the entire curriculum, see standard 2 for more details.

| | |
|---|---|
| 1 | A starting maintenance professional is able to analyse the value of assets in an uncertain and not entirely manageable environment. |
| 2 | A starting maintenance professional is able to settle into and reflect on a new technological, business or cultural context in an efficient way. |
| 3 | A starting maintenance professional participates in the development of business processes and markets through the analysis of technology strategies, maintenance concepts and views on asset usage. |
| 4 | A starting maintenance professional is able to analyse, evaluate and create suggestions for improvement on the performance of an asset and/or a business process in a maintenance context in an efficient way. |
| 5 | A starting maintenance professional is able to analyse and if necessary, improve the translation of a business strategy into operational decisions in maintenance and vice versa in an efficient way. |
| 6 | A starting maintenance professional is able to reflect on the contradictions included in the combined roles of organiser, advisor, technician and coach. |

*Figure 3 The six professional qualifications of the IEM major*

*Alignment with the professional field*

Alignment with the professional field is done in meetings with the work field advisory board (in Dutch: werkveldadviesraad, WAR). This committee is shared with the full-time programme in Tilburg. During WAR meetings, specific attention is given to both Tilburg and Breda programmes. Apart from the WAR meetings, lecturers also maintain individual contacts in the professional field, for example, with companies where students do internships and/or graduate, as well as through company visits and guest lectures, which are regularly organised. The panel is under the impression that the lecturers within the programme are sufficiently aware of what is happening in the regional professional field and the issues that exist in the maintenance and asset management sector.

In the new educational structure that started in September 2024, the WAR will continue to exist. Additionally, the ATIx Academy is working on recruiting new strategic partners who will co-create (components of) the programme with the lecturers over time. These companies must meet high standards regarding professional content and sustainability. Through this initiative, the Avans organisation aims to actively contribute to the sustainability of technical business education.

The panel sees the added value of such academy-wide developments and advises the programme to also independently organize counter-voices from the professional field. One way to do this is by better utilising what already exists. The panel has noted with interest that an external expert is involved in every graduation session. The panel advises the programme management to find a way to make these experts a part of the feedback cycle of the programme. Thus, they should periodically invite them to reflect on what they have been observing during the graduation process and what this might mean for the programme as a whole.

# Standard 2 Teaching-Learning Environment

*The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.*

**Conclusion**
Based on the considerations mentioned below, the audit panel assesses that the bachelor's study programme IEM **meets** the generic quality requirements for standard 2.

The programme offers a solid and carefully composed curriculum that supports students in achieving the intended learning outcomes. The programme is somewhat traditional, but due to the merger and the broader ambitions of Avans, this will be adjusted in the short term. Since students indicate that the current education is not static, the panel is confident that this will also be noticeable in the programme which will phase out.
The panel realizes that the educational programme has a technical focus while also paying significant attention to the softer aspects, such as communication skills, management skills, change management, etc. The panel regards the balance between both as positive. Guest lectures, company visits, and practical projects are components of the programme that students highly appreciate. The students even suggest to offer more of these. New technological developments in areas such as VR/AR are covered in the curriculum, but this needs more emphasis.
The panel has read and experienced that lecturers are able to create a safe learning environment, especially for international students. There is a considerable amount of informal contact between students and lecturers, but the more formal student counselling moments are also fully utilised. The panel finds it commendable that students maintain contact across different year groups.

**Substantiation**

*Content and structure of the curriculum*
The programme is based on the ideas of social constructivism when designing the curriculum. In this theory, learning is seen as an active and constructive process, taking place in a professional context and in collaboration with others. The programme has followed this approach in three aspects: group study, studying in a professional context, and an industry-linked curriculum. The panel recognises this approach in how the Self Evaluation Report describes the programme and also in the conversations that took place during the site visit. These three components are discussed in more detail below.

The programme structures its curriculum based on the so-called IEM triangle, in which Engineering, Business & Management, and Environment, Health & Safety converge. In addition to these three components, there are two learning lines: Data and Skills. Together, these five aspects form the content of the programme are described as development lines. Across the four years of the programme, students gain an increasing knowledge and skills in these five development lines. Furthermore, as students progress through the programme, they develop into increasingly independent engineers. The complexity of the assignments also increases as the programme advances. The programme specifically highlights the triad: operational / 'explaining'

(during the first year), tactical / 'improving' (year two and the internship), and strategic / 'innovating' (year four). The combination of all this constitutes the structure of the IEM programme. This is summarised in a figure 4.

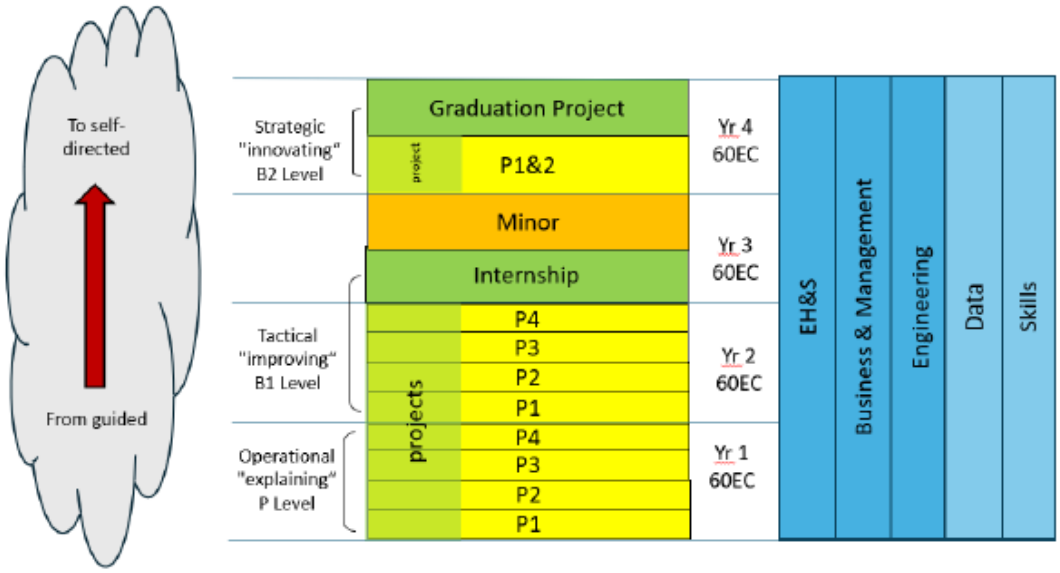


*Figure 4 - structure of IEM programme*

Figure 4 shows that a project is scheduled in each period. During the first two years, students work together on these projects. In the fourth year, there is a duo research project. In addition to the project, attention is given to each of the five development lines in every period during the first two years (the blue columns in Figure 3). The amount of study credits per development line can vary per period.
The panel believes that the programme is well-structured and maintains a good balance between project-based work and acquiring knowledge and skills. This structure is sound but somewhat traditional. The panel believes, that the move that presently is being made towards larger more integrated module, will make the curriculum more future proof. The panel encourages the programme to maintain focus on ensuring that students meet the complete set of knowledge and skills described in the national profile and the BoKS during the development of such modules.

*Knowledge and Skills*
In the documents provided to the panel and during conversations, the programme demonstrates how knowledge and skills are progressively introduced to students. Starting with practical knowledge of subsystems or assets, students learn to manage failure modes and strategies, eventually mastering more complex asset system components. For business development, the MO/PCOI logic (Market & Output / Process, Control, Organisation and Information) is applied. In the field of safety, students learn to recognize general EH&S (Environment, Health and Safety) issues, then develop specific engineering-related safety knowledge about non-routine use of technical systems. In the data line, students learn effective ways to use data from sensors and eventually acquire knowledge to create or conduct Reliability-Centred Maintenance studies and learn about AR/VR and artificial intelligence in industry and maintenance context. In the skills line, students not only learn writing and research skills but also engage in lessons on global engagement, sustainability, and intercultural awareness.

*Teaching language*
The programme is offered in English until September 1st 2024 and also uses an English name. In the past, it was decided to start this English-language variant in addition to the Dutch-language TBK programmes of Avans. The considerations were threefold: in the field of maintenance the language of instruction is often English, an English-language programme could also attract international students, and by teaching in English students are offered an international or English-language career perspective.
The English programme name was chosen at the time to be recognizable to English-speaking students. For new students starting as of September 1st 2024, the programme has become part of the Dutch-language TBK programme of Avans at the Breda location and will be in Dutch.

In recent years, the number of international students has grown to about fifty percent of the intake. Until last year, all students were expected to have a B2 level of English proficiency at the start. By the end of their studies, most graduate with proficiency at C1 or C2 levels. Students indicate that they are satisfied with the language skills of their lecturers.
The panel believes that the English language aspect is one of its distinguishing features of the programme. As far as the panel is concerned, the potential of this is no longer being utilised, and the programme would do well to investigate how this English language aspect can be used as an added value in the new TBK programme. One could think of an English-taught honours programme, minors or offering additional language courses to keep the English-language job market within reach for students.

*Research*
Avans has recently decided to embody the concept of a University of Applied Sciences. As part of this, research will gain a more balanced position within the Avans organisation, facilitated by the development of Centres of Expertise (CoE), where research groups collaborate with educational programmes and the professional field on practical research questions. The IEM programme maintains connections with the research group New Materials and their Application within the CoE Technical Innovation. This is achieved through a minor, the availability of internship and graduation assignments, and involvement in the fourth-year research project. One of the IEM team members is part of the aforementioned CoE. The panel encourages the programme to continue reflecting on what practice-oriented research means in the context of Industrial Engineering and Management and how students can be taught to transfer systematic data analysis to concrete practical applications.

*Internationalisation*
In its international perspective, the programme goes a step further than other programmes within the ATXi Academy. Due to the English-language instruction and the relatively large group of international students, internationalisation is in the opinion of the panel an integral part of the programme, both in the course content and the learning environment. Students are in contact with international peers and lecturers on a daily basis. Regarding course content, the Skills line includes space for intercultural and personal competencies. Additionally, all students are required to gain at least one international experience during their studies that meets the NLQF level 5 or 6. This experience may also take place in the Netherlands, provided it involves an explicit international context.

*Admission*
Until this year, all incoming students underwent an intake assessment to establish whether they met the English proficiency requirements (level B2). International students had to provide proof of

their English language ability prior to admission. Additionally, a preliminary test was conducted to check the level of mathematics. In case of any deficiencies here, the programme offers extra lessons in Maths & Statistics and Physics in the first period of the first year. Moreover, peer-to-peer student tutoring is also available.
In general, the dropout rate of the programme is quite high, at 30-40 percent. According to lecturers, this is due to the level of mathematics and physics required. Several students are unable to meet these requirements or, on reflection, they do not find the programme suitable after all and then drop out. Personal reasons for leaving the programme are also frequently mentioned. Since the panel noticed a remarkable low dropout rate in Tilburg, the panel encourages the Breda programme to learn how colleagues from Tilburg manage the study dropout rates. This could be beneficial for the newly merged programme.

*Tutoring*
Students report that the informal contacts among both students and teachers are very good. Similarly, the official tutoring sessions provided by the programme are highly appreciated. These scheduled moments offer opportunities to have more in-depth discussions with teachers about learning development, difficulties in the programme, and any personal circumstances. Especially among international students, these organised contacts are highly valued. In addition to these sessions, the programme also offers comprehensive coaching for project work, workshops, and peer-group coaching. Internship and graduation supervision are tailored to individual needs.

*Staff*
Although the team is small in size, it excels in performance. Students are particularly appreciative of the way they are treated by the staff. There are many informal contacts, which are especially valued by international students. The lecturers ensure a safe and approachable environment within the programme as a whole. This applies both to interactions between students and lecturers and among students themselves.
Now that the programmes are merging the number of students will increase. This can pose a threat to the perceived small-scale nature of the programme. The panel has seen that the programme is aware of this and advises further discussions with colleagues from Tilburg, as they also value their small-scale nature as an asset.

In addition to the personal treatment mentioned before, students also appreciate the professional attitude among lecturers. They are open to receiving feedback and take action on it, for example when feedback is given in the Study Programme Committee (SPC). During classes, students are invited and challenged to actively participate and think critically. lecturers assist in finding additional study materials, project assignments, and internship and graduation positions.

The programme is aware that it is, due to the size of the team, not always possible to pair two assessors with substantive expertise on topics involved in an assessment. While the panel shares this concern, it also observes that this issue may be resolved since September 2024. From that time, the lecturers of the IEM programme will operate jointly with the TBK Tilburg lecturers and partly with the BIM programme's teaching team. The panel encourages the lecturers to take advantage of this collaboration to effect a more efficient and subject-specific organisation.

## Standard 3 Student Assessment

*The programme has an adequate system of student assessment in place.*

**Conclusion**
Based on the considerations mentioned below, the audit panel assesses that the bachelor's study programme IEM **meets** the generic quality requirements for standard 3.
The assessment system supports the learning process. There is a good balance between individual assessment and the evaluation of professional products created by a group of students. The panel is positive on the mix of group assessments and individual assessments and the way in which the input of all group members is validated equally. The execution of assessments is carefully documented and meets the basic quality standards, including those regarding the final assessment
The panel welcomes the developments towards less summative testing in favour of more formative assessment. The panel recommends organising the assessment of student products in such a way that both assessors involved have adequate expertise to evaluate the student product as to contents. The panel is confident that this can be realised in the short term by the merging of the teaching teams.

**Substantiation**
The panel believes the programme has designed a solid assessment plan that systematically helps students acquire the necessary knowledge and skills to achieve all intended learning outcomes. Group work, as mentioned under standard 2, promotes collaboration. In the assessment of group work, individual contributions are monitored and evaluated. For all projects involving group assessments, an individual assessment is also conducted. Students receive study credits for both components. The panel appreciates this approach, which prevents any potential negative effects of, for example, group dynamics that could impact the evaluation of individual performance of the group members.

In accordance with the examination programme attached to the Education and Examination Regulations, students have to complete multiple tests each period in addition to the project report and presentation. The panel appreciates that various forms of assessment have been chosen. In addition to written exams, students are also evaluated based on assignments, reports, oral assessments, case studies, and presentations. Yet, many tests on specific themes that provide few study credits can also lead to fragmentation and miss the opportunity for more integrated knowledge acquisition. In recent years, this has been a major topic of discussion in higher professional education, and the panel appreciates that the programme has included this development in the new curriculum.

The panel has been broadly informed about this new curriculum and the direction being taken. This development aligns with the design of modular education and programmatic assessment, where student progress is assessed in a more integrated manner. The programme has chosen to use a combination of formative and summative assessments with tests for which students receive a greater number of study credits. The panel sees good potential in this approach and has noted that the merger of the programmes has also taken up the redevelopment of the curriculum (and thus the assessment programme).

Additionally, the panel advises the programme to remain vigilant during the redesign of the assessment structure, ensuring and verifying that students master the essential knowledge and skills from the BOKS.

*Assessment policy*
The programme uses the assessment policy plan drawn up under the responsibility of the Academy for Technology and Innovation (ATIx). This outlines the frameworks that the assessment must meet. There are frameworks for the organisation of assessments, for ensuring the complexity and level of the assessments, and for the variety in assessments. Additionally, it outlines the solidity of assessment design and administration.
Together, the academy management, the 'fundament' curriculum committee, and the IEM education committee are responsible for ensuring that high-quality education and assessment are provided. Within the programme, the curriculum coordinator is the first point of contact on matters concerning assessment. The curriculum committee ensures the improvement of assessment quality by periodically conducting satisfaction surveys.

*Execution of assessment policy*
In the design of the education, the programme utilises the IEM Qualification Matrices. In a document the programme indicates per level (Propaedeutic, Bachelor 1, Bachelor 2) what students need to know and be able to do, which IEM qualifications are involved, and within which development lines this is tested. With these outlines the responsible lecturers are able to design valid and reliable module assessments. The testing coordinator of the programme promotes a good testing culture within the educational team. This person contributes to the professionalisation and updating of the testing programme, among other things, by organising calibration sessions with the entire team.

The panel is positive about the explanation and implementation of the assessments. Students are informed in advance about what is expected of them and how they can prepare for the tests. Manuals are available, and relevant information can be found on Brightspace. For all exams, an overview of qualifications is available. Through the projects, connections are made with current and profession-relevant assignments, especially when students have to acquire these assignments themselves.

The panel has reviewed several tests, such as Reliability-Centred Maintenance Part 2 (year 2, period 4) and Sustainability (year 1, period 2). In the RCM module, a group of students performs an asset analysis to complete the RCM worksheet and the RCM decision diagram in order to add recommendations for implementation in a report. In the Sustainability module, students learn about understanding environmental issues related to maintenance activity in the broadest sense. It is rounded off with a written exam. the panel is satisfied with the quality of the assessment that was reviewed.

*Quality assurance*
The quality of testing and assessment is well ensured. The assessment meets quality criteria regarding transparency, validity, and reliability, and the Examination Committee Engineering (EC) adequately supervises the assurance of assessment quality.
The Examination Committee Engineering consists of two chambers (Tilburg/Breda and Den Bosch) and oversees the TBK programme variants in Den Bosch, Tilburg (full-time), and Breda. The Examination Committee Deeltijd (parttime) supervises the part-time TBK programme in

Tilburg. Both committees have periodic meetings to coordinate. The EC Engineering maintains a certain distance from the IEM programme and has established a process through which the programme's assessments are periodically evaluated. The results of this evaluation are discussed with the curriculum committee within the programme.

Assessment of the testing is performed by examiners appointed by the Examination Committee. Examiners must hold a BKE certificate: the Basic Qualification for Examination. The programme conducts assessments always by two examiners, ensuring validity and reliability. Regular calibration takes place within the programme, particularly in the case of oral assessments and the graduation process. Given the limited number of assessors, the panel sees risks here. It is not always feasible to pair assessors who both have sufficient substantive expertise about the subject being assessed. To overcome this, assessments are recorded when appropriate, so that they can be subsequently assessed by a third assessor. The panel’s advice is to collaborate with the assessors of the full-time TBK programme in Tilburg to address this issue.

The panel has found that the examination committee is adequately involved in the current curriculum changes. In consultation with the programme, careful consideration is given to professional development for examiners, needed for the new interpretation of their role. This is because oral assessments and criterion-based interviews (CGI) will become more common. Both the examination committee and the programme recognize that these new forms of assessment require different skills which assessors will have to comprehend. Active support is offered by the Avans organisation in this regard.

# Standard 4 Achieved learning outcomes

*The programme demonstrates that the intended learning outcomes are achieved.*

**Conclusion**

Based on the considerations mentioned below, the audit panel assesses that the bachelor's study programme Industrial Engineering and Management (IEM) **meets** the generic quality requirements for standard 4.

The structure of the graduation programme is meticulous and helps the student achieve the final level. In the final projects the panel reviewed, the assignments are sufficiently complex and are carried out with an adequate degree of independence. They therefore meet the basic quality that can be expected from the programme. The panel appreciates that the maintenance profile of the programme is clearly reflected in the final projects and notes that alumni are satisfied with the alignment of the programme with the professional practice as regards maintenance. They feel well-prepared, both in terms of content and the required working and thinking level. The panel is pleased with how the professional field is involved in the graduation projects in terms of an external expert at the final sessions. The panel finds it a missed opportunity that these external experts are not asked for their opinions on the graduation process and the programme in general. Therefore, the panel advises bringing this group of people together periodically to close a highly relevant feedback loop.

**Substantiation**

*Graduation process*

Graduation takes place in the final year of the programme. Students work individually on a graduation assignment within a company, preferably in maintenance. They have 100 days to complete the project (30 EC) and can do so in either P1/P2 or P3/P4 of the final year. The topic must be approved before the student can start working on it. They develop a professional product and conduct the necessary research for this product. This could involve advice, a design or redesign, a physical or digital end product, or a professional action. The result must ultimately contribute to the maintenance process or the asset management process in a broader perspective.

The assessment of the graduation project takes place using the IEM Assessment Form Graduation Project. In the approval of the research proposal this form is also used. The final report is assessed by both examiners prior to the defence session. During this session, students present their final work to both examiners, the company supervisor, and an external expert.

The final grade consists of the following three parts: Proposal (10% of the final grade), Report (70%), Defence & Reflection (20%).

The panel is pleased with the comprehensive structure of this graduation process and the way students are challenged to carefully and systematically set up their research in the proposal.

The final grade depends for 70% upon a written report in spite of the fact that writing this kind of report is rarely relevant for the future workplace. The panel encourages the programme to explore how students can demonstrate their level in a way which aligns with their future workplace.

In addition, the panel suggests considering placing a greater importance on students' personal performance and their development in so-called soft skills in the graduation assessment. This is especially relevant as both students and companies describe these skills as particularly valuable.

The panel appreciates the way the professional field is involved in assessing the final level of the programme. In addition to the assessors, the student's company supervisor and an external expert are also present at the defence-session. This approach highlights the value and necessity of companies' input in maintaining the connection between education and practice. The assessment criteria help to reflect the supervisor's judgment, and the external expert's considerations are provided as advice to the examiners.
The panel was surprised to learn that the input from these external experts is only considered individually for each final session, while their collective feedback could provide such valuable insights into the programme as a whole. The panel encourages the programme to invite these experts, perhaps once a year, to reflect on their views about the graduation process and the programme in general.

*Level of intended learning outcomes in graduation products*
The panel has reviewed sixteen final projects, encompassing all those completed in the last two academic years. Based on this, the panel confirms that the intended learning outcomes are achieved. The panel has established that this method thoroughly determines the final level. Students worked on sufficiently complex assignments and did so with adequate independence. As noted under standard 1, the programme aims to assess one of the domain competencies ('Consult') at a higher proficiency level than other TBK programmes do. In addition, it has struck the panel that it is insufficiently demonstrated how assessors examine this higher level of proficiency for Consult. When the programme chooses to maintain this level of proficiency, the panel recommends to describe how students demonstrate this level of proficiency in their graduation reports and how examiners assess it.

The programme further values that graduation assignments have a strategic focus. During the review of final projects, the panel found that this is not usually the case. The panel does not see this as an issue, as the programme meets the generic quality requirements. The programme is free to additionally challenge or even require students to choose a strategic focus for their graduation topic. However, it is recommended to be clear about what a strategic focus means and to explicitly state this in the assessment criteria. In this way, assessing strategic focus becomes more valid and transparent.

*Functioning of alumni in the professional field*
Alumni are of the opinion that the programme aligns well with the needs of the job market, and many students receive job offers from their internship or graduation companies even before graduating. There is a high demand for technicians, including graduates in Industrial Engineering and Management (IEM). According to both the graduates themselves and the HBO Monitor, the unemployment rate for IEM graduates is zero percent. This confirms the high demand from the industry and demonstrates that new professionals with an IEM diploma are highly valued in the job market. A significant portion of the graduates chose to pursue further studies, often at Tilburg University or Eindhoven University of Technology, with which the programme is affiliated.

# Distinctive feature of Sustainable Higher Education

*Introduction*
Avans University of Applied Sciences regards sustainable development as an important focus and has formulated various ambitions regarding sustainable development. In the past, all programmes were required to achieve AISHE certification at a 2-star level. Since 2020, the assessment of sustainable development for all programmes has been secured through the evaluation of the Distinctive Feature of Sustainable Higher Education (in Dutch: bijzonder kenmerk duurzaam hoger onderwijs; BKDHO), in conjunction with the regular programme accreditation in accordance with the NVAO framework. Therefore, the audit panel has evaluated, along with the limited programme assessment, whether the full-time IEM programme in Breda meets the Distinctive Feature of Sustainable Higher Education based on three criteria.

*Context*
Since 2015, sustainability has been included in the Avans educational vision, and efforts have been made to make Avans more sustainable. Since 2022, the internal organisation has been involved in the Avans-wide implementation plan for sustainable development "Pionieren met lef" (Pioneering with Courage). Avans played a key role in the SDG (Sustainable Development Goals) charter of all universities of applied sciences, aiming to make all students SDG-competent through education and research. Central Avans ambitions include the development towards: education with attention to sustainability and SDG goals, circular operations ("mission zero"), an inclusive organisation, and contributing to the transition to a sustainable society.
Avans-wide, a Green Office implementation plan for Sustainable Development is being prepared. This plan includes, among other things, that besides integrating sustainability into education, Avans aims to develop broadly as a sustainable university of applied sciences. There is a supporting network GreenOffice 2.0 that supports Avans organisational units in achieving sustainable development goals.

In the educational innovation around Ambition 2025, sustainability and the SDGs are integrally included and explicated. In blueprints for new curricula, the themes of sustainability, diversity, and internationalisation are included as design principles. The ATIx Academy profiles itself in terms of sustainability with the themes: smart industry, smart energy, and smart health. Through covenants, partners are sought at the academy level who want to strategically, tactically, and operationally contribute to realising the sustainable education vision. In the context of the Energy Transition, there is cooperation with Tanis Confectionery in Oosterhout, focusing on smart industry. A co-creation group has been started to translate Avans policy in this area into academy goals.

Within the ATIx Academy, a 'table for Sustainable Development' started at the end of 2022, where a sustainability vision for 2025 is being developed, and staff can suggest new initiatives. Twice per educational period, there is an online Sustainability Hour where staff can participate and is being informed. The Whole School Approach (WSA) is used as a framework for sustainable development. This creates an integrated approach where all domains that influence learning contribute to a more social and green world.

### Criteria 1 Distinctiveness

*The characteristic to be assessed is distinctive for the programme in relation to relevant programmes in Dutch higher education.*

**Conclusion**

The programme **meets** this criterion of the distinctive feature of Sustainable Higher Education. The panel observes that the programme operates from a clear vision of sustainability as developed within the Avans institution and the organisation of the ATIx Academy. Through this top-down alignment, IEM-students are continuously engaged and challenged to think about sustainability. This approach is system-oriented, meaning that the student's environment becomes increasingly infused with sustainability. The panel also finds the specific focus of the programme on maintenance to be distinctive in terms of sustainability. Repairing materials instead of replacing them is generally preferable from a sustainability perspective. However, the panel challenges the programme to more explicitly highlight how sustainability can be achieved within the context of maintenance. By promoting this aspect, sustainable maintenance engineering gains more prominence in a fairly traditional branch, such as maintenance. The panel encourages the programme to seek ways to more clearly articulate sustainability as a fundamental principle of the education provided. In the future the IEM programme will also develop towards co-creating educational content with centres of expertise and the professional field. If the sustainable proposition of the programme is clear, this collaboration should lead to practical solutions in sustainable maintenance.

### Criteria 2 Concretisation

*The consequences of the characteristic to be assessed for the quality of education have been operationalised on the basis of the relevant standards of the Accreditation Framework for the Higher Education System in the Netherlands.*

**Conclusion**

The programme meets this criterion of the distinctive feature of Sustainable Higher Education. Sustainable development is clearly interwoven and sufficiently operationalised within all four standards. For each standard, the panel has the following considerations.

*Standard 1: Intended Learning Outcomes*

The programme states that the nature and profile of the curriculum inherently provide opportunities to connect sustainability to projects related to maintenance and asset management. In fact, in the domain competencies of design and management, it is explicitly mentioned that engineers can assess and evaluate the impact of environment, sustainability, and ethical aspects on the design during process (re)design. Moreover, the management process takes into account the entire life cycle of products, including aspects of sustainability. The panel finds it necessary to update these qualifications in line with the clear ambitions the programme has regarding sustainability. In this way, the programme can also more explicitly describe what it aims to achieve and assess in terms of sustainability.

The panel has observed that, although there is considerable attention to sustainability (as also mentioned below in Standard 2), there are no mutual expectations regarding this. When asked how sustainability is addressed in the curriculum, students mention aspects related to health and safety, while lecturers cite material innovation, energy and emission savings as important aspects. Sustainability is a broad concept and necessitates making specific choices. The panel

advises the programme to focus on those elements of sustainability that align with the content and intended learning outcomes of the IEM programme.

*Standard 2 Teaching / Learning Environment*
As mentioned under standard 1, as far as sustainability education is concerned, the programme primarily aligns with the domain competences that deal with assessing and evaluating the impact of environment and sustainability on the (re)design of processes in companies. In order to do such assessment and evaluation carefully, the programme provides students with knowledge and information they can use for that purpose. This is done primarily within the development line Environment, Health and Security, but sustainability is also addressed within a number of other programme components. The programme presented a poster detailing how sustainability is addressed in the curriculum. In each case, it was explicitly stated to which Sustainable Development Goal the content of that component contributes. In Project Management and Material Science, for instance, attention is paid to sustainable materials, methods and energy sources. Lean Thinking focuses on preventing waste, whereas Special Safety Risks and Industrial Cleaning consider how to handle hazardous substances carefully and without waste. In internships and graduation, students are encouraged to work on assignments in which sustainable solutions can be found.
The panel is impressed by the extent to which attention is paid to sustainability and notes that, partly due to the development of the so-called ‘sustainability table’, there is also an awareness of thinking about why this is happening. The panel appreciates that the programme is so open about its own development ambition and encourages it to fulfil that ambition. Again, the advice here is to make choices and focus on sustainability aspects that are most in line with the programme's profile.

*Standard 3: Student Assessment*
The panel appreciates that the focus on sustainability is not optional and that it is addressed in assessments. In the first two years, in a number of cases sustainability is incorporated into learning objectives / learning outcomes, such as in Sustainability, ERP, Lean Thinking and Material Science. The panel looked at several module manuals and reviewed several assessment procedures. One of which was Sustainability (year 1, period 2). The panel found that various aspects of sustainability are tested by means of a knowledge test, in each case in relation to the effect of these aspects on, for example, maintenance activities or safety issues. This shows that active links are made between sustainability issues and practical solutions. During the internship, students are expected to pay attention to the EHS consequences for their proposed solution. In the assessment, the examiner checks whether this attention was sufficiently present. The panel has viewed a number of internship reports and assessment forms and finds that the aspect of EHS consequences is effectively assessed. In the graduation process, in the assessment of the final report an assessment criterion is used concerning the presence of a proposal for evaluation / sustainability. In the opinion of the panel, this criterion is somewhat ambiguous, because an evaluation proposal is not necessarily the same as a sustainability proposal. It is therefore recommended to separate the two, so they can be assessed separately and can be determined to what extent a sustainability plan (or something similar) has been realised.

*Standard 4: Achieved Learning Outcomes*
There is broad attention to sustainability in the curriculum so students learn how to become critical thinkers with regard to sustainability and learn how to contribute to sustainable solutions through their actions in practice. Accordingly, students are expected to consider sustainability issues in the graduation project. One of the assessment criteria is that students must assess and

evaluate the impact of their project or (re)design on environment, sustainability, and ethical aspects. In practice there are final reports with considerations on safety, health and environment. There are also final reports on issues concerning the reduction of waste, on well-being and inclusion. As many assignments are about maintenance, most reports contain- from the nature of things - advice and recommendations that can be understood as sustainable. There are also graduation projects with topics that are sustainable in a different way. As an example how sustainability and maintenance can also be paired, the programme refers to a project in which the student researched the excessive energy consumption of a company and how to reduce it.
The panel finds that standard 4 meets the criteria of this distinctive feature but is of the opinion that the programme can do more. At the moment, the sustainability aspect in graduation is mainly determined by the maintenance focus of the programme. The panel recommends the programme to strengthen the connection between asset management, maintenance and sustainable development of the professional field in maintenance. Trying to convince companies to bring profit more in balance with people and planet. The panel believes that education in general, and in this case the IEM programme, can be a driver for such changes.

### Criteria 3 Relevance

| |
|---|
| *The characteristic to be assessed is essential to the nature of the programme.* |

**Conclusion**
The programme **meets** this criterion of the distinctive feature of Sustainable Higher Education. By choosing to focus on maintenance in the profiling of the programme and emphasizing its sustainable character, the programme has proven the added value of the distinctive feature of sustainability. Not only is the English-taught IEM programme unique in the Netherlands, but the way students are prepared for their position as maintenance engineers is also unique. The panel was impressed by the safe and sustainable learning environment which was created, helping students from different countries to feel at home in Breda. For further explanation, the panel refers to the text under criterion 2.
The panel is convinced that the sustainability feature is relevant to the nature of the industrial engineering programme in general. Given the above, this applies even more to this IEM programme with its maintenance profile. The panel sees the great relevance of the programme to the professional field and the maintenance companies within it. The programme has an excellent ambition to strengthen the connection between asset management, maintenance and sustainable development of the professional field in maintenance by trying to convince partners in the professional field to bring profit more in balance with people and planet.
This ambition offers a promising perspective to companies in the region that—whether driven by societal developments in this area—are looking for ways to make their operations more sustainable.
The panel has noticed that the programme and the broader organization of the ATIx Academy have far-reaching plans to make concrete progress in this area. The distinctive feature of Sustainable Higher Education can help the programme stay focused on this ambition.

# Final Conclusion

### Assessments of the Standards

The audit team comes to the following judgements with regard to the standards:

| | Industrial Engineering & Management |
|---|---|
| *Standard 1 Intended Learning Outcomes* | Meets the generic quality requirements |
| *Standard 2 Teaching-Learning Environment* | Meets the generic quality requirements |
| *Standard 3 Student Assessment* | Meets the generic quality requirements |
| *Standard 4 Achieved Learning Outcomes* | Meets the generic quality requirements |

| | Industrial Engineering & Management |
|---|---|
| *Criterion 1 Distinctive character* | Meets the generic quality requirements |
| *Criterion 2 Concretisation* | Meets the generic quality requirements |
| *Criterion 3 Relevance* | Meets the generic quality requirements |

The judgments were weighed in accordance with the NVAO's decision-making rules. Based on this, the visitation panel has a **positive assessment** on awarding the distinctive feature Sustainability of Higher Education for the full-time variant of the existing bachelor's degree programme in Industrial Engineering and Management at Avans University of Applied Sciences in Breda.

# Recommendations

The audit panel has the following recommendations for the study programme:

**Standard 1**

- The panel recommends reconsidering the choice to assess the competency ‘consult’ at proficiency level 3 and clarifying why a maintenance professional needs a higher proficiency level in this competency compared to other TBK-professionals.

**Standard 2**

- The panel recommends maintaining the balance between technical and softer aspects such as communication and management skills.

**Standard 3**

- The panel recommends organising assessments in such a way that both assessors have the necessary expertise to evaluate student work content-wise.

**Distinctive feature**

- The panel recommends the programme to strengthen the connection between asset management, maintenance and sustainable development of the professional field in maintenance. Trying to convince companies to bring profit more in balance with people and planet. The panel believes that education in general, and in this case the IEM programme, can be a driver for such changes.

# Appendices

## Appendix 1: Programme for the Site Visit

| | | |
|---|---|---|
| 10.00 – 10.15 | Introduction & welcome | Curriculum Coordinator<br>Curriculum Coordinator & Curriculum Committee<br>LIC |
| 10.15 – 11.00 | Discussion with students and alumni | 2nd year student<br>3rd year student<br>4th year student<br>Two alumni |
| 11.00 – 11.15 | | Break |
| 11.15 – 12.00 | Discussion with lecturers and examinators (curriculum, student study coaching, assessments etc.) | IEM Lecturers<br>Testing Coordinator<br>Curriculum Coordinator<br>Curriculum Coordinator & Curriculum Committee |
| 12.00 – 12.15 | | Break |
| 12.15 – 13.00 | Sustainability | Sustainability Coordinator<br>Two IEM Lecturers |
| 13.00 – 13.45 | | Lunch |
| 13.45 – 14.45 | Discussion about quality assurance and graduation process | Graduation Coordinator<br>IEM representative Study Programme Committee<br>Examination Board<br>Testing Coordinator<br>Quality Assurance Coordinator<br>Professional field representative<br>Student representative Study Programme Committee |
| 14:45 – 15:00 | | Break |
| 15.00 – 15.30 | Discussion with study programme coordinators: Profile of the study programme | Faculty Dean<br>Assistant Dean<br>Curriculum Coordinator<br>Curriculum Coordinator & Curriculum Committee |
| 15.30– 16.30 | Panel assessment | Panel |
| 16.30 – 16.45 | Feedback | Everyone is welcome |
| 16.45 – 17.30 | Development discussion<br><br>Together with representatives of the TBK Tilburg fulltime programme | Fundament Coordinator<br>IEM Curr. Coordinator & Curr. Committee<br>IEM Lecturer<br>TBK Tilburg Curr. Coordinator & Curr. Committee<br>TBK Tilburg Curriculum Coordinator<br>Sustainability Coordinator<br>minute taker |

## Appendix 2: Documents Examined

Self evaluation
Self evaluation sustainability

Education and Examination Regulations 23-24, (ATIx)
Examination programme Industrial Engineering & Management (IEM) 2023-2024
IEM Graduation Guide
IEM Internship Guide
IEM Programme Profile
IEM Qualification Matrices
Education Policy (Onderwijsbeleid) ATIx (Dutch)
Overview IEM Lecturers
Assessment Policy (Toetsbeleid) ATIx (Dutch)
Borgingsagenda examencommissie 2023-2024 (Dutch)
Annual report by the Exam Board Engineering (Dutch)
Minutes Examination Board, including coordination with EB Parttime Academy (Dutch)
Internal Regulations of the Engineering Examination Board 2022
Minutes Study Programme Committee
Minutes professional board (WAR) (Dutch)
Minutes sprint review IEM blueprint

All sixteen available graduation files with assessment forms. The files consist of a Project Management Document, a research proposal, the final report, a self reflection report.