TRANSLATION OF TECHNICAL TEXTS IN ENGINEERING: THEORIES, CHALLENGES AND USES

DOI: 10.56177/AUA.PHILOLOGICA.2.26.2025.art.34

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Abstract: *In today's globalized engineering industry, the translation of technical texts plays a vital role in ensuring accurate communication across languages and cultures. Engineering documents require precision, consistency, and clear terminology to avoid misunderstandings that could lead to errors. This paper examines key translation theories that emphasize the significance of purpose, audience, and context in technical translation. It also discusses common challenges, such as the complexity of engineering language, terminological ambiguity and inconsistency in source texts, cultural differences in technical standards, and discrepancies between source and target language conventions, especially in technical writing styles. Additionally, interdisciplinary collaboration between engineers and translators is often limited, which can lead to misinterpretations or reduced clarity. It highlights the importance of domain-specific knowledge, as engineering texts usually require familiarity with specialized terminologies and concepts that extend beyond basic language skills. Furthermore, the paper highlights the increasing influence of artificial intelligence tools in the translation process and presents examples drawn from teaching ESP courses in engineering contexts. Practical uses are examined, with special emphasis on the importance of technical translation within academic environments, particularly for undergraduate engineering students. By understanding the basic principles of technical translation, future engineers can develop both linguistic and technical skills in order to navigate engineering knowledge appropriately. Translation of texts in the field of engineering is not a purely linguistic endeavour but a complex task that requires technical expertise, cross-cultural sensitivity, and effective use of translation technologies. The paper calls for enhanced interdisciplinary collaboration, better translator training, and continued research to meet the evolving demands of technical translation.*
Keywords: *translation; technical texts; ESP; terminology; AI translation tools*

1. Introduction

Translation of technical texts in engineering implies a unique set of challenges and pedagogical opportunities, especially in the context of English for Specific Purposes education at tertiary level. As English for Specific Purposes (ESP) teachers our goal is to bridge the gap between linguistic competence in a foreign language and domain-specific knowledge. This intersection demands a layered understanding of translation theories, common difficulties faced by learners, and practical applications of translated materials in engineering contexts, such as using specific terminology, interpreting technical diagrams, and producing accurate, concise written documents in English. Translation serves as a valuable tool in this process, offering a way to explore how meaning shifts between

languages while preserving technical precision and intent. It also enhances learners' awareness of both linguistic and conceptual differences across cultures and professional practices.

2. Discussing Translation of Technical Texts from a Pedagogical Perspective

Incorporating translation exercises in the ESP classroom not only strengthens comprehension and production skills but also prepares students for real-world scenarios where interpreting technical information across languages is important. Through targeted instruction, authentic materials, and task-based learning, translation acts as an important link between developing language skills and applying them within professional engineering contexts. Teachers must recognize the common challenges learners face, such as decoding complex syntax, distinguishing between general and technical meanings of words, and reconciling discrepancies between native and target language conventions.

Furthermore, within the framework of English for Specific Purposes (ESP), translation can be a valuable instructional practice provided that texts are carefully chosen for their linguistic relevance and domain-specific features. Translation tasks require learners to attend simultaneously to semantic accuracy and grammatical form, thereby fostering heightened language awareness and promoting analytical engagement with specialized vocabulary.

However, the pedagogical use of translation in ESP is not without limitations. It tends to focus primarily on receptive and productive written skills such as reading and writing while often neglecting listening and speaking. Moreover, translation exercises are frequently product-oriented, with emphasis placed on polished final versions rather than on the cognitive and metalinguistic processes involved. As a result, students may perceive translation as a mechanical task, overlooking its potential as a strategic learning tool. In the ESP course for our first-year engineering students, the main objectives in using translation activities are: to support the development of technical English proficiency, enabling learners to accurately comprehend and produce domain-specific texts; to engage students in their learning by encouraging reflection on the translation process, the tools used, and the outcomes achieved; as well as to promote both independent and collaborative work, fostering communication, critical thinking, and decision-making skills in creating connections between language learning and their studies in science and technology. Targeted pedagogical strategies can develop learners' communicative competence in professional engineering contexts through contrastive analysis tasks, glossary building projects, and translation workshops. Contrastive analysis tasks engage students in comparing source-language and target-language versions of technical documents such as instructions in a user guide that are expressed differently across languages, thereby fostering awareness of structural and terminological differences critical for accurate communication. Glossary building projects encourage collaborative learning as students compile bilingual glossaries tailored to their specific engineering subfields, reinforcing subject-specific vocabulary acquisition. Translation workshops provide practical

opportunities for students to develop translation skills and engage in peer editing, promoting both linguistic precision and critical thinking. One significant challenge might be the complexity of the source texts, which often contain dense, technical language and field-specific conventions. Additionally, students may lack specialized knowledge in the subject areas from which the source texts are drawn, making it difficult to fully understand and accurately render the content in another language. These challenges highlight the need for targeted instruction that integrates language training with subject-matter familiarity and technological competence.

3. Theories Applied in Translating Technical Texts

Technical translation is a type of specialized translation involving the translation of documents, texts produced by technical writers, which relate to technological subject areas or deal with the practical application of scientific and technological information. The translation process consists of varied "types of problem-solving activity, which include source text (ST) reading to target text (TT) production and dictionary consultation, and how factors such as time restriction, text complexity, and translation experience have an impact on the allocation of cognitive resources."[1]

The purpose of technical translating is to continue scientific communication across the language border. According to Byrne,[2] technical translation denotes "a generic term which is used to refer to pure science, applied scientific research, and technology. […] Technical translation can be characterised at a basic level based on: subject matter; type of language; purpose." The purpose of technical translation implies "to present new technical information to a new audience, not to reproduce the source text, per se, or reflect its style or language. Technical translation is a communicative service provided in response to a very definite demand for technical information which is easily accessible in terms of comprehensibility, clarity, and speed of delivery." [3]

Technical translation requires the formulation of communicatively adequate technical texts in the target language, including clarity, precision, and linguistic economy. Considering Herman's opinion "clarity, concision and correctness, the principal stylistic goals of technical writing, are simultaneously those of technical translation; an excellent technical translator is an excellent technical writer."[4] The same author states that "a translation of technical prose, though non-literal, should convey the exact meaning of the original text as directly

[1] Kristian Tangsgaard Hvelplund, *Translation of Specialized Texts*. Amsterdam/Philadelphia, John Benjamins Publishing Company, 2017, p. 93.
[2] Jody Byrne, *Technical Translation: Usability Strategies for Translating Technical Documentation*. Springer Dordrecht, The Netherlands, 2006, p. 8.
[3] Jody Byrne, *Technical Translation: Usability Strategies for Translating Technical Documentation*. Springer Dordrecht, The Netherlands, 2006, p. 11.
[4] Mark Herman, Technical Translation Style: Clarity, Concision, Correctness in *Scientific and Technical Translation* edited by Sue Ellen Wright and Leland D. Wright, Amsterdam/Philadelphia, John Benjamins Publishing Company, 1993, p. 11.

as possible. Purposeful ambiguities, ungrammatical constructions, and sound combinations which call attention to themselves are the province of literary translation."[5] Clarity in translation often requires completely rephrasing sentences in the target language when there are significant syntactical and lexical differences between the source and target languages. In addition, concision implies "an extra pruning step; […] words which do not contribute to meaning or clarity can be eliminated once the sentence has been recast from the source language into proper target-language word order… repetitions required by the source-language thought processes can be eliminated if the target language does not require them"[6]. Regarding correctness in a technical translation; this concept indicates "accurate re-creation of the ideas and technical terms of the original in the target language […] it requires that words or grammatical constructions that are not totally understandable be footnoted as such […]it means producing an accurate technical document in the target language despite mistakes in the original"[7]. For instance**,** common errors in technical papers refer to inconsistencies between numbers listed in tables and the conclusions drawn from those numbers, textual references to one thing and accompanying diagrams showing something else etc. The translator's role is to correct such errors in square brackets or footnotes, both in order to render the client a service and to preclude the client's blaming such errors on the translator.

Technical texts are typically categorized as informative. Reiss asserts that the primary function of informative texts is the "communication of content"[8] which implies that translation should prioritize semantic accuracy, clarity, and terminological precision over stylistic flair or literary effect. As a result, the translation strategy for technical or scientific texts should reflect their functional priorities. Since the main goal is to ensure the accurate transmission of information, translators working with such texts must focus on faithful representation of facts, correct use of domain-specific terminology, and unambiguous phrasing.

Skopos Theory emphasises the purpose (skopos) of translation. For technical texts, the goal is clarity, functionality, and precision. The Skopos Theory, developed by Hans J. Vermeer in 1989, marks a significant departure from traditional equivalence-based translation models by focusing on the *purpose* or *skopos* of a translation as the primary determinant of translation strategies. Vermeer argues that "the prime principle determining any translation process is the purpose

[5]Mark Herman, Technical Translation Style: Clarity, Concision, Correctness in *Scientific and Technical Translation* edited by Sue Ellen Wright and Leland D. Wright, Amsterdam/Philadelphia, John Benjamins Publishing Company, 1993, p. 13.

[6] Mark Herman, *Technical Translation Style: Clarity, Concision, Correctness* in *Scientific and Technical Translation* edited by Sue Ellen Wright and Leland D. Wright, Amsterdam/Philadelphia, John Benjamins Publishing Company, 1993, p. 17.

[7] Mark Herman, *Technical Translation Style: Clarity, Concision, Correctness* in *Scientific and Technical Translation* edited by Sue Ellen Wright and Leland D. Wright, Amsterdam/Philadelphia, John Benjamins Publishing Company, 1993, p. 18.

[8] Katharina Reiss, *Translation Criticism: The Potentials and Limitations*, Manchester: St. Jerome Publishing, 2000, K., 2000, p. 26.

(Skopos) of the overall translational action"[9]. In this model, the translator is viewed as a purposeful agent who makes strategic choices based on the intended function of the target text within its new context. Rather than striving for linguistic or stylistic fidelity to the source text, Skopos Theory prioritizes the communicative needs and expectations of the target audience. This is particularly relevant in technical and engineering translations, where clarity, usability, and functionality often outweigh strict word-for-word accuracy. Defining a clear goal and target audience may not simplify the translator's task, but it increases the chances of delivering a successful and appropriate translation. "The target text, the translatum, is oriented towards the target culture, and it is this which ultimately defines its adequacy. It therefore follows that source and target texts may diverge from each other quite considerably, not only in the formulation and distribution of content but also as regards the goals which are set for each, and in terms of which the arrangement of the content is in fact determined"[10]. Nevertheless, "the skopos, which is (or should be) defined in the commission, expands the possibilities of translation strategies, and releases the translator from the corset of an enforced – and hence often meaningless – literalness; and it incorporates and enlarges the accountability of the translator, in that his translation must function in such a way that the given goal is attained"[11]. In engineering contexts, the application of Skopos Theory means that translated documents such as user manuals, safety instructions, or technical specifications must fulfil their specific communicative purpose making it particularly suitable for English for Specific Purposes courses where students must learn not only to translate accurately, but to do so with a keen awareness of audience and context. For example, a maintenance manual translated for factory technicians in another country must be intelligible and actionable, even if this requires adapting terminology, reformatting diagrams, or simplifying complex sentence structures.

Functional equivalence, a theory developed by Eugene Nida and Charles Taber (1969), underlines the idea of conveying the meaning and intent of the original message rather than reproducing its exact linguistic form; "the best translation does not sound like a translation"[12]; in its place, it should evoke the same response in the target audience as the source text does in its original context. This approach stands in contrast to formal equivalence, which prioritizes structural and lexical fidelity. Functional equivalence seeks to make the translated text natural, fluent, and communicatively effective, especially when the cultural and

[9] Hans, J. Vermeer, *Skopos and Commission in Translational Action*. Helsinki: Oy Finn Lectura Ab., 1989, p. 20.
[10] Hans J, Vermeer, *Skopos and Commission in Translational Action,* in *The Translation Studies Reader* edited by Lawrence Venuti, London and New York, Routledge Taylor & Francis Group, 2000, p. 227.
[11] Hans J, Vermeer, *Skopos and Commission in Translational Action,* in *The Translation Studies Reader* edited by Lawrence Venuti, London and New York, Routledge Taylor & Francis Group, 2000, p. 229.
[12] Eugene Nida and Charles Taber, *The Theory and Practice of Translation*, Leiden: E. J. Brill., 1969, p. 12.

linguistic distance between the source and target languages is significant. In the field of engineering and the context of technical translation, functional equivalence is particularly relevant. The goal of such texts is often to instruct, inform, or guide action, purposes that demand clarity and precision more than literal adherence to source structures. For example, translating an instruction manual or safety guideline requires that the reader understand what to do, not just what the original text said verbatim. Applying functional equivalence allows translators to adapt idiomatic expressions, restructure complex sentences, or replace culture-bound references with functionally similar terms that suit the target context. For ESP learners, this theory provides a practical framework for focusing on meaning, usability, and effectiveness, helping them produce translations that are not only accurate but also fully functional in real-world engineering settings.

In technical translation, recognizing the communicative function and purpose of the source text is essential for selecting the appropriate style, terminology, and level of formality in the target language. Technical texts such as manuals, datasheets, research articles, and patents each serve distinct purposes and audiences, which dictate specific linguistic and stylistic requirements. Considering House's opinion, "the translator must analyse the text type and communicative function before deciding on translation strategies"[13]. For example, instruction manuals are instructional texts meant to guide the user clearly and directly through procedures or operations; often requiring straightforward, imperative language, concise sentence structure, and terminology that is consistent and easy to follow and avoidance of ambiguity[14]. Datasheets provide highly condensed factual information about materials or components, where precision, numerical accuracy, and formatting (e.g., units, symbols, technical codes) are essential. Thus, the translator must focus on consistency with local engineering standards, correct conversions, and clarity in tabular formats. This type of functional awareness directly informs the adaptation of the translation style: while manuals might favour simple sentences and active voice for usability, patents often contain long, complex sentences with nominalizations and passive voice to ensure exhaustive coverage and legal defensibility. Furthermore, Hvelplund (2017) states that the high lexical density and structural complexity of technical documents impose substantial cognitive demands on translators who must simultaneously manage domain-specific terminology and genre conventions which "provide cues to textual interpretation and must be preserved or adapted appropriately in translation"[15] as "the cognitive processes involved in the translation of specialized texts are more resource-demanding than for general texts, because of the additional need for

[13] Julian House, *Translation Quality Assessment: Past and Present*. New York: Routledge, 2015, p. 23.
[14] Daniel Gouadec, *Translation as a Profession*. Amsterdam and Philadelphia: John Benjamins Publishing Company, 2007.
[15] Kristian Tangsgaard Hvelplund, *Translation of Specialized Texts*. John Benjamins Publishing Company, 2017, p. 95.

subject-specific knowledge" [16]. Hvelplund argues that successful translation depends on effective terminology management and genre awareness, stating that "terminological accuracy is the cornerstone of specialized translation"[17]. Therefore, translators must not only employ tools such as bilingual term bases and technical corpora but also adapt their strategies to suit the function and audience of the target text. This functional orientation aligns with Skopos theory, reinforcing the need for purpose-driven decision-making in technical translation contexts. In Dejica's opinion, a classification of genres which can be used as a basis for technical translation includes the following type of documents: "instruction manuals / user guides / maintenance guides; technical brochures / technical information materials / presentations of a technical product; technical drawings; product catalogues; technical reports / technical bulletins; technical specifications; feasibility studies; technical projects; technical lists / technical forms; letters, technical correspondence"[18]. For ESP learners performing their role as trainee translators, adapting style and tone based on the text genre and target audience is a fundamental skill. Effective instruction should involve comparative analysis of various text types and genre-based practice, encouraging learners to align translation strategies with both linguistic and functional demands.

Some examples of translating instruction manual excerpts from English to Romanian, demonstrate the principles of functional equivalence focusing on clarity and usability rather than a literal word-for-word translation. Thus, instructions are clear, direct, and maintain the intended meaning and function. Sentence structures are slightly adapted to sound natural and easy to follow for Romanian speakers, sticking to the purpose of the written document.

Example 1[19] (English language ST/ Romanian language TT)

For more accurate step-by-step instructions, check the user manual. / Pentru instrucţiuni pas cu pas mai precise, consultă manualul de utilizare.

Example 2[20] (English language ST/ Romanian language TT)

For drilling purposes, adjust the setting ring for the torque to the last setting "Drill". In the drill setting the slip coupling is non-functional. The maximum torque is available for drilling. / Pentru găurire comutaţi inelul de reglare al cuplului de torsiune pe ultima treaptă „Găurire". În treapta găurire cuplajul de siguranţă cu fricţiune nu este activ. La găurire este disponibil cuplul de torsiune maxim.

Peter Newmark (1981) distinguishes between communicative and semantic translation as two distinct approaches that serve different purposes in translation

[16] Kristian Tangsgaard Hvelplund, *Translation of Specialized Texts*. John Benjamins Publishing Company, 2017, p. 45.

[17] Kristian Tangsgaard Hvelplund, *Translation of Specialized Texts*. John Benjamins Publishing Company, 2017, p. 78.

[18] Daniel Dejica, 'Understanding Technical and Scientific Translation: A Genre-based Approach' in *Scientific Bulletin of the Politehnica University of Timişoara, Transactions on Modern Languages*, Vol. 19, No. 1-2 / 2020, Timişoara, Editura Politehnica, pp. 56-66, p. 60.

[19] https://context.reverso.net.

[20] https://manualzz.com.

practice. Communicative translation focuses on making the message natural and comprehensible to the target audience and it is "oriented towards the receiver of the text"[21]. It aims to reproduce the same effect the original text had on its readers, even if it means sacrificing some lexical or syntactic fidelity. In contrast, semantic translation emphasizes fidelity to the source text, retaining stylistic features, cultural nuances, and syntactic structure. Newmark describes semantic translation as attempting to "render, as closely as the semantic and syntactic structures of the second language allow, the exact contextual meaning of the original"[22].

In the field of English for Specific Purposes, teaching often leans toward the communicative model of translation preparing learners to use English effectively within specific professional or academic domains. Therefore, translation activities prioritize functional equivalence and clarity of intention over literal accuracy. As Dudley-Evans and St. John (1998) state English for Specific Purposes is goal-directed and needs-based which aligns with the communicative approach that seeks to convey meaning in ways that are practical and user-friendly for specific audiences. Consequently, communicative translation supports English for Specific Purposes (ESP) learners in understanding the purpose behind texts and responding appropriately in context, reinforcing the importance of message over form. This approach enhances learners' ability to interpret and convey meaning in real-life professional interactions where effectiveness often matters more than formal precision[23].

Discussing Lexical Challenges in ESP Translation

According to Byrne, J. (2006), terminology is considered to be the most significant linguistic feature of technical texts and specific vocabulary gives the text the reason it needs to convey the information "perhaps even more important than terminology actually knows how to write the texts. Failing to comply with target language text conventions can underdetermine the credibility of the text; the author and the information in the text [...] terms in a text presuppose memorized contexts and practical situations both for their usage and for their comprehension"[24]. Texts may contain definitions of technical terms, descriptions of products, instructions and examples. In most cases, they are accompanied by graphics, tables or illustrations.

Lexical challenges refer to the abundance of technical jargon and domain-specific terminology not found in General English. These terms are precise, context-bound, and often lack direct equivalents in everyday language, posing significant challenges for non-native learners. Moreover, technical texts often rely on high-frequency specialized terms in English for Specific Purposes (ESP) vs.

[21] Peter Newmark, *Approaches to Translation*. Oxford: Pergamon Press, 1981, p. 39.
[22] Peter Newmark, *Approaches to Translation*. Oxford: Pergamon Press, 1981, p. 39.
[23]Tony Dudley-Evans and Maggie St. John, *Developments in English for Specific Purposes: A Multi-Disciplinary Approach*. Cambridge: Cambridge University Press, 1998.
[24] Jody Byrne, *Technical Translation: Usability Strategies for Translating Technical Documentation*. Springer Dordrecht, The Netherlands, 2006, p. 4.

General English (GE), i.e: *alteration-transformare, deformare, alternare, variaţie (alteration of frequency/ variaţie a frecvenţei) (ESP)/ alterare, schimbare, modificare (GE); load- încărcătură, greutate, randament, sarcină, presiune introducere de date, debit (ESP)/ muncă de efectuat, număr de sarcini de rezolvat, grămadă (GE); stress - deformare, effort, greutate, forţă, încărcare, presiune, sarcină, solicitare (ESP)/ accent, accentuare, apăsare, constrângere (GE)*[25]. Consequently, term inadequacy leads to message distortion, meaning misinterpretation and even to rendering no meaning at all in the target language. It is also important to recognize that many terms have polysemantic meanings. As a result, a common challenge in technical communication for engineering students arises from the use of familiar everyday words that carry specialized meanings in technical contexts, such as: *bearing, bus, cell, chip, clutch, file, nails, nuts, outlet, recess, thread, saw, spark, spring* etc.

bearing- a person's posture or direction/ a machine component that constrains relative motion and reduces friction between moving parts, such as in shafts or wheels (Ro translation *rulment*)- *Precision bearing hinge blade guard system reduces wear and noise. / Sistemul cu apărătoare de disc cu balama cu rulment de precizie reduce uzura și zgomotul.*[26]

crank-a person who is eccentric or grumpy/ a lever attached at a right angle to a rotating shaft used to convert linear motion into rotary motion or vice versa (Ro translation *manivelă*)- *Crank, gear and connect bar are oxidized hardening and milled, having super comprehensive mechanical performance and durable function. / Manivelă, angrenaj și bara de conectare sunt întărite prin oxidare și măcinate, având o performanță mecanică superioară și o funcție durabilă.*[27]

clutch- a quick grasp or hold of something, often suddenly or tightly/ a mechanical device that connects and disconnects two rotating shafts, allowing power transmission to be engaged or disengaged, commonly used in vehicles to control the connection between the engine and the transmission (Ro translation *ambreiaj*)- *Clutch plates require friction to operate effectively which in turn generate large amounts of heat. / Discurile de ambreiaj necesită frecare pentru a funcţiona eficient, iar frecarea, la rândul său, generează cantităţi mari de căldură.* [28]

gear- equipment or clothing/ a toothed wheel that meshes with another to transmit torque and rotational motion in machinery (Ro translation *roată dințată; pinion; angrenaj*)

spring- a season or an action of leaping or bouncing/ an elastic mechanical component that stores and releases energy, often used for damping, suspension, or returning parts to a set position (Ro translation *arc*).[29]

When translating noun phrases in engineering from English to Romanian, it is essential to account for structural and grammatical differences between the two

[25] https://context.reverso.net.
[26] https://context.reverso.net.
[27] https://context.reverso.net.
[28] https://context.reverso.net.
[29] https://context.reverso.net.

languages. English frequently uses a linear modifier- modifier- head noun structure (e.g. *energy management system*), where the main noun comes last. In contrast, Romanian typically employs a head noun followed by modifiers structure, often using prepositional phrases to express relationships (e.g. *sistem de management al energiei*). The word order is generally reversed, resulting in a 3-2-1 structure rather than the English language 1-2-3 format. Additionally, correct grammatical agreement in gender, number, and case must be maintained, especially when definite or possessive forms are used. Prepositions must be carefully selected to convey the precise technical relationship, and abstract or compound nouns in English often require a more explicit syntactic structure in Romanian. This systematic approach ensures both clarity and technical accuracy in professional and academic engineering contexts.

English (1-2-3)	**Romanian (3-2-1)**
data security measures	*măsuri de securitate a datelor*
user interface design	*design al interfeței utilizatorului*
software development process	*proces de dezvoltare a software-ului*
mobile device applications	*aplicații pentru dispozitive mobile*
network performance monitoring	*monitorizare a performanței rețelei*
heat transfer coefficient	*coeficient al transferului de căldură*

Strategies for unpacking dense constructions include identifying the heads of noun phrases, recognizing embedded modifiers, and rephrasing complex sentences into simpler forms. Creating glossaries, visual aids, and contextualized examples can be essential strategies for ensuring that students do not just translate these terms but understand them functionally within their professional domain. By developing these skills, learners can enhance both their comprehension and production of technical texts, leading to more effective communication in specialized domains. Phrases such as the ones selected from[30] and included below compress multiple layers of information into a single syntactic unit. They reduce repetition and improve conciseness, which are valued in technical writing, but they also demand a high level of grammatical and domain-specific knowledge:

fatigue limit (limită de oboseală/ rezistenţă de oboseală)*; fatigue limit under pulsating stress* (limită de oboseală în ciclu pulsatoriu/ rezistenţă de oboseală în ciclu pulsatoriu); *pulsating bending fatigue limit* (limită de oboseală la încovoiere în ciclu pulsatoriu);

tensile strength (rezistență la tracțiune/ rezistenţă de rupere la întindere/ rezistenţă de rupere la tracţiune/ rezistenţă la întindere/ rezistenţă mecanică la rupere/);

boundary layer (strat limită/ strat de separare/ strat laminar/ pătură limită); *thermal boundary layer* (strat limită termic); *turbulent boundary layer* (strat limită de turbulenţă în atmosferă); *laminar boundary layer* (stratul laminar de margine); *boundary-layer motion* (curgere în strat laminar);

[30] https://hallo.ro.

yield point (punct de curgere/ rezistență la curgere/ limită de curgere/ limită de fluaj/ punct de deformare/ punct de rupere); *compression yield point*/ *yield point of (for) compression* (limită de curgere la compresie/compresiune); *crushing yield point* (limită de curgere la compresiune/ limită de rupere/ strivire); *hot yield point* (limită de curgere la cald).

A Case Study in ESP Translation – Human Translation vs. Machine Translation

The research was conducted in the Technical University of Cluj-Napoca, Faculty of Engineering, Baia Mare as a translation activity during the ESP course. The target group consisted of forty 1st year students in Mechanical Engineering. The following empirical methods were used: observation, discussions, and analysis of experimental teaching, interpretation of data. The students were given a sentence in English related to their field of study, i.e. *If an object is at rest and is free to move, an external force will make the object accelerate*. They had to translate the sentence into Romanian, focusing on both linguistic accuracy and subject-specific terminology. During the activity, students were encouraged to collaborate, use specialized dictionaries, and justify their translation choices. After completing their own translation, students used ChatGPT/DeepL to translate the same English sentence into Romanian. They compared their version with the AI-generated one, analysing differences in vocabulary, grammar, and style. This comparison helped them reflect on their choices and better understand how professional and context-appropriate language can vary. Students' translations provided ten different sentences for the same ST sentence as included below:

Dacă un obiect este staționar și liber să se deplaseze, o forță externă îl va determina să accelereze.

Dacă un obiect este în repaus și este liber să se miște, o forță externă va determina accelerarea acestuia.

Dacă un obiect este în repaus și este liber să se miște, o forță externă va face ca obiectul să accelereze.

Dacă un obiect este în repaus și este liber să se miște, o forța externă o sa facă obiectul sa accelereze.

Dacă un obiect e în repaus și liber în mișcare, o forță externă va face obiectul să accelereze.

Dacă un obiect este în repaus și este liber la mișcare, oforță exterioară va face obiectul să accelereze.

Dacă un obiect este în repaus și este liber să se miște, o forță externă va face ca obiectul să accelereze în direcția forței.

Dacă un obiect este în repaus și este liber să se miște, forța externă va face obiectul să accelereze.

Daca un obiect se afla in stare de repaus si se poate misca liber, o forta externa va produce acceleratia obiectului.

Daca un obiect este in repaus si este in miscare libera, o forta externa va pune obiectul in miscare.

Multiple expressions were used to express similar concepts: ‘este în repaus’, ‘se află în stare de repaus’, ‘este staționar’ all describe a stationary state; the Romanian translations ‘se poate mișca liber’, ‘este liber să se miște’, ‘este liber la mișcare’, ‘este în mișcare liberă’ are variations in describing unconstrained motion. Whereas ‘va face obiectul să accelereze’, ‘va determina accelerarea acestuia’, ‘va produce accelerația obiectului’, ‘va pune obiectul în mișcare’ imply different ways of expressing the action caused by the force. One can notice a rich lexical variation used by human translators to avoid repetition and tailor the message based on audience, tone, or clarity. Students choose between concise forms ‘va accelera’ vs. explanatory forms ‘va produce accelerația obiectului’ to match the expected communicative function; formal expressions ‘se află în stare de repaus’, ‘va determina accelerarea acestuia’ vs. colloquial or simplified ones ‘o forță externă o sa facă’, ‘e în repaus’. These sentences also exhibit syntactic flexibility, selecting forms that suit style, rhythm, or register, such as causative constructions ‘va face ca obiectul să accelereze’, ‘va determina accelerarea acestuia’, ‘va pune obiectul în mișcare’; verb phrase ‘să accelereze’ (to accelerate) or noun phrase ‘accelerarea acestuia’ (its acceleration). These translations demonstrate semantic fidelity to the original concept, but also show variation in expression, typical of human translation.

The translation provided with the help of AI tools (Chat GPT/ DeepL) convey the same fundamental meaning that an external force causes a stationary object which is free to move, to accelerate:

Dacă un obiect este în repaus și este liber să se miște, o forță externă va face obiectul să accelereze.

Dacă un obiect este în repaus și este liber să se miște, o forță externă va face ca obiectul să înceapă să se miște și să prindă viteză.

Dacă un obiect este în repaus si este liber sắ se deplaseze, o forță externắ va determina obiectul să accelereze.

However, they use different lexical choices and syntactic structures such as: ‘va face obiectul să accelereze’ (will make the object accelerate); ‘va face ca obiectul să înceapă să se miște și să prindă viteză’ (will make the object start to move and gain speed and incorporating expanded semantic content) or *‘va determina obiectul să accelereze’* (will cause the object to accelerate).

All in all, these examples highlight the necessity for machine translation systems to effectively manage lexical diversity, semantic variation, morphosyntactic precision, and consistent terminology in order to produce accurate and reliable translations. Compared to machine translation, human translation is more context-aware and stylistically nuanced.

Conclusion

Fostering translation skills helps non-native students develop both communicative competence and technical literacy in an engineering setting. A strategic approach rooted in translation theory and real-world practice can significantly enhance their academic and professional trajectory. Thus, translation

serves the primary goal of both language learning and communication. When used as a practical, learner-centred, and process-oriented activity, it can significantly enhance student engagement and performance. It motivates learners by involving them in real-life situations, problem-solving, and autonomous learning. Therefore, in technical contexts, translation should be incorporated as an effective strategy within foreign language teaching. In conclusion, universities are well positioned to take on the vital role of offering specialized translation programmes, particularly due to their unique capacity to integrate both theoretical foundations and practical training in translation.

Bibliography

BYRNE, Jody, *Technical Translation: Usability Strategies for Translating Technical Documentation.* The Netherlands, Springer Dordrecht, 2006.

DEJICA, Daniel, 'Understanding Technical and Scientific Translation: A Genre-based Approach' in *Scientific Bulletin of the Politehnica University of Timişoara, Transactions on Modern Languages*, Vol. 19, No. 1-2 / 2020, Timișoara, Editura Politehnica, pp. 56-66.

DUDLEY-EVANS, Tony and Maggie ST. JOHN, *Developments in English for Specific Purposes: A Multi-Disciplinary Approach*. Cambridge, Cambridge University Press, 1998.

GOUADEC, Daniel, *Translation as a Profession*. Amsterdam/ Philadelphia, John Benjamins Publishing Company, 2007.

HERMAN, Mark, 'Technical Translation Style: Clarity, Concision, Correctness' in *Scientific and Technical Translation* edited by Sue Ellen Wright and Leland D. Wright, Amsterdam/Philadelphia, John Benjamins Publishing Company, 1993.

HVELPLUND, Kristian Tangsgaard, *Translation of Specialized Texts*. Amsterdam/Philadelphia, John Benjamins Publishing Company, 2017.

HOUSE, Julian, *Translation Quality Assessment: Past and Present*. New York, Routledge, 2015.

NEWMARK, Peter, *Approaches to Translation*. Oxford, Pergamon Press, 1981.

NIDA, Eugene and TABER, Charles, *The Theory and Practice of Translation*. Leiden: E. J. Brill, 1969.

REISS, Katharina, *Translation Criticism: The Potentials and Limitations*. Manchester: St. Jerome Publishing, 2000.

VERMEER, Hans, J., *Skopos and Commission in Translational Action*. Helsinki: Oy Finn Lectura Ab., 1989.

VERMEER, Hans, J., '*Skopos and Commission in Translational Action*' in *The Translation Studies* Reader edited by Lawrence Venuti, London and New York, Routledge Taylor & Francis Group, 2000.

https://context.reverso.net

https://hallo.ro

https://manualzz.com