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# TECHNICAL TRANSLATION IN A DIGITAL AGE: TERMINOLOGY, ACCURACY, TECHNOLOGY-ASSISTED WORKFLOWS, AND TRAINING NEEDS IN THE UZBEK CONTEXT

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**Abstract:** Technical translation is the branch of translation practice concerned with texts that describe, specify, or instruct in scientific, engineering, industrial, and information-technology domains. Its defining feature is that the reader acts on the translated text: a mistranslated warning, torque value, or dosage instruction can produce equipment failure, financial loss, or physical injury. This article examines the theoretical foundations of technical translation, principally functionalist (skopos-based) approaches and the terminology-oriented tradition, and considers their implications for professional practice. Drawing on the international scholarly literature and on observation of current professional conditions, the study analyses how computer-assisted translation (CAT) tools, translation memories, terminology databases, and neural machine translation with post-editing are reshaping technical translation workflows. Particular attention is given to the structural and terminological challenges of the Uzbek–English language pair, including the agglutinative morphology and verb-final syntax of Uzbek, the legacy of Russian-mediated technical vocabulary, the transition from Cyrillic to Latin script, and the lack of standardised bilingual terminological resources. The article concludes with recommendations for curriculum development, terminology standardisation, and cooperation between universities and industry.

**Keywords:** technical translation, terminology management, skopos theory, computer-assisted translation, post-editing, translation quality assurance, Uzbek–English language pair, translator training.

## 1. Introduction

Technical translation occupies a position of particular practical importance within translation studies. Unlike literary translation, where interpretive freedom is often valued, or general-purpose translation, where minor imprecision may pass unnoticed, technical translation is judged chiefly by whether the target reader can correctly understand and use the information provided. User manuals, installation guides, safety data sheets, patents, engineering specifications, software documentation, and scientific reports all belong to this category, and in each of them terminological precision, consistency, and clarity are not stylistic preferences but conditions of functionality and safety (Byrne, 2006).

The importance of the field has grown considerably in recent decades. Globalised manufacturing, the expansion of international trade, the localisation of software, and the transfer of technology all depend on documentation that is available in the language of the end user. Uzbekistan's deepening economic integration, the arrival of foreign investment in manufacturing, energy, construction, and information technology, and the localisation of digital services have all increased the volume of technical documentation that must be rendered between Uzbek and English, often alongside Russian. Despite this demand, technical translation as a distinct academic and professional specialisation receives limited attention in Uzbek translator training, where programmes tend to concentrate on general and literary translation.

This article seeks to address that gap by synthesising the principal theoretical approaches to technical translation, describing the workflows and technologies that shape contemporary practice, analysing the specific linguistic and terminological challenges of the Uzbek–English pair, and proposing measures for strengthening training in this area.

## 2. Theoretical Framework and Literature Review

Early scholarship on scientific and technical translation emphasised the translator's need for subject knowledge and for mastery of specialised terminology. Pinchuck (1977) described the practical problems of translating scientific and technical texts, stressing accuracy, conciseness, and the avoidance of ambiguity. Newmark (1988) similarly treated technical translation as a category in which the informative

function of language dominates, so that the translation should be judged by its factual accuracy and by the clarity with which it conveys information, rather than by expressive or aesthetic qualities.

A decisive theoretical shift came with functionalist approaches. Reiss and Vermeer (1984) proposed skopos theory, according to which the purpose (skopos) of the translation determines the translation strategy. Nord (1997) elaborated this view, arguing that translation is a purposeful activity directed at a target audience and a communicative situation, and that fidelity to the source text must be understood in relation to the translation brief. For technical translation this perspective is especially productive: a maintenance manual translated for field technicians has a different purpose, and therefore a different optimal rendering, from the same content translated as part of a legal dossier or a marketing brochure.

A second major strand concerns terminology. Cabré (1999) presented terminology as an interdisciplinary field concerned with the identification, description, and management of specialised concepts and their designations. Within this tradition, technical translation is understood as concept-based rather than word-based: the translator must identify the concept designated by a source term and select the established designation of the same concept in the target language, rather than substitute a word-for-word equivalent. Sager (1994) linked this view to the growing role of language technology, arguing that systematic terminology work and automation would become inseparable parts of professional translation.

A third strand addresses usability and the quality of technical communication. Byrne (2006) argued that technical translators are, in effect, technical communicators, and that translated documentation should be evaluated according to whether users can find, understand, and apply the information. This usability-oriented perspective explains why technical translation standards place so much weight on consistency, clarity, and conformity with the conventions of the target-language genre. Together, these frameworks provide the conceptual vocabulary of purpose, concept-based equivalence, terminological consistency, and usability through which the challenges of Uzbek–English technical translation can be analysed.

## 3. The Professional Landscape of Technical Translation

### *3.1. Text Types and Genres*

Technical translation covers a wide range of genres, each with its own conventions. Instructional texts, such as user manuals and operating procedures, rely on imperative structures, numbered sequences, and consistent naming of components. Descriptive and specification texts, such as engineering drawings' notes, datasheets, and standards, rely on dense nominal phrases, units of measurement, and tolerances. Regulatory and safety texts, such as safety data sheets and warnings, rely on standardised formulae that signal degrees of risk. Scientific and research texts, such as articles and reports, combine specialised terminology with argumentative structure. Software documentation and user-interface strings add the further constraints of length limits, placeholders, and context-dependence. A translator working in this field must therefore master not only the terminology of the domain but also the textual conventions of each genre in the target language.

### *3.2. Quality Requirements and Professional Standards*

Quality expectations in technical translation are unusually explicit. The international standard ISO 17100 (2015) defines requirements for translation services, including the qualifications of translators, the management of the translation process, and the requirement that a translation be revised by a second linguist who is competent in the subject field. This requirement reflects a recognition that accuracy in specialised domains cannot be guaranteed by linguistic competence alone. Typical quality criteria include terminological accuracy, consistency of terms and phrasing across a document and across a project, completeness without omission or addition, correct handling of numbers and units, and conformity with the target-language style and layout conventions. In safety-critical documentation, the consequences of failing these criteria can be severe, which is why technical translators are expected to flag ambiguities in the source text rather than silently resolve them.

## 4. Technology and the Changing Demands of Technical Translation

Technical translation is among the fields most strongly affected by language technology, largely because technical texts are repetitive, terminologically controlled, and produced in large volumes. Computer-assisted translation (CAT) tools segment

source texts and store approved translations in translation memories, allowing identical or similar segments to be reused and ensuring consistency across revisions of a document. Terminology databases integrated into these tools alert the translator to approved designations and prevent inconsistent usage. Quality-assurance functions automatically check numbers, units, tags, and terminology. For large documentation projects, which are updated repeatedly as products change, such tools have become indispensable.

A more recent development is the widespread use of neural machine translation (NMT). The history and principles of machine translation have been described by Hutchins and Somers (1992), and the quality of output has improved markedly since then. For technical texts with controlled vocabulary and simple sentence structure, machine translation followed by human post-editing can raise productivity considerably. The standard ISO 18587 (2017) specifies requirements for full human post-editing of machine-translated output and for the competence of post-editors. At the same time, machine translation remains vulnerable in precisely the places where technical accuracy is most critical: the disambiguation of polysemous terms, the rendering of negation and conditions, the preservation of numerical values and units, and the translation of languages with limited training data. Languages that are morphologically rich and relatively low-resourced, which includes Uzbek, are especially exposed to such errors.

The implication is that technology changes the translator's role rather than eliminating it. The technical translator increasingly acts as a terminology manager, a post-editor, and a quality controller, and needs competence in managing translation memories and termbases, in evaluating machine output critically, and in recognising the categories of error to which automated systems are prone. Training that ignores these competences leaves graduates poorly prepared for the realities of the profession.

## 5. Structural Challenges of Uzbek–English Technical Translation

The Uzbek–English pair presents several characteristic difficulties. The first is typological. Uzbek is an agglutinative language in which grammatical relations are expressed by suffixes attached to word stems, and its basic word order is subject–object–verb, while English is analytic and verb-medial. Technical English relies

heavily on long noun phrases in which a head noun is premodified by several nouns or adjectives, as in phrases naming a component by its function, material, and position. Rendering such compounds into Uzbek often requires restructuring into genitive or participial constructions, and doing so without introducing ambiguity about which modifier belongs to which head demands careful analysis of the source concept.

The second challenge concerns the history of Uzbek technical vocabulary. During the twentieth century, a large part of the scientific and technical lexicon entered Uzbek through Russian, often in the form of loanwords of Latin, Greek, or Western European origin. As a result, a given concept may be designated in Uzbek by a Russian-mediated borrowing, by a direct English-based borrowing, or by a coined native term, and different industries and institutions may prefer different variants. For the translator working from English, this creates a continual need to decide between competing designations, and in the absence of an authoritative reference, such decisions risk inconsistency between translators and between documents.

A third difficulty is the transition from the Cyrillic to the Latin alphabet in Uzbek. Technical documents, standards, and reference materials produced at different times exist in different scripts and orthographic conventions, which complicates the reuse of existing terminological resources, the construction of translation memories, and the training of machine-translation systems. Alignment and reuse of legacy materials often require transliteration and normalisation before they can be of use.

A fourth challenge is the scarcity of standardised, authoritative bilingual terminological resources for the Uzbek–English pair in specialised domains. Where such resources are unavailable, translators construct ad hoc solutions under time pressure, which leads to inconsistency across projects and increases the risk of mistranslation. Finally, differences in genre conventions, such as the formulation of warnings, the use of the imperative in instructions, the formatting of decimal separators and units, and the conventions for naming standards, require functional rather than literal rendering if the translated document is to be usable by its readers. In terms of skopos theory, the translator must always ask what the reader of the Uzbek text needs to be able to do, and shape the translation accordingly (Nord, 1997).

## 6. Technical Translator Training in Uzbekistan: Current State and

**Recommendations**

Translator training in Uzbekistan is concentrated in university departments of philology and foreign languages. In general, curricula devote most attention to language proficiency, general translation, and literary and cultural topics, and give comparatively limited space to specialised domains, terminology management, and translation technology. Technical universities, for their part, train specialists in engineering and information technology who often have strong subject knowledge and good access to English-language sources, but who do not receive systematic instruction in translation. The two tracks therefore intersect only marginally, and technical translation in practice is frequently carried out either by subject specialists without translation training or by linguists without subject knowledge. Gile (2009) has argued that translator training is most effective when it is organised around explicit models of the translation process and its competences, an approach that is directly applicable to the design of specialised technical translation courses.

Several measures are proposed to address this situation. First, a dedicated technical translation course, covering genres, terminology work, revision, and quality criteria, should be introduced as an elective or specialisation track within existing translation curricula. Second, practical instruction in CAT tools, translation memories, termbase creation, and machine translation post-editing should be integrated into the programme, so that graduates are able to work with the tools used in the industry. Third, a collaborative Uzbek–English terminology project in selected fields, such as information technology, construction, energy, and agriculture, undertaken by linguists, engineers, and industry specialists, would produce reference resources that benefit both translators and students. Fourth, cooperation agreements between universities, translation agencies, and technical enterprises could provide students with internships and authentic projects under the supervision of experienced translators and subject experts. Fifth, joint teaching, in which subject specialists contribute to translation courses and translation teachers contribute to technical programmes, would help to bridge the gap between the two tracks.

## 7. Conclusion

Technical translation places exceptional demands on its practitioners because accuracy in this field is directly connected to the functioning and safety of products

and processes. This article has reviewed the principal theoretical frameworks relevant to the field, namely the functionalist emphasis on purpose, the concept-based approach of terminology science, and the usability-oriented view of technical communication, and has applied them to the contemporary professional landscape. It has examined how translation memories, terminology management, and machine translation with post-editing are changing the work of the technical translator, while cautioning that automated tools cannot replace subject-aware human judgment in contexts where errors carry serious consequences. It has also identified the particular challenges of Uzbek–English technical translation, arising from typological differences, the layered history of technical vocabulary, the change of script, and the shortage of standardised terminological resources.

The central conclusion is that competent technical translation cannot be left to incidental bilingual ability or to subject knowledge alone. It requires dedicated training in terminology, specialised genres, and translation technology, together with sustained cooperation between universities, industry, and standardising bodies. As Uzbekistan continues to integrate into international markets and to localise technology and services, the development of well-trained technical translators should be regarded not as a peripheral academic concern but as a practical contribution to economic development, safety, and access to knowledge.

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