European International Journal of Philological Sciences (ISSN: 2751-1715)

Received: 14 April 2026 | Accepted: 02 May 2026 | Published: 31 May 2026

DOI: 10.55640/eijps-06-05-21

RESEARCH ARTICLE

Structural-Semantic Features of English, Uzbek And Russian Technical Terms

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VOLUME: Vol.06 Issue05 2026

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Abstract

This article examines the structural-semantic features of English, Uzbek and Russian technical terms. Technical terminology is one of the most dynamic layers of specialized vocabulary because it reflects scientific progress, technological innovation, industrial development and professional communication. The comparative study of technical terms in English, Uzbek and Russian is important for linguistics, translation studies, terminology standardization and technical education. The purpose of this article is to analyze the structural models, semantic properties and word-formation mechanisms of technical terms in the three languages. The study is based on descriptive, comparative, structural-semantic and componential methods of linguistic analysis. The results show that English technical terminology is characterized by high productivity of compounding, conversion, abbreviation and international lexical elements; Russian technical terminology actively uses derivational affixes, compound structures and calques; Uzbek technical terminology combines native word-formation resources with borrowed, translated and adapted terms from English and Russian. The semantic structure of technical terms is marked by precision, systematicity, monosemy, contextual stability and conceptual correlation with specialized knowledge. At the same time, synonymy, polysemy, semantic narrowing, semantic expansion and terminological variation may appear in all three languages. The article concludes that structural and semantic analysis of technical terminology is necessary for improving translation quality, developing multilingual dictionaries, standardizing technical vocabulary and ensuring effective professional communication.

KEYWORDS

Technical terms, structural-semantic analysis, terminology, English, Uzbek, Russian, word formation, semantics, translation, terminological system, specialized vocabulary.

INTRODUCTION

Technical terminology is an essential component of scientific and professional communication. Every branch of technology, engineering, production, information systems, transport, energy, architecture, mechanics and digital innovation has its own terminological system. These systems are formed to name concepts, processes, devices, materials, operations, parameters and methods that are used in specialized fields. A technical term differs from a common word because it is connected with a definite concept within a professional sphere and is expected to express this concept accurately. For this reason, the study of technical terms has both linguistic and practical importance.

The structural-semantic study of English, Uzbek and Russian technical terms is especially relevant in the context of

multilingual communication. English is widely used as an international language of science, technology and digital innovation. Russian has historically influenced the formation of technical terminology in many post-Soviet countries, including Uzbekistan. Uzbek, as the state language of Uzbekistan, is developing its own technical terminology under the influence of national language policy, scientific modernization, translation practice and international technological integration. As a result, many technical concepts may exist simultaneously in English, Russian and Uzbek forms, and their structural and semantic relations require careful linguistic analysis.

The problem of technical terminology is not limited to naming. Terms must be structurally clear, semantically precise, grammatically compatible and functionally convenient. A technical term should help specialists understand each other without ambiguity. However, in practice, technical terms may create difficulties because of borrowing, synonymy, translation variation, abbreviations, semantic shifts and differences in word-formation models. For example, an English compound term may be translated into Uzbek as a noun phrase, while in Russian it may appear as a derived noun or a calque. Such differences show that each language has its own structural resources for expressing technical concepts.

The comparative study of English, Uzbek and Russian technical terms makes it possible to identify general and specific features of terminology formation. English technical terms often show compactness and analytical structure. Russian technical terms tend to use derivational morphology and complex syntactic combinations. Uzbek technical terms are formed through native derivation, compounding, descriptive combinations, direct borrowing and translated equivalents. These structural differences influence semantic interpretation, translation equivalence and terminological standardization.

The purpose of this article is to analyze the structural-semantic features of English, Uzbek and Russian technical terms. The article focuses on the formation of simple, derived, compound, multi-component and abbreviated terms, as well as on their semantic characteristics, including precision, conceptuality, motivation, monosemy, polysemy and synonymy. The study also explains how structural differences between the three languages affect the semantic organization of technical terminology.

The study is based on descriptive, comparative, structural-semantic and componential methods. The descriptive method was used to characterize the main linguistic features of technical terms in English, Uzbek and Russian. This method makes it possible to explain how terms function within specialized vocabulary and how they differ from general lexical units. The comparative method was applied to determine similarities and differences among the three languages in terms of word formation, grammatical structure and semantic organization.

The structural-semantic method was used as the main analytical tool. It allowed the study to examine the relationship between the form and meaning of technical terms. In terminology, structure and semantics are closely connected because the formal model of a term often reflects the conceptual structure of the object or process being named. For example, the components of a multi-word term may indicate function, material, field of use, technical parameter or operational principle. Therefore, the analysis of structure helps reveal semantic relations within the term.

The componential method was used to identify semantic elements of technical terms. Technical concepts are usually complex and consist of several conceptual features. For instance, a term denoting a device may include semantic features such as function, mechanism, material, energy source or field of application. The componential approach helps clarify why some terms are semantically transparent while others require specialized knowledge for interpretation.

The research also relies on general principles of terminology theory developed by scholars such as E. Wüster, D. S. Lotte, V. M. Leychik, A. V. Superanskaya, S. V. Grinev-Grinevich and other researchers. Their works provide a theoretical foundation for understanding terminology as a systematic, conceptual and functional layer of language. The article uses examples from technical vocabulary in engineering, mechanics, energy, information technology and production in order to illustrate structural and semantic tendencies in the three languages.

The analysis shows that English, Uzbek and Russian technical terms are formed according to different structural models, although they often express the same or similar technical concepts. English technical terminology is characterized by a high degree of structural compactness. Many English technical terms are formed through compounding, such as “gearbox,” “circuit breaker,” “power supply,” “data processing,” “cooling system” and “control unit.” These terms often consist of two

or more nouns, where the first component modifies the second. The semantic relation between components may express function, material, location, purpose or technical process. English also widely uses conversion, abbreviation and acronyms, especially in information technology and engineering. Terms such as "input," "output," "drive," "CAD," "CPU," "GPS" and "AI" demonstrate the tendency toward short and efficient forms.

Russian technical terminology is structurally different because it uses rich morphological resources. Derived terms formed with suffixes and prefixes are common, such as "двигатель," "соединение," "измеритель," "нагреватель," "преобразователь," "перегрузка" and "заземление." These terms are often semantically motivated because affixes indicate action, result, instrument, process or technical function. Russian also uses compound and multi-component terms, such as "электрическая цепь," "система управления," "двигатель внутреннего сгорания," "печатная плата" and "автоматизированная система проектирования." In such terms, grammatical agreement and case relations play an important role in organizing semantic connections between components.

Uzbek technical terminology combines several structural sources. Native derivational models are used in terms such as "o'lchagich," "uzatkich," "qizdirgich," "sovutkich," "boshqaruv," "ulanish," "hisoblagich" and "ta'minot." The suffixes "-gich," "-kich," "-uv," "-ish" and similar elements help form nouns denoting instruments, processes and actions. At the same time, Uzbek technical terminology includes many borrowed and adapted terms from Russian and English, such as "motor," "generator," "transformator," "kompressor," "sensor," "modul," "algoritm" and "monitoring." In addition, Uzbek frequently uses descriptive term combinations, such as "elektr ta'minoti tizimi," "ichki yonuv dvigateli," "ma'lumotlarni qayta ishlash," "boshqaruv bloki" and "avtomatlashtirilgan loyihalash tizimi."

The semantic structure of technical terms in all three languages is based on conceptual precision. A term is expected to denote a specific concept within a specialized field. For example, "transformer," "трансформатор" and "transformator" refer to a technical device that changes voltage in an electrical circuit. The formal similarity among the three forms demonstrates international terminological convergence. However, not all terms show such direct equivalence. Some English terms are structurally compact, while their Uzbek and Russian equivalents are longer and more descriptive. For example, "power supply" corresponds to Russian "источник питания" or "электропитание" depending on context, and Uzbek "elektr ta'minoti" or "quvvat manbai." This shows that semantic equivalence may be achieved through different structural means.

One of the main semantic features of technical terminology is motivation. A motivated term reveals some feature of the concept through its structure. English "cooling system," Russian "система охлаждения" and Uzbek "sovutish tizimi" are semantically transparent because their components directly indicate the function of the system. Similarly, "measuring device," "измерительный прибор" and "o'lchash asbobi" show functional motivation. However, some terms are less transparent because they are borrowed or international. Terms such as "laser," "robot," "sensor" and "module" require specialized knowledge, although they are widely used in many languages.

The study also reveals that monosemy is an ideal feature of technical terms, but complete monosemy is not always achieved. Many technical terms may have different meanings in different fields. For example, the English term "cell" may refer to a biological unit, a battery element, a spreadsheet unit or a telecommunications area. Russian "ячейка" and Uzbek "katak" or "element" may also vary according to context. The term "network" may mean a computer network, electrical network or communication system. Such cases show that technical terminology is context-dependent, and semantic precision is maintained through professional usage.

Synonymy is another important issue in technical terminology. Ideally, one concept should have one term, but in practice several terms may compete. In Uzbek, this is especially visible because borrowed, translated and native forms may exist together. For example, "kompyuter" and "hisoblash mashinasi," "datchik" and "sensor," "loyihalash" and "proyektlash," "uzatma" and "transmissiya" may be used in different contexts. Russian also has synonymic variation between native or calqued forms and borrowed terms. English technical terminology may include synonymy caused by professional jargon, shortened forms or differences between British and American usage. Such variation can create difficulties in translation, standardization and education.

Abbreviations and acronyms form a special structural group of technical terms. English is especially productive in this respect: "CAD," "CAM," "CAE," "CNC," "CPU," "RAM," "USB," "GPS" and

"LED" are widely used in international technical communication. Russian often adapts these abbreviations or creates Cyrillic equivalents, such as "САПР" for computer-aided design systems. Uzbek practice may preserve English abbreviations, use Russian-based abbreviations or create descriptive translations. This creates a multilingual terminological environment in which one concept may appear in several graphical and phonetic forms.

The structural-semantic comparison of English, Uzbek and Russian technical terms shows that terminology is both linguistic and conceptual. Terms are not random lexical units; they represent specialized knowledge and organize professional communication. At the structural level, each language uses its own grammatical and word-formation resources. At the semantic level, all three languages aim at precision, systematicity and conceptual clarity. The differences appear in how these aims are achieved.

English technical terminology tends toward analytical structure and compactness. The noun-noun model is very productive and allows new terms to be formed easily. This feature is useful in rapidly developing fields such as information technology, electronics, robotics and digital engineering. However, English compounds may be semantically ambiguous for non-native speakers because relations between components are not always explicitly marked. For example, a term may express purpose, material, location or function without grammatical indicators. Therefore, translation into Uzbek or Russian often requires interpretation of the semantic relation between components.

Russian technical terminology has strong derivational and syntactic mechanisms. Affixes make many terms semantically clear because they indicate instruments, processes and results. Multi-word Russian terms often show grammatical relations through adjective-noun agreement and genitive constructions. This structure provides semantic precision, but it may also produce long and complex terms. In translation, Russian often serves as an intermediary source for Uzbek technical terminology because many technical concepts entered Uzbek through Russian during the development of modern science, engineering and industry.

Uzbek technical terminology is developing in a multilingual environment. It uses national word-formation resources, but at the same time it actively absorbs international and borrowed terms. This is natural because modern technology develops globally, and many concepts first appear in English or Russian scientific-technical discourse. The main challenge for Uzbek terminology is to balance international comprehensibility with national language norms. Some borrowed terms are convenient because they are internationally recognizable, while some translated terms are preferable because they are semantically transparent for Uzbek speakers. The choice between borrowing, calquing and native formation depends on frequency, clarity, field of use, standardization and user acceptance.

The semantic development of technical terms is closely related to scientific and technological progress. When a new device, process or method appears, language must create or adapt a term for it. At the first stage, several variants may coexist. Later, one variant may become standardized. This process can be observed in all three languages. English often creates original terms, Russian may translate or adapt them, and Uzbek may borrow from English directly or through Russian, or form its own equivalent. Such processes show that terminology is dynamic and historically conditioned.

One of the most important issues in technical terminology is equivalence. Structural similarity does not always guarantee semantic equivalence. A borrowed term may have a narrower or broader meaning in the receiving language. A calque may preserve the structure of the original but sound unnatural in the target language. A descriptive translation may be clear but too long. Therefore, translation of technical terms requires not only linguistic knowledge but also understanding of the technical concept. The translator must identify whether the term denotes an object, process, function, parameter, material or system, and then select the most accurate equivalent.

The structural-semantic study of technical terms is also important for lexicography. Multilingual technical dictionaries should not simply provide word-to-word equivalents. They should include definitions, field labels, usage examples, abbreviations, variants and semantic distinctions. This is especially important for Uzbek, where terminology is still being standardized in many fields. Dictionaries and terminological databases can help reduce synonymy, prevent incorrect translations and improve the quality of technical education.

Another important aspect is the role of terminology in education. Students of engineering, information technology, energy, mechanics and other technical fields often study professional literature in several languages. If they do not understand structural and semantic features of terms, they

may misinterpret technical texts. Therefore, teaching technical terminology should include analysis of word formation, semantic motivation, international components, abbreviations and translation equivalents. Such an approach develops not only vocabulary knowledge but also professional linguistic competence.

The comparison of English, Uzbek and Russian technical terms also shows the importance of standardization. Standardized terminology ensures that specialists, translators, teachers, students and researchers use the same terms for the same concepts. Without standardization, technical communication becomes inconsistent. However, standardization should not be mechanical. It must consider linguistic norms, international practice, professional usage and semantic clarity. A successful technical term should be accurate, concise, systematic, pronounceable and acceptable to users.

The structural-semantic analysis of English, Uzbek and Russian technical terms shows that technical terminology is a complex and dynamic system. English technical terms are characterized by compounding, abbreviation, conversion and international productivity. Russian technical terms actively use derivation, affixation, compound structures and syntactic combinations. Uzbek technical terms are formed through native derivational models, descriptive combinations, borrowings, calques and adapted international terms.

At the semantic level, technical terms in all three languages aim to express specialized concepts accurately and systematically. Their main features include precision, motivation, conceptual clarity, contextual stability and connection with professional knowledge. At the same time, synonymy, polysemy, semantic variation and translation inconsistency may appear because of borrowing, technological development and different structural patterns of the languages.

The study confirms that structural-semantic analysis is necessary for translation, terminology standardization, multilingual dictionary development and technical education. English, Uzbek and Russian technical terminology should be studied comparatively because these languages are actively used in scientific, industrial and educational contexts. Further research may focus on specific fields such as energy, automotive engineering, information technology, mechanical engineering or construction in order to create more precise terminological classifications and translation recommendations.

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