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A Brief Analysis of the Characteristics and Translation Strategies of Mechanical English

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Abstract: With the acceleration of globalization and the increasing international cooperation in the field of mechanical engineering, mechanical English, as an important branch of professional English, plays a key role in technical literature, product manuals, operation manuals, etc. This paper aims to explore the characteristics of mechanical English and its translation strategies, with a view to improving the accuracy and efficiency of mechanical English translation and promoting international technical exchanges and cooperation. Mechanical English has the characteristics of professional terminology, rigorous structure and strong logic. Aiming at these characteristics of mechanical English, this paper proposes several effective translation strategies. Mechanical English translation is a complex and meticulous task. It requires not only translators to have solid language skills and rich professional knowledge, but also to be able to use various translation strategies flexibly to ensure the accuracy and professionalism of translation. Through the research of this paper, I hope to provide useful reference and improvement for the translation practice of Mechanical English.

1. Introduction

With the acceleration of globalization, international cooperation in the field of mechanical engineering is increasing, and Mechanical English, as an important branch of professional English, plays a key role in technical literature, product manuals, and operation manuals and so on. The purpose of this paper is to discuss the characteristics of Mechanical English and its translation strategies, with a view to improving the accuracy and efficiency of Mechanical English translation and promoting international technical exchanges and cooperation.

Mechanical English is characterized by professional terminology, rigorous structure and strong logic. First of all, Machinery English contains a large number of professional terms, which often have clear definitions and specific scope of use, and put forward higher requirements on the professional knowledge of the translators. Secondly, the sentence structure of Mechanical English is usually more complex and informative, which requires the translator not only to understand the meaning of the original text accurately, but also to maintain the clarity and coherence of the translation. In addition, the expression of mechanical English often pursues logic and precision, which requires that the translation process must strictly follow the logical structure of the original

text to ensure the accuracy of the technical parameters and operating instructions.

Aiming at these characteristics of mechanical English, this paper proposes several effective translation strategies. The first is to strengthen the study of professional knowledge, translators should constantly improve their knowledge in the field of mechanical engineering in order to better understand and accurately translate the terminology. The second is to focus on contextual understanding and logical reconstruction. Translators should not only accurately grasp the meaning of each word, but also make reasonable vocabulary selection and sentence reorganization according to the context and overall logic. In addition, adopting the methods of comparative analysis and peer review is also an effective way to improve the quality of translation. By comparing and analyzing the translations of different versions and inviting professionals to conduct reviews, errors and deficiencies in translation can be effectively discovered and corrected.

Mechanical English is mainly characterized by vocabulary, sentences and diagrams. First of all, from the vocabulary point of view, mechanical English text involves a large number of terms and abbreviations. In terms of terminology, the translator adopts phonetic translation, Italian translation, formal translation and other methods to translate. For abbreviations, the translator adopts two translation methods: (1) Translate in order with the original text. (2) Using the source text directly. Secondly, from the syntactic point of view, the sentences in the mechanical English text also have their unique characteristics: a large number of passive sentences are used. Translators classify the translation methods of passive voice into four categories: translating sentences into Chinese active sentences, translating sentences into Chinese non-primary sentences, translating sentences into Chinese judgment sentences, and translating sentences into Chinese passive sentences. In addition, diagrams and charts are widely used in technical texts to enhance the readability of the text and improve the reading experience of the readers. Translators must maintain the original author's writing style when translating. Therefore, when translating diagrams and charts, translators only need to convert individual explanatory words and texts explaining the diagrams into English and Chinese, while retaining the original expressions of idiomatic expressions. Based on this translation practice, the translator summarizes several translation experiences of technical literature: firstly, accurately grasp the translation of mechanical terminology and abbreviations; secondly, according to the commonly used translation techniques, the sentence translation should take into account the rigorous and objective expression characteristics of mechanical English. Again, when translating charts and diagrams, the original expressions should be retained as much as possible in order to convey accurate information about the charts and diagrams.

Mechanical English has a certain level of comprehension. For example, in terms of vocabulary, Mechanical English has a large number of specialized vocabularies, a large number of derivatives and compound words are used, and abbreviations are everywhere. In terms of syntax, Mechanical English makes good use of long sentences and passive voice. These findings are supported by prior research, such as Chen Tongjian's 1996 work Mechanical Engineering English Readings [1]; Zhao Haiheng's 2001 New Compilation of Mechanical Engineering Professional English [2]; Shi Ping's 2003 Mechanical Engineering Professional English Tutorial; Qin Yan's 2005 paper A Brief Discussion on Translation Methods and Techniques for Mechanical Engineering Professional English; Wang and Wang Ping's 2008 Characteristics and Translation Methods of Mechanical Engineering English; Niu Yuehui and Cong Min's 2008 joint work Problems and Countermeasures in Engineering Machinery English Translation; Wu Zhifang and Lu Fengzhen's 2008 study Characteristics and Translation of Mechanical English Vocabulary [3]; and Liao Fumei's 2010 publication Linguistic Features and Translation Strategies of Mechanical Engineering English [4]. These scholars have conducted detailed and in-depth analyses of mechanical English. Throughout the previous studies, together with my own translation practice, I have gained a more gradual understanding of Mechanical English. There is no doubt that the faster the translation, the better.

Generally speaking, Mechanical English is characterized by wide scope, focus on organization, professionalism and logic [5]. Therefore, for translators with non-mechanical background or little knowledge of the specialty, it is a great challenge to complete the translation quickly and well within a short period of time. Previous studies have either focused on the specific translation of a single word or a certain type of word, or on the translation of a certain sentence pattern, although their studies have been very in-depth. However, I personally believe that in this fast-changing era,where information resources are extremely abundant, we can make translation easier, faster and of higher quality with the help of electronic tools.

2. Linguistic Features of Mechanical English

2.1 Use of terminology

As the name suggests, Mechanical English is mainly concerned with the knowledge in the field of mechanical engineering, which is an applied discipline based on relevant natural and technical sciences, combining with the technical experience in production practice, to study and solve all theoretical and practical problems in the process of developing, designing, manufacturing, installing, applying, and repairing of various kinds of machinery [6]. Therefore, Mechanical English has the following unique lexical characteristics, such as multi-specialized vocabulary and multiple meanings of words.

2.1.1 Abbreviations and Semi-Abbreviations

Professional Technical language demands concise expression and standardized terminology, while acronyms offer distinctiveness, memorability, and efficiency. Consequently, mechanical English extensively employs acronyms and semi-acronyms [7]. For example: EDM = Electron Discharge Machining OOBA = Out-of-Box Audit OC = Quality Control ME = Manufacturing Engineer SOP = Standard Operating Procedure Wire EDM = Wire Electron Discharge Machining Expansion dwg = Expansion Drawing

2.1.2 Derived and compound words

Derivation and compounding are both primary methods of word formation in English. Derivation involves creating new vocabulary through prefixes or suffixes, resulting in derivative words. Compound words typically consist of two or more free morphemes, expressing a single semantic concept [8]. Mechanical English contains numerous complex and specialized derivatives and compounds. Examples include setscrew (fixing screw), locknut (locking nut), point-to-point and continuous-path (point-to-point control and continuous control), etc.

2.1.3 Specialized vocabulary

In everyday English, certain high-frequency words often carry relatively fixed meanings in students' minds—such as boring meaning dull, driver meaning motorist, console meaning to console, and dog meaning canine. However, within the mechanical field, their meanings undergo significant shifts and acquire specialized definitions. In mechanical English, “boring” means drilling or making holes. “Driver” refers to a screwdriver or a vehicle driver. “Console” denotes a control panel. ‘Dog’ signifies a locking device. If we translate phrases like “boring tool,” “console table,” and “a dog driver stops the rotation of the wheel” using their general English meanings—such as “a dog driver stops the wheel”—it would be comical.

2.1.4 Multiple meanings of a word

Readers often encounter this problem while reading: they seem to recognize every word in the text, yet struggle to grasp the overall meaning. A key reason for this is the phenomenon of polysemy in English vocabulary. Certain terms have become specialized vocabulary through their application in the mechanical field. As a highly technical discipline, mechanical English naturally contains numerous examples: “thread” generally means “line,” but in mechanical English it often refers to “screw thread”; ‘screen’ typically denotes a “display,” yet in mechanical English it signifies a “filter mesh” or “windshield”; “tube” fundamentally means “pipe” or “cylinder,” but in mechanical English, it signifies “hose” or “inner tube.” ‘disc’ is even more complex: beyond its common meaning of “record,” it can denote “disk,” “diaphragm,” “valve plate,” or “capillary tube,” depending on the context. Similarly, “pin” in mechanical English can denote “pins,” “tacks,” or “studs,” while also meaning “pins” or ‘terminals’ in contexts like “hinge pin” (connecting pin) or “output pin” (output terminal).

2.2 Grammatical structures and sentences

In terms of style, Mechanical English has a real, objective and clear style, and is characterized by professionalism, abstraction, logic, standardization and interpretability [9]. And it is because of these features that Mechanical English often uses long sentences and passive voice in its structure.

2.2.1 Use more passive sentences

According to the statistics of *John Swales* of the University of Leeds, at least one-third of the predicates in technical English are in passive voice [10]. Using the third person and the passive voice can avoid subjectivity, which is in line with the characteristics of scientific and technical writing [11]. In the paragraph of Example 1, every sentence is a passive sentence.

Example 1：In principle, one computer can be used to control more than 100 separate machines. The DNC computer is designed to provide instructions to each machine tool on demand. When the machine needs control commands, they are communicated to it immediately.

2.2.2 Use more long sentences

Generally speaking, long sentences and subordinate clauses can elaborate complex theories, ideas and processes logically, rigorously and precisely through various connectives to avoid ambiguity. Mechanical English needs to express complex principles, processes, procedures, methods and experiments, etc., so it uses a lot of long sentences and subordinate clauses [12]. The subordinate clauses in Mechanical English are mostly definite clauses, which, in Example 2, contain a large amount of information. In mechanical English, there are a lot of logical long sentences.

Example 2：The lubricating oil pump is the heart of the engine oil system and is usually equipped with an inlet screen located in the oil pan to strain out any contaminants that could damage the pump.

The translation: The oil pump is the core component of the engine's lubrication system. Typically, a filter screen is installed in the oil pan to trap contaminants that could damage the oil pump.

2.3 Logic and precision

Mechanical English belongs to a type of professional English, due to the requirements of professional and technical, language expression needs to be rigorous and objective to reflect the content of scientific research, and its discourse is always concise and fluent, focused, clear, positive,

whether it is the explanation of mechanical principles, equipment design and manufacturing instructions, experimental methods, etc., all the expression must be concise, precise, accurate, logical and fluent, and in the linguistic characteristics of the language, do not emphasize the lively image of the language image.

Example 3：Silicon photo diodes, located in the tape reader head on the control unit, detect light as it passes through the holes in the moving tape. The light beams are converted to electrical energy. which is amplified to further strengthen the signal.

3. Translation Strategies and Methods of Mechanical English

The most important principle of mechanical English translation is to accurately understand the terminology and understand the operation process [13], in order to avoid "take for granted" or "look at the meaning of the text" resulting in a differential translation, so that people do not know what to say. For example, “check valve”，“air cleaner element”，“free air delivery”，“reduced drilling”，“cross member”. These terms cannot then be taken for granted when translating into “Check valve”, “Air Filter Essentials”, “Free-Air Transport”, “Reduce rock drilling”, “Cross-component”. Instead, they should be translated separately by consulting the relevant information as“Check Valve”，“Air Filter Cartridge”, “Displacement”, “Drilling of Unequal-Diameter Bores”, “Transverse Beam”.

1) Improve reading ability and increase the input of specialized background knowledge. From the perspective of correlation theory, the process of reading comprehension is a process in which learners utilize their existing background knowledge to make as many logical inferences about correlations as possible, so as to construct the meaning of the discourse. So mastering solid professional knowledge is the prerequisite for smooth reading, and increasing the input of professional knowledge is the key to improving professional English reading ability. In the study of professional knowledge, attention should be paid to the consolidation and expansion of knowledge points, and various learning resources should be utilized to acquire relevant knowledge and improve their knowledge structure [14]. Only in this way can the existing information be related to the reading context, reasoning, successfully constructing discourse meaning, and overcoming the reading obstacle caused by incomplete knowledge structure.

2) Use electronic tools to determine word meanings. Electronic tools include the Internet, electronic reference books, electronic reference books and all other documentary resources that exist in electronic form and can be retrieved and read with the help of a computer [15]. Compared with traditional paper-based tools, electronic tools have certain significant features that can speed up translation and improve the quality of translation, making them particularly convenient for translators. The most important feature of electronic tools is the ease of retrieval. Although paper reference books can also be searched easily and good publications come with indexes, their search speed cannot be compared with that of electronic tools. For example, when searching for certain compound words or phrases with unrecognizable words, a traditional reference book would need to find the meaning of each word and then consider it to determine the final meaning of the word or phrase. Using electronic tools is often much simpler, as long as the meaning of a compound word or phrase can be determined, the meaning can essentially be determined. Such as "hydraulic shock absorber" in "hydraulic" is the meaning of "Hydraulic", in Google, type in "hydraulic shock absorber", space and then enter "Hydraulic" click on the query, you can immediately open many web pages and determine its meaning as "Hydraulic Shock Absorber". Secondly, the capacity of electronic tools can be described as infinite, especially when it comes to Internet resources. While personal collections are always limited, the Internet has almost all the world's resources. According to the current development trend, in the future, materials from libraries all over the world will be

digitized and made available online for public access. In this way, translators can access electronic resources not only after the birth of the Internet, but also historical resources before the birth of the Internet. Electronic tools can be updated in a timely manner [16]. While paper reference books are outdated at the time of publication, electronic resources are constantly being updated and added to, which is extremely important for the translation of certain new words in mechanical English. Electronic tools such as "PLC" (Programmable Logic Controller), "ECU" (Engine Control Unit), "EUI" (Electronic Unit Injector), etc. can also be easily extracted. While searching for paper tools requires the use of a pen to extract or copy the information found, using the copy and paste function of an electronic reference book not only saves us a lot of labor but also avoids potential errors.

4. Conclusion

Through the analysis of this paper, it is not difficult to find that the main difficulty of mechanical English lies in understanding the meaning of the original text accurately and conveying it accurately and faithfully using standardized expressions that follow Chinese grammar and habits. To solve these two problems, the translator needs not only solid basic knowledge of English, high level of Chinese, comprehensive translation theory and flexible translation skills, but also rich knowledge of mechanical engineering. It can be seen that the translation of mechanical English is not only a huge workload, but also complex. Translators should constantly strengthen their bilingualism, supplement relevant mechanical expertise, and accumulate translation experience to make translation work more skillful, accurate and exquisite. The shortcoming of this article is that it is not deep enough. Therefore, the authors believe that more efforts are needed to adopt different and effective translation methods in the study of mechanical English translation. It is hoped that the level of mechanical English translation in China can be gradually improved in the future.

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