

The Application of Intelligent Translation Technology in English Translation of Space Science and Technology

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ABSTRACT

As an important branch of English translation, English translation of space science and technology is of great significance to foreign cooperation in the field of space science and technology, which is related to the success or failure of international space launch cooperation, and has high requirements for industry confidentiality, translation accuracy and translation timeliness. In view of the actual needs of the English translation work of space science and technology, through combining the combination and comparison of the current commonly used translation means, combined with the comprehensive comparison of example translation, it is found that intelligent translation technology has the obvious advantages of good security and confidentiality, high translation accuracy, strong independent learning ability and high translation efficiency in its application.

Keywords: Aerospace Technology, English, Machine Translation, Intelligent Translation.

1. INTRODUCTION

With the vigorous development of China's space industry, space science and technology field of foreign exchanges and cooperation has deepened, space science and technology English translation status is becoming increasingly important. Strong English translation ability of space science and technology will lay the foundation for China's space sector to enhance the breadth and depth of opening up and communication, provide assistance for China's space industry to continuously integrate with international standards, and contribute to China's efforts to promote the "Belt and Road" construction. In view of the needs of English translation in space science and technology, different translation methods are discussed, analysis and comparison are carried out, and methods and means of carrying out English translation tasks in the field of space science and technology are studied.

2. THE CURRENT SITUATION OF ENGLISH TRANSLATION OF SPACE SCIENCE AND TECHNOLOGY

As an important part of English translation in science and technology, the English translation work of space science and technology not only has the general characteristics of rigorous and thorough translation, coherent thinking logic, concise and clear writing, but also has the distinctive characteristics of space science and technology.

2.1. *The confidentiality requirements for English translation of space science and technology are high*

Space science and technology is the most representative high-tech field in the world today, is an important symbol to measure a country's science and technology, national defense strength, so the relevant confidential work in the English translation of space science and technology is very important. In reality, the space field units usually put forward the translation work of the computer and the Internet should be isolated, translation work cannot be outsourced,

translation materials cannot be outflow and other strict confidentiality requirements, space science and technology English translation of the use of external resources is extremely limited.

2.2. The translation efficiency of English translation in aerospace science and technology is required highly

Space science and technology is a huge project, involving the production of spacecraft and vehicles, transportation, testing, fuel filling, launch and many other links, foreign involving international commercial negotiations, international insurance negotiations, the use of international space law and many other aspects, so the space launch mission produced a large number of related documents, covering a wide range of space science and technology English translation work is more onerous, a large number of space science and technology English data translation timeliness requirements are very high.

2.3. The accuracy of English translation in space science and technology is required highly

As one of the most sophisticated scientific and technological fields of mankind, any mistake is enough to lead to disastrous consequences, while aerospace science and technology is a comprehensive science involving chemistry, physics, engineering, medical, measurement, structure and many other disciplines of cutting-edge science and technology, so aerospace science and technology English translation not only requires a high degree of faithfulness to the original text, but also make full use of professional terms to ensure the scientific and accurate translation results.

2.4. The current situation of the English talent team of space science and technology

The limitations of the education system, engaged in aerospace science and technology work experts, engineers are mostly non-English major science and engineering graduates, the general lack of professional English translation level and qualifications, in the space science and technology English translation to achieve "faithful, accurate, graceful" ability is lacking; At this stage, there are few translation experts with English professional ability and space science and technology literacy. Therefore, there is an urgent need for a new safe, efficient, accurate and easy-to-use technical means for rapid upgrading of ordinary English professionals and non-English majors in space science and technology translation capabilities.

3. THE HISTORY AND TECHNICAL CHARACTERISTICS OF TRANSLATION TECHNOLOGY

From the 1930s to the present, translation technology has experienced several stages of development, such as electronic dictionary translation technology, machine translation technology, intelligent translation technology, etc., as follows:

3.1. First-generation electronic dictionary translation technology

The history of translation technology can be traced back to the first translation machine in 1933 that used mechanical devices for word translation conversion. In 1947, with the invention of computer technology, Warren Weaver proposed to apply computers to translation work, but because of the lack of computer performance, expensive, huge volume, artificial intelligence translation development quickly ushered in a low point. Until the 1990s, with the maturity of microelectronics and integrated circuit board technology, the first generation of electronic translation dictionaries represented by "The Wen Que Star" came out. Electronic dictionary as the first generation of practical electronic translation technology, with small weight, cheap, word storage, word pronunciation and other advantages, soon in the English learners at that time popular, but limited by objective technology, it also has only to translate words, cannot translate phrases or segments, cannot learn from themselves, with the progress of the times, gradually eliminated.

3.2. Second-generation machine translation technology

After entering the 21st century, with the vigorous development of the Internet, Microsoft, Google, NetEase and other well-known companies have launched online web translation tools, in 2011, IBM launched Watson system, marking the artificial intelligence translation technology into the era of machine translation. Machine translation is a kind of translation method which uses the relationship between English words and Chinese words to replace them automatically through electronic products. After 2010, the domestic machine translation technology is also becoming more and more mature, forming a Baidu, Youdao and Xunfei translation as the representative of the mechanical translation tools, Xunfei translation even developed a translation machine, can be real-time voice translation. Machine translation tools through real-time Internet connection has the advantages of near-unlimited storage, fast translation speed, the ability to translate short sentences and phrases, but also highly dependent on network databases, unable to learn, no document processing, no proofreading and other disadvantages. At

present, the machine translation technology is still the mainstream translation technology, has been widely used in English translation in all walks of life.

3.3. Third-generation intelligent translation technology

Although machine translation can meet most people's daily basic translation needs, but the face of professional, diverse, meticulous and contains human emotions of complex translation tasks, machine translation is still difficult to replace traditional human translation[1]. Therefore, artificial intelligence translation began to appear with human mirror, mutual embedding and information for each other's human-machine relationship trend. In 2015, the intelligent interactive translation technology (artificial interactive translation, AIIT)[2], represented by Trados, which absorbs and embraces some of the functions of machine translation technology, has high degree of translation accuracy, professionalism, self-learning improvement and teamwork, and other new functions, will be intelligent translation technology to a new height, because of its unique advantages in large-scale professional materials, so that intelligent translation technology in the field of space science and technology translation has broad prospects.

4. RESEARCH ON THE APPLICATION OF INTELLIGENT TRANSLATION TECHNOLOGY IN ENGLISH TRANSLATION OF AEROSPACE SCIENCE AND TECHNOLOGY

4.1. The basic principles of intelligent translation technology

Traditional translation services are based on the translator's personal knowledge, and are highly accurate because the articles are translated verbatim and contextually, and the correct expression is checked against the glossary. Machine translation technology is to try to replace human(Kenny, 1999:67) through a fully automated translation process, using the program automatic correspondence to translate text, manual in the translation process can not intervene, resulting in the translation of documents obscure, sentence structure frequent errors, not in line with the target's reading habits. The letter "LV" means Louis Vuitton luxury brands in fashion, representing launch vehicles in the aerospace sector, but machine translation is difficult to distinguish between low-level mistakes when translating professional documents, resulting in word failure. For example, "To obtain and maintain the necessary orbital location, frequency spectrum and other other approvals and licensings to the operating Satellite at the designated orbital position "if translated by the industry means "to hold the orbital position, spectrum permit and other relevant licenses necessary for the satellite to operate in orbit, the satellite can operate in a predetermined orbital position." "Simply put, but if the result of the use of machine translation is "to obtain and maintain the necessary orbital position, spectrum and other approvals and licenses to operate satellites in the design orbital position", it is clearly with a thick translation cavity and does not conform to Chinese language habits, if the whole article is such a statement will completely confuse the reader. The process is shown in Figure 1

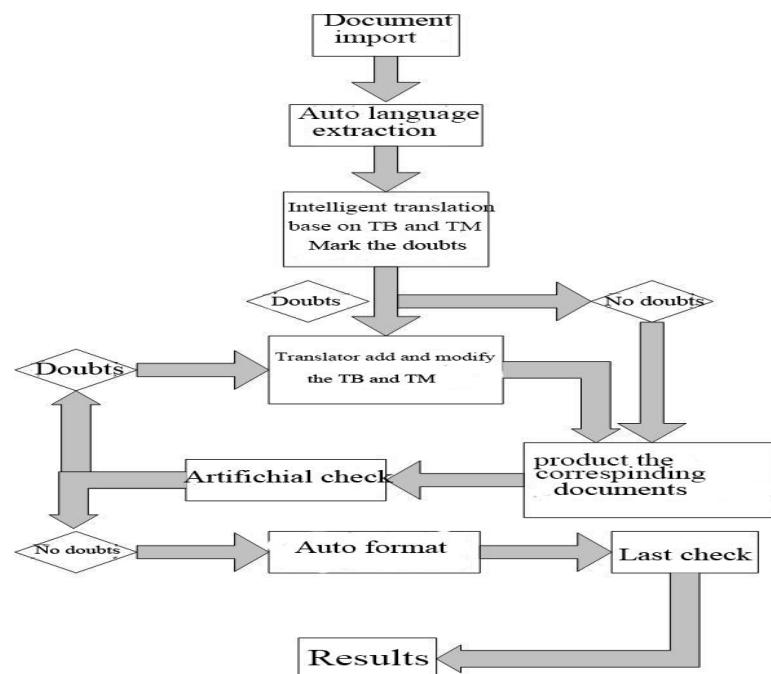


Figure 1 Machine Translation Technology Workflow

Intelligent translation is smarter than machine translation, and emphasizes the decisive role of human beings in intelligent translation compared to the above-mentioned automatic translation that relies only on program big data. Intelligent translation technology can accurately translate professional vocabulary in space science and technology English by establishing the right termbase, while supporting different expressions of the

same meaning in different contexts. The translation section records and learns, no longer forces the translated material to match the previous memory bank exactly, but automatically identifies the similarity, checks the author's translation after prior disposal, updates the existing memory bank and establishes a new translation model based on the evaluation of human translation. Workflows are shown in Figure 2.

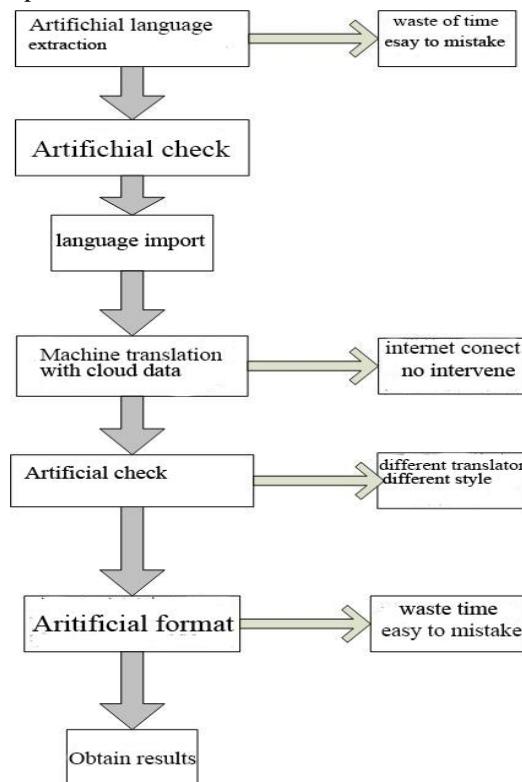


Figure 2 intelligent Translation Technology Workflow

In the translation status, intelligent translation emphasizes its status as a "student", through continuous learning of human "teacher" translation habits, continuous improvement of their own text recognition ability and translation language level, in the scientific and technological English translation standards as far as possible from "faithful" and "accurate" to "graceful" requirements. As appeared above, the letter "LV", if the use of intelligent translation, intelligent translation technology can learn the translator's previous translation documents in advance, in advance to understand the author's translation habits and language logic, the letter "LV" can be translated into different meanings in different contexts, or even the same meaning expressed in different ways. For example, when the software detects that the author is using satellites, field areas, transitions, etc. in large numbers of relatively colloquial nouns in the previous file, the translation of "LV" will use "rocket" for a simple description. When the software detects that the author's previous file uses a large number of space carriers, stations, windows and other more formal terms, the translation of "LV" will also be modified to "launch vehicle", in short, through the

simulation of human logic (not just big data accumulation) of the same meaning for different expressions, so that the translation results more appropriate, translation results more convenient to use [3].

Of course, to make intelligent translation software and human translation to achieve a perfect fit, establish a perfect and professional termbase, memory, reduce the actual work of intelligent translation software learning time and number of times, improve the success rate of intelligent translation for the first time.

4.2. Key advantages of intelligent translation technology

Intelligent translation technology because it not only absorbs the termbase technology of machine translation, but also pioneers the use of memory, but also adds intelligent recognition ability, so that intelligent translation technology in space science and technology English translation has great potential for development, the current mainstream intelligent translation software

has Trados and D'j vu. There are mainly the following advantages:

a) Good security and confidentiality. Intelligent translation technology machine translation no longer rely on the network cloud database big data processing, but can establish and independently run offline termbase and memory, in the implementation of translation tasks, can be physically isolated from the International Internet, for the required Internet existing mature terminology library and memory, can also be imported through the engraving disk, fully realize the one-way flow of Internet data, to maximize the safety of data in the implementation of space science and technology English translation.

b) High translation accuracy. Machine translation intelligent translation technology allows translators to "privately tailor" existing words, terms and phrases, especially in space science and technology English some of the proprietary nouns, proprietary phrases and professional meaning of the meaning of the word, to ensure the accuracy and professionalism of the space science and technology English translation.

c) Strong self-learning ability and human-computer interactivity-friendly. Unlike second-generation machine translation technology, intelligent translation technology places more emphasis on interaction and communication with translators. According to statistics, in different industries and departments, the repetition rate of information ranges from 20%-70%[4], which means that by comparing the language habits of learning translators' previous translation materials, intelligent translation technology can quickly improve translation capabilities in professional fields, while intelligent translation technology in translation when in doubt (such as matching similar translation content less than 95%), intelligent translation system will mark the content of doubt, and pre-rolled results to ask the translator, for later approximate translation to lay the foundation.

d) Translation is more efficient. Intelligent translation technology into the AI image recognition technology, which means that when dealing with PDF, JPG and other picture documents, intelligent translation system can automatically recognize the language in the document, and the results of the translator's validation directly inserted into special documents, greatly saving the translator to extract the original text of the picture and re-PS picture time and effort; At the same time, intelligent translation technology can automatically divide the original language and target language into segments according to semantics, forming a one-to-one correspondence, convenient for translators to quickly manual proofreading, manual proofreading, intelligent translation system can also be based on the source language format (such as font size, bold, color, etc.), the target language adjustment, saving the translator's

typography energy. Good human-machine efficiency can greatly improve the efficiency of translators.

e) Stronger team collaboration. Compared with machine translation technology can only provide one-to-one translation services, intelligent translation technology allows translators to carry out engineering management of large-scale translation tasks, through the establishment of translation project teams, the establishment of translation projects in the internal network of units, online use of intelligent translation systems and other means, can be unified use and update of translation terminology and memory, intelligent audit of different translators translation results, complete the target language format proofing work, to ensure that the translation of tens of thousands of words of documents can also be completed by multiple people can also achieve language norms, format correct, the context is unified.

4.3. Typical application comparison

In order to further verify the differences in the capabilities of existing mainstream translation techniques, a simple translation comparison test experiment was carried out. On the Internet, select a 190-word English manual for home copiers for translation comparison experiments. The manual has the following four characteristics[5]:

a) The specification is a standard description, just like the space science and technology English style with concise, clear characteristics.

b) The specification is a normative document with a high degree of accuracy for translation required by all requirements of Aerospace Science and Technology English.

c) The manual uses a large number of professional vocabulary and has all the highly professional characteristics of Aerospace Science and Technology English.

d) The manual is based on a format commonly used in general technical instruments and has the characteristics of a common instrument format in English for space science and technology.

In order to show the characteristics of different translation methods, traditional human translation technology, machine translation technology and intelligent translation technology were selected to translate the manual, as follows:

4.3.1. Application of human translation techniques

Invite comrades in english translation to translate the manual manually. It takes 11 minutes to manually translate the original text and proofread it. Because the

cookbook is in a variety of formats, the target language is formatted in the original format for 4 minutes. Full-text translation and matching format took a total of 15 minutes, but the accuracy of human translation is very high, the translation results do not have obvious logic, grammar, words and other translation errors.

4.3.2. Application of machine translation technology

Typically using machine translation Microsoft translation plug-ins, by connecting to the Internet, using Microsoft's cloud platform materials directly to machine translation of the manual, As shown in Figure 4. The Microsoft Translation plug-in automatically matches the translation target language to the source language in a format that takes 15 seconds. After manual inspection, a total of 21 translation errors and non-grammatical habits were found, with an error rate of 11.05%. There are three main translation errors. First, the statement logic error, this error seriously distorts the original meaning, such as "avoid direct sunlight" is mistakenly translated as "in direct sunlight", "place copier" is translated as "find the copier location ", used to guide specific work, very easy to cause accidents. Second, the use of word matching errors, mainly contrary to language habits for vocabulary matching, such as "paper transmission" is translated into "paper travel", "back will not be blocked" translated into "back will not be stopped", used to guide specific work, easy to cause confusion and distrust. Third, the meaning of polyser meaning errors, mainly a variety of meanings of the use of the environment to distinguish errors, such as "steps" is translated into "pace", "be careful" is translated into "handwriting", the language to guide specific work, easy to cause misunderstanding and misinterpretation of meaning[6].

4.3.3. Application of intelligent translation technology

Select a typical representative of intelligent translation technology transmate platform to translate the manual, in the call to the pre-prepared memory and

termbase, intelligent translation platform offline, the original file pre-translation matching, pre-translation accuracy of more than 80% and complete the identification of the translation question area in Figures 5 and 6, while automatically matching the target file with the original file format, the whole process took a total of 15 seconds. The human translator then modifies and verifies and outputs the translated document in the intelligent platform's pretranslated file question area, which takes 2 minutes. It took a total of 2 minutes and 15 seconds to translate the manual using intelligent translation techniques. After other translators to check the translation results, no obvious logic, grammar, words and other translation errors were found.

4.3.4. Comparative analysis of translation results

Through the comparison test of three different ways, we can see that in terms of translation speed, machine translation speed is relatively fast, traditional human translation speed is the slowest. In terms of translation accuracy, machine translation, with its error rate of 11.05%, cannot be used directly in science and technology, while the accuracy of traditional human translation and intelligent translation technology can be guaranteed. In terms of translation labor intensity, traditional human translation requires manual translation, manual proofreading, manual format adjustment, so the translation intensity is the greatest (in terms of points for 10 points),intelligent translation technology for the need for computer pre-translation results manual proofreading and modification, labor intensity is medium (in terms of points for 3 points),the second generation of machine translation technology in the translation process personnel cannot intervene, so the lowest labor results (in terms of points expressed as 1 point). In translation security, traditional human translation and intelligent translation technology have security and confidentiality, while the second generation of machine translation technology needs to connect to the Internet, there is no security and confidentiality. For a detailed comparison, see the figure below:

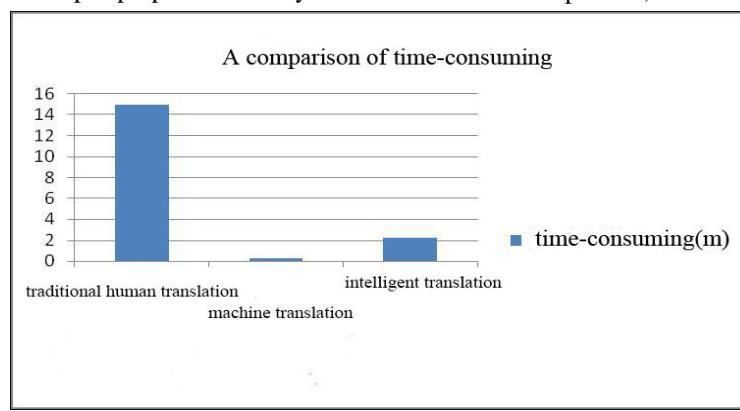


Figure 3 A compares the time-consuming means of translation

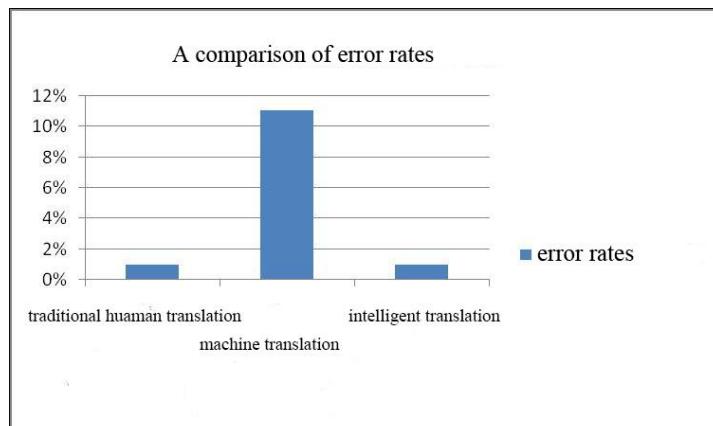


Figure 4 A comparison of error rates of the three translation methods

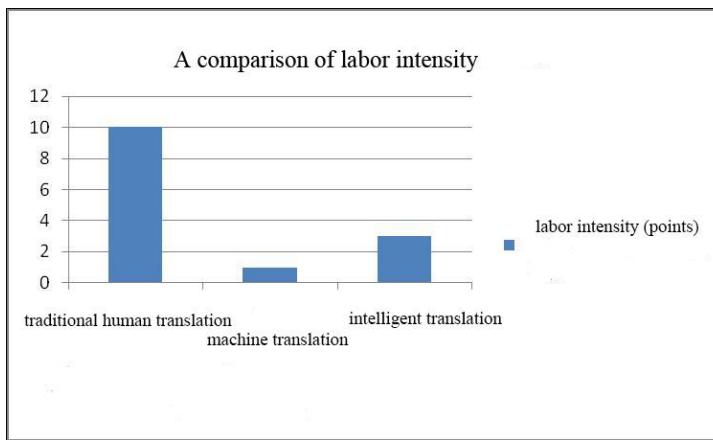


Figure 5 A comparison of the labor intensity of the three translation methods

Table 1 A comparison of the confidential security of the three translation methods

The serial number	How to translate	Networking needs	Confidential security
1	Traditional human translation	not	high
2	Second-generation machine translation	Yes	low
3	Third-generation intelligent translation	not	high

Through the above comparison can be found that three different translation means, in the completion the corresponding translation tasks, each has significant

characteristics, the current use of mesh diagram shown as follows:

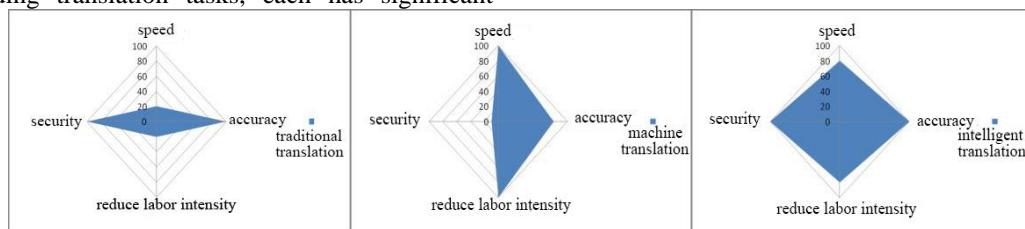


Figure 6 A comparison of the three translation methods

In order to further illustrate the characteristics of different translation techniques, five different short film

descriptions were also translated, and the results were as follows:

Table 2 Compares the translation results of different documents by three translation methods

serial number	Translation means	Description 1 182 words	Description 2 195 words	Description 3 307 words	Description 4 455 words	Description 5 530 words
1	Human translation is time-consuming	14.5 minutes	16 min	35 minutes	45 minutes	50 minutes
2	The correct rate of	100%	100%	100%	100%	100%

serial number	Translation means	Description 1 182 words	Description 2 195 words	Description 3 307 words	Description 4 455 words	Description 5 530 words
	human translation					
3	Labor intensity of human translation	high	high	high	high	high
4	Human translation security	high	high	high	high	high
5	Machine translation is time-consuming	13.99 seconds	14.99 seconds	23.61 seconds	34.99 seconds	40.76 seconds
6	Machine translation accuracy	79.3%	81.2%	87.7%	89.2%	91.1%
7	Mechanical translation labor intensity	low	low	low	low	low
8	Machine translation security	not	not	not	not	not
9	Intelligent translation takes time	2 minutes and 14 seconds	2 minutes and 15 seconds	3 minutes 25 seconds	5 minutes and 40 seconds	6 minutes and 40 seconds
10	Intelligent translation accuracy	100%	100%	100%	100%	100%
11	Intelligent translation labor intensity	moderate	moderate	moderate	moderate	moderate
12	Intelligent translation security	high	high	high	high	high

After comparative analysis, we can see that traditional human translation has a high translation accuracy, strong security, but in translation labor intensity, translation time has obvious weaknesses, in the space science and technology English translation work, for the large-scale documents about 100,000 words, the use of traditional manual translation means will appear to be inadequate, consuming a lot of human and material resources; Machine translation technology has a little bit of fast translation speed and low translation labor intensity, but there is a poor translation security and confidentiality, low translation accuracy, in the implementation of space science and technology English translation work, the use of machine translation means will cause serious risk of leakage and translation accidents; Intelligent translation technology has the characteristics of fast translation speed, high degree of translation security and high translation accuracy, but it is necessary to accumulate and perfect the corresponding translation memory and translation termbase in advance, and constantly improve the basis of the establishment of the two libraries, Using intelligent translation technology can safely, efficiently and quickly complete a large number of space science and technology English translation work.

4.4. Intelligent translation technology is used in the scene of space science and technology in English

If intelligent translation technology is introduced into space science and technology for use in English, we should pay attention to the following aspects:

a)Build a sound organizational management organization. The foreign affairs department or translation department of space science and technology shall establish a fixed translation organization and

management agency, which shall have the participation of the user (translation demand party), foreign language experts and translators, and shall do a good job in the work related to security and confidentiality.

b) Standardize the establishment of a translation termbase. The establishment of the English translation termbase of space science and technology is directly related to the scientific and accurate translation results, is the basis of intelligent translation system, and should pay attention to the establishment of the English translation termbase of space science and technology.

One is to buy and import existing industrial technology vocabulary. Such as UDMH (partial dimethyl), NTO (nitrogen tetraoxide) and other terms, also widely used in other fields, can be directly on the Internet to buy engravings import, reduce the task workload;

c) Standardize the establishment of translation memory. Translation memory is the core of intelligent translation technology, is the basis of intelligent translation principles of space science and technology English, so in the establishment of space science and technology dedicated memory library, to have been audited translation control materials as a "benchmark" and "benchmark", and as a reference to standardize the establishment of space English translation memory, to ensure that different translation memory content unity, consistency, before and after

Improve the accuracy and success rate of first-time automatic translations.

d)Standardized management of translation work. The standardized management of English translation in space science and technology is to standardize, regularize and program translation work with the goal of obtaining the best order and best translation benefit of

the translation team, so as to ensure the unity, stability and accuracy of translation results. Through the intelligent translation system dedicated server architecture, build a project platform, project management, to ensure that many people can participate in large-scale translation tasks in accordance with the progress of the project quality, quantity, standard promotion, through the intranet project platform authorization, strengthen the space-specific terminology and memory library clearance audit, to ensure that the two libraries are not "polluted" by low-quality translation.

e) Continue to improve the overall proficiency of English translators. After the introduction of intelligent translation system, space science and technology English translators are not strong must be served by English professionals, there is a certain English foundation of space science and technology personnel can join the work of science and technology English translation, but intelligent translation system can only be in the position of auxiliary tools, can never completely replace the role of human beings, so it is necessary to carry out space missions to continuously improve the level of English talent, but also to continue to strengthen English education, and continuously improve English professional skills, but also to carry out intelligent translation platform research and training, and ultimately obtain the overall ability of space science and technology English translation.

5. CONCLUSIONS

Intelligent translation technology is high security of confidentiality, high translation accuracy, fast translation speed and low labor demand, so that it has the advantage which the traditional artificial translation methods and machine translation in the field of space science and technology does not have, so the use of intelligent translation technology in space science and technology English translation prospects are very broad. The core of the application of intelligent translation technology lies in the construction and management of its memory bank and termbase, which does not have a professional space science and technology memory bank on the Internet, nor is there a systematic space science and technology termbase. In the application of this technology, space science and technology units should establish corresponding teams, and constantly accumulate, standardize and improve the space memory and terminology library with the characteristics of their own field, to improve the ability of translators to use,

and maximize the effectiveness of intelligent translation technology.

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