

Exploration of French-Chinese Translation Methods of Electrical Engineering Terminology Using Online Image-Text Retrieval Mode

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Abstract: With the incessant propulsion of the Open Door Policy, which is related to the consolidation of international collaborative partnerships, an increasing number of Chinese companies are moving toward cooperating countries to participate in infrastructure construction, employing a win-win strategy in favor of the people and governments of both countries. Among the cooperation domains, our country's electrical companies have achieved a series of remarkable results in the international Engineering, Procurement, and Construction (EPC) project market with their outstanding business capabilities and technical advantages. Nevertheless, some shortcomings cannot be overlooked, the most notable of which appears to be the impediment associated with engineering translation, which has always been an obsession among translators of Chinese companies. Taking the transmission line project in the Republic of Madagascar as an example, an analysis of French-Chinese translation methods of electrical engineering terminology in the field of the transmission line is carried out.

Keywords: Engineering translation; Translation methods; Electrical engineering terminology; Interdisciplinary communication; Online image-text retrieval mode

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1. Introduction

The AOI (*Appel d'Offre International*, International Bidding) is the most common method for submitting technical and commercial tender documents of electrical engineering projects (such as the overhead power line project listed here) in francophone countries. The language for communications shall be that stated in the Particular Conditions, which is usually French (France). The translation is always considered a difficult task that embarrasses both translators and technical personnel, as the former does not know much about electricity, while the latter knows almost nothing about the language. It is unrealistic for technical personnel to master French or to train a translator to be an electrical engineer within a short period of time. Besides, with the submission deadline (one or two months in most cases), how could translators accomplish the translation work accurately and efficiently? The following sections will briefly explain the preparatory works of translation, the extraction and unification of high-frequency word(s), and the translation methods in the face of electrical engineering terminology.

2. Preparatory works of translation

When setting up a translation team, the priority is in the selection of translators who have not only excellent French interpretation and translation skills but also a certain level of knowledge in the field of transmission

lines. In addition, translators must have a great capacity for learning and a humble and practical cooperative spirit. The translation process is generally task-oriented, with the two essential criteria of “efficiency” and “accuracy” being applied.

Once the translation team has been set up, a group leader shall be appointed, whose responsibility consists of going through all the files to be translated and sending out an outline of the tasks to the team members, who can then discuss their respective areas of expertise. For example, some translators may have experience in the field of power transmission, others may specialize in electrical substations, yet others may have a good grasp of civil works. It is essential to comply with the credo “The right person, doing the right thing.” Moreover, the group leader and team members need to communicate about the amount of daily translation and proofreading expected to be completed, the translation method, and other aspects. The final proposal shall be collated and sent to the team members for translation work. In short, the preparation stage of translation mainly involves the following five parts: the division of tasks, the selection and unification of translation tools, the extraction and unification of high-frequency word(s), terminology processing, and the discussion of post-translation proofreading methods.

3. Extraction and unification of high-frequency word(s)

Whether in French-Chinese translation or Chinese-French translation, it is common to encounter recurring word(s) or phrases. How can we define and unify “high-frequency word(s)”? If the translation team does not define the high-frequency word(s) in advance, there may be multiple translations. Incorrect or inaccurate translations are likely to lay down latent dangers for technical and commercial negotiations or even cause risks for future construction works. The six-step method proposed by Professor Shen Guanglin in the *Practice of French Translation for Engineering and Technology (Pratiques Traductives du Français des Technologies)* for the extraction and unification of high-frequency word(s) is strongly recommended. This method includes assigning translation works, reading through processing, identifying high-frequency word(s) or phrases using Transmate or manual search, setting frequency count criteria, determining word(s) or phrase(s) according to the criteria defined, translating high-frequency word(s) or phrases, and submitting them to the group leader for review and so forth, which will not be discussed in detail.

4. Translation methods of common technical terminology

Translators should pay close attention to technical terminologies, especially those appearing in high frequency. For example, in the process of translating the French *Proposition Technique du Projet d'Interconnexion de la Ville de Toamasina au Réseau Interconnecté d'Antananarivo (Technical Proposal of Grid Interconnexion Project between Tamatave and Antananarivo* in English; hereinafter referred to as the *Technical Proposal*) into Chinese, several terminologies were repeatedly encountered, and the original translation itself differed from those in the *Technical Proposal* (Table 1).

Table 1. Comparison between two target language translations (Chinese Pinyin)

Original language	Target language (Chinese Pinyin) translation in the literal meaning	Same target language (Chinese Pinyin) translation in the <i>Technical Proposal</i>
<i>bus</i>	<i>gōng jiāo chē</i>	<i>mǔ xiàn</i>
<i>intervalle</i>	<i>jiān jù</i>	<i>biàn diàn zhàn jiàn gé</i>
<i>pylône</i>	<i>zhī zhù</i>	<i>gān tǎ</i>
<i>contrainte</i>	<i>xiàn zhì</i>	<i>yìng lì</i>
<i>circuit</i>	<i>huán xiàn</i>	<i>huí lù</i>

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Original language	Target language (Chinese Pinyin) translation in the literal meaning	Same target language (Chinese Pinyin) translation in the <i>Technical Proposal</i>
<i>écartement</i>	<i>jiàn gé</i>	<i>dàng jù</i>
<i>armoie</i>	<i>yī guì</i>	<i>biàn diàn zhàn kāi guān guì</i>
<i>entrée</i>	<i>rù kǒu</i>	<i>jìn xiàn</i>
<i>sortie</i>	<i>chū kǒu</i>	<i>chū xiàn</i>
<i>bride</i>	<i>fǎ lán</i>	“U” <i>xíng xiàn jiǎ</i>
<i>chape tourillon</i>	<i>zhóu xíng zhī jià</i>	<i>zhí jiǎo guà bǎn</i>
<i>manchon de jonction</i>	<i>lián jiē</i>	<i>jiē xù guǎn</i>
<i>pince d’ancrage</i>	<i>máo dǐng jiǎ</i>	<i>nài zhāng xiàn jiǎ</i>
<i>corne d’amorçage</i>	<i>qǐ hú jiǎo</i>	<i>zhāo hú jiǎo</i>
<i>oeillets à rôtule</i>	<i>qiú wō huán</i>	<i>qiú tóu guà bǎn</i>

The target language has a clear professional leaning, and some are jargon exclusive to the field of the overhead transmission line. In view of this, when translating such terms for the first time, translators could, in addition to using online resources, talk with technical personnel, including designers, constructors, national electricity company consultants, and government energy resource departments, to improve the accuracy of the translation.

For instance, although the term *pince d’ancrage* literally means *máo dǐng jiǎ*, it has another term exclusive to the field of the transmission line. Translators could give a quick translation by “keyword retrieval + technique clarification.” Specifically, we can start by typing *pince d’ancrage* into the retrieval engine Bing (International version) and find the definition of *pince d’ancrage*: *Les pinces d’ancrage et les fixations sont utilisées en arrêt de ligne ou lorsqu’il y a changement de direction de câbles* (in English: Anchor clamps and fasteners are used in line stops or when there is a change in the direction of the transmission line). The result of the images search is shown in **Figure 1**.



Figure 1. *Pince d’ancrage* (*nài zhāng xiàn jiǎ* in Pinyin; photo source: <https://ines-max.com/?s=pince>)

After talking with the technical personnel, we can confirm that *pince d’ancrage* means *nài zhāng xiàn jiǎ*, which is mainly used for the connection of circuit terminals or conductor turn angle, thus conforming to the aforementioned clarification. As another example, *corne d’amorçage* is defined as *dispositif équipant généralement les isolateurs haute tension, composé d’éléments conducteurs courbés en vis-à-vis, et destinés, en cas de surtension, à créer un arc ailleurs qu’à travers l’isolateur, empêchant ainsi sa destruction par l’arc*, which means a high-voltage relay protection device that prevents damage to insulating devices caused by electric arcs. In conjunction with the drawings (**Figure 2**) and the comments given by a technical engineer, *corne d’amorçage* is a type of insulator protection device used in the construction of overhead transmission lines. Based on this, *corne d’amorçage* is translated into *zhāo hú jiǎo*.

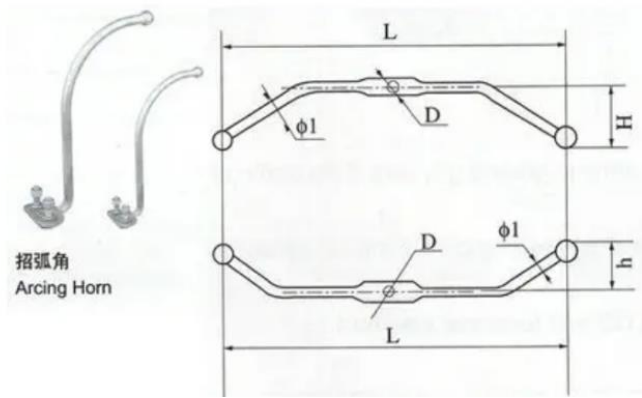


Figure 2. *Corne d'amorçage* (zhāo hú jiǎo in Pinyin; photo source: https://www.jdzj.com/jiage/1_2_3686181.html)

5. Translation methods for technical terminology with multiple modifiers

When translating terminologies with multiple modifiers in conjunction with the propositions provided by technical personnel, the translation could be preceded by the following procedures: orientation and segmentation, identification, and fusion of translation of the segmented part using “Linguee + image retrieval.”

Specifically, orientation and segmentation involve positioning technical term(s) formed by multiple modifiers and their head word(s), stripping these modifiers and headword(s) according to sense group, and attempting to translate each stripped component. When translating *Technical Proposal* (French-Chinese), Linguee and online image retrieval functions are used to enhance the translation. The former is an online multilingual translation platform that could assist users in comparing the original language with the target language through various options like word explanations, example sentences, and related references cited, while the latter could facilitate the comprehension of translation via visualization. For instance, the phrase *le transformateur de courant de l'huile inversé*, which appears several times in *Technical Proposal* (*Substation Construction Section*), could be segmented into *le transformateur de courant* (head word) and *de l'huile inverse* (modifier). Through retrieval on Linguee, we find that the headword *le transformateur de courant* is mostly translated into “current transformer” (highlighted by primrose yellow on the right in Figure 3).

External sources (not reviewed)

Le transformateur de courant différentiel mesure la disparité du courant entre le départ et les câbles de retour pour un [...] <small>↳ reo.de</small>	The differential current transformer measures the current disparity between the outgoing and return cables in single or three-phase supplies. <small>↳ reo.</small>
Toutefois, l'EMN mesurant le courant de chaque phase, on peut aisément savoir si le transformateur de courant a été débranché et à quel moment. <small>↳ lem.fr</small>	However, the EMN measure the current on each phase which will tell immediately if the CT is disconnected and when. <small>↳ lem.</small>
Il est donc indispensable de tester et d'étalonner le transformateur de courant, car la précision de l'ensemble de la chaîne [...] <small>↳ omicron.at</small>	It is therefore essential to test and calibrate the metering current transformer, as the entire metering chain is only as accurate [...] <small>↳ omicron.</small>
[...] soigné de la boucle de régulation, tandis que le transformateur de courant intégré permet de surveiller directement la charge [...] <small>↳ gefran.in</small>	The LBA alarm carefully controls the control loop, while the on board current transformer lets you directly monitor the load and activate the [...] <small>↳ gefran</small>
Raccord à fiche pour le transformateur de courant de l'option "Current-Limit" (montage par l'usine). <small>↳ soft-start.ch</small>	Plug-in connection for the current transformer for the current limit option (installed at the factory). <small>↳ soft-start.</small>
⚠ Le photomètre et le transformateur de courant (adaptateur secteur) sont livrés dans un carton. <small>↳ hemocue.no</small>	⚠ The photometer and a transformer (battery eliminator) are delivered in a carton. <small>↳ hemocue.</small>
⚠ Entrée analogique 3 ; le transformateur de courant pour la phase 3 doit être connecté aux broches 10 et 2 (commun). <small>↳ www05.abb.com</small>	⚠ Analog input 3; the current transformer for phase 3 must be connected on pins 10 and 2 (common). <small>↳ www05.abb.cc</small>
⚠ Le transformateur de courant externe est branché avec le relais antichoc série « SS » afin d'offrir une protection contre [...] <small>↳ tsubaki.ca</small>	⚠ The external current transformer is wired together with the "SS" series shock relay to provide overload protection for applications [...] <small>↳ tsubaki.</small>

Figure 3. Bilingual (French-English) retrieval mode on Linguee (photo source: <https://www.linguee.com/english-french/search?source=auto&query=le+transformateur+de+courrant>)

Its modifier *l'huile inverse* is related to *huile* (oil) and *inversé* (inverted). Therefore, the complete translation can be tentatively identified as an “oil inverted current transformer.” However, the accuracy of the translation is debatable; the only thing that can be certain is that the current transformer might contain oil and be inverted. Hence, two translation forms could be deduced: *dào zhì shì chōng yóu diàn liú hù gǎn qì* and *yóu jìn dào lì shì diàn liú hù gǎn qì*. In order to improve the accuracy of the translation, these two translations should be typed into Bing (Chinese version) for image retrieval. The results are displayed in **Figure 4**.



Figure 4. *Transformateur de courant de l'huile inverse* (*yóu jìn dào lì shì diàn liú hù gǎn qì* in Pinyin; photo source: <https://cn.bing.com/images/search?q=%e6%b2%b9%e6%b5%b8%e5%80%92%e7%bd%ae%e5%bc%8f%e7%94%b5%e6%b5%81%e4%ba%92%e6%84%9f%e5%99%a8&form=HDRSC2&first=1>)

Through meticulous observation, the interpretation below almost every image is *yóu jìn dào lì shì diàn liú hù gǎn qì* instead of *dào zhì shì chōng yóu diàn liú hù gǎn qì*. Therefore, it is presumed that the former is more appropriate. Along with the clarification from technical personnel, it is confirmed that the phrase can be translated into *yóu jìn dào lì shì diàn liú hù gǎn qì*.

In another example, although there are more modifiers in the phrase *le parafoudre à oxyde métallique sans éclateurs pour réseaux à courant alternatif* than the previous one, the head word can be easily found: *parafoudre*. After positioning it, the modifier is split into three parts according to the position of the preposition: the first part *à oxyde métallique*, the second part *sans éclateurs*, and the third part *pour réseaux à courant alternatif*. After combining these three parts, the term can be tentatively identified as *jiāo liú wú huǒ huā jiàn xì jīn shǔ yǎng huà wù bì léi zhēn*. After typing it into Bing (Chinese Version), the most frequently appearing keyword is *jiāo liú wú jiàn xì jīn shǔ yǎng huà wù bì léi qì*. The image retrieval results are shown in **Figure 5**.



Figure 5. *Parafoudre à oxyde métallique sans éclateurs pour réseaux à courant alternatif* (*jiāo liú wú jiàn xì jīn shǔ yǎng huà wù bì léi qì* in Pinyin; photo source: <https://cn.bing.com/images/search?q=%e4%ba%a4%e6%b5%81%e6%97%a0%e9%97%b4%e9%9a%99%e9%87%91%e5%b1%9e%e6%b0%a7%e5%8c%96%e7%89%a9%e9%81%bf%e9%9b%b7%e5%99%a8&form=HDRSC2&first=1>)

Entering *le parafoudres à oxyde métallique sans éclateurs pour réseaux à courant alternatif* into Bing (International version) for image retrieval, the retrieval result shows a high similarity between these two retrievals, which undoubtedly increases the accuracy of the translation. Along with clarification from technical personnel, *parafoudres à oxyde métallique sans éclateurs pour réseaux à courant alternatif* is translated into *jiāo liú wú jiàn xì jīn shǔ yǎng huà wù bì léi qì*. It is worth noting that *éclateur* is herein translated into *huǒ huā xì* instead of *jiàn xì*. Although technical personnel could assist in consolidating the accuracy of the translation, it is still important for translators to be highly competent. It is important for translators to pay close attention to the whole translation process, as the accuracy of translation directly affects the judgment of technical staff and an inaccurate or incorrect translation is likely to cause communication issues, resulting in a deadlock. Moreover, technical personnel and translators are often not situated in the same country, and jet lag would undoubtedly cause communication lag. Hence, it is not recommended to burden the technical staff with the clarification work.

6. Conclusion

Based on the aforementioned methods, the image-text retrieval mode in conjunction with suggestions from technical personnel plays an important role in engineering translation, with word(s) retrieval alone being insufficient. Although computer-assisted translation tools have been developing rapidly in recent years, the engineering translation industry still exists because most of these tools can only provide auxiliary referential support. For instance, when dealing with large and complex translation projects in domains like biomedicine, law, economics, engineering, *etc.*, two fatal flaws are exposed: these tools are unable to generate corpus (corpora) spontaneously nor provide translators with effective translation methods. Therefore, engineering translators are still in demand. Furthermore, unlike ordinary translators, engineering translators must have information retrieval ability, translation processing skills, interdisciplinary communication skills, and rapid self-learning ability. In addition, it is strongly recommended for a qualified engineering translator to establish a personalized system of translation processing. That being said, once translation works have commenced, the translator should know which “preferred” retrieval engine(s), translation tool(s), and translation methods should be used and who should be inquired in case of failure of translation processing. Undoubtedly, greater professional experience and profound self-reflective consciousness will inject new vitality into the enhancement and innovation of translation processing methods, and the improvement of translation accuracy and efficiency will increase the chances of winning bids in francophone countries.

Disclosure statement

The author declares that she has no relevant or material financial interests that relate to the research described in this paper.

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