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Corpus-based Research on Marine Electrical and Electronic Professional English Translation Teaching

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Abstract: *Marine Electrical and Electronic Professional English (ESP) is a core course for marine electrical and electronic engineering in maritime colleges and universities, and a required subject for the Certificate of Competency of Marine ETO (Marine Electro-technical Officers) in sea going ships. This paper establishes a 1 million word corpus of marine electrical and electronic English, which represents this particular professional English. The author applies this corpus to translation teaching: professional vocabulary is retrieved by computer, various translations and usages of professional vocabulary are explained in detail according to the contextual adaptation theory. Different original English materials about the same content can be retrieved through the corpus, and students can learn translation by comparison.*

Keywords: *Corpus, Marine Electrical and Electronic English, Translation teaching research*

1. Introduction

In 2010, IMO held a conference in Manila and revised the STCW Convention—International Convention on Standards of Training, Certification and Watchkeeping for Seafarers). The amendment requires ETOs (Marine Electro-technical Officers) to be able to communicate in English, read manuals in English, maintain and manage shipboard equipment, and fill ship logs and maintenance plans in English. In addition, the Maritime Safety Administration of China has revised the existing seafarers' competency certificate examination syllabus, which came into effect on January 1, 2018. The new syllabus also sets higher requirements on the practical application ability of English for ETO. Traditional teaching has been unable to meet the needs of current requirements.

Corpus is a special tool for language material retrieval and statistics. It consists of a large number of collected written words and is stored and processed by computer. Its biggest feature is that it can quickly provide a large number of real language materials and carry out relevant statistical analysis. In recent decades, with the development of computer technology, great breakthroughs have been made in the research and creation of English corpus, which has become a cross-century and interdisciplinary emerging discipline. According to the statistics of J. Edwards, a linguist of University of California in the United States, there are more than 50 kinds of corpus built and put into use in the world. Among them, the British National Corpus (BNC), The English Scientific Papers Corpus (NESS) and the International English Corpus (ICE) are famous. In China, the establishment of English Corpus for Special Purpose (JDEST), presided over by Prof. Renjie Huang and Prof. Huizhong Yang of Shanghai Jiao Tong University in 1982, marked the beginning of English corpus research in China. Over the past three decades, China has built dozens of large English corpora and published thousands of relevant academic papers, making remarkable achievements[1].

However, there are only a few corpora on Chinese marine vessels. We found that there are only "Marine Treaty English Corpus" (MTEC), "Marine Engineering English Corpus" (MEEC), etc. In the professional field of Marine Electrical and Electronics Engineering, there is no such corpus in China.

2. Create a Marine Electronic and Electrical Professional English Corpus

There is a general consensus that a corpus of one million words is usually enough to conduct most language studies on vocabulary, grammar, discourse and so on. The ship Electrical and Electronic English corpus established by this project contains a little more than one million bytes to represent the corpus of this subject.

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The author collected both paper and electronic textbooks and periodicals of marine electronic and electrical professional English at home and abroad, and ship instructions. The contents mainly include four aspects: ship electricity, ship automation technology, ship computer network, ship communication and navigation equipment, which covers a large number of modern new knowledge systems. The author scanned paper versions of marine electronic and electrical professional English textbooks and periodicals, converted the scanned copies, electronic pictures or web pages into TXT formats, and identified the pictures and words. The electronic picture or web format of the corpus were converted into TXT format, the pictures, tables and other non-text symbols were deleted, only the English part were retained. Then text content calibration and expert argument were carried out to ensure low error rate and accuracy of the corpus. There are 1,008,433 words for the final Marine Electronic and Electrical English corpus, which has the general characteristics of marine electronic and electrical English[2].

3. Corpus-based Translation Teaching of Ship Electrical and Electronic English

There is a huge gap between the professional language samples involved in class and the language facts used in real work life. It is difficult to memorize the vocabulary of Marine Electrical and Electronic English, and understand the text reading. Through computer software programming, the author extracted high-frequency professional words, so that students can memorize them more easily and effectively. In the process of translation teaching by multimedia teaching in corpus, the teacher can expand the professional language materials, showing a large number of standard English materials timely so that the students can clearly understand each word, and contact the original marine electrical and electronic professional English as widely as possible to, which helps to improve the students' ability of fast reading and translation.

3.1 Corpus-based Professional Vocabulary Teaching

Table 1: Marine Electrical and Electronic English Vocabulary (part)

feedback	GPS: global positioning system
loop	DGPS: differential global positioning system
comparator	VHF: very high frequency
instigate	HF: high frequency
output	DSC: digital selective calling
indicator	AIS: automatic identification system
regulator	VDR: voyage data recorder
integral	MSI: maritime safety information
deviation	ECDIS: electronic chart display and information system
offset	EPIRB: emergency position indication radio beacon
sustained	Inmarsat: international maritime satellite organization
corrective	ITU: the international telecommunication union
represent	NCS: network co-ordination station
remote	ADE: above deck equipment
proportional	LES: land earth station
derivative	SES: ship earth station
magnitude	SCC: satellite control center
simulation	CES: coast earth station
manual	RCC: rescue co-ordination center
viscosity	SART: search and rescue radar transponder
control	NAVTEX: navigational telex
transmission	NBDP: narrow band direct printing
signal	PA system: public address system
designate	GOC: general operator's certificate
automotive	ETO: electro-technical officer
detector	IEC: international electro-technical commission
sensor	SOLAS: the international convention for the safety of life at sea

Marine electrical and electronic English belongs to English for science and technology, which on one hand contains a large number of professional vocabulary, on the other hand the professional vocabulary is in a limited range. Through computer software programming, the author extracted a total

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of about 800 high-frequency professional words for students to memorize. After memorizing these professional words, the learning of text translation becomes much easier.

By computer programming, 794 high-frequency vocabulary was extracted from marine electrical and electronic English corpus, including 5 parts: 247 marine electrical professional words, 120 ship automation professional words, 120 ship computer professional words, 120 marine communication and navigation professional words, 68 abbreviations, and 119 marine management and international conventions professional words. These words were sorted out and sent to students to memorize. The teacher was in charge of checking their memorization: randomly select 10 words from each part of the vocabulary, all correct answers will be regarded as passing, so as to ensure that each student can fully memorize all these 794 professional words.

Part of Marine Electrical and Electronic English Vocabulary are listed, as shown in Table 1.

3.2 Teaching and Learning Professional Vocabulary in Context

From the perspective of teachers' teaching and students' independent learning, a large number of examples of words, collocation or authoritative marine electrical and electronic professional English terms can be obtained by computer retrieval, so that each word and sentence can be better understood and used.

Before class, teachers can also assign some new words for students to search in the corpus by themselves. In class, teachers can search professional words by computer and explain in detail the various translation usages of professional words in different sentences according to the theory of contextual adaptation. New words are learned and consolidated in various contexts of corpus.

For example, the word "secure" is programmatically retrieved through computer. We can get multiple sentences with "secure": because it's difficult to find a *SECURE* way to exchange the encryption key.

Be sure you *SECURE* the phone correctly when you are through talking.

Field poles are constructed of laminated sheets of steal and *SECURE* to the machine frame.

SECURE and tag the supply circuit breaker in the open position.

it's the responsibility of a Ship-LAN network administrator to keep the computer network *SECURE* from these threats.

network administrators is to *SECURE* the Ship-LAN networks.

All electrical appliances must be firmly *SECURED* and served by permanent connections.

the Master in maintaining the *SECURITY* of the ship is not constrained by the Company.

Requires that ships must have a ship *SECURITY* alert system,

A number of minimum functional *SECURITY* requirements are set for ships and port facilities.

The Convention aims to achieve both decent work for seafarers and *SECURE* economic interests in fair competition for quality shipowners.

SECURE that the machine will function reliably without any unforeseen actions.

Based on the contextual adaptation theory, the teacher explains in detail the various translations of the professional word *secure*. Contextual adaptation restricts the choice of meaning, that is, we have to choose the correct meaning from multiple dictionary meanings of a word. There are many polysemy phenomena in English. "Language in life is full of ambiguity and omission. How to eliminate ambiguity and how to supplement omitted information depends on context to a great extent." (Jean Stiwell Peccei, 1999) In the translation process, how to choose the correct meaning from multiple meanings should conform to the context relationship, so as to make the choice of meaning conform to the context, which reflects the stylistic translation style of Marine Electrical and Electronic English, and accurately understand the meaning of electrical and electronic English. For example, the dictionary meanings of the word "secure" include "safe, to make something safe, to cut off the electricity, to make sure, to guard against terrorism", etc. The following sentences are with "secure":

1) It's difficult to find a *secure* way to exchange the encryption key.

2) Be sure you *secure* the phone correctly when you are through talking.

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3) *Secure* and tag the supply circuit breaker in the open position.

4) *Secure* that the machine will function reliably without any unforeseen actions.

In the above sentences, according to "find a secure way" in sentence 1), "secure" should be translated into "safe". In sentence 2), in accordance with the phrase "secure the phone", it's inferred that "secure" should be translated into "to make something safe". While in sentence 3), "secure" is followed by "supply circuit breaker", we can assume that it's relevant to electrical information. Based on the contextual adaptation theory, "secure" should be equal to "cut off the electricity". In sentence 4), "secure" is followed by an attributive clause, and should be translated into "make sure". These four meanings are also the common meanings of the word "secure" in Marine Electrical and Electronic English. The translator should adapt to the context, conform to the scientific and technological context of Marine Electrical and Electronics Engineering English, and determine the correct word meaning according to the specific context [3-4].

3.3 Corpus-based English Discourse Teaching

In former teaching class, there is a huge gap between the English language samples of Marine electrical and electronic English and the language that students are exposed to in practical work after boarding the ship. Besides, the English foundation of vocational students is relatively weak. Therefore, in the process of teaching, by the use of corpus in multimedia, the marine electrical professional English language materials are expanded, the teacher can timely show a large number of marine electrical professional English materials, so that the students are able to contact the original marine electrical professional English materials as widely as possible, and contact with the different expressions about the same content. All those can help college students to consolidate and improve their ability of fast reading and translation of real materials.

For example, when teaching the Automatic Identification System, the teacher can search the Ship Electrical and Electronic Professional English corpus in the teaching process, and show the different original English corpus paragraphs about the Automatic Identification System to the students in time on PPT:

TEXT 1: The Automatic Identification System

Each AIS transponder consists of one VHF TDMA transmitter, two VHF TDMA receivers, one VHF Digital Selective Calling (DSC) receiver, and links to shipboard display and sensor systems via standard marine electronic communications. Timing is vital to the proper synchronization and slot mapping (transmission scheduling). Therefore, every unit is required to have an internal time base, synchronized to a global navigation satellite system (e.g. GPS) receiver. This internal receiver may also be used for position information. However, position is typically provided by an external receiver such as GPS. Other information broadcast by the AIS, if available, is electronically obtained from shipboard equipment through standard marine data connections. Heading information, position (latitude and longitude) and speed over ground (SOG) are normally provided by all ships equipped with AIS. Other information, such as angle of heel, pitch and roll, destination, and ETA may also be provided.

An AIS transponder normally works in an autonomous and continuous mode, regardless of whether it is operating in the open seas or coastal or inland areas. AIS transponders use two different frequencies, VHF maritime channels 87B (161.975 MHz) and 88B (162.025 MHz), and use 9.6 Kbit/s Gaussian minimum shift keying (GMSK) modulation over 25 or 12.5 kHz channels using the High-level Data Link Control (HDLC) packet protocol. Although only one radio channel is necessary, each station transmits and receives over two radio channels to avoid interference problems, and to allow channels to be shifted without communications loss from other ships. The system provides for automatic contention resolution between itself and other stations, and communications integrity is maintained even in overload situations [5-6].

TEXT 2: Shipborne Automatic Identification System (AIS)

AIS is included in the Safety of Life at Sea (SOLAS) Convention, and large ships began fitting AIS in July 2002. AIS transmits, automatically and at set intervals, dynamic information relating to the ship's course, speed and heading; static information related to the ship's name, length, breadth; and voyage-related details such as cargo information and navigational status (e.g. underway or at anchor).

Put simply, the Automatic Identification System (AIS) is a Very High Frequency (VHF) radio broadcasting system that transfers packets of data over the VHF data link (VDL) and enables

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AIS-equipped vessels and shore-based stations to send and receive identification information that can be displayed on a computer or chart plotter.

Especially when used with appropriate graphical displays, this information can help in situational awareness and provide a means to assist in collision avoidance. AIS transceivers can be found interfaced to radars and ECDIS (Electronic Chart Display and Information System) displays. When interfaced to a radar, AIS can be a source of target information, in addition to conventional ARPA (Automatic Radar Plotting Aid). AIS fitted to real (physical) aids to navigation such as floating buoys and beacons. AIS base stations can broadcast a non-physical "synthetic" AIS A to N to appear at the location of a real (physical) A to N on an AIS-enabled display system (e.g. AIS, ECDIS or radar). AIS base stations can also broadcast a non-physical "virtual" AIS A to N at a particular location when no real (physical) A to N exists.

TEXT 3: The Automatic Identification System

All ships of 300 gross tonnage and upwards engaged on international voyages and cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships irrespective of size shall be fitted with an automatic identification system (AIS), as follows:

1) Ships constructed on or after 1 July 2002;

2) Ships engaged on international voyages constructed before 1 July 2002;

2.1) In the case of passenger ships, not later than 1 July 2003;

2.2) In the case of tankers, not later than the first survey for safety equipment on or af¬ter 1 July 2003;

2.3) In the case of ships, other than passenger ships and tankers, of 50,000 gross ton¬nage and upwards, not later than 1 July 2004;

2.4) In the case of ships other than passenger ships and tankers, of 300 gross tonnage and upwards but less than 50,000 gross tonnage, not later than the first safety equipment survey after 1 July 2004 or by 31 December 2004, whichever occurs earlier; and

3) Ships not engaged on international voyages constructed before 1 July 2002, not later than 1 July 2008;

4) The Administration may exempt ships from the application of the requirements of this paragraph when such ships will be taken permanently out of service within two years. after the implementation date specified in subparagraphs 2 and 3.

As can be seen from the three paragraphs, the definition and introduction of Automatic Identification System are similar in meaning, but the expressions used are completely different. The use of corpus expands language materials. Students can better learn the source language of English and improve their understanding and translation skills of Marine Electrical and Electronic English through comparative study of the three paragraphs.

4. Conclusion

Marine Electrical and Electronic English got distinct professional characteristics, so teachers should adopt appropriate teaching method according to its professional and language characteristics to meet specific teaching requirements and teaching objectives, complete teaching tasks and improve teaching effects. The corpus-based teaching method is a reform of the traditional teaching mode, which shows the professional vocabulary and discourse of Marine Electrical and Electronic English in a more scientific and data-oriented way, so that students can Learn more effectively[7].

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