

Technical and Scientific Translation: Petroleum Engineering

*Compositional analysis of Colombian heavy crude oils subjected to the catalytic
aquathermolysis process as a recovery method at laboratory level*

Degree work to opt for the title of: Bachelor of Foreign Languages with an emphasis on English

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Table of Contents

	Pag.
Introduction.....	9
1. Objectives	16
1.1. General objective	16
1.2. Specific Objectives	16
2. Body of the Paper.....	17
2.1. Theoretical Framework.....	17
2.1.1 Differences between technical and scientific translation.....	17
2.1.2. Translation Approaches.....	18
2.2 Activities carried out during the internship project	25
2.2.1. Pre-translation process	25
2.2.2 Translation and proofreading process: challenges and coping strategies.....	28
3. Conclusions and Project Evaluation	38
References.....	41
Appendixes	45

Table List

	Pag
Table 1 <i>Selling apartments to foreigners in Spain</i>	22
Table 2 <i>Short translation brief</i>	22
Table 3 <i>Analysis of functionalist translation</i>	23
Table 4 <i>Problem-solving in translation I</i>	36
Table 5 <i>Problem-solving translation II and proofreading</i>	37

Figure List**Pag**

Figure 1 <i>Translation types within functionalism (Nord, 1997, p. 49)</i>	21
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Appendix List

	Pag.
<i>Appendix A Translation Brief</i>	45
<i>Appendix B Matrix of parallel texts</i>	46
<i>Appendix C Glossary extract.....</i>	47

Abstract

Title: Technical and Scientific Translation: Petroleum Engineering¹

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Key Words: *Translation, Proofreading, Translation Approaches, Technical and Scientific Translation.*

Description:

This internship project aimed at the application of the theoretical and procedural knowledge needed for the translation of technical and scientific texts in the field of Petroleum Engineering. Hence, three main translation approaches were considered in order to inform and guide the translation process as well as helping with the solution of potential translation challenges. These approaches were: The Equivalent Effect (Nida, 1964), the Functionalist Approach (Nord, 1997) and Translation Competence (Hurtado, 2017). The application of these approaches enabled the production of high-quality target texts through the translation of utterances (translation units), which did not interfere with the meaning and the function of the source texts. Furthermore, before the translation and proofreading processes, the pre-translation phase consisted of training sessions needed to develop the skills required as translators to approach each text. Thus, two research articles were translated, and one was proofread and edited. Different challenges such as linguistic interference, grammar and writing style, as well as terminology inconsistency were encountered. Finally, there was an approximated experience to corpus/document analysis experience through the research of parallel texts in order to get familiar with the field of knowledge, text typology, target audience, among other aspects identified in the translation brief.

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Resumen

Título: Traducción Técnica y Científica: Ingeniería de Petróleo*

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Palabras Clave: Traducción, Revisión, Enfoques de traducción, Traducción Técnica y Científica.

Descripción:

El objetivo de este proyecto de pasantía fue aplicar los conocimientos teóricos y procedimentales necesarios para la traducción de textos técnicos y científicos en el campo de la Ingeniería de Petróleos. Por esta razón, se consideraron tres enfoques principales de traducción con el fin de respaldar el proceso y resolver posibles desafíos de traducción. Los enfoques considerados fueron: el Efecto de Equivalencia (Nida, 1964), el Funcionalismo (Nord, 1997) y las Competencias de Traducción (Hurtado, 2017). La aplicación de estos enfoques permitió la producción de textos meta de alta calidad a través de la traducción literal de enunciados (unidades de traducción), sin interferir con el significado y la función de los textos fuente. Además, antes de los procesos de traducción y corrección, la fase de pre-traducción consistió en sesiones de capacitación, necesarias para el desarrollo de las habilidades requeridas como traductores antes de abordar cada texto. Dentro del proyecto se tradujeron dos artículos de investigación, y uno más fue revisado y editado. Durante los procesos de comprensión y traducción, se encontraron diferentes desafíos relacionados con interferencia lingüística, gramática y estilística, así como inconsistencia terminológica. Finalmente, se tuvo una experiencia aproximada al análisis de corpus mediante la búsqueda de textos paralelos, con el fin de familiarizarse con el campo de conocimiento, tipología textual, público objetivo, entre otros aspectos identificados en el encargo de traducción.

* Trabajo de Grado.

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Introduction

The Enhanced Oil Recovery research group (GRM for its initials in Spanish), which belongs to the School of Petroleum Engineering, resulted from the Technological Cooperation Agreement No 004 among the Instituto Colombiano del Petróleo (ICP, for its initials in Spanish), Ecopetrol S.A., and the Universidad Industrial de Santander (UIS) in 2004. At first, this agreement was intended to last for 4 years. However, in 2008, the UIS-ICP agreement was renewed for 4 years more due to the good results obtained by the research group. Years later in 2013, Ecopetrol S.A. signed a new agreement as a result of the strong research ties developed by the parties. In addition to this, the research group obtained a patent for radial displacement equipment EDR3; therefore, innovating in this research area. In 2016, the UIS-ICP agreement turned into an alliance with Ecopetrol S.A. due to the common interests which lied in both scientific research and academic production. Also, the group received the ECP National Award for innovation the same year. In the next year, Colciencias acknowledged the Enhanced Oil Recovery research group (GRM) as a Category A group.

On the one hand, the group's mission is to train scientists with a high ethical, technical and professional quality. Focused on the production and expansion of knowledge, the active participation in academia as well as in the construction of a research culture centered on the development and adaptation of technologies for the enhanced recovery of hydrocarbons, which allow increasing the reservoirs of the resource worldwide. On the other hand, the group's vision is to obtain recognition as research leaders in the analysis, development, and technical and financial evolution of projects of the enhanced oil recovery (EOR), with an infrastructure of high-

quality laboratories, supported by both students and professionals trained in the evaluation, development, modeling, and simulation of processes of hydrocarbons' enhanced recovery.

Currently, the Enhanced Oil Recovery research group's work focuses on the following research lines: air injection, steam injection, polymer injection, surfactant injection, water injection, miscible injection, computed tomography, integrated reservoir management, and scaling of EOR processes. These research lines seek improvement for crude oil extraction methods, management, supervision, and optimization of extraction processes. Additionally, the research group has a total of 46 published articles to date, which mainly follow the research lines of air, water, steam, miscible, and chemical injection. Furthermore, the group's director is MSc. Samuel Fernando Muñoz Navarro, full-time professor at the School of Petroleum Engineering. Other active professors of this research group are the following: Ph.D. Maika Karen Gambus, Ph.D. Viatcheslav Kafarov, Ph.D. Ronald Alfonso Mercado Ojeda, and Ph.D. Adan Yovani León Bermúdez, who is also the co-director of this translation internship project. Last but not least, the group also counts on the participation of Ecopetrol professionals and both undergraduate and postgraduate students from the Capital Semilla Program.

The internship translation project was carried out in conjunction with the SETRA Semillero Translation Group, which belongs to the School of Languages of Universidad Industrial de Santander. In addition, this internship focused on the execution of a Scientific and Technical Translation project within the field of Petroleum Engineering: *Compositional Analysis of Colombian heavy crude oils subjected to the Catalytic Aquathermolysis process as a recovery method at laboratory scale*. This internship research/translation project was directed by Professor Heidy Alegría Gutiérrez León, from the School of Languages, and co-directed by Professor Adan Yovani León Bermúdez, from the School of Petroleum Engineering. Consequently, the

purpose of this internship project was to set the foundations for interdisciplinary work, as well as strengthening and maintaining collaboration among different fields of knowledge. For that reason, the interns were expected to carry out bidirectional translations, that is from English to Spanish and from Spanish to English, of academic articles, research studies, abstracts, and other technical and scientific texts to be published or that will help to disseminate the knowledge produced by the GRM research group.

Justification

Although in the last twenty years literary translation has doubled the academic attention received compared to technical translation (BITRA, 2001-2015), the social importance of technical and scientific translation is such that in today's globalized world, these constitute the vast majority of what is translated worldwide (Gamero & Hurtado, 1999, p.9). In the linguistic combinations of these types of translations, English has overwhelmingly become the lingua franca. Therefore, it is becoming more frequent to see that this is the language from which and to which translation is carried out (Franco Aixelá, 2015, p.2). Translators then must respond to a variety or modality of technical translations, some of them being the translation of written texts or technical audiovisual translation, for example, a video about the coffee production process. Also, a sight translation of technical texts and liaison, simultaneous or consecutive interpretation for companies in meetings or training courses, as well as the reverse technical translation (Gamero, 2005, p. 1086). Hence, this internship translation project explores the multiple models of translation competence referring to the applicable aspects in scientific and technical translation (Hurtado, 2001, p.191), such as linguistic competence, extralinguistic competence, and the professional competence or work style. First, the linguistic competence seeks understanding in the source language (Spanish) and producing in the target language (English). Second, the extralinguistic competence deals with

cultural and thematic knowledge. Finally, the professional competence or work style consists of making good use of documentation, research, and computer tools necessary both to document and speed up the translation guaranteeing terminological uniformity (Franco Aixelá, 2015, p.23) as well as to solve the problems encountered in the development of the translation process.

Methodological approach

Translators need to consider their target audience's previous knowledge. A text that provides too little new information lacks interest just as a text that presents too much new information is hard to understand or even incomprehensible. In translation, the referential function relies on shared knowledge between the author and the target audience, where new information is always preceded by a reference to something known by the readers (Nord, 2014, p. 40) meaning that for a text to work in a certain way within the target culture, translators have to adjust to the norms and conventions of this audience. This translation project used this as its main function, as we bore in mind how knowledgeable our target audience was through the description of techniques such as the steam injection with addition of naphtha and its materials considering only the terminology used in the field of hydrocarbon industry as shown in the example.

“temperatura operacional, tiempo de residencia, agente químico añadido y su concentración, tipo de prueba y equipo empleado, gas de presurización y comportamiento del análisis composicional S.A.R.A (Saturados, Aromáticos, Resinas y Asfaltenos).”

“operating temperature, residence time, added-chemical agent and its concentration, type of test and equipment, pressurization gas, and behavior of the SARA compositional analysis (Saturates, Aromatics, Resins and Asphaltenes).”

In order to make sure that the texts reach the target audience, this project has been guided by three main translation approaches. In the following lines, the notions of ‘Functionalism’, ‘Equivalence’ and ‘Competence’ will be put forward. These notions set the foundations and guided translation processes for this project. First, the functionalist approach. This approach claims that

the translator needs to create a bridge between the gaps (Nord, 1997, p. 43) by collecting as much information as possible about the communicative purposes, the target text is supposed to achieve; in the case that source and target audiences do not share the same amount of previous knowledge, the translator must provide additional information.

Second, the formal equivalence approach puts forward the idea that translations need to reveal the original text in its true context, to the farthest extent possible. This approach is characterized by the accuracy and the correctness of its texts, essential in scientific translation. Thus, the translator's concern is that the message in the target language matches as closely as possible the different elements in the source language. In Nord (1997, p. 52), the notion of equifunctional translation can be compared with the equivalence principle which is widely demanded in the academic environment and also intends the audience to gain a closer look into the language and culture of the source text. Examples of this principle in this internship project are:

Este comportamiento exhibido en los datos a través de los años puede ser observado en la tendencia del aumento que se presentan en los análisis de cuartiles de los grupos.

This behavior exhibited in the data through the years can be observed in the increasing trend presented in the analysis of quartiles of the groups.

El uso de gráficos de frecuencia permite identificar las tendencias que presentan las variables de proceso como parámetros importantes en el uso de la tecnología de acuatermolólisis catalítica.

The use of frequency graphs allows the identification of trends presented by the process variables as important parameters in the use of catalytic aquathermolysis technology.

Third, the notion of translation competence (Hurtado, 2017, p.10) also makes part of the translational foundations of this project. This approach aims to distinguish the translator from any other bilingual person who is not a translator. It entails the description of the abilities and resources translators require to solve problems (Ibid). Thus, there are two main types of resources that may help translators to perform in a professional setting (Alves, 1997, p.31, as cited in Hurtado 2017, p. 10). First, the internal support. This gives account for the automatized and non-automatized

cognitive resources; for instance, spontaneous or immediate solutions that are not found in source-text segments but rather rely on the translator's knowledge and experience. Second, the external support. This involves all manners of information resources such as the parallel texts and the glossaries included in our internship project.

Documentation

Generally, translation is done 'by assignment'. The person who requests the translation (client) defines the conditions under which the target text should carry out its particular function. The client describes or comments on the purpose, the addressees (target-audience), time, place, and the function the text is intended to have. This information constitutes a translation brief (See Appendix A); however, this brief does not work as a guide for the translators on how to start their translating job or what approaches to use (Nord, 2014, p.30). These decisions depend entirely on the translator's competence and responsibility.

In translation, the *skopos* (Greek word to determine purpose) distinguishes three different kinds of purposes: the translator's general purpose, the communicative purpose, and the purpose aimed by the certain methodology used (Nord, 2014, p.27). Nevertheless, the term *Skopos* usually refers to the purpose of the target text, meaning that function is given by the receivers, who may use the text according to their own needs, expectations, and previous knowledge.

Either explicitly or implicitly, the translation brief must also contain information regarding the target-text addressees, the time and place of text reception, the medium over which the text will be transmitted, the motive for the production or reception of the text, and the text function(s) (Nord, 2014, pp. 60). The function of a text is understood as the intention meant from the receiver's point of view who should be able to understand the target text and interpret it as this is coherent with their own communicative situation and culture (Du, 2012, p. 2189). Thus, the translator should not

expect to offer the same amount of information as the source-text producer, yet the translation must be adequate to the requirements of the brief and equivalent by serving the same communicative function or functions as the source text:

De igual manera cabe resaltar que estas tendencias son de tipo cualitativo, teniendo en cuenta que las muestras empleadas en el desarrollo del estudio no presentan similitudes entre ellas. Por otra parte, aunque existen diferentes tendencias los resultados permiten evidenciar que los catalizadores juegan un papel importante en las propiedades fisicoquímicas del crudo mejorado.

Similarly, it is worth mentioning that these trends are qualitative, considering the fact that the samples used in the development of the study do not share similarities between them. On the other hand, and even though there are different trends, the results show that catalysts play a very important role in upgraded crude oil physicochemical properties.

The analysis of parallel texts is also proof that a specific grammatical function is expressed differently in source and target texts. According to Floros (2014, p.2), parallel texts resemble one another not only in the topic they discuss but also in their communicative function; for instance, they belong to the same text class (scientific-technical) offering both a textual database of systematic information and a terminology resource. Due to the concretion of the thematic fields on which the translation of scientific-technical texts works, numerous of parallel texts were collected and revised (See Appendix B)

1. Objectives

Bearing the above in mind, one general objective and four specific objectives were established in order to carry out this internship project. These objectives are as follows:

1.1. General objective

Apply the necessary theoretical and procedural knowledge for the translation of scientific and technical texts within the field of Petroleum Engineering, especially focused on the enhanced oil recovery methods in laboratories at Universidad Industrial de Santander.

1.2. Specific Objectives

1. Acquire knowledge about the terminology and conceptual structure of the field and the topics of the texts in order to translate accurately, keeping constant communication with the authors of the source texts.
2. Create and manage terminology banks/glossaries that may guide the translation process
3. Use and apply the necessary translation tools, strategies, techniques, and approaches for the complete understanding of the scientific and technical texts in order to solve possible translation problems that may arise in the source texts.
4. Produce high-quality professional translations of each text, taking into account clarity, accuracy, fluency, and adaptation, as well as revision and edition of both the source and target texts.

2. Body of the Paper

2.1. Theoretical Framework

2.1.1 *Differences between technical and scientific translation*

Even though technical and scientific translation is often grouped as a specialization within the broad field of translation, different authors have reported differences between technical translation and scientific translation. These differences have to do with textual aspects such as topic, function, language, and communicative situations. First, regarding topic, Gamero (2005, cited in Bruno et al, 2016, p. 11) states that all texts whose topics are framed in sections 31 (agronomic sciences) and 33 (engineering sciences) are considered to be technical; whereas texts which topics are framed in the other sections of UNESCO's nomenclature for fields of science and technology are considered to be scientific. However, a text can be instinctively considered to be technical or scientific when its topic is related to the experimental sciences (physics, mathematics, chemistry, etc., Aixelá, 2015, p. 3).

Second, function is another aspect where technical and scientific texts differ. This is because scientific texts seek the broadcasting of knowledge, whereas technical texts deal with the appliance of it (Bruno et al, 2016, p. 8). Additionally, Bruno et al (2016, p. 11) classify technical texts into three main types of textual genres: expository, expository-exhortative, and exhortative. For that reason, Bruno et al (2016, p. 8) assert that the topic is taken as a referencing point since there are other aspects to examine to determine whether a text is technical or scientific, such as language and communicative situations.

Third, language present in the texts is also an important factor to differentiate technical and scientific texts. Gamero (2005, cited in Bruno et al, 2016, p. 9) considers that the language found

in scientific texts is broader than that found in technical texts, therefore, terminological equivalence is higher between the working language pair when it comes to technical translation.

Fourth, the communicative situations of the texts can take place in different contexts, which allows their identification. According to Bruno et al (2016, p. 9), the communicative situations for technical texts occur more often in laboural spaces rather than academic, because their purpose is focused on the reception and emission of the message. Therefore, technical texts are more frequently found in the industry field, for example, instruction manuals for determined products, guidelines protocols, sales orders, among others. Finally, the communicative situations for scientific texts share a more research-oriented nature. Some examples of these are research articles or literature reviews.

2.1.2. Translation Approaches

This project focuses on the translation of scientific and technical texts; thus, three main approaches have provided us with theoretical and practical foundations required in the translation process of our internship. These approaches are the Equivalent Effect (Nida, 1964), Functionalist Approaches (Nord, 1997), and Translation Competence (Hurtado, 2001)

2.1.2.1 The Equivalent Effect. For a start, one of the most common approaches used in legal, scientific, and technical translation works is the Formal Equivalence Effect, which was proposed by Eugene Nida in 1964, in his book titled *Towards a Science of Translating*. This approach consists of carrying out the translation work without making changes in the original structure of the source text, which allows literal translation of utterances, also known as translation units, rather than words. According to Vinay and Darbelnet (1995, p. 21, cited in the Handbook of Translation Studies, 2010, p. 437) a translation unit is “the smallest segment of utterance whose signs are linked in such a way that they should not be translated individually”, however in the same

chapter, Ballard(2007) concludes that

(...) A translation is initiated by a translator when he applies a translation strategy to a segment or element of the source text (which is the base of the unit) with a view to producing a segment or element (the outcome of the unit) that will contribute to the reconstruction of a new entity that will be perceived as a text.

Therefore, this translation project has taken translation units as a category for the translation process and for analysis. We selected segments of meaning rather than isolated words, as concluded by Ballard (2007), and based on the definition provided by Vinay and Darbelnet (1995).

In addition, Nida (1964, as cited in Munday, 2016, p. 65) also proposed three notions of meaning that helped us give shape to translation units and reach more systematic results. Nida's notions of meaning are the following: linguistic or grammatical meaning, referential meaning, and connotative meaning. Regarding grammatical meaning, Nida (1964, p. 37, as cited in Yan, 2008, p. 35) stated that it is "the meaningful relationship between the constituent parts of the grammatical construction"; in other words, it refers to meaning as a whole, rather than the meaning of isolated words. For that reason, this meaningful syntactic relationship between words and/or phrases cannot be willingly changed. Referential meaning refers to the meaning found in dictionaries, that is, it is the literal meaning of words (Nida, 1964, p. 70, as cited in Yan, 2008, p.37). Finally, according to Nida (1982, p. 91, as cited in Yan, 2008, p. 37), connotative meaning is understood as "the emotional reaction to words", which means that a word will have a determined meaning according to context (Munday, 2016, p. 66); therefore, connotative meaning has a pragmatic sense rather than semantic. All these notions of meaning help the translator understand the source texts in a better and deeper way, enhancing the translation process.

2.1.2.2. Functionalism. Other approaches widely implemented for the translation of technical and scientific texts are the Functionalist Approaches, also known as Functionalism. These functionalist approaches first started in Germany between the 1970s and 1980s. An example of these approaches is Skopostheorie proposed by Hans J. Vermeer in 1978, which sees translation as a form of communicative approach so that it fulfils a functional purpose in the target text and culture (Munday, 2016, p. 114). Therefore, Skopostheorie deals with the purpose of translation and the action of translating. However, in order to identify the purpose of the translation and establish the path for translation, it is important to implement a translation brief as it provides the trainee translators with important information to take into account before, during, and after the translation process.

The translation brief will provide information about aspects such as the target text's audience, the client's intentions, the text's function and typology, the language pair, the deadline for the submission of the target text, the audience's expectations, prices, among others. For that reason, Nord (1997, p. 47) asserts that "(...) trainee translators cannot be expected to interpret a situation that, in the classroom, is not very clear anyway. Each translation task should thus be accompanied by a brief that defines the conditions under which the target text should carry out its particular function". In other words, the translation brief will give general ideas to the trainee translator about how to approach the source text as well as its translational intention.

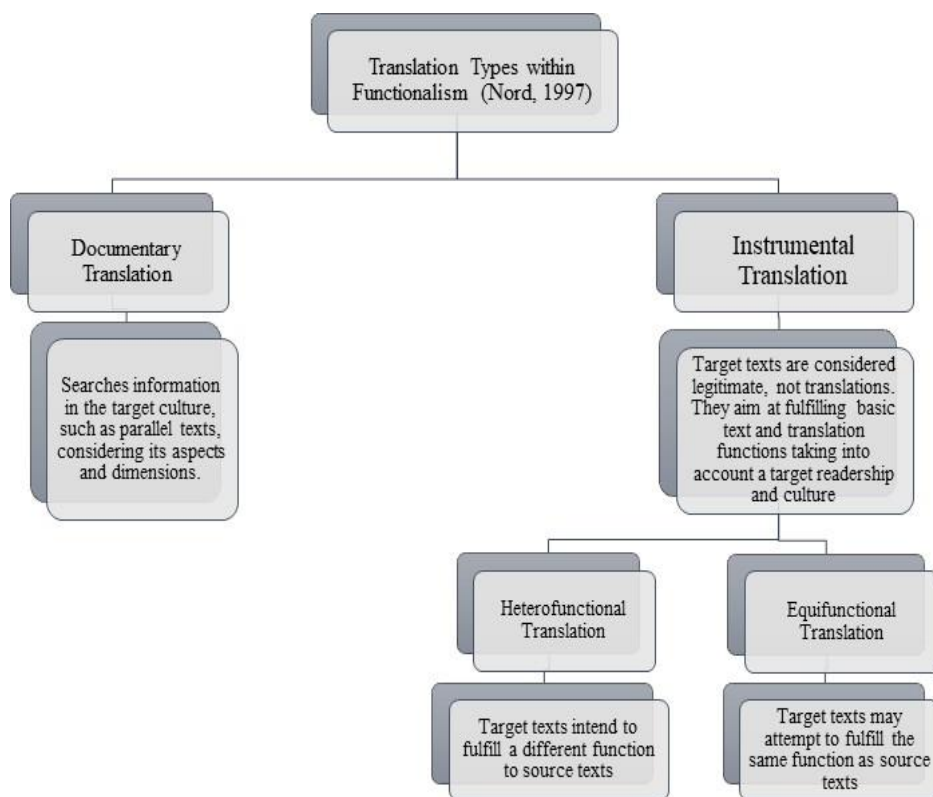
Regarding text and translation functions, Nord (1997, p. 48) elaborated a schema which is based on Bühler (1934) and Jakobson's (1960) language functions. This schema contemplates the following language functions: referential function, expressive function, appellative function, and phatic function. First, the referential function is objective and refers to words' phenomena and objects. Also, this function involves the following translation subfunctions: informative,

metalinguistic, metatextual, directive, didactic, etc. Second, the expressive function has to do with the attitudes or feelings of the message sender. The translation subfunctions for the expressive function are as follows: evaluative, emotive, ironical, etc. Third, the appellative function consists of appealing at the receiver's emotions, previous experiences, or willingness to act; its translation subfunctions are the following: illustrative, persuasive, imperative, pedagogical, advertising, etc. Lastly, the phatic function seeks to establish, maintain or end social interactions between the message receiver and sender. This function contemplates the following translation subfunctions: small talks, taking leave, opening a text, etc.

Likewise, Nord (1997, p. 49) identifies two main translation types and subtypes within the functionalist approaches, which are based on text corpus, as shown in Figure 1.

Figure 1

Translation types within functionalism (Nord, 1997, p. 49)



Nord (1997, p. 50) also provides an example “*Selling apartments to Foreign visitors in Spain*”, a short translation brief as well as an analysis of a functionalist translation for this specific context. Both the example and analysis are summarised in Tables 1, 2, and 3.

Table 1*Selling apartments to foreigners in Spain*

Context	<i>A Spanish estate agent wants to sell a number of apartments situated in a large building by the seaside in a small town called Cullera in the South of Spain. They have produced a folder in Spanish, but somehow the business does not prosper. The place is full of Germans, Austrians, Swiss, French, Belgian and English people spending their holidays mostly in rented apartments, and the agent thinks it would be worthwhile to have the text translated into German, English and French to address a larger clientele. So they ask a group of translators who happen to be around to produce a German, English, and a French translation for separate folders in these language</i>
Target Audience	<i>Any German-speaking, anglophone or francophone visitors who pass by the agent’s office or the building site where the folder is distributed free; they are already in Cullera and know the place, they seem to like Spain, and they should be sufficiently well-off to afford to buy an apartment abroad</i>
Place and time of reception	<i>Cullera, Spain. From the start of the project to the moment all apartments have been sold.</i>
Medium	<i>Monolingual folder with coloured pictures and short pieces of text in a given layout which will be the same for all versions</i>
Purpose	<i>Establish contact between the building company and prospective customers</i>
Text and translation functions	<i>Phatic (to attract customers’ attention) Referential-informative (to inform about the building) Appellative-persuasive (to raise the reader’s interest and eventually ‘seduce’ them to buy one of the apartments)</i>

Table 2*Short translation brief*

Translation brief	<i>The text must attract the audience’s attention (phatic function), provide clear and comprehensive information (referential function), and persuade visitors to buy an apartment to spend their holidays in Spain (appellative function) The source text is divided in three parts.</i>
Assumptions	<i>The source text addresses its source culture in a similar way.</i>
Meeting requirements	<i>An equifunctional translation is needed in order as it adapts the source texts to the target culture’s needs, norms and conventions.</i>

Table 3*Analysis of functionalist translation*

Translation Analysis	
Source Text	Target Text
<i>Part I contains a kind of slogan, “En el lugar más tranquilo de la playa de San Antonio”, and the name of the building, “Torres de San Antonio”) and the identification of the sender (Cooperativa de viviendas “El Ferrobús” + address), accompanied by an illustration suggesting sun, sea and a stereotypical Spanish village.</i>	<i>Part I is mainly phatic: contact is established by offering information and producing a positive impression on the reader, using mainly nonverbal means which appeal to the cliché of a prototypical Spanish coastal village, thus responding more to the expectations of foreigners than of Spaniards even in the original</i>
<i>Part II presents the attractions of the apartment block and the premises, including two schematic maps, one showing the situation of the building with regard to the town and the seaside and another one showing the localization of the projected building on the premises, and a photograph showing a model of the building.</i>	<i>Part II is mainly appellative, using the expressive-evaluative elements praising the positive aspects of the building (el lugar más tranquilo, emplazamiento inmejorable, soleamiento adecuado, materiales de primera calidad, etc.) and referential-informative elements referring to the social aspect (dos piscinas, dos pistas de tenis, parque infantil, local social, etc.) as an indirect means of appeal</i>
<i>Part III gives the prices for the three basic types of apartment, the conditions of payment and some information concerning tax reductions and other financial advantages.</i>	<i>Part III is also mainly appellative, since the information given in this part is supposed to make the object attractive to the reader (I have deleted the original prices because they would look ridiculous today after various devaluations of the peseta); we would neither expect nor find any negative aspects of the building to be mentioned in this kind of text</i>

Furthermore, Nord (1997, pp. 52-53) states that if the same functions for the target audience are to be fulfilled, the following principles have to be considered.

First, the referential function refers to correctness and comprehensibility. Therefore, the translator must come up with additional information if both the source and target audiences do not share the same previous knowledge. An example of this is making information more explicit in the target version as foreigners are not familiar with the Spanish housing and tax systems. Second, the phatic function is conventional, which means that if a target-oriented image is being used in

the source text, it should not be changed as it will not cause any functionality issues. Third, the appellative function relies on the audience's participation. If the elements presented in the target texts are not attractive or persuasive enough from a target-culture's perspective, these must be "upgraded" or adjusted to fit in the target culture's expectations. However, if these elements are rather exaggerated, then they must be "downgraded" in order to fulfil the target text's purpose and functionality.

2.1.2.3. Translation Competences. Translation Studies have recently been concerned in finding out what characteristics and/or skills set a translator should have in order to perform their work correctly. These skills are known as Translation Competence (Hurtado Albir, 2017, p. 12). For that reason, Hurtado Albir (1996a, p. 34, 1996b, p. 39, as cited in Hurtado Albir, 2017, p. 20) defines translation competence as the "ability to know how to translate", and in turn, identifies the following sub competences: linguistic competence, extralinguistic competence, transfer competence, professional competence, and strategic competence. First of all, the linguistic competence requires that the translator has complete understanding and knowledge of the two working languages, one of them being comprehension and the other production. Second, there is the extralinguistic competence, which has to do with thematic and cultural knowledge of both languages. Third, the transfer competence consists of performing the translation process accurately. Then, the professional competence relates to the translator's working style as well as the usage that they do of technological tools in order to enhance their work. Lastly, the strategic competence are those conscious and individual procedures that the translator follows in order to deal with possible translation problems that may arise during the translation process. Furthermore, Hurtado Albir (2017, p. 12) states that the knowledge of these competences "[...] identifies the translator and distinguishes her/him from the non-translator".

2.2 Activities carried out during the internship project

2.2.1. Pre-translation process

Before carrying out the assignments of the internship project, briefing and translation training sessions were required in order to accomplish each one of them.

2.2.1.1. Briefing. As it has been mentioned, carrying out a translation brief is highly important as it provides the trainee translators with relevant information, not only about the source texts but also the assignments. However, the translation brief does not determine the strategies and/or approaches to apply, nor the translator's work style. The decisions on how to start translating and approaching each text is completely up to the translators themselves (Nord, 1997, p. 47).

The translation brief for this internship project was carried out online due to the current health emergency, caused by COVID-19 pandemic. For that reason, there were many connection problems that hindered communication in the briefing sessions. Therefore, three briefing sessions were needed in order to clarify all doubts regarding the source texts and agree on the assignments to be carried out. These agreed assignments were as follows: two translation assignments from Spanish into English, and one proofreading assignment in English. The texts to be translated were: 1. *Efecto de la inyección de vapor con adición de nafta sobre la reducción de viscosidad de un crudo pesado colombiano* (Naphtha-added steam injection effect on the quality of Colombian crude oils using FTIR and ^1H NMR spectroscopy), and 2. *Análisis estadístico descriptivo de los parámetros operacionales en pruebas de acuatermólisis realizadas en laboratorio* (Descriptive statistical analysis of operational parameters in laboratory aquathermolysis tests). As for the proofreading, the text selected for this assignment was 3. *Catalytic upgrading evaluation during steam injection conditions with spectroscopy ^1H NMR*.

Similarly, during these briefing sessions, it was possible to obtain the necessary information and details about the source texts in order to start the translation and proofreading process.

2.2.1.2. Source texts' information and details. The information and details obtained during the briefing sessions was classified in different categories as follows: target audience, type of text, purpose, language function, language pair, length, deadline, and type of assignment.

First, the source texts' target audience were those professionals whose interests are focused on hydrocarbons, oil, and fossil fuels industry, especially Petroleum and Petrochemical Engineers.

Second, the textual typology of all texts was the same (scientific expository) since all of them were research articles written by members of the GRM group, which presented slight differences in their structure.

Third, even though all of the source texts were research articles, they did not share the same purpose. Therefore, this is why structural differences were found. For instance, the first article aimed at identifying and documenting the naphtha-added steam injection effects on the quality of heavy oils, which is a recovery method. On the other hand, the second article was a literature review, which looked into conventional and chemical-added aquathermolysis tests carried out to date. Finally, the third article's purpose was to evaluate catalytic aquathermolysis processes through an experimental design. Furthermore, all three articles shared a scientific nature as they mainly attempted at broadcasting knowledge and reporting results.

Fourth, as for language function, the referential and appellative functions were recurrent in all of the source texts. On the one hand, the authors of the source texts implemented the referential function as they reported facts and data in an objective way. On the other hand, the authors implemented the appellative function as they started a conversation with the readers and made suggestions for future research in the field. This function was also seen in the use of imperatives,

although they were very limited (Nord, 1997, p. 48).

Fifth, the language or combination for the translation assignments was Spanish-English, whereas for the proofreading assignment it was only English.

Finally, the length and deadline for each agreed assignment was different. Regarding length, the first article was the longest with 23 pages and 5,378 words. The second article was shorter, with 19 pages and 4,091 words. The shortest article was the third, with 16 pages and 4,126 words. As for the deadlines, the first article was submitted in December 2020, whereas the second article was submitted in January 2021, and the third in February 2021. All the information described in this section is summarised in Appendix A.

2.2.1.3. Training. The training process to carry out this internship project consisted of two phases, which took place simultaneously. For a start, the primary and main requirement for the interns/translators was to take the Course - Text Translation I 28595, from the School of languages at Universidad Industrial de Santander. Second, we were required to attend meetings with Professor Adan Bermúdez from the GRM group, in order to become familiar with the topics and field of knowledge of the texts to be translated. On the one hand, during the translation classes, we had the opportunity to acquire basic knowledge, such as translation theory, translation techniques and approaches, as well as various ways of carrying out terminology extraction in source texts. This knowledge was of paramount importance, since it allowed us to develop skills as translators during the project, as well as improve our level of proficiency in the language pair (Spanish-English). On the other hand, the meetings with Professor Adan Bermúdez allowed us to learn more about the field of Petroleum Engineering, especially chemical processes, such as aquathermolysis, that occur during enhanced recovery processes. Thanks to this training, we were able to identify the most suitable translation approaches for each task as well as the most common terminology in

the field of hydrocarbons.

2.2.1.4. Word banks or glossaries. In order to create and manage the word banks (glossaries), all three texts were fully read in their source language (Spanish). This early approach to the texts helped us identifying new terminology that may become a translation challenge. Once these terms were identified, we organised them alphabetically in a separate document. Then, based on other glossaries within the field of Petroleum Industry, we looked for terminological equivalence among the words in the language pair Spanish-English. Additionally, to double check this equivalence, we decided to inquire into other possible ways to translate these terms in the parallel texts. Finally, the target texts were also revised by experts and they confirmed or suggested arrangements regarding terminological accuracy. See Appendix C for an example of this word bank.

2.2.2 Translation and proofreading process: challenges and coping strategies

During the development of the internship project, different translation challenges arose in each assignment. Most of these challenges were related to writing and grammar mistakes in the source texts and language. Furthermore, other linguistic problems related to linguistic interference matters, such as negative transfer, were also encountered. Thus, this section discusses and describes the translation challenges encountered as well as the strategies and tools applied by the translators to cope with them.

2.2.2.1 Grammar and writing style. Regarding the two translation assignments, both articles required a complete reading in their source language (Spanish) in order to identify possible translation challenges. Consequently, during the development of these translation assignments it was found that the source texts presented shortcomings related to grammar, such as syntax, as well as writing style, such as long wordy statements and terminology inconsistency. On the other

hand, during the proofreading assignment, linguistic interference issues, such as negative transfer, were the most recurrent instances.

2.2.2.2. Misuse of linking devices. For a start, in the first article, "*Naphtha-added steam injection effect on the quality of Colombian crude oils using FTIR and 1H NMR spectroscopy*", the most common syntactic shortcomings were related to the misuse and excessive repetition of connectors as well as the omission of determinants in the source language. These shortcomings affected the reading fluency of the source texts, and therefore, their comprehension. The example below shows the misuse and excessive repetition of connectors in the source text.

*A). Modelos cinéticos propuestos para fracciones pesadas del petróleo, crudo pesado y fracciones livianas han determinado que la fracción RCH₃ representa un grupo de hidrocarburos que va desde C₁₀H₂₂ hasta C₂₅H₅₂. **Por otra parte**, la escisión de enlaces C-C, seguida por reacciones de radicales libres se produce la polimerización de las cadenas activas durante el proceso. **Por otra parte**, los resultados de los parámetros de aromaticidad, condensación aromática y bajos valores de parafinicidad sugieren que el crudo sometido en condiciones de inyección de vapor a sin nafta 270 °C (0), está precedido por reacciones de polimerización, lo cual conduce a la formación de un crudo con mayor viscosidad en comparación con el crudo base.*

The phrase in bold, *por otra parte*, in example A is a Spanish speech adversative conjunction that means "conversely", "on the other hand", or "on the contrary". This connector is used in the same way as in the English language, that is, to show opposition or contrast. However, the example above shows that this device is repeated twice in a row, causing confusion in readers as it is not possible to determine exactly which statements are being contrasted, nor which one is the one that fulfils the function of contrast. Additionally, this device appears 16 times in the source text. Other linking devices that were recurrent in the source text are: "*en general*" and "*generalmente*", which mean "generally" or "broadly"; as well as "*adicionalmente*", which means "in addition" or "additionally".

2.2.2.3. Lack of determiners. The example above also shows the lack of a determiner (plural definite article: *los*) at the beginning of the paragraph, which does not let readers know

the types of kinetic models that the authors are referring to

(det) Modelos cinéticos propuestos para fracciones pesadas del petróleo, crudo pesado y fracciones livianas han determinado que la fracción RCH_3 representa un grupo de hidrocarburos que va desde C_3H_8 hasta $C_{14}H_{30}$

(det) indicates where the determiner is lacking

In the Spanish language, determiners are important words as they agree with nouns in gender and number, making them easier to identify. For that reason, nouns without determiners cannot name objects by themselves. Furthermore, there are different types of determiners in Spanish, such as articles, possessives, and demonstratives (Moliner, 2013, p. 90). Other examples that show omission of determiners in Spanish are the following:

A. A partir de los resultados se observa que la producción de gases aumenta proporcionalmente con el incremento de la temperatura y (det) tiempo de reacción

(det) indicates where the determiner is lacking

A. De acuerdo con los resultados de los parámetros de parafinicidad y (det) longitud de (det) cadenas alquílicas, se puede indicar que la nafta participa en las reacciones de radicales libres de hidrocarburos y alquilación en diferentes especies aromáticas.

(det) indicates where the determiner is lacking

In example *B* there is an omission of determiner “*el*”, which in Spanish is the masculine singular definite article and should go before the noun phrase “*tiempo de reacción*”. Likewise, determiners “*la*” and “*las*” are also missing in example *C*. In this case, the former is the Spanish singular feminine definite article, whereas the latter is the feminine plural definite article.

2.2.2.4. Long word strings and wrong word order. When it comes to writing style, the most frequent challenge encountered in the first article was the presence of long and wordy statements as well as word order within the statements (i.e., not following S+V+O structure), which in turn has to do with misuse of conjunctions, as shown by the examples below.

A) *La envolvente de fase de la nafta se presenta en la figura 2, mientras la envolvente de fase de la mezcla crudo-nafta se presenta en la figura 3.*

E) *Teniendo en cuenta que la reducción de la viscosidad es un parámetro representativo en los crudos mejorados, debido a que esta propiedad está relacionada con la razón de movilidad y el factor de recobro. La nafta seleccionada en esta investigación, se puede considerar como un solvente apropiado en fase líquida.*

F). *Como se observa en la figura 2, a 400 psi la nafta presenta una presión de burbuja alrededor de 230 °C. Mientras en la mezcla con crudo al presentarse un intercambio másico con este por solubilidad, y el comportamiento PVT es diferente (figura 3).*

G) *La diferencia de los resultados de la conversión de las fracciones con puntos de ebullición superiores a 565 °C con respecto al crudo base inicial se pueden atribuir a la cambiante composición química generada durante las diferentes condiciones establecidas en las pruebas de inyección de vapor en presencia de nafta.*

The underlined word “*mientras*” in examples *D* and *F* is a Spanish adverb that means “while”. As happens in English, this adverb is generally used to talk about actions that are taking place at the same time. Although this adverb can be translated in different ways depending on context, we are not going to deepen in these exceptions. In these examples, the authors of the source text tried to use the word “*mientras*” as a conjunctive locution rather than an adverb in order to unite the statements and show contrast between them. Nevertheless, the conjunction is incomplete as it needs the relative pronoun “que” to make the contrast between the two statements clearer.

In addition, the word order after the conjunction must be changed to provide a more rounded meaning. In example *E*, as well as in *G*, it is possible to identify punctuation problems. For instance, there is a mispositioned period (.) that abruptly cuts the sentence in example *E*. Also, the commas (,) are not well used either as the statement succeeding it should be non-defining relative clause (*oración subordinada explicativa*) (Moliner, 2013, p. 188). On the other hand, in example *G*, punctuation marks are completely lacking, which makes the statement very long and exhausting to read. Therefore, the correct use of punctuation marks in academic writing and

translation is of paramount importance as they help convey and clarify meaning.

2.2.2.5. Term inconsistency or variability. The second article “*Descriptive statistical analysis of operational parameters in laboratory aquathermolysis tests*” had a better writing style compared to the first one, which means that shortcomings related to syntax and writing style were minimal. Still, the example below shows that there were a few statements with similar shortcomings to those discussed above.

H). En el presente trabajo con el objetivo de generar una revisión de la información reportada en la literatura relacionada a pruebas de acuatermolisis, convencional y con adición de agentes químicos, se generó un procedimiento de observación, procesamiento y análisis de la información recolectada.

In *H*, the elements of the paragraph must be reorganized so that the syntactic relationships among the statements are clearer. This can be achieved by using punctuation marks correctly.

Furthermore, this article presented a lot of terminological inconsistency, especially found in the description of the graphs that were originally written in English, as shown in the following examples:

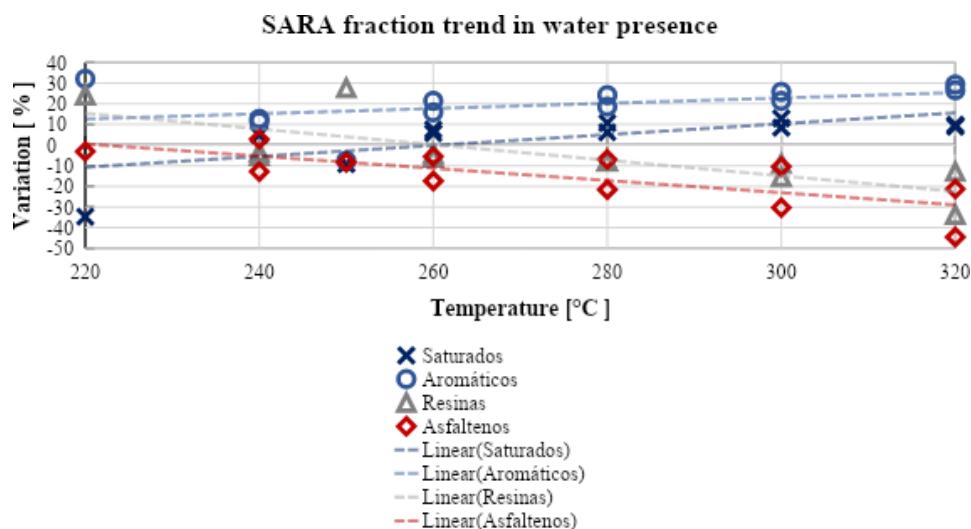


Figure 18 SARA fraction behavior with presence of water

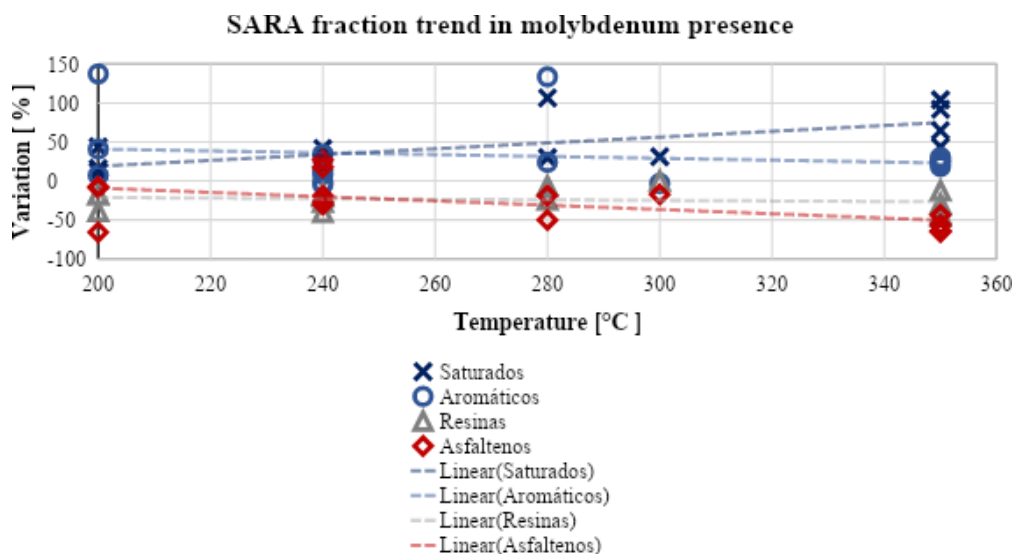


Figure 20 SARA fraction behavior with presence of molybdenum

As seen in the examples above, the titles and descriptions of each *figure* do not match. On the one hand, the word “presence” has a different position in both the figures’ titles and descriptions. The figures’ titles appear at the top, whereas the descriptions are at the bottom. In the titles, the word “presence” makes part of a noun phrase, which is the object of a preposition; whereas in the descriptions, the word “presence” is just another noun in the statement, and the words “molybdenum” and “water” alone are the objects of the preposition “of”.

In another instance of term (in) consistency or variability, the authors use the words “behaviour” and “trend” indistinctively, and even though these are synonyms, the texts’ consistency and coherence can be affected using different terms to mean the same. Moreover, the preposition “with” found in the descriptions is not the best option, as the correct collocation of the word “presence” is the preposition “in”.

Finally, in both the first and second article, the use of the reflective passive voice was highly recurrent. In the Spanish language, this grammatical structure is a frequently used resource, especially in scientific articles and papers. Although its use is not an error per se, it did represent

a translation challenge, since not all statements could be translated into English without affecting their meaning. The words in bold in *I* and *J* are examples of this phenomenon:

*H). Adicionalmente, **se observa** que las líneas entre factores son paralelas, lo que indica que no existe interacción entre factores como **se indicó** en el diagrama de Pareto.*

*I). Hacia 1985 **se observó** que había una diferencia en los valores de temperatura utilizados, sin embargo, alrededor de 1994 **se presenció** una marcada tendencia a emplear temperaturas superiores a los 300 °C.*

2.2.2.6. Linguistic interference. Bearing in mind that the third article “*Catalytic upgrading evaluation during steam injection conditions with spectroscopy 1H NMR*” was a proofreading assignment, the most common challenge encountered was negative transfer. According to Benson (2002, 68ff, cited in Galvao, 2009, p. 1), negative transfer is a type of linguistic interference that occurs when the L1 (Spanish) heavily influences the L2 (English), thus leading to errors in the production of the L2. Additionally, this type of linguistic interference was related to syntactic structures (word-for-word) and lexis (cognates). The examples below show the linguistic interference issues found during the proofreading process:

*J). Currently, conventional steam injection pilots are being implemented in a Colombian oil field, with API gravity of 12.8°, and viscosity of 5584 cP @ 45° C). **According to that reason, this oil** was selected in this **study**.*

*K). Firstly, the catalyst was the **unique** variable, and the tests were performed at the same temperature and pressure conditions (270° C and 800 psi).*

*M) The importance of quantifying the oil upgrading from its viscosity **refers to the link of this property with the mobility ratio and the flow of this phase in the porous medium**.*

The expressions “*According to that reason*” in *K* follows a very Spanish-like structure. The author of the text made a word-for-word translation of the Spanish expression “*de acuerdo a lo anterior*”, however, the attempt resulted in a wrong translation as the most suitable element to link both statements in English is a cause-effect speech connector such as “for that reason”. Similarly, the author often used the words “study” and “work” indistinctively to talk about the

paper. Even though these words can carry the same meaning in this context, using synonyms to mean the same causes terminology inconsistency, affecting the text's writing style and aesthetics. Furthermore, "*this oil*" is confusing as it does not let readers know which type of oil the author is talking about.

On the other hand, example *L* shows interference in cognates. In this example, the author uses the word "unique", and although it does mean "*único*" in Spanish, its use in English is quite different. In the English language, the words "only" and "unique" can be used as adjectives, yet the difference between them is that "only" describes something alone in a category (exclusive), whereas "unique" describes something that cannot be compared as there is one of its kind (Cambridgedictionary.com, [www]). Finally, example *M* shows that the statement in bold presents a very Spanish-like grammatical structure, which English readers may find odd and difficult to understand.

2.2.2.7. Problem-solving and translation tools applied. In order to solve the different translation challenges discussed above, the most common translation approach applied for this internship project was Functionalism, since as translators, our aim is not to change the source texts' functionality, but rather maintain it to enable the production of high-quality translations. In addition to this, the formal equivalence approach was used to carry out literal translation of utterances. Explain that in cases G to J, target texts show a significant change in length. Also explain that target texts were translated taking into account the syntactic and lexical challenges identified in the source texts.

The tools applied to solve translation challenges were online dictionaries and concordancers such as Linguee.com and Reverso.com; revision of technical and scientific dictionaries and glossaries such as *the Dictionary of Oil, Gas and Petrochemical Processing*

(Bahadori et al, 2014), *Diccionario Técnico de Mineros y Petroleros inglés-español* (De la Vergne, 2012), *the Glossary of the Petroleum Industry, Fourth Edition* (Proubasta, 2006), *Glosario Inglés-Español de Términos Petroleros* (Colegio de Ingenieros Petroleros de México, AC, 1990), as well as parallel texts and our own glossaries. Table IV and V below show the examples discussed in the previous section and its translation into English.

Table 4

Problem-solving in translation I.

Source text samples	Target text translation
A). Modelos cinéticos propuestos para fracciones pesadas del petróleo, crudo pesado y fracciones livianas han determinado que la fracción RCH_3 representa un grupo de hidrocarburos que va desde C_3H_8 hasta C_6H_{14} . Por otra parte , la escisión de enlaces C-C, seguida por reacciones de radicales libres se produce la polimerización de las cadenas activas durante el proceso. Por otra parte , los resultados de los parámetros de aromaticidad, condensación aromática y bajos valores de parafinicidad sugieren que el crudo sometido en condiciones de inyección de vapor a sin nafta 270 °C (0), está precedido por reacciones de polimerización, lo cual conduce a la formación de un crudo con mayor viscosidad en comparación con el crudo base .	A). Proposed kinetic models for heavy fractions of crudeoil, heavy crude oil and light fractions have determined that the RCH_3 fraction represents a group of hydrocarbons that ranges from C_3H_8 to C_6H_{14} . Furthermore , the cleavage of C-C bonds, followed by reactions of free radicals, is produced by the polymerization of active chains across the process. On the other hand , results of parameters of aromaticity, aromatic condensation and low paraffinicity values suggest that crude oil under steam injection conditions without naphtha at 270°C is preceded by polymerizationreactions, which causes the formation of a higher viscosity crude oil compared to the base heavy crude oil .
B). A partir de los resultados se observa que la producción de gases aumenta proporcionalmente con el incremento de la temperatura y (det) tiempo de reacción .	B). Results show that the gas production tends to increase with increasing temperature and reaction time .
C). De acuerdo con los resultados de los parámetros de parafinicidad y (det) longitud de (det) cadenas alquílicas , se puede indicar que la nafta participa en lasreacciones de radicales libres de hidrocarburos y alquilación en diferentes especies aromáticas.	C). According to parameters of paraffinicity and length of alkyl chains results , naphtha participates in reactions of hydrocarbons' free radicals and alkylation in different aromatic species.
D). La envolvente de fase de la nafta se presenta en la figura 2, mientras la envolvente de fase de la mezcla crudo-nafta se presenta en la figura 3.	D). The phase envelope of naphtha is shown in figure 2, whereas the phase envelope of the heavy crude oil A - naphtha mixture is shown in figure3.
E). Teniendo en cuenta que la reducción de la viscosidades un parámetro representativo en los crudos mejorados, debido a que esta propiedad está relacionada con la razón de movilidad y el factor de recobro . La nafta seleccionada en esta investigación se	E). Bearing in mind that viscosity reduction is a representative parameter of upgraded crude oils, and since this property is linked with the mobility and recovery factors , the naphtha solvent used in this study may be considered

puede considerar como un solvente apropiado en fase líquida.

as a proper solvent in liquid phase.

F). Como se observa en la figura 2, a 400 psi la nafta presenta una presión de burbuja alrededor de 230 °C. **Mientras en la mezcla con crudo** al presentarse un intercambio másico con este por solubilidad, y el comportamiento PVT es diferente (figura 3).

F). As shown in figure 2, at 400 psi the naphtha has a bubble pressure of about 230 °C; **whereas in the mixture with crude oil**, when a mass exchange by solubility occurs, the PVT behavior is different (figure 3).

Table 5

Problem-solving translation II and proofreading

Source text samples	Target text translation
G) La diferencia de los resultados de la conversión de las fracciones con puntos de ebullición superiores a 565 °C con respecto al crudo base inicial se pueden atribuir a la cambiante composición química generada durante las diferentes condiciones establecidas en las pruebas de inyección de vapor en presencia de nafta.	G). The difference in the results of the conversion (X 565°C+), regarding the base crude oil, can be related to the changing chemical composition generated under the different established conditions in the steam injections tests in the presence of naphtha.
H). En el presente trabajo con el objetivo de generar una revisión de la información reportada en la literatura relacionada a pruebas de acuatermolisis, convencional y con adición de agentes químicos, se generó un procedimiento de observación, procesamiento y análisis de la información recolectada.	H). This paper aims at conducting a literature revision on conventional and chemical-added aquathermolysis tests. To do so, processes of observation, processing, and analysis of selected information were carried out.
I). Adicionalmente, se observa que las líneas entre factores son paralelas, lo que indica que no existe interacción entre factores como se indicó en el diagrama de Pareto.	I). In addition, figure 7 shows parallel lines between the factors, which indicates that there is no interaction between factors, as indicated by the Pareto graph.
J). Hacia 1985 se observó que había una diferencia en los valores de temperatura utilizados, sin embargo, alrededor de 1994 se presenció una marcada tendencia a emplear temperaturas superiores a los 300 °C.	J). Around 1985, a difference in the temperature values used was identified . However, around 1994 there was a marked trend to use temperature above 300°C.
K). Currently, conventional steam injection pilots are being implemented in a Colombian oil field, with API gravity of 12.8°, and viscosity of 5584 cP @ 45° C). According to that reason, this oil was selected in this study.	K). Currently, conventional steam injection pilots are being implemented in a Colombian oil field, with API gravity of 12.8°, and viscosity of 5584 cP @ 45° C). For that reason, this oil was selected in this study.
L). Firstly, the catalyst was the unique variable, and the tests were performed at the same temperature and pressure conditions (270° C and 800 psi).	L). Firstly, the catalyst was the only variable, and the tests were performed at the same temperature and pressure conditions (270° C and 800 psi).
M) The importance of quantifying the oil upgrading from its viscosity refers to the link of this property with the mobility ratio and the flow of this phase in the porous medium	M) The importance of quantifying the oil upgrading from its viscosity lies in the link between this property and the mobility ratio, as well as the flow of this phase in the porous medium.

3. Conclusions and Project Evaluation

Translation is an ancient activity that has been exercised for many years and under different situations and contexts (Delisle, 2003). For that reason, Delisle (2003) asserts that translation has been a powerful tool for society's progress due to its instrumental and mediating functions, which seek to provide access to knowledge in a foreign language. In this internship project, linguistic services were provided to researchers from the GRM group whose studies followed the line of steam injection. The group's decision to acquire linguistic services relied mainly in the need for knowledge broadcasting in order to reach a wider audience, as Aixelá (2015, p. 8) states "scientists today do their best to publish their research studies in English, in order to make them visible and establish a real dialogue with their colleagues". The services provided included the translation, proofreading, and adaptation of texts according to the publication standards required by international scientific journals.

In today's globalized world, scientific translation is in high demand and in need of more translators who know how to deal with culture-specific terms, purpose, and audience of the target text, etc. Nowadays, virtually all translators process texts electronically and use computers in their everyday work (Neshkovska, 2019, p. 68), translation studies recognize the potential of corpus-based translation (Laviosa, 2004, p.7) as researchers began to realize that electronic corpora can function as a reliable methodology that handles a wide range of textual resources. The use of corpora provides opportunities for the development of the students' innovation and problem-solving abilities; for instance, the extraction of information and its further interpretation taking into account translators' aptitude and competence. Also, it favors the translator's autonomy,

authenticity, and flexibility in translation (ibid) by devising their strategies for extracting information and developing their hypothesis regarding textual data.

These principles of autonomy and authenticity are present in this internship project in the collection and evaluation of texts, the extraction of terminologies, and the creation of glossaries to find correspondence between different languages (Spanish-English). As translators, the benefits of the creation of our corpora were multiple. First, the compilation of our own translated text can be used to study future features of translations improving the efficiency and quality of the final translation product. Second, corpus-based translation has helped us fill our knowledge gaps as it made us more aware of the typical translation mistakes we make. Third, the use of a corpus has fostered the aforementioned principle of autonomy since the documentation tasks were based on our textual classification criteria bearing in mind the specific thematic field and text type of the project.

Translation can be classified in different specialties according to field of knowledge and text typology. According to Gamero and Hurtado (1999), the importance of Technical and Scientific Translation lies in the fact that most of the translations carried out nowadays fall under this specialty. For that reason, Technical and Scientific Translation is one of the most demanded specialties in the broad translation market. However, it is also the one that receives the least attention due to the fact that Translation Studies did not consider Technical and Scientific Translation as a specialty at its beginnings as a discipline, as its main focus was on literary translation (Gotti, 2006, Bruno, Luque, & Ferreyra, 2016, Aixelá, 2015).

From all the experience acquired during this internship project, we strongly believe that linguistic services, such as technical and scientific translation, should continue to take into account the benefits that it brings to all the university community. First, these types of internships in the

field of translation encourage cooperative learning and teamwork among schools and faculties. Second, faculties and schools that count on linguistic services can increase the chance of gaining international visibility and prestige through the translation of their research papers and subsequent publications in international journals. Third, students from the School of Languages who decide to take part in this internship project have the chance of finding out about the real challenges that professional translators face every day in their job.

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Appendixes

Appendix A

Translation brief

Source text	Target audience	Text typology	Purpose	Language function	Language pair	Length	Deadline	Agreed assignment
Efecto de la inyección de vapor con adición de nafta sobre la reducción de viscosidad de un crudo pesado colombiano.	Petroleum engineers, people into hydrocarbon industry, petrochemical engineers	Research article	Study and identify the effect of naphtha-added steam injection in Colombian heavy crude oils	Referential function Appellative function	Spanish-English	5378 words / 23 pages	November, 2020/ December, 2020	Translation
Análisis estadístico descriptivo de los parámetros operacionales en pruebas de acuatermolisis realizadas en laboratorio	Petroleum engineers, people into hydrocarbon industry, petrochemical engineers	Literature Review	Revise the existing literature on conventional and chemical-added aquathermolysis tests	Referential function Appellative function	Spanish-English	4091 words / 19 pages	January, 2021/ January, 2021	Translation
Catalytic upgrading evaluation during under steam injection conditions with spectroscopy 1h-nmr	Petroleum engineers, people into hydrocarbon industry, petrochemical engineers	Research article	Evaluate catalytic aquathermolysis processes in Colombian heavy crude oils through an experimental design	Referential function Appellative function	English	4126 Word / 16 pages	February, 2021/ February, 2021	Proofreading

Appendix B*Matrix of parallel texts*

Title	Author(s)	Type of text	Published in	Publisher
La importancia del petróleo pesado (2006)	Alboudwar, H., et al	Article	Oilfield Reviews/ Schlumberger	Magazine/journal
Efecto del proceso de acuatermolisis catalítica sobre las propiedades fisicoquímicas de un crudo colombiano	Keyner, N., et al	Research Article	Revista Fuentes: El reventón energético	Magazine/journal
Estudio de la acuatermolisis catalítica en procesos de upgrading como método complementario en el recobro térmico de hidrocarburos (2018)	Arboleda, J.A., Castillo, A.M., & Muñoz, S.F.	Research Article	Revista Fuentes: El reventón energético	Magazine/journal
Inyección de vapor en medianos: recuperación y rentabilidad (2015)	Naranjo, P.A.L., et al	Research Article	Revista Fuentes: El reventón energético	Magazine/journal
Enhancement of Heavy Oil/Betumen Thermal Recovery Using Nano Metal Particles (2013)	Yousef Hamed Shokrlu	Ph.D. Dissertation	University of Alberta, CA.	University of Alberta, CA.
Reactivity of Vacuum Residues by Thermogravimetric Analysis and Nuclear Magnetic Resonance Spectroscopy (2020)	León, A.Y., et al	Research Article	Energy and Fuels / ACS publications	Magazine / journal
Laboratory study of cyclic liquid solvent injection for heavy oil recovery through computed tomography (2019)	Sandoval-Martínez, M.I., & Muñoz-Navarro, S.F.	Research Article	DYNA / Universidad Nacional	Magazine/journal
Enhanced oil recovery mechanism of low oxygen air injection in high water cut reservoir (2018)	Hu Ju, Shu Pin-Yin, Xian Ping Ma.	Research Article	Journal of Petroleum Exploration and Production Technology / Springer	Magazine / journal
An overview of oil properties and its recovery and transportation methods (2014)	Santos, R., et al	Research Article	Brazilian Journal of Chemical Engineering	Magazine / journal

ppendix C

Glossary extract.

F

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- **Fase líquida (n.):** Liquid phase
 - **Fisicoquímica (n.)(adj.):** Physicochemistry (n.), physicochemical (adj.).

G

-
- **Gradiente, gradaint (n.):** Variation of a magnitude as a function of distance, starting from the line where this variation is maximum for magnitudes whose value is different at various points in a region of space.
 - **Grado de condensación (n.):** 1. *Condensation degree*. 2. *degree of condensation*)
 - **Gravedad API, API gravity (n.):** Specific gravity scale developed by the American Petroleum Institute (API) to measure the relative density of various petroleum liquids, expressed in degrees. (Oilfield Glossary)
 - **Gravimetría, gravimetry (n.):** The measurement of gravity or the study of its variations. (Oilfield Glossary)

H

-
- **Hidrocarburo, hydrocarbon (n.):** organic chemical compound composed exclusively of hydrogen and carbon atoms. Hydrocarbons are naturally-occurring compounds and form the basis of crude oil, natural gas, coal, and other important energy sources.
 - **Hidrocarburos pesados y extrapesados (comp. n.):** *Heavy and eztra-heavy hydrocarbons*.
 - **Hidrogenación, hydrogenation (n.):** chemical reaction between molecular hydrogen (H₂) and another compound or element, usually in the presence of a catalyst such as nickel, palladium or platinum.

I

- **-Intercambio Másico, mass exchange (comp. n.):** The movement of the mass of a component in a system containing two or more components from a region of high concentration to that of a lower concentration.
- **Inyección de vapor, steam injection (n.):** An improved recovery technique in which steam is injected into a reservoir to reduce the viscosity of the crude oil.
- **Inyección cíclica de vapor, cyclic steam injection (CSS)(comp. n):**. also known as huff-n-puff is another thermal EOR method which only requires one well, and it consists of three levels. First, high-pressure steam is injected through the target zone for several weeks to reduce the oil viscosity; then, in the next step, a soaking period is given to the steam to diffuse through the reservoir. Finally, oil is produced from the same well. In multilayer reservoirs, the treatment starts from the bottom layer and moves up to the top layer. (Sheng, 2013).
- **Inyección continua de vapor (SD) (n.):** *Continuous steam injection (SD).*
- **Inyección de agua caliente (n.):** *Hot water injection/flow (HWF).*
- **Inyección térmica de solvente, cyclic solvent injection (CSI)(comp. n.):** A follow-up EOR technique, which is under consideration for application in the oil industry. This method targets extracting large amounts of remaining oil in the matrix by solvent diffusion, taking advantage of its high contact area with wormholes. (Y. Soh, A. Rangriz-Shokri, T. Babadagli, 2018).
- **-Isomerización, isomerization (n.):** In chemistry isomerization (also isomerisation) is the process by which one molecule is transformed into another molecule which has exactly the same atoms, but the atoms have a different arrangement e.g. A-B-C $\rightarrow$ B-A-C (these related molecules are known as isomers). In some molecules and under some conditions, isomerization occurs spontaneously.