

BOOK BY

JORGE GOMES & FERNANDO ALVES

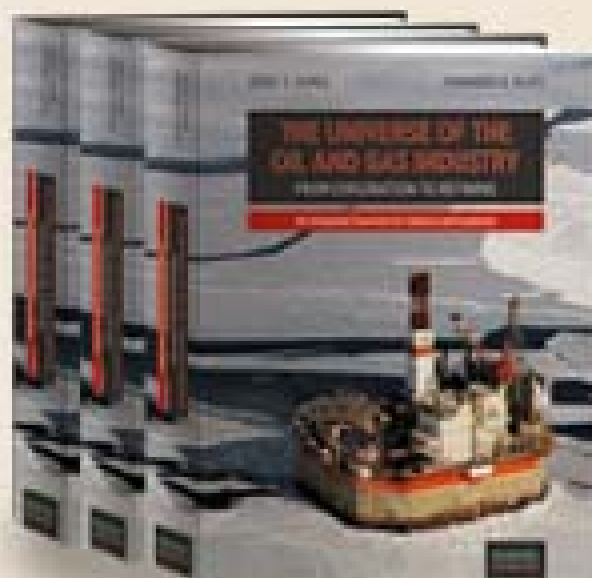
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BY PARTEX OIL AND GAS

# THE UNIVERSE OF THE OIL AND GAS INDUSTRY

FROM EXPLORATION TO REFINING

An Integrated Overview for Industry and Academia



**PARTEX**  
OIL AND GAS

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Drawing on more than 60 years of the combined industry experience of its authors, this comprehensive textbook covers all major technical and non-technical aspects of the industry, from the exploration of oil and gas to their supply to the markets.

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## **OFFICIAL LAUNCH OF THE BOOK**

### **Introduction of “The Universe of the Oil & Gas Industry”**

“The Universe of the Oil & Gas Industry”, a book which has been sponsored and promoted by Partex Oil & Gas, was written by two members of its senior staff, Fernando Alves and Jorge Gomes.

This book combines information captured throughout their extensive and diverse careers, creating a document that reflects Partex experience in multiple domains and is valuable to the understanding of the natural resources that revolutionized the history of our time – oil and gas.

It presents a global overview of the issues of the oil and gas industry and attempts to analyse each one of them, showing how these issues impact the universe of oil and gas

It begins with the history, origins and fundamentals of this industry, guiding us through the importance of geological and engineering knowledge for the efficient exploration and production of Oil & Gas resources.

Throughout the book all the technical areas are analysed, all the way from exploration to refining, but it also addresses the many other related aspects of the oil and gas industry, such as organisations, careers, environment, contracts and markets.

The book was released in Abu Dhabi on the 28<sup>th</sup> of May, 2013 and in Muscat on the 2<sup>nd</sup> of June, 2013 before audiences of high dignitaries from different sectors and various international oil and gas companies, receiving praise from all quadrants.

This is a most significant example of Partex Oil & Gas’s culture of knowledge sharing with the industry, and in particular with its long time partners in Oman and the UAE over the last 75 years.

In the words of the Society of Petroleum Engineers Regional Director (Middle East, North Africa and India) and Senior Vice President of ADCO (Abu Dhabi Company for Onshore Oil Operations), Mr. Fareed Abdulla, truly a remarkable, most comprehensive, instructive and invaluable collection which represents the contribution of a career full of learning that Jorge and Fernando have acquired through years of experience in serving the industry.

The *Universe of Oil and Gas Industry* is an easy to read, systematic and practical book which effectively describes analyzes and guides the reader step by step through all the necessary components and latest technologies associated with the fundamentals and advancement of the oil and gas industry.

This book is distinctive because it is an up to date and realistic reference for both students and professionals in the petroleum industry.



### **Jorge S. Gomes**

Jorge Gomes graduated in Geology in the University of Porto (Portugal) and holds a MEng and a PhD in Petroleum Engineering from Heriot-Watt University, Edinburgh (UK). Recipient of two international awards, one from the Petroleum Institute (UK) and the other from the SPE, for the best thesis and the most innovative European research project in 1991.

He started his career in 1982 in the field of mineral exploration with BP and EDMA and in 1984 began working for Partex Oil and Gas as a petroleum consultant. In 1985 he was seconded to Qatar Petroleum having been responsible for two gas discoveries and worked on Dukhan, Maydan Mahzam, Idd El Shargi and Bu Hanine fields. After 1999 he worked for Hot Engineering in Austria, as chief geologist, responsible for studies on Sarir and Messla fields in Libya.

In 2001 he started work for Partex Oil and Gas in ADCO, the Abu Dhabi Company for Onshore Oil Operations, where he was involved in operations and field studies on Rumaitha, Al-Dabbiyah and Asab fields. In 2010, he joined the Petroleum Institute in Abu Dhabi, as Partex Chaired Professor and has since then been dedicated to academia, preparing the next generation of engineers and geoscientists.



### **Fernando B. Alves**

Fernando Alves graduated in Chemical Engineering in the University of Coimbra, Portugal, holding a MSc degree in Petroleum Engineering from the Imperial College of Science and Technology, London University. He received a SPE award for research projects in the area of numerical methods for the study of petroleum reservoirs.

He began his professional career in 1980 at the Partex Oil and Gas group, having been seconded from 1985 to 1994 to ADCO, the Abu Dhabi Company for Onshore Oil Operations, where he was responsible for the reservoir management and studies of several major oil fields and the coordination of the team in charge of the planning of four of the first gas injection EOR projects in the United Arab Emirates. Since 1994 he participated in the implementation and supervision of oil field development projects in the Middle East, West Africa, Siberia and Kazakhstan.

The author has held several technical leadership positions, managing petroleum studies and projects of Partex Oil and Gas and representing the group in its participations in Abu Dhabi, Oman and Kazakhstan. He has been a member of the Partex Oil and Gas executive commission since 2004, holding responsibilities in the management of the participations of the group and the investments in new exploration and production assets.

## ***SPEECHES OF THE SPEAKERS INVITED FOR THE LUNCH CEREMONY***

Mr. Fareed Abdulla, Senior Vice President in the Abu Dhabi Company for Onshore Oil Operations (ADCO) and SPE Regional Director (Middle East, North Africa, & India)

Your excellency, Distinguished guests, Ladies and gentlemen,

It is a great pleasure and honor to be here this evening and witness the launch of a truly remarkable book, specially that I have known and worked with the two wonderful authors since mid 80's, an association which has built a strong professional and friendship relationship among the three of us.

But I have to confess that in 2007 when they launched the first edition of this book which was in Portuguese, it came with a total surprise to me. Simply, how could the authors keep the making of such a wonderful book a secret!

Recently and before the start of the printing of the book in English, Fernando and Jorge asked me if I could look at the book and give them my opinion. And of course I happily indulged myself in reading/browsing through the 700+ pages of this magnificent book.

As I kept reading the book, I was just simply convinced that this is a unique book that I have ever come across in the oil and gas industry, and I say this for many good reasons and let me share with you some of the reasons:

- 1) It is a complete journey through the oil and gas sector. It covers everything you need to know. It teaches engineers, geo-scientists and students with everything they need to know about this amazing and challenging industry.
- 2) The book does a fantastic job of covering topics like the fundamentals of petroleum industry, the origin of oil and gas, the rocks, drilling and well completions, logs, reserves and their classification, field development plans and how to estimate the development costs (CAPEX, OPEX), enhanced oil recovery techniques, reservoir management practices, production, refining, distribution networks, transportation, the environment and safety.
- 3) It further covers natural gas, unconventional, shale gas, it even touches on the importance of developing experts in the petroleum industry and how to do it. It explains in detail the various production contracts between IOCs and NOCs. It explains about the role of service companies. It also comprehensively explains the major factors driving the market (the so called Supply and Demand) and the secrets behind the pricing.

- 4) But most importantly, it is an up to date piece of work. For example, if you want to know about the latest development and techniques in logs, stimulation, seismic, the book covers it. And even the impact of environmental disasters such as Macondo in the Gulf of Mexico and the impact of regional conflicts on the oil and gas industry is also covered and analysed in the book.
- 5) I was also fascinated by the simple English in which the book explains and teaches various technical subjects.

The timing of the launch of this priceless book is quite important as in our fascinating industry we have not seen such a comprehensive and up to date book which aims at helping the professionals in the industry at a time when brain drain is taking its toll and of scarce supply of professionals, but most importantly the students in the universities who are aiming to join our industry.

Another amazing fact about the book is that it uses lots of nice pictures and images that are familiar to us here in Abu Dhabi, which makes us proud to see such a local taste and footprint in this book.

Now allow me to say a few words about the authors:

Fernando Alves is a senior executive member of Partex Oil & Gas who actively participates in ADCO and PDO's Boards together with other geographical responsibilities. A reservoir engineer who graduated in Chemical Engineering from the University of Coimbra in Portugal, Fernando also holds a Master of Science degree in petroleum engineering from Imperial College of Science and Technology in London University. Fernando is the recipient of an SPE award.

In 1985 and for almost ten years he was seconded to ADCO where I had the pleasure of working with him. Our famous work was the implementation of the first miscible gas injection pilot project in north Bu Hasa Shuaiba in 1989 when Fernando was the brain behind the reservoir simulation work and I was in charge of the reservoir management, monitoring and data collection. In addition, Fernando has been instrumental in other major studies while in ADCO.

Fernando is also an expert in Football, however we differ in one main issue, he supports the team from Porto while the rest of the world only knows Benfica!

Jorge Gomes graduated in Geology from the University of Porto in Portugal and holds a Master of Engineering and a PhD in petroleum engineering from Heriot-Watt University in Edinburgh, UK. Jorge is the recipient of two international awards, including SPE.

Jorge worked for BP and EDMA before joining Partex in 1984. In 1985 he was seconded to Qatar Petroleum and was responsible for two Gas discoveries in Qatar. In 1999 he shortly worked for Hot Engineering in Austria before returning to Partex and in 2001 he was seconded to ADCO.

For close to 10 years Jorge provided his dedicated technical work to the North East Bab and Asab teams and eventually was part of the creation of the so called "Expert Team" in ADCO, where he was the authority in Geo-science studies and development.

Since 2010 Jorge has joined the Petroleum Institute in Abu Dhabi and has dedicated his life to Academia by preparing the next generation of engineers and geoscientists.

I am sure with the gift of these books to the Petroleum Institute, the teaching faculty at PI and the students (undergraduate and graduate) will greatly benefit from this valuable book.

Well-done gentlemen and congratulations.



Dr. Abdulla Al Lamki, former Deputy Managing Director of  
Petroleum Development Oman (PDO)

Your Excellency, Ladies and Gentlemen, Assalam Alaikum wa Rahmatullah. Good evening.

I feel greatly honored and deeply humbled by Partex invitation to say a few words on the occasion of this book launch.

After a six year flirtation with the academic world, lecturing Physics in Ireland and Iraq, I joined the Oil and Gas Industry and served in it for 38 years. I have worked mainly in Oman, but also in Holland, Nigeria and Norway.

In these four decades our Industry has changed in many ways but has evolved slowly, particularly on the technology aspects. Major changes have taken place on the market in terms of pricing and trading policies and practices. Some International Oil Companies have swapped positions in the packing order of influence and size. National Oil Companies have cropped up in nearly all the oil producing countries. Significant adjustments had to take place in the relationships between governments and oil companies. Some of these changes we have seen in Oman. The number of exploration and production operators in Oman has grown four to five times over the past three decades. The world governments have asserted much more explicitly their wish to manage and govern the exploitation of the hydrocarbon resource base in the country. We have seen this in Oman too. The Industry has adjusted very well to all the political and social changes, as well as to the modus operandi at the market place.

When it comes to technology the pace of change has not been quite so dramatic, at least in comparison with a lot of other industries. For the size of the Industry we do not spend an adequate amount on research and development of the fundamental processes in the Industry.

With the world annual consumption of over 30 billion barrels of oil and 120 TCF of gas, the cash trading of the raw commodities alone amounts to over \$4 trillion. This does not take into account the mid- and downstream values, nor the impact on the GDP as a result of the economic stimulus that the Industry provides.

The amount of money spent on research and efforts on improving the way we work are not commensurate with the size or importance of the Industry. As the molecules become more difficult to extract and more expensive, I have no doubt

that this attitude and practice will change. We have plenty of time and opportunities to change or reform the Industry because it is here to stay for a long time to come. If I may quote from the book that we are launching today:

“Exploration will continue to open new frontiers which will combine, in a sustainable way, new technologies, further investment in specialized human resources and the continuous improvement in best practices, health, safety and environment. In areas as volatile as the economy and energy, recent discoveries and new projects confirm that oil and natural gas resources are far from becoming scarce and that the oil and gas industry will maintain a dominant position throughout the 21<sup>st</sup> century.”

It is in the spirit of continuity and permanency, I believe, that the authors have spent a phenomenal amount of their time to produce a truly comprehensive book on the oil and gas industry.

The book was first published in Portuguese in 2007 and the current English version is from the second Portuguese edition of July 2011. Excluding the terminology chapter at the end, the book covers a total of 650 pages in eight parts. I have read the 650 pages which to me is quite a challenge! Thanks Fernando!

Part I of the book introduces the reader to all the key technical elements of the Oil and Gas Industry (Exploration, Field Development, Transportation and Refining) as well as the origin, migration and composition of hydrocarbons. The section also wets the reader's appetite by giving a brief reference to business and economic issues associated with the Industry. To me this is a very useful scene-setting section. In 70 pages it provides a good feel for the wide-ranging issues associated with the exploration, production and consumption of oil and gas.

The following three parts of the book, which amount to 50% of the total volume, are dedicated to the Upstream business, covering Exploration, Drilling, Evaluation and Completion, Development of fields and finally Reservoir Management. I cannot think of any aspect of the Upstream that is not covered and covered extensively. Each subject is treated with the drill-down technique, allowing the reader to stop at the level of detail he wishes to go to. I tried hard to think of what else could be included in this section of the book that would enhance it. Everything I know for the understanding and appreciation of the Upstream Business was adequately covered. I thank the authors for that.

The next two parts cover the mid- and downstream, including oil and gas processing, transportation, refining and gas-specific processes such as LNG and GTL.

Environmental aspects of the Industry receive due attention in a whole part dedicated to the subject, including legal requirements and impact of emissions and effluents.

The book ends up with organizational and contractual arrangements the Industry has adopted, with a sound critique of the various options adopted by different companies and countries.

Oil and Gas professional development requirements and the role of universities and companies in this context are all covered.

Finally the authors talk about the market and the outlook for the future. With the realization that the Oil and Gas Industry has been notoriously wrong in predictions of both price and consumption, the authors treat this section with a lot more humility.

I deliberately indicated to you, Ladies and Gentlemen, the coverage of the text to demonstrate how comprehensive the book is. Normally in our Industry one gets deep and narrow coverage of one or two subjects or disciplines in one text. This particular text covers the complete spectrum of the Industry, both technical and commercial as well as professional development. This is rare in our Industry.

Excluding the section on terminology, the text has 300 references for further deepening on various subjects, if one wishes. The book is easy to read and digest. It certainly contributes to the dissemination of the technological capabilities and the intrinsic values of the oil and gas industry. I have no doubt that it is worth the efforts of the authors.

There is only one thing, in my view, that would have enhanced the book even further. Inclusion of solved examples or technical problems in the relevant chapters would aid the understanding of students using the text. I will leave that thought with the authors for future editions.

I have met Jorge Gomes previously and I have had contact and worked with Fernando for some 15 years. In the words of the Middle East SPE Regional Director and I quote "..... the text represents the contribution of a career full of learning that Jorge and Fernando have acquired through years of experience in serving the industry."

Fernando represented Partex in PDO technical and management committees, when I was Technical Director in PDO until end 2011. I was always grateful for Partex support and challenge and very much appreciated Fernando's constructive and highly professional manner. Thank you Fernando for that and your friendship over the years.

I wish Jorge and Fernando success in this English version of their book. A truly comprehensive text for the professional and an easy to read reference for the public who wish to raise their level of understanding of energy issues.

Thank you Ladies and Gentlemen.