ECHO

SPE Suez University Student Chapter Annual Magazine

Issue 15 | Feb 2023

Published By:
Society of Petrolleum Engineers
Suez University Student Chapter

Our company
About Us

BGS Energy Services is recognized as one of the leading providers of innovative solutions for Reservoir Management, Drilling Management, Well Services, Process & Pipeline Services, Real-Time Solutions, and Down Hole Motors.
BGS Energy Services pride itself in challenging the norm to produce cost-effective, best-in-class solutions that save downtime and maximize benefits to our customers' value chain from the wellhead out; through eliminated risk and reduced execution time. Our highly motivated workforce is committed to responding quickly and efficiently to customers' requirements, without compromising our unequaled safety record.
We specialize in delivering technically and commercially tailored packages for a wide range of disciplines; providing a wholly integrated solution that distinguishes us from other providers.

Our Service
What We Offer

GEOLOGY AND GEOPHYSICS

Seismic data , Well data , Reservoir Characterization

PIPELINE AND PROCESS SERVICES

Process Services , Pipeline Services , Flow Management, HDPE

ENGINEERING, PROJECT MANAGEMENT

Effective management of personnel, equipment, resources, planning...

MANAGED PRESSURE DRILLING

Reduce total well expenditure through mitigation of Non-Productive Time

REAL TIME DATA

Platform incorporates existing analytics packages, multiple data sources

DOWN-HOLE MOTORS

Strong,Responsive,Reliable

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Foreward

Hossam Magdy
ECHO Chairperson

" ALWAYS DREAM & DON'T GIVE UP "

We all in childhood had many dreams and great expectations about our life in the future but when growing up we start giving up again and again.

The question here: Were our dreams exaggerated or did we give up too quickly?
The answer is ninety percent of our dreams at that age can become reality and just ten percent were exaggerated because our minds contained imaginary things at that age. I expect most of those reading this page to dream they could fly.

I think this happens because people tend to rest and be calm. When we face challenges and problems, we begin to give up and retreat until we can reach a stage where we are alive but dead. Sometimes we give up even before we start. And at other times, most crucially, we tend to give up just before we are about to make a huge break-through.

So we can follow some steps that can help us to achieve our goals:

* First of all, trust in God and make sure that God helps you in everything.
* Know your qualifications, work on improving them and adapt to the changes which happen in the world.
* Take the responsibility and know that you can't always control the results. But you own your efforts, your ideas, and your perseverance against obstacles.
* Put a clear plan of your goals.
* Always review the plan and edit it.
* Dream more and more.

To conclude, we should realize that our hardest times often lead us to the greatest moments of our lives. **'Keep going' should be our mantra**. Tough situations build strong people at the end. We should not fear failure but rather fear not trying, so don't give up.

Foreward

Fares Elhamadi
ECHO CEO

" BE REALISTIC, CHOOSE YOUR QUOTE AND DECIDE YOUR CAREER "

"You have all the right to control your life." I believe that the circumstances and opportunities available differ from one person to another, so I choose this quote:

"I am not a product of my circumstances. I am a product of my decisions." –Stephen Covey.

Our days are filled with a continuous stream of decisions. Most are normal, but some are so important that they can haunt you for the rest of your life. You have the right to choose your own path and dream. The bigger the targets the longer the road goes. Before anything you should have the belife of success, but at the beginning you should believe of yourself.

A study from the University of Texas shows that even when our brains aren't tired, they can make it very difficult for us to make good decisions. When making a decision, instead of referencing the knowledge we've accumulated, our brains focus on specific and detailed memories. For example, if you're buying a new car and trying to decide if you should go for the leather seats, even though you know you can't afford it, your brain might focus on memories of the wonderful smell and feel of the leather seats in your brother's sports car, when it should be focused on the misery you're going to experience when making your monthly car payments. To clarify more, if you don't have any memories about something yet, it's hard for your brain to contemplate, so you should think and imagine what happens when you make this decision first and do not rush.

On your road, you will suffer from tiredness, and pain, you may also be stressed , worried and hopeless. "To know that the road of success is not straight". Hardness road and the things you have to make you the person who is able to pass everything thing and make you patient about everything you meet. It's going to be hard, but hard doesn't mean impossible. Today do something that your future self will thank for you. Each of us has inner strength. It's the greatest of mountains. Finally, you can be the person you want with your unique goals, thoughts, and ambitions, you should consider that anything beautiful is worth getting hurt you.

A career is a marathon, not a sprint but you need to make many sprints to reach the suitable marathon in your life. When you were young you tend to be impatient and always need to make a new step toward your career, but you couldn't decide what you need whether to be an engineer or graphic designer, or data analyst programmer, at this moment if you can't be in some form of monogamy with a particular subject you need to pursue all of them.Your life needs you to start not to wait or stop, take the step and throughout your career never think it is the end when you succeed to achieve something, it is only the beginning of a new journey, so you need to believe in yourself till people believe in you.

Stop trying to be perfect , you are unique in your person.

Interview

BY / Fares Elhamadi

Eng. Terry Palisch

SPE 2024 President

Q1: At the beginning, we would like to know more about yourself and your education & professional career?

I am from St. Louis, Missouri, a city in the Midwest of the USA. I graduated from the University of Missouri-Rolla (now Missouri S&T) in 1986 with a BS in Petroleum Engineering. Upon graduation, I went to work for ARCO Alaska, and had positions of reservoir, operations, and new ventures engineering. I transferred to ARCO International as a production advisor in Algeria. After a 4-year stint teaching math at Wylie High School, I went to work for CARBO Ceramics as a Global Advisor and am currently the VP of Technology & Engineering, providing technical support to our oilfield division and leading our R&D group.

Q2: How did you draw up your success story to be 2024 SPE? President

Being SPE President was not something I originally aspired to do. That said, as I served on the SPE Dallas Section board, and eventually as the chairperson of the section, I became more enthusiastic about the SPE. What the Society has done for my professional fulfillment and career has been tremendous, and I wanted to help ensure others have access to those same benefits. When I was elected as the Completions Technical Director, I realized even more benefits as I met and collaborated with some great colleagues across the globe. While I never planned to run for President, I had several fellow SPE members encourage me to run, and the rest they say is history.

Q3: Also, What the challenges that you encountered in your career And how did you deal with them?

Everyone has challenges in their careers, and life in general. I would say one challenge I had early on was that I was told by my managers that I had extremely poor soft skills, particularly technical writing,and presentation skills. To overcome these deficiencies, I joined a Speaker's Bureau while at ARCO Alaska, as well as began to author technical papers, primarily SPE papers. Nothing improved my technical writing and presentation skills more than performing these tasks as often as possible. To date I have coauthored over 50 SPE papers and made 100s of presentations. SPE has provided a platform for me to vastly improve my soft skills.

Terry Palisch is the vice president of technology and engineering at CARBO ceramics in Richardson Texas He began his career with ARCO during which he served 4 years in Algeria and 10 years as a senior petroleum engineer in Alaska

Palisch joined CARBO in 2004 and in his current position leads a team of technologists developing and championing new products and services and advising clients on completion and fracture optimizatin

Q4: What is your vision towards the SPEI in season 2024 & what is the most important steps will you take to achieve this vision?

The Board and SPE leadership are currently in the middle of assembling a new Strategic Plan. This should be completed by Q1 2023, and while Med Kamel will begin the implementation of this Plan, I will carry the mantle forward into my Presidency. My goal is to bring all members together to be able to get the very most out of their SPE membership so that they can thrive in their professional careers. My vision is that SPE members see their Society as a resource to help them advance their technical and soft skills, and that all members see SPE as the medium to thrive in an ever-changing world.

Q5: As your career & experience, how can you see the future of the oil industry with the modern technologies and trends in the upcoming years?

I see the future of the oil and gas industry as very bright. As petroleum engineers, we have been solving the world's energy problems since our industry began in the 1800s. We should be proud of what we have accomplished in bringing affordable, dependable, and sustainable energy to the planet. Because of our industry, life-expectancy has more than doubled in the last 150 years, and the discovery of low-cost natural gas has led to a reduction in GHG's over the last several years in many regions as natural gas has displaced coal in power plants. But we are just getting started. As petroleum engineers, we are now applying our expertise to decarbonize our processes via reduced flaring, methane emissions and electrifying our operations, as well as geothermal expansion and CCUS.

Q6: As you worked in Algeria 4 years, what is your impression about the future of the oil & gas industry in the North Africa?

North Africa will continue to be critical to the delivery of hydrocarbons in the region, and particularly the production of natural gas. Natural gas and its derivatives (petrochemicals, ammonia, etc.) are critical to reducing emissions and feeding the world and provides access to affordable energy to most of the humanity.

Q7: From your perspective, Can the robots take place in our industry?

There is a time and place for robots or other autonomous technology in our industry. Robots that can access areas that are unsafe for humans, or perhaps where humans are unable to access, will be beneficial. Related technologies will also help engineers be more efficient and allow us to spend our time and mental capital solving engineering problems, and there will always be a critical need for our creative expertise.

Q8: Do you advise young petroleum engineers to view Energy transition as an opportunity & how can they deal with this new trend?

I absolutely advise young PEs to see the energy "transition" [evolution!] as a great opportunity. As a petroleum engineer, we are trained in the broad fundamentals of engineering, and we are trained to solve problems. These skills are critical to hydrocarbon extraction, as well as other new or related energy technologies. The most important advice I give is to make sure you are always learning. Always have an SPE paper to read, a local section meeting to attend, or webinar/training to access. SPE has a wealth of opportunities to gain experience, stay current and broaden your expertise. By constantly learning you will keep your talents sharp, relevant, and marketable.

Q9: Your current position leads team of technologists, can you tell us about the new technologies on completions and fracture optimization?

Much of the technologies being developed in the completions and fracture optimization are centering on the development of unconventional resources, and economically improving ultimate recovery in these reservoirs. Most UC resources currently project no more than 10-15% recovery, so there is a tremendous resource in place for potential improvement. Technologies that allow us to contact more rock are at the forefront of the work, as well as the diagnostics associated with their evaluation.

Q10: What are your plans to support student activities around the world?

I (and my colleagues on the Board) recognize that our students are the lifeblood of the Society of Petroleum Engineers. I hope to be able to visit many student chapters during my Board service and presidency and convey the excitement I have for the future of our industry and our Society. We will continue to look for ways to support the students, both financially and professionally. We are also continually evaluating what the Society can do to supportstudents as they transition to professional members. Our goal is to make the society a lifelong commitment to all members of our industry.

Q11: Could you leave a massage for fresh graduates and senior students who are?

As you embark on your exciting career (and life) journey, I will leave you with four words of advice:Learn – never stop learning, reading papers, attending conferences, accessing training, etc. Participate – attend your local section events and activities and network with your colleagues. Volunteer – look for ways to volunteer at your local section, as well as ways to help on international committee Lead – as you volunteer, start looking for waysto lead committees, sections, etc. If you do these things, you will be well on your way to a successful and fulfilling career.

Interview ?

BY / Fares Elhamadi & Hossam Magdy

Eng.Anastasia Poole

Regoinal Manager Digital & Integration at SLB

Q1: Your career journey passed through different stations; how do you see the diversity in the work environment?

SLB has always been very strong on diversity, and we almost take it for granted. It is very common to see teams with at least 3–4 or more different nationalities all the way at the top of the organization. This is, we believe, one of our key strengths and differentiators from other
organizations.Another important thing is that when people talk about diversity, they often only focus on gender diversity, but while traveling and living in different countries, I learned about cultural diversity, background diversity, and, very importantly, diversity of thought and experience. This all helps us see different perspectives, connect, innovate, and grow personally and professionally in a way that would not be possible if we stayed in the "box." That was another reason I created my mentoring program and ensured it was open to all functions, divisions, and geographies of SLB. While not everyone can travel and change locations to gain experience with different cultures and environments,

Q2: Now, we will start a new direction for our interview: we need to know more about the vision of SLB, And Why did it change its name to SLB?

SLB was always a company with a big focus on innovation and technology. We strongly believe that our experience, knowledge, and ability to deliver solutions at scale can help us help the planet and accelerate the energy transition.Our new identity symbolizes SLB's commitment to moving farther and faster in facilitating the world's energy needs today and forging the road ahead for the energy transition.We are a global technology company driving energy innovation for a balanced planet. Three years ago, we set out on a strategy to provide reliable, secure, and accessible energy to meet growing demand while rapidly decarbonizing for a sustainable future. This rebrand reflects the progress we have made in that journey and symbolizes our ambitions for the future.Our brand articulates our commitment to supporting the energy transition, accelerating decarbonization, and the role we're playing in developing new energy technologies. We have been working with our customers and partners for years to make their operations more sustainable.We have the best expertise, scale, and technology to deliver a balanced energy system and a decarbonized world.

Over the last 20 years in oil and gas, I had the privilege to live and work across the globe, from Africa and the Middle East to Australia, Europe, Russia, and North America. My first location with SLB was in fact in Egypt, where I started with Western Geco division as a junior field geophysicist, on one of its land-desert seismic crews. It was a great and unforgettable experience that gave me a strong start in SLB and the industry.

I have held several regional technical and line management roles, supported the SLB Geophysical technical community worldwide as a discipline career manager, and worked on special HR projects. I am very passionate about leadership and people development and couple years ago I initiated the pilot on Leadership Mentoring in couple of locations. Now it is a worldwide program We Lead available to all employees in SLB who completed their fixed step program.

Q3: How can SLB bring CCS technology to Egypt and help ensure the country meets its decarbonization goals?

SLB has already started laying the foundations for CCS technology in Egypt. The first step in any CCS project is to identify the emitters and then screen the areas for suitability for CCS. In 2022, Egypt Upstream Gateway (EUG) team SLB, in partnership with EGAS, EGPS, Shell, and the University of Aberdeen, started the ambitious project of creating Egypt's first CCS atlas. With results of the 1st screening phase of East Mediterranean presented at COP27. We now have on-going studies in other areas of Egypt with the ambition to generate regional studies to help accelerate the CCS planning and implementation cycle. This study will not only help O&G industry, but also other high carbon emitters industries like for example building industry where cement plants are one of the top emitters. In addition to the subsurface knowledge, SLB also has the technological "know-how" during implementation stages for actual CCS capture, injection, and storage, with the ability to monitor the performance of the storage container over a long period of time. We are uniquely positioned to provide a full range of services from planning to implementation as we are a full E&P cycle company that can explore the required areas, provide injection and compression services, and use our digital technologies for modeling and prediction of CCS project performance. The ability to have full support in one place helps projects be safer, faster, and more efficient helping deliver decarbonization ambitions faster.

Q4: Will this vision affect your services in the oil & Gas industry as it is considered the largest provir of oil field services?

The SLB brand will continue to build on nearly a century of technology innovation and industrialization expertise in the energy services industry. SLB will continue to operate its legacy oil and natural gas business with strong focus on efficiency optimization, reducing carbon footprint of our operations while also expanding in technologies to help companies curb emissions of carbon dioxide and methane. It's all part of an effort to serve the existing oil industry while pivoting toward the energy transition.Our strategy is to create a lower-carbon energy future through our three engines of growth: Core, Digital, and New Energy .Oil and gas-focused technology services is the most significant part of our business and will remain so. This vital part of our business is also where we can have our most significant impact with technologies that monitor, reduce and capture emissions. Our innovations and partnerships in the cloud, AI, machine learning, data management, and more are helping customers in oil and gas and beyond drive performance and become more efficient and sustainable.

Q5: How do you see the impact of digitalization in the industry and how is SLB using Digital?

SLB has a very strong and well-established digital business, from software development to large data management and high-performance computing. A few years ago, we announced the deployment of the ground-breaking DELFI cognitive E&P environment. DELFI is a collaborative technology that unites the E&P life cycle in the cloud. It's open, secure, scalable, and fully managed, seamlessly connecting people, data, and leading software applications across exploration, development, drilling, production, and midstream. Since then, we have adopted digital in all our businesses, optimizing reservoir modeling and characterization, drilling, and operations planning. We realized that to accelerate the digitalization of the industry, we could not do it alone. SLB opened its data ecosystem and contributed it to The Open Group's Open Subsurface Data Universe™ (OSDU) Forum to accelerate the delivery of the OSDU Data Platform. Now oil and gas companies can accelerate their digital progress by moving data to the cloud using the OSDU Data Platform, enabling a seamless experience when deploying their own applications or adapting the DELFI applications to their needs. Rapid improvements in data control and integration across enterprise data sources, operations, and security are enabled. This approach allows for not only digital innovation and transformation in individual locations and parts of businesses but doing it at scale across regions, functions, and businesses, interacting with partners, employees, and vendors without borders in a safe and secure environment.SLB uses digital in all its operations, improving the efficiency of our processes and services to our clients as well as innovating and building new tools for the future. One of the most recent examples is a collaboration between SLB and Saudi Aramco on developing digital sustainability solutions for hard-to-abate carbon industries.

Q6: Finally, what is your advice for fresh graduates and senior students to keep up with the ongoing skills-demanding job market?

My advice to new graduates is to invest time in building strong technical skills in their domain of choice as well as learn about at least the basics of coding, artificial intelligence, and machine learning to help them stand out. Knowledge of new energy and how you can contribute even after graduating as a petroleum engineer is also very important. The most important thing is to be curious, be open to new learning experiences and opportunities, and explore. For me, the key thing is whatever direction you pick—do something that makes you happy, excited, and jump out of bed every morning. This way, you will progress much faster and have a much bigger impact on yourself and others around you.

Interview

By / Mazen Ibrahim

Eng.Saeed Abdel- Moniem

Chairman at Khalda Petroleum Company (Apache)

Q1:Can you tell us about the challenges that you faced during your journey to Khalda ?

There are numerous challenges, I believe, not only in Khalda but in all sectors. It is how to create a favorable environment for all investors to invest in our sector and all companies here. And now, I think you see many international companies inside Egypt here. They invest too much money in Egypt for the production of oil and gas, so here is the challenge.

Q2: what is the biggest challenge in oil and gas generally, worldwide, and especially in Egypt?

The biggest challenge is how to increase your production with more investments. To accomplish this, you should establish new exploratory fields and facilities. All of this needs a lot of money and investment. The main challenge is how to increase your production. **And how can you increase your production?** By more investment, **and how to get more Investments?** By making it easier for foreign investors to come to our country and invest their money. Actually, we do this now.

Q3: We are eager to know more about your story, especially as the chairman of Khalda.

Well, it's not a story. I graduated from Cairo University in 1996 from the faculty of petroleum and mining engineering. I joined Khalda in 1998 as a reservoir engineer for two years, then worked as a subsurface engineer from 2000 until 2001, and I continued in this way until I became the manager. After that, I worked as an operations manager for eight months at Qurun (QPC), then I returned again to Khalda for two years until I became the chairman.

Eng. Said Abd El Moniem has more than twenty four years of experience in Oil and Gas Exploration and production operations,management, and petroleum engineering.

He is graduated from Faculty of Engineering (Cairo University) Major Petroleum class 1996, He is actively a member of SPE since 1993. Eng. Said Joined Khalda Petroleum Company in August 1998, in Reservoire Engineering Sector for two years then Enginnering Departement, he was promoted in several positions with KPC,

Q4:Can you give us some tips and tricks for the fresh graduates and students to prepare themselves for the future?

I'll tell them that they're living the best years of their lives right now. I mean, now you are students in the engineering field. So first, all I want from the students is to study well until their graduation, so you should read very well, attend all the technical sections, and share the information with the other students. Make research in the oil and gas industry, and it is easy to do that now because it was difficult for us as students. We went to the library to get the books and to get just a piece of information.

Now, it is easy to do from your home, and your phone makes it easier; once you enter Google and search about what you want, you will get the information. So, everything is now easier for you than it was previously. So, you must work on yourself. And don't quit learning about any new information you need to know; ask anyone who is working in the oil and gas industry. Ask your doctor; ask your friend; and ask anyone until you get the information.

Q5: what about your career journey that you passed through different challenges?

It is passing through different stations. Now that I'm a chairman, my challenge is to figure out how to grow my entire company to increase production while maintaining a safe operation and a good experience.Through more than twenty four years of experience in Oil and Gas Exploration and Production and production operations, management, and petroleum engineering.

i occupied the position of sub Services operations Assistant General Manager, then Engineering General Manager, then he was transferred by a Minsterial decree to occupy the Position of QPC Operations General Manager for 8 Months, then back to KPC as Deputy Operations General Mnanger, and Since May 2020 I the Chairmain of the Board and Managing Director of KPC and SPE Egypt Chairperson.

Q6: Now I'm going to ask about the energy transition and how this is going to affect our industry?

A personal vision for me is that there is no way for the entire world to use energy without using oil and gas. By the way, to get green hydrogen, you should use gas to introduce it. You can feel it right now if you look at Europe and the rest of the world, but especially at Europe because of the war between Russia and Ukraine and how it has affected Europe, which is suffering from a gas shortage. As a result, I believe that without oil and gas, no one can find another energy source. But, by the way, it is good to have different energy resources, such as oil and gas plus hydrogen or any other source of energy, and we must use this for at least 20 or 30 years to do so, and we should try to use other energy.

Q7: Finally, what is your advice for fresh graduates and senior students?

For every one in Oil & Gas Industry is to work every day to learn new things and know new people in our field , don't stop to improve your technical knowledge and your interpersonal skills, you also should put different plans to your future Start from now enhance your personal branding by working to connect with people in the same field , and finally gain practical Knowledge outside the books to minimize the gap between academic and the the labor market and to discover what is the new updates and discovries in your field.

Dr. Medhat Kamal

-He is SPE 2023 President.

- He is the Chevron Fellow Emeritus and also, an Honorary Member of The American Institute of Mining, Metallurgical ,and Petroleum Engineers (AIME)

- He won Severral regional and international awards including the Cedric K. Furgeson Medal and the Texas Petroleum Engineer of the Year Award

The Oil & Gas Industry In Energy Transition

When we talk about the energy transition, we will talk about a couple of things:

There is energy transition within our industry and energy transition outside of our industry. Energy transition within our industry comes from changing the way we work in response to new challenges. For example, we need to reduce emissions from our wills because there is a very large amount of admission missing in the atmosphere from our weather. We need to reduce and eliminate that, and we do so through new technology. Then there's the energy transition outside, which is renewable energy, some of which is relevant to us and some of which is not. For example, geothermal, right now when people talk about it, they're talking about producing very high temperature steam or water, and actually using these hot fluids to generate electricity. In the new geothermal, we do not produce fluid; we only produce heat.

But we also need to recognize that for the foreseeable future, a major part of the energy that the world uses will continue to be hydrocarbons, simply because of the efficiency of the energy that exists in the hydrocarbon molecules and because of the advanced technology that we have been using for hundreds of years that has allowed us to produce efficiently, and we will continue to do that with larger resources.

Celebrate With ECHO 15

I had a chance to look at a couple of issues of Echo magazine, and one of the things that I like about your magazine is that you actually have interviews with people in the different spectrums of the industry, and your question is always trying to figure out for them what experiences they have and how these experiences can be helpful to you. Also, your magazine is consistently published, which means that with time you are going to be building a very good library of information.

Eng. Kamel Al-Sawi

-He is The President of Kuwait Energy Egypt

- He is the General Manager and Managing Director & Board Member of both Burg Al Arab Petroleum Company and East Abu Sennan Company .

- He holds BSC & MSC in Petroleum Engineering from the Suez Canal University and an Executive master's in management (EMIM) from Ashridge University.

Tips and Tricks For Youth Development

I witness with great respect the passion and commitment of SPE Undergraduate students to contribute to society with amazing skills and opportunities. Hence, I would like to seize this opportunity to address our young professionals to develop competencies and interpersonal skills that may shape their future. At this phase of life, the youth is always driven by Fantasy or freedom and the power to choose his or her response. But all this Must be cautiously exercised, and every step should be planned. It is the best And appropriate phase to accomplish the dual goals of intelligence and character.

Based on Experiential knowledge, my key advice to every petroleum Engineering student is to Focus on contribution, not achievement. I strongly Believe that real success isn't determined by how much you've achieved. It's Determined by how much you've contributed. **My second** advice is to Share your knowledge with other ib your field.

Thirdly, Commit to personal growth in order to build character, Take intentional steps to become more hard working, disciplined, focused, and empathetic. Your academic degree isn't enough, you have to improve yourself, attend training if you can, make yourself visible, attend conferences, expand your network, and trust me, opportunities will come, and if it didn't, create them. Search for opportunities around you, many oil and gas companies including Kuwait energy provides youth empowerment programs in line with Egypt's Vision 2030 to learn and develop such as skill acquisition, Job training and recruitment, panel sand conferences.

Fourthly and lastly, always ask for feedback from others Though feedback is not easy, it is important to increase self-awareness.I invite all oil & gas companies to provide more youth capacity building and Supporting community investment programs.

Thanks and Good luck to all the rising stars!

Eng. Mostafa Fouad

-He is the Global Director at BGS Energy Services.

-He joined Halliburton, and held several operational and managerial roles in Egypt and internationally.

-He received his BSc in Mining and Petroleum Technologies from Suez Canal University.

-He pursued a Master's degree in the field of Geophysics.

The Best Ways To Develop Our Mindsets And Get Ready To be Engineers

As Friedrich Nietzsche said long time ago "That which does not kill us makes us stronger" Throughout history, challenging situations and difficult times frequently result in great and positive changes. This is one of the valuable lessons we have learned and carried forward. If you rise to the challenge, work hard and smart to overcome it, and find opportunities within it to grow personally and professionally, you will find the patience and strength to beat one challenge after another.

With the continuous rise in global population, emerging economies, as well as quality of life standards, energy demand will continue to rise. The oil and gas industry hasalways been a broad field for major opportunities, despite the rough patches. There is a lot of room for development, introducing new technologies, increasing productivity, and optimizing efficiencies to meet these demands while managing the ever-looming challenges. Egypt is one of the primary hubs for BGS Energy Services to introduce and implement cuttingedge technological solutions. Additionally, we continue to expand our current technologies and solutions in 3D scanning and modeling, digitization, and other solutions, after the successes in all our active divisions in the country, in one project after the other with major oil and gas companies in the market. We continue to provide our advanced pipeline preservation technologies in Egypt through our Pipeline and Process Division, as we continue delivering robust data management solutions and real-time data services through our RTD Division, a role with which we pride ourselves, in Egypt's expedited and ongoing digitalization journey of its oil and gas sector.

BGS is committed to supporting young students and talented individuals

in Egypt as a part of the company's responsibility to give back to the community and society. There is nothing more valuable to BGS than investing in the future of young individuals who will become the future leaders in the oil and gas industry, both in Egypt and globally. Pursuing this goal, we believe that engaging and nurturing young individuals early in their careers is imperative for the growth of the oil and gas community. Through providing technical and financial support, we emphasize that education and gaining practical knowledge represent the keys to long-term success for everyone in the oil and gas sector. A win for one is a win for all.

To our young, up-and-coming leaders, I want to highlight the importance of education and effective learning. Always look for possibilities to educate and develop yourselves; be curious about everything if you can. By expanding your viewpoint on things, you can look at them from a variety of angles, develop original solutions, and bring more value to yourself and your organizations. Set a vision, then challenge yourself, commit to how and where you want to see yourself, and work hard to achieve it.

Being an engineering student prepares you to explore and develop innovative ideas in several ways. It is always exciting to work on something new. The university is not the end of your education, but the beginning, where you can hone your skills and develop a problem-solving and innovative mindset.

It is important that a student who graduates continue learning, as it is a never-ending process. For better opportunities, you must always seek knowledge growth.Engineering is a vast field of knowledge, and it is impossible to learn everything in one lifetime. So, decide on a topic of interest and begin gathering information from various sources. You can also look for various certification programs.

With this, you will need to identify and list your goals, then challenge yourself to beat those goals.

Furthermore, it is critical in modern life to stay on top of things by staying up to date on innovations and technologies. Engineering and innovation are two distinct terms that are related. Someone, somewhere in the world, is always working on some new technology. As a result, you must keep up with engineering innovation news. You should keep track of the details of new technologies and their implementation for future growth.

An imperative aspect that young future leaders usually forget is their soft skillsets and capacities. Effective communication may be one of the vital essentials. The world's best and most innovative ideas will never make it past the drawing board if they cannot be communicated effectively.

Expanding your network and staying close to market shapers, knowing where the markets are headed, understanding the rules, and what clients are looking for will all put you ahead of the game on your development path.

We wish you all the best as you set out on your exciting journeys.

Kuldeep Chanchlani

Executive Engineer at Oil and Natural Gas Corporation Ltd. He has a Bachelor In Technology Petroleum Engineering from Pandit Deendayal Petroleum University.

HYBRID ARTIFICIAL LIFT-SRP/GAS LIFT FOR OIL PRODUCTION IN HIGH GOR ENVIRONMENT

ABSTRACT

Gas lift is the ideal candidate in a high GOR environment. Due to different surface constraints, a rod pump is adopted at the field scale. This necessitates the installation of a downhole gas anchor. Free gas, once vented, is utilized by the installation of gas lift valves above the pump depth. The flowing gas recombines with liquid, reducing fluid- density The Casing Gas Pressure Operated Rod Lift (CGPORL) is a new concept, where free gas after separating from the downhole gas anchor can be reinjected from the annulus into the tubing through gas lift valve(s) above the pump setting depth. After combining with liquid, gas reduces the fluid's density thus, the liquid production rate of the producer well is enhanced due to the hybrid System

The Casing Gas Pressure Operated Rod Lift (CGPORL) is a new concept, where free gas after separating from the downhole gas anchor can be reinjected from the annulus into the tubing through gas lift valve(s) above the pump setting depth. After combining with liquid, gas reduces the fluid's density. Thus, the liquid production rate of the producer well is enhanced due to the hybrid assistance of rod lift and gas lift modes Once free gas is released into the tubing and the injection valve is closed, the annulus will become a closed system. The free gas released from the downhole gas anchor gradually pressurizes the annulus until the valve opens for the next cycle. This mechanism indicates an intermittent gas lift process in the cycle. When the well ceases to flow due to rod lift failure (rod, pump, or tubing failure) using CGPORL, the well will continue to flow through the annulus, by keeping the annulus valve connected to the non-return valve (NRV) open. Due to the non-development of annulus pressure in cases of rod lift failure, a mobile air compressor can be used for valve unloading, until the rig is provided for servicing

The placement of the gas lift valve in these installations is critical. The pump was placed at a deeper depth, and gas lift valves were designed at different depths above the pump. In the first well, very good self-flow through the annulus was observed for 6 days, and the pump was kept stopped. When the self-flow ceased, the pump was started again. In the second well, good withdrawal was observed through the tubing, due to the pump effect. Diagnostic studies are carried out regularly to monitor the pump's performance. Two pen recorder charts tracked continuous flow through the gas lift valve. The productivity of the wells increased four times post application of this technoloy Due to a limited supply of gas and the availability of a compressor network, rod pumps are used in low productivity and high-GOR wells. This paper will benefit the operators by enhancing the rates and exploiting the maximum from these low productivity, high GOR wells of the fieldCGPORL consists mainly of a rod pump

a downhole gas anchor, gas lift valve(s), and tubing strings. The gas lift valve will open once annulus pressure exceeds the valve closing pressure. Once free gas is released into the tubing and the injection valve is closed, the annulus will become a closed system. The free gas released from the downhole gas anchor gradually pressurizes the annulus until the valve opens for the next cycle. This mechanism indicates an intermittent gas lift process in the cycle. When the well ceases to flow due to rod lift failure (rod, pump, or tubing failure) using CGPORL, the well will continue to flow through the annulus, by keeping the annulus valve connected to the non-return valve (NRV) open. Due to the non-development of annulus pressure in cases of rod lift failure, a mobile air compressor can be used for valve unloading, until the rig is provided for servicing The placement of the gas lift valve in these installations is critical. The pump was placed at a deeper depth, and gas lift valves were designed at different depths above The pump. In the first well, very good self-flow through the annulus was observed for days, and the pump was kept stopped. When the self-flow ceased, the pump was started again. In the second well, good withdrawal was observed through the tubing, due to the pump effect. Diagnostic studies are carried out regularly to monitor the pump's performance. Two pen recorder charts tracked continuous flow through the gas lift valve. The productivity of the wells increased four times post application of this technology. Due to a limited supply of gas and the availability of a compressor network, rod pumps are used in low productivity and high-GOR wells. This paper will benefit the operators by enhancing the rates and eexploiting the maximum from these low productivity, high GOR wells of the fiel **Casing Gas Pressure Operated Rod Lift (CGPORL)**

It is a hybrid lift system comprising gas lift and rod lift modes. It consists of a rod pump, tubing strings, a downhole gas anchor, and gas lift valves. It allows operators to switch between two modes of artificial lift without costly workovers. The key factor of this lift mode is the ability to isolate or communicate between the tubing and the annulus without pulling the tubing string out of the hole. Gas lift requires that the annulus should isolate tubing to inject the gas through gas lift valves installed inside pocket mandrels, whereas rod pump needs communication between tubing and annulus for passage of liberated free gas.

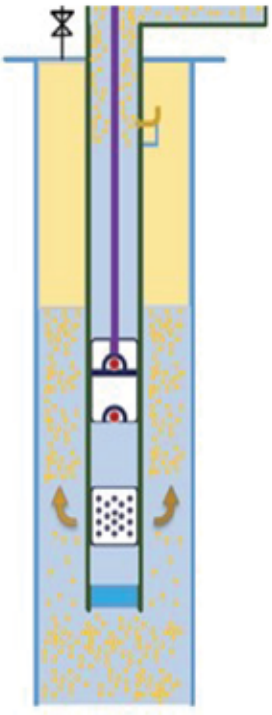

Figure 1— Structure of CGPORL (1)

Mechanism

The gas lift valve will open once annulus pressure exceeds the valve closing pressure. Once free gas is released into the tubing and the injection valve is closed, the annulus will become a closed system. The free gas released from the downhole gas anchor gradually pressurizes the annulus until the valve opens for the next cycle. This mechanism indicates an intermittent gas lift process in a cycle. When the well ceases to flow due to rod lift failure (rod, pump, or tubing failure) using CGPORL, the well will continue to flow through the annulus, by keeping the annulus valve connected to the non-return valve (NRV) open. Due to the non-development of annulus pressure in cases of rod lift failure, a mobile air compressor can be used for valve unloading until the rig is provided for servicing of the rod pump. Lf represents gas lift valve placement depth.L represents pump depth.oc, ogb, ogfe and adh are the pressure gradients representing different pump or gas lift valve setting depths (1)

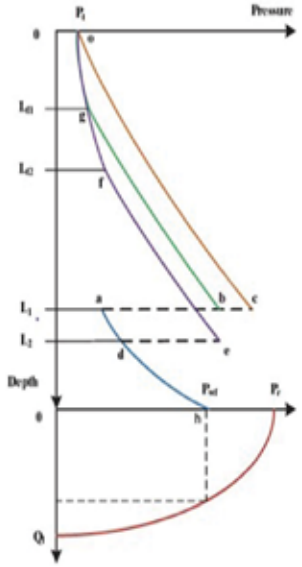

Figure 2— Pressure profile under different conditions (1)

Lf represents gas lift valve placement depth.

L represents pump depth.

oc, ogb, ogfe and adh are the pressure gradients representing different pump or gas lift valve setting depths (1).

As the solution gas is recombined with the liquid above the pump setting depth, the hydrostatic head is relatively decreased. As shown in Figure 2, as the hydrostatic pressure gradient changes from "oc" to "ogfe," the polished rod load varies. If the gas lift valve is placed at a shallower depth, then the drilled well length contributing to the reduction of fluid density is short. For example, if the valve depth is Lf1, then the drilled well length contributing to gas lift is restricted to "og." Vice versa, if the valve is kept closer to the pump, it requires high pressure to open the gas lift valve, so gas injection happens infrequently.

If the valve is placed at a deeper depth of Lf2, the gas lift contributed well length is "ogf". In other words, if the pump is placed at a deep depth (from a to d in Figure-2), annulus pressure can be high, so the gas lift valve can be placed in a low position. Optimization for the point of pump setting and gas lift valve setting depth is required. All these effects are directly related to the frequency and rate of injection, which are to be examined along with factors of economics and safety. Although this method is derived from field experience, it lacks theoretical guidance.


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FOUR "REAL-WORLD" CHALLENGES IN HYDRAULIC FRACTURE MODELING

Andreas Michael
postdoctoral research fellow

He is the Advisor of The Way Ahead. SPE's magazine for Young Professionals, He's a postdoctoral fellow at Colorado Michael holds bachelor's and master's degrees from the University of Texas at Austin and a doctorate from louisiana State University („SU) all in petroleum engineering.

ABSTRACT

The key element of hydrauic fracture modelling remains the prediction of the generated fracture geometries. Over the years, research conducted within the industry and academia over the years has trickled cown several predic- tive software. Neverthe ess, the ability to design optimal fracture treatments is hampered because we cannot "see" the subsurface. This article identifies four specific modelling challenges, essential for realistic, multiple fractures (multi-trac) computational simulations

Multi-Frac Growth Modeling from Horizontal Wells: State of the Art.

The development of theoretical hydraulic fracturing models started several decades ago, setting the basis for hydraulic fracture design, optimization, and diagnostics. As a reservoir stimulation technique, the problem of hydraulic fracturing in essence is one of predicting the geometric shape and dimensions (length, width, and height) of the growing fracture as a function of time, which mathematically translates to a set of non-linear,integrodifferential equations with moving boundaries, solved numerically over a number of time-steps. When it comes to multistage fracture treatments (Fig. 1), where many fractures are being"pumped" simultaneously within each stage, the problem's complexity increases exponentially. The old adage of four inputs necessary for optimal fracture design (reservoir permeabilities, in-situ stress distributions, a sound geological model, and a fluid-loss model in naturally fractured rocks) is no longer the case, as multi-frac interactions and interference (intra-stage, intra-well, and inter-well) should also be incorporated. Classic treatment design software, although convenient to use, struggles to predict multi-frac growth geometries with sufficient certainty, leading to significant disparities between simulations and field observations. although convenient to use, struggle to predict multi-frac growth geometries with sufficient certainty, leading to significant disparities between simulations and field observations.

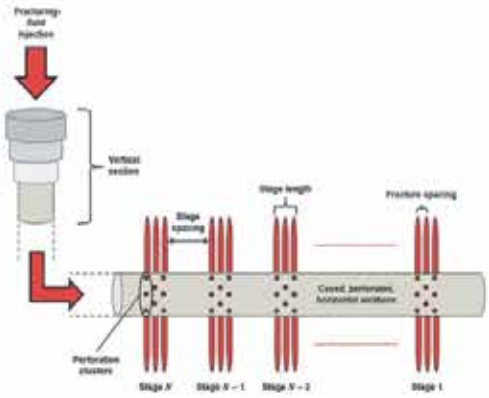

Fig. 1 – Schematic of a multistage hydraulic fracture treatment from a horizontal well, with three perforation clusters per stage. The number of stages, stage spacing, number of perforation clusters-per-stage, and number of perforations-per-cluster can be varied strategically from one fracture treatment to another to optimize their outcome (modified from Michael, 2021).

Non-Simultaneous Fracture Initiation Within a Stage.

Time delays between fracture initiations from different perforations, neglected in virtually all single-stage models, are a major source of inaccuracy for multi-frac simulations. Fracture propagation pressures are significantly smaller than fracture initiation pressures (approximated by the recorded "formation breakdown" pressures) in the same rock. Hence, earlier fracture initiation from one perforation provides a low-energy pathway for the fracturing fluid, which would "prefer" to enter an existing fracture and propagate it rather than initiate new fractures from nearby perforations. Modern-day simulators should incorporate non simultaneous multi-frac initiation and its effects on the resultant multi-frac growth geometry.

2. Dominant (or "Runaway") Fracture Creation.

Dominant (or "runaway") fractures are fracturing whose growth is significantly larger, compared to that of the other fractures. Laboratory-scale experiments where more than one fracture was pumped from a single fluid source displayed dominant fracture creation as a consistent observation. This observation qualitatively agrees with the acoustic sensing data from the field-scale operations (Fig. 2). Dominant fractures end up receiving the entire fracturing fluid by the end of a stage , while the remaining fractures cease propagating. The contribution of these few dominant fractures to the post-stimulation well's productivity could be major.

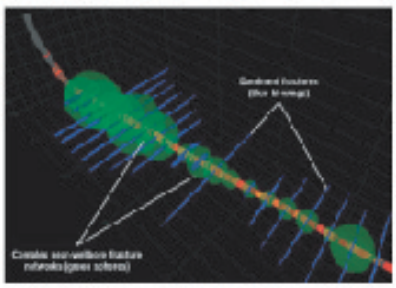

Fig. 2 – Acoustic sensing data, using ambient noise from a hydraulic fracturing operation to characterize the complexity of the generated fracture network (modified from Jacobs, 2019).

3. Inactive Perforation Clusters

Fracturing fluid can bypass entire perforation clusters, initiating fractures from perforation clusters further downstream along the horizontal lateral. This occurs both by inactive perforation clusters located between active clusters and by inactive perforation clusterslocated adjacent (upstream or downstream)
to active clusters .There are many probable causes of a perforation cluster failing to generate fractures, including non- simultaneous fracture initiation and dominant fracture creation. "Limited-entry" techniques accomplished by varying perforation numbers and diameters, later proposed for mitigating interference between simultaneously growing fractures from horizontal wells ("stress-shadowing"), can potentially be effective in eliminating inactive perforation clusters, if specific patterns are detected.

4. Fracture Reorientation in the Near-Wellbore Region.

The drilling of a well disturbs the surrounding stress field in a way that can make the plane of fracture initiation different from what is dictated by the far-field stress state. This causes fractures to terminate prematurely within the near-wellbore vicinity (a few well diameters) or reorient themselves to align with the "proper" fracture plane as they propagate away from the near-wellbore region (those who do are likely to become dominant fractures).
This generates complex near-wellbore fracture networks (Fig. 2), which induce fluid flow resistance, triggering completion and production-related problems, such as early screen outs and poor post-stimulation well productivity.

Raising the Stakes in Hydraulic Fracture Modeling.

Engineering a successful hydraulic fracture treatment involves several petroleum engineering subdisciplines, such as completion, production, and reservoir engineering, a background in geomechanics and fluid dynamics, with good knowledge of the limits of the materials and equipment available. Incorporating economics enables optimizing the treatment design towards profit maximization. Fracture geometry is the most critical element of a treatment design, with a several considerations made for influencing multi-frac growth to optimize production and economics. Being able to the confidently predict in advance the multi-frac geometry generated in treatment, will enable "massification" of fracture operations with projects currently labeled unprofitable becoming profitable, through cost reduction from lower capital expenditures. Post-stimulation productivity estimations along with the corresponding cash flows often assume individual fracture geometries that may bear no resemblance whatsoever with the actual multi-frac growth resulting from treatment. While users of standard industry software focus on downstream aspects when it comes to model validations and history-matching, such as production flow rates and volumes from a fractured well or pad, we cannot run away from multi-frac geometry reliability questions for long. Post-fracture morphology data acquisitions using micro seismic technologies (Fig. 3) can provide "real-world" multi-frac geometry data necessary for tweaking computational simulators to improve their reliability, combining physics-based and data-driven modeling approaches.

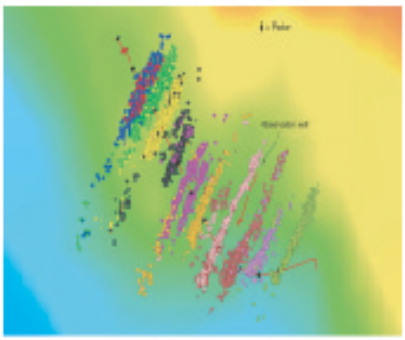

Fig. 3 – Map view of micro seismic results from a stimulated horizontal well displaying details of individual fracture geometries (from Shaffner et a., 2011).

Bjorn Brechan
Resarcher at Equnior

DIGITAL WELL PLANNING AND RIG AUTOMATION

Abstract

The cost-saving potential of rig automation was identified in field trials more than a decade ago. Since then, the oil and gas industry has been developing systems and infrastructure to establish permanent solutions. Over the last few years, many industry players have begun to develop a digital workflow for well planning. Integrating a fully automated workflow for planning well construction, workovers, and final plugging of wells (P&A) with automated rig equipment is believed to provide many opportunities, such as safer and more cost-effective operations.

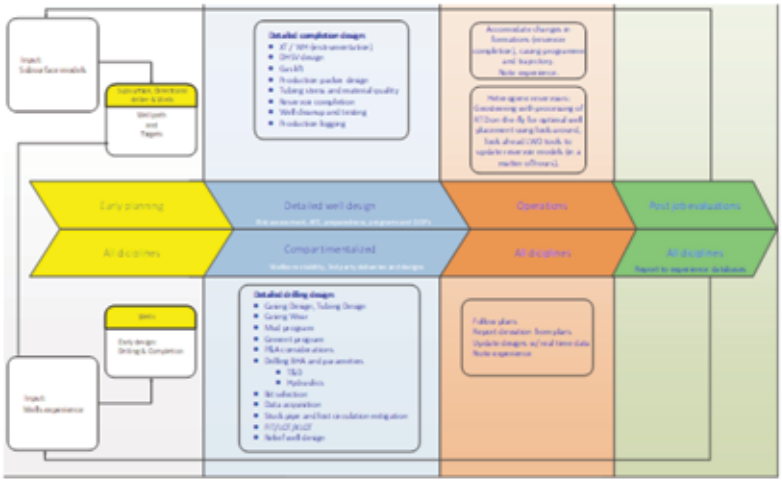

Figure 2 - Generalized well planning workflow.

Well planning typically follows the same major steps despite the differences between onshore, offshore and subsea developments. A general outline of well planning is typically as shown in Figure 1. In legacy well planning, the workflow consists of a series of disconnected steps or i terations in which the subsurface team's mature reservoir targets and the wells team assess the feasibility of drilling and completing the proposed well with the data provided. In many cases, the first suggested targets would represent unacceptable risks and challenges to drill. With the many engineering models required to evaluate all aspects of the drilling design, iterations were timeconsuming . Any notable change in planning required all disciplines to re-run simulations in their models to assess feasibility.There were often 10-folds of "manual" iterations conducted before all disciplines could reach consensus and the planning team arrived at the optimal plan.

Figure 2 outlines an over view of the major steps in developing a complete drilling and completion dsign for a well. Note that modern well planning often follows the same workflow as the traditional method, onlymany of the detailed steps and iterations are peformed automatically by the software. The figure is therefore valid also today, with the difference that the planning requires less time and resources because of the comprehensive support offered by modern well planing software. Oliasoft is one of the companies offering well planning software with a degree of automated engineering. Such software reduces the time to verfy each design change/iteration in the well planning phase.

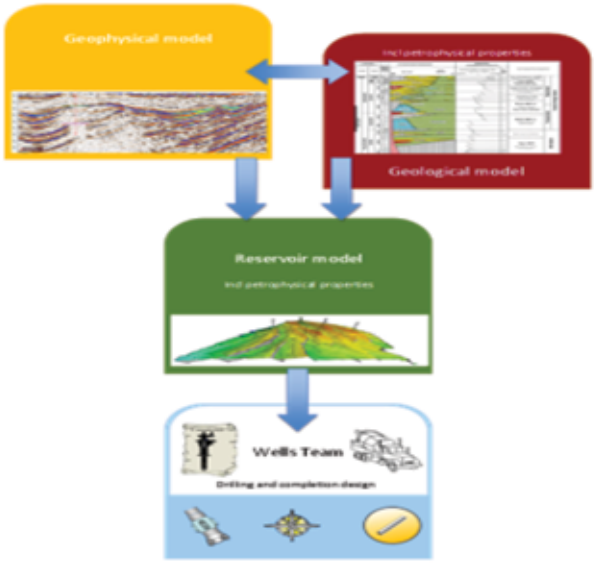

Figure 1 - Outline of discipline models in well planning.

Modern well planning is not just about saving cost and improving HSE. New potent software for trajectory planning automatically generates and perform quality checks of well paths,which has moved most of the task over to the Subsurface team.This type of software typically evaluates the feasibility of 100 000+ possible well paths from the given starting point of the well to the desired reservoir targets ,see Figure 3. More options are investigated, resulting in higher oil and gas recovery , lower cost, and other advantages. Today, many operators and service companies are digitalizing their work processes to be more attractive and available. The actors with open API for sharing data and integrated services, Are likely to have a long and prosperous future. Companies with non-compatible or non-sharing formats are less attractive.

Figure 3 - Automated trajectory generation and feasibility study using constrints per field and formation.

The reason is simply that the larger oil and gas companies integrate their services into a system that can communicate across disciplines / (software) platforms / service providers, etc . Manufacturers, logistics, procurement, operations and other users will all see and use the data seamlessly, which requires sharing and open API software. As an example, a pipe manufacturer now uses the 3rd party software Taghub to manage their data sharing for their operation in the USA. Each pipe has a unique ID, a bar code or QR code, which can be read off to find absolutely all data about the specific joint of pipe. Taghub can let this pipe manufacturer supply information Taghub can let this pipe manufacturer supply information such as specific pipe grade, ID, OD, wall thickness, length, ovality, mechanical properties and manufacturing steps.When scanning the code painted on the pipe, all information is available to parties given access to the cloud-based app, see Figure 4. Administration of logistics, procurement and invoicing becomes automated. For the well planning team, there is a full overview of number of joints and their respective properties. There are many expectations to the next generations of well planning software development. Altus Well Experts are working with Total Energies to develop one the first casing and tubing design applications applying the modern and more accurate calculations, refer to the latest editions of API 5C3 / ISO 10400. Once available on the market, it would provide a more accurate picture of the well integrity if the data as listed is available. Other expectations for the next generations of well planning software, is full integration with automated rigs.

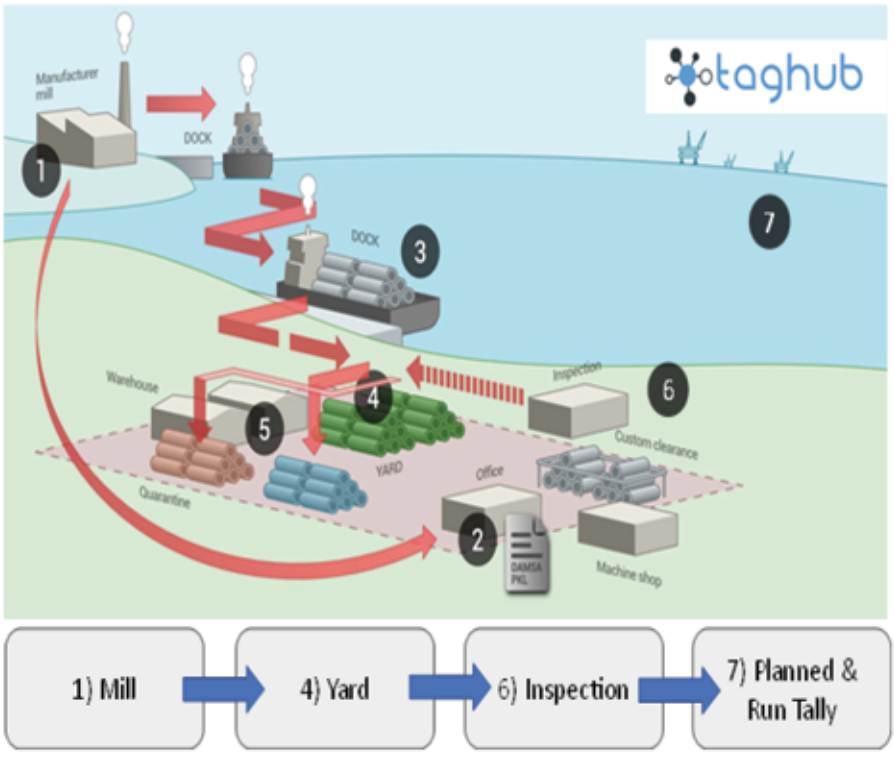

Figure 4 - Digital Casing Workflow.

Every operational step in the plan will provide the complete set of states for the rig equipment. The Driller can then remain fully in charge of the operation, seeing which operational step in the plan the rig equipment is performing or suggesting performing. Today, the app can analyze every activity on the rig and provide automated drill down of the performance TDE ProNova. ProNova has reporting capacity, which means writing daily rig reports is about to become. close to fully automated for rigs with this software. Data from ProNova has the capacity to support risk evaluations and improve performance. A traditional weakness in the well planning process was experience transfer. It was limited to the experience, awareness and capacity of the involved personnel Today, modern well planning software has started to provide support for applying experience into well planning.


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Recycling Exhibition
It is a one-day event initiated by SPE Suez, and represented by the E4ME Team at Suez University. The main aim of the exhibition is to raise awareness of the duty to conserve natural resources and reduce pollution displaying many recycled models, and there are several posters also shown to focus on global initiatives to raise awareness for recycling were highlighted.
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APPLICATIONS OF NANOMATERIALS IN THE OIL AND GAS INDUSTRY

Dr. Kamel Bou-Hamdan is an assistant professor in the chemical and petroleum engineering department at Beirut Arab University, Lebanon He holds a PhD degree in petroleum engineering from the University of Aberdeen (UK), an MSc in petroleum engineering from Heriot-Watt University

ABSTRACT

The petroleum industry has been an ever-growing industry. New technologies are always being introduced to encompass the challenges that are encountered Nanomaterials are being included in these technologies to improve the operation of different processes. Their distinctive physical and chemical characteristics encourage their use in different sectors, such as the upstream, midstream, and downstream of the oil and gas industry. In this chapter, the nanomaterials that are utilized in the oil and gas industries are highlighted. Their implementation in various applications is also provided. These applications include hydrocarbon exploration, well drilling and completion, production operations, enhanced oil recovery mechanisms, transportation, and refining operations.

INTRODUCTION

Over the years, the energy demand has increased because of The growth in population and limitations in fossil fuels. As a result, new technologies were invented to match the needs of the industry, such as drilling extended-reach wells to cover an additional surface area in the hydrocarbon reservoir. Utilizing enhanced oil recovery methods to improve the recovery factors, hydraulically fracturing troublesome or low permeability reservoirs to release the trapped hydrocarbons within the micro- or nano-pores of the rock in addition to that, new approaches attempt to make use of nanotechnology to optimize different processes within this industry.The discovery of nanomaterials encouraged engineers and researchers to vastly study their proper- ties and use them in manufacturing unique tools. These materials are characterized by their very small size, which ranges between 1 to 100 nanometers. Due to their nanosized dimensions, the chemical and physical properties of these materials behave differently than the larger size. Many properties are altered, including their magnetic characteristics, thermal behavior, internal pressure, and others. They were incorporated in different fields, including, but not limited to, medical applications, aerospace, photography, electronics, and petroleum

APPLICATIONS OF NANOMATERIALS IN THE PETROLEUM INDUSTRY

Hydrocarbon Exploration

Hydrocarbon exploration is the initial step in the search for hydrocarbons. It involves huge risks and is very costly. The goal of this procedure is to locate hydrocarbon deposits under the earth's surface. However, it frequently offers unique obstacles, such as unexpected geology and unforeseeable hazards, which can significantly raise the entire cost of extraction. Numerous traditional sensing approaches are said to be limited in their ability to offer details about the reservoir since they are limited to just a few centimeters from the borehole, as shown in Figure 1. Modern geophysical techniques are incapable of producing subsurface images with high resolution. They are also unable to reach far into reservoirs to gather critical reservoir information. Moreover, sensing methods, such as traditional electrical sensing devices, are frequently unable to give meaningful information when reservoir conditions are severe. Despite recent advances in exploration technologies like three-dimensional and four-dimensional seismic surveys, innovative technologies that may reliably detect hydrocarbons and are simple to use, affordable to obtain, and non-destructive remain desirable. Many scholars studied the unique advantage of nanoparticles as nano sensors. The notion of utilize- Ing hyperpolarized silicon nanoparticles in hydrocarbon exploration was first proposed in 2007. These nanoparticles were previously investigated in biomedical applications as a possible replacement for magnetic resonance imaging. The use of nano-optical fibers to detect microbes in subsurface reservoirs was proposed based on the idea of resonance Raman spectroscopy. Such a method could be managed to partly assess reservoir characteristics such as temperatures, pressures, and water salinity because microorganisms can only exist in certain conditions. The use of magnetic nanomaterials in electromagnetic reservoir monitoring is one of the most frequently explored technologies. Magnetic nanoparticles are thought to be capable of providing high resolution during measurements by altering the magnetic properties of rock formations and reservoir fluids at extremely low frequencies.

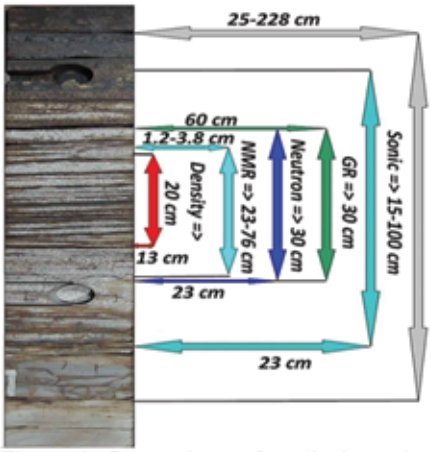


Figure 1. Comparison of vertical resolution and radial depth of investigation for different well logs

Magnetic nanoparticles have been shown in recent research because they can be simply manufactured to be adsorbed at oil and water contactThedisplacement of nanoparticles that are adsorbed at the oil-water contact or gas-water contact and can probe the spread of immiscible fluids in additional magnetic fields causes interfacial fluctuations and pressure waves, which are used to detect the presence of nanoparticles. This technique is known as magneto-acoustic tomography.Similarly, superparamagnetic iron oxide nanomaterials could be employed as a contrast material in nuclear magnetic resonance imaging for characterizing rocks and detecting flood fronts. In recent research, superparamagnetic iron oxide nanoparticles were shown to improve NMR logging contrast by reducing the NMR T2 relaxation time. The nanoparticles are intended to function as NMR nano sensors in this technique, with NMR relaxometry performed immediately within the formations at the borehole or on fluid samples retrieved from a well. The nanomaterials that are pumped inside the reservoir are then adsorbed at the boundary between the immiscible fluids. Therefore, it is possible to evaluate variations in fluid characteristics as the well is put into production. Magnetic nanomaterials have also been used in other studies as contrast agents for underground magnetic sensing surveys and reservoir classification.One of the recent advancements in the application of nanotechnology in the petroleum industry is the use of reservoir nano-robots such as nano-detecting devices. These devices integrate a reservoir sensor, a micro-dynamic mechanism, and micro-signal transmission. Patents were awarded for different inventions of nano-robot systems in well logging and other measurement operations.

Production Operations

Fracturing Fluids

Fracturing fluid is used in hydraulic fracturing operations to break parts of the rock to enhance its permeability, as shown in Figure 5. During the fracturing stage, fracturing fluids must have a high viscosity to produce large pressure gradients in the spreading crack and to limit fluid leakage into the adjacent formation. However, after the proppants are in place, the fracturing fluid must be thoroughly cleaned to ensure that the flow of gas, water, and oil is not obstructed. Controlling the fracturing fluid viscosity using a polymer nanoparticle mixture is a viable approach for achieving these dual aims. Initially, the polymer particles are linked to nanoparticles, either in network form or as dendrimers, during the fracturing phase, resulting in high viscosity. After that, the polymer particles are separated from the nanoparticles during the removal stage, lowering the fluid›s viscosity and allowing the fluid to be readily extracted from the newly formed crack. It has also been suggested to use ferrofluid as a fracturing fluid to gain external control.

The high use of water volumes in hydraulic fracturing, especially for unconventional resources such as shale oil and gas production, is a source of concern. Therefore, CO2 foam has been utilized as a fracturing fluid in a few applications to minimize water consumption. Silica nanoparticles were used to create stable CO2 foams using low water volumes (around 2٪) while still maintaining a high apparent viscosity of around 100 cp. Furthermore, nanomaterials were used to solve additional problems in hydraulic fracturing operations. Proppants were coated with nanoparticles to control the migration of rock fines and proppants into the wellbore. The fines and proppants migration could cause sanding off the wellbore, and the well would require remedial actions before being put into production.

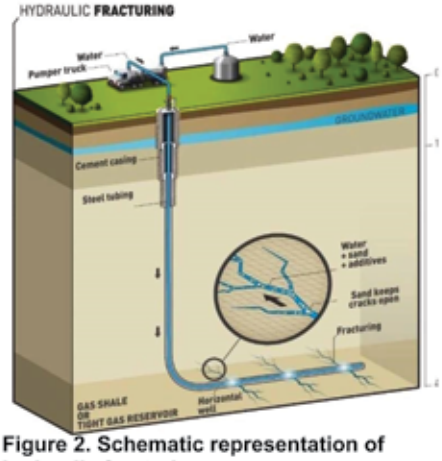


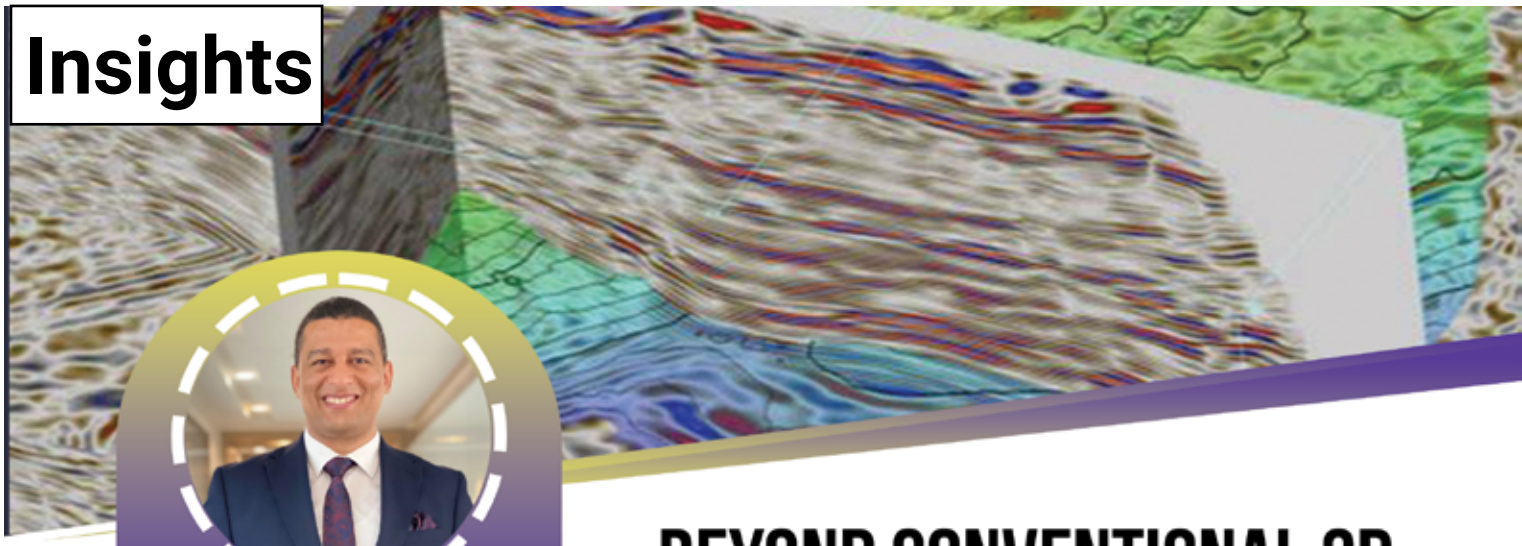
Figure 2. Schematic representation of hydraulic fracturing

Enhanced Oil Recovery

Enhanced Oil Recovery (EOR) refers to advanced operations that can be used to enhance the production of partially depleted reservoirs. The main branches of EOR can be divided into four parts: gaseous EOR, using chemicals, thermal EOR, and other advanced EOR. Figure 2 shows a comprehensive list of different EOR methods.Nanomaterials like nanofluids might be utilized to speed up hydrocarbon recovery during secondary or tertiary recovery. The use of nanoparticles for enhanced oil recovery is one of the most prevalent uses of nanotechnology in this field. Nanoparticles are thought to provide a better and more efficient approach to regulating and increasing oil recovery than any other current or past technology. From core-displacement analysis, it was discovered that most nanomaterials performed better than surfactants and polymers in altering the rock's wettability Compared to other EOR approaches like microbiological and thermal recoveries the increasing use of nanoparticles in chemical EOR has received great interest. Nanoparticles are widely used to increase oil sweep efficiency and drive fluid stability. Several nanoparticle types were found to have a promising EOR application, such as Al2O3, Fe2O3, MgO, and SiO.Additionally, nanoparticles are utilized to help in the formation of a Pickering emulsion. In contrast to conventional emulsions, Pickering emulsions are oil-in-water, water-in-oil, or a combination of the two, and are stabilized by solid particles like nanoparticles rather than surfactants. Stabilizing the solid nanomaterials in Pickering emulsion is thought to result in enhanced emulsion characteristics, such as strong resistance to agglomeration, high-temperature resilience, and a high pH. Several organic and inorganic solids, such as barium sulfate, calcium carbonate, carbon nanotubes (CNT), cationic nanocrystals, clay, laponite, latex, magnetic nanoparticles, and protein, were employed as Pickering emulsion stabilizers in numerous studies. However, silica and magnetic nanomaterials are among the most popular particles employed to make a Pickering emulsion for EOR. It is claimed that using nanoparticles in a Pickering emulsion improvesemulsion stability and gives more control over viscous fingering effects during the EOR application. Moreover, nanoparticles can be utilized to stabilize CO2-generated Pickering emulsions for CO2-foam EOR flooding. Surface-modified silica nanoparticles were shown to enhance the production of stable CO2 foams.

FUTURE RESEARCH DIRECTIONS

Nanotechnology's implementation in the oil and gas sector has the potential to transform the existing technique of exploring and producing hydrocarbons from the subsurface. The synthesis of smart and unique collections of nanoparticles is steadily reaching every area of the oil and gas industry, thanks tothe fast growth of nanotechnology in numerous applications.The cost-benefit of several types of nanomaterials compared to the existing technology is still quitelow, especially in oil and gas applications. The desired outcomes in oilfield tests may only be attained byusing a substantial dose of nanomaterials. However, using too many nanomaterials might raise the cost of operating substantially. As a result, the ability to produce massive quantities of nanoparticles simplyand cost-effectively will become crucial for the widespread use of nanomaterials.Additional obstaclesthatmight be encountered in the future deployment of nanomaterials could be due to extreme subsurface environments. The ability of nanoparticles to cluster under severe circumstances such as high temperatures and water salinity is well recognized. Therefore, the particle grain size will dramatically increase, and the particles' distinctive characteristics will be lost.To solve this issue, modifying the surface of the nanoparticle or coating it can help. This can be accomplished by adding additional molecules to the nanoparticle surface or coating it with polymers to minimize the attraction force between the particles. However, many of these procedures will weaken or even eradicate numerous unique characteristics of nanoparticles. As a result, it .appears that another strategy is required



Dr. Ramy Emadeldin
Lead Geophysicist, Apache Egypt

BEYOND CONVENTIONAL 3D SEISMIC DATA

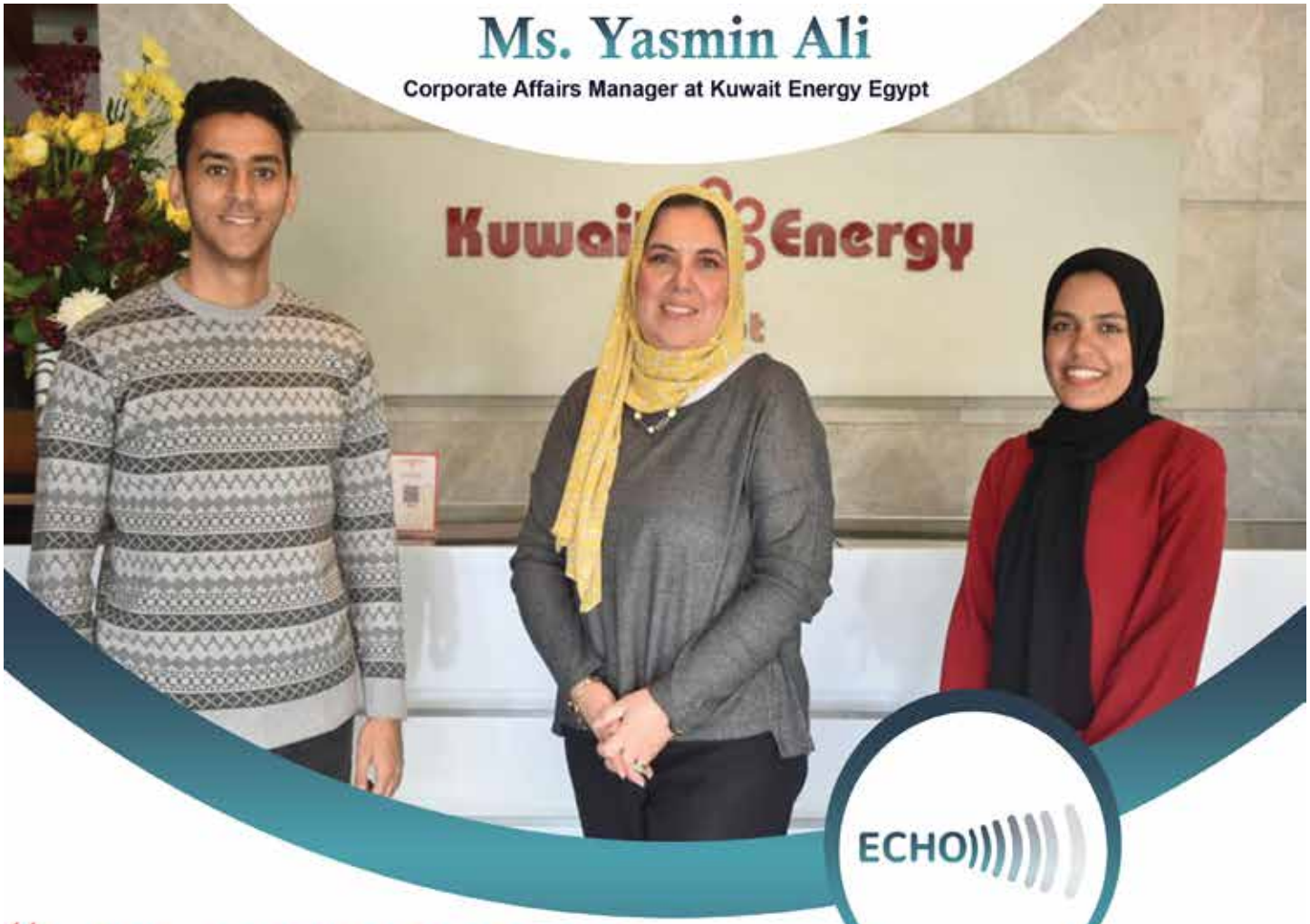
Since conventional 3D seismic data is band-limited, it provides limited subsurface geological information. Moreover, higher frequencies within the band are more attenuated. Seismic spectral Blueing (SSB) matches the average seismic spectrum to the shape of the well log reflection coefficient spectrum, which is rich in high frequencies. This effectively whitens the seismic wavelet to enhance seismic resolution and ensures that the blue seismic data shows the true reflectivity of the subsurface.

The conventional 3D seismic surveys usually provide a fair and sometimes a good image of the subsurface layers, but they may fail in cases where the thickness of a layer is below seismic resolution (e.g., thin beds and channels). High resolution seismic spectral Blueing inversion and spectral decomposition analysis are among methods that can help us to delineate and study the sub-seismic resolution features.
It has been observed from "reflectivity data obtained from wells" that higher frequencies equate to higher amplitudes. This behavior is true in the global sense and refers to "the spectrum being blue." During the processing of seismic data, the amplitudes are often whitened. The spectral shaping of seismic data using Seismic Spectral blueing enhances resolution without boosting noise to an unacceptable level. Restricted resolution imposes limits on the detection of subsurface geologic features using surface seismic data.

Hundreds of SSB case studies concluded that the implication of the SSB method had increased the seismic bandwidth to an acceptable range and consequently increased the dominant frequency, which resolved the thin part of the tuned wedge. It also improved the signal-to-noise ratio in noise-prone zones. Beside that, this method is rapid and easier for implementation and interpretation. LSO, the results show that the SSB flow is more reliable and renders clearer seismic images, with improved resolution, without increasing computational cost. Moreover, the correlation with the well logs (DTC and GR) shows a higher level of confidence and accuracy in most of these studies when it is inverted using SSB data instead of conventional data. These great outputs are a strong indication of the reliability of predicting reservoir properties by means of SSB inversion.

Ms. Yasmin Ali

Corporate Affairs Manager at Kuwait Energy Egypt



ECHO

"Celebrate With ECHO 15"

Our youth development sustainable projects would not have been possible without the long-standing collaboration with SPE, a well-organized student chapter with an impactful development plan to equip the members and university students with needed tools to conquer the market and enhance engagement. I'm proud to witness your success every year and I strongly believe In your unique capabilities to impact our communities in terms of development, knowledge and growth.

In addition to sponsoring the chapter, Kuwait Energy Egypt is extremely honored to constantly sponsor SPE magazine since its first publication in 2009 till this issue of 2023. Through 15 years full of powerful achievements, ECHO team has always sought to provide the most possible opportunities to help youth in both technical and non-technical aspects. It is with pride and pleasure to keep supporting the new generation and I look forward to continuing our journey with their insightful partnership to achieve more and more in the upcoming future.

For Kuwait Energy Egypt, our objective is to enhance the capabilities and opportunities for youth, and continuously seek to offer them the opportunities by investing a high-end plan in order to achieve our CSR sustainable goals.

In planning our contributions to youth development, we have always strived for a participatory and collaborative approach with a shared vision to achieve the outmost results. Together, with the vision of "Collaboration for Growth", we help young people develop as mature, well-rounded adults or deal with challenges in their lives.

Kuwait Energy Egypt

Dr. Kai A. Konrad
Director at the Max Planck Institute

AN UNEXPECTED FUTURE FOR OIL AND GAS

Using oil and gas for climate-neutral or climate-friendly products would radically tranform the markets:

A few years ago, in light of these problems, it was suggested that countries with oil and gas reserves should be paid not to extract them and instead to leave these resources in the ground forever. This approach does not offer a compelling solution however, for it would quickly require unimaginably large annual compensation payments to the resource owning countries. Moreover, international negotiations regarding financing by the international community would be just as challenging as the ongoing climate negotiations aimed at securing measures to address demand.

It would be better to extract oil and gas and put them to good use. This would usher in a radical transformation of the market. Oil and gas would be more valuable than they are today, putting an end to the rush to burn. Resource-rich countries would not need to extract their stocks as quickly as possible or sell them at dumping prices. Rather, they could take their time to extract and commercialize the reserves over decades. As a result, oil and gas would already be in shorter supply today, and prices would be higher. Higher prices would stimulate the energy transition by making alternative, climate-friendly energy concepts more competitive on the market and their innovation economically more attractive. Ideally, oil and gas would become too valuable and expensive to burn – and there would be no need for an international climate agreement, carbon taxes or prohibitions on the use of oil and gas for combustion.

As a climate-friendly and carbon-neutral energy carrier, hydrogen will be a key energy input to the economy following the energy transition. And the carbon nanomaterials – e.g., carbon nanotubes (CNTs) – produced during pyrolysis might actually be even more important than the hydrogen. Products made from carbon nanomaterials have potential applications in areas like construction, the automotive industry and aerospace engineering, where they could replace traditional materials such as steel, aluminum or concrete. As the production of these materials usually carries a considerable carbon footprint, replacing them could also lead tomajor reductions in CO2 emissions.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Case Study

Ozan Sayman

He is a Petroleum Engineer with an MSc degree from Univ. of Tulsa.

CASE STUDY: APPLICATION OF A MECHANISTIC PAGL SIMULATION TOOL TO SAN JUAN FIELD OPERATIONS.

1.Field Data

DJR Energy operates plunger and gas lifted wells in San Juan Basin. Most of the plunger lift wells utilize gas injection with two-piece plungers in PAGL operation. Although plunger lift is believed to be only applicable for marginally producing wells, DJR Energy has been able to deploy two-piece plungers successfully for wells producing over 500 STB/d liquid with 2-7/8 in OD tubing size. Furthermore, low tubing wellhead pressure is achieved, extending the life of PAGL operation to gas production rate as small as 50 mscf/d gas and 37 STB/d with 8% water cut for the same 2-7/8 in OD tubing. Two years of field data from 11 wells were studied as a part of the 2021 study on PAGL wells. Furthermore, up to eight years of field data of three wells have been provided by DJR Energy for this study. The average production value for the given timeframe of all wells is seen in Figure 1. The wells are designated with A, B, and C letters and numbers.

Study	Total Days	Site	Hours On	Oil Produced (STB/d)	Water bbl (STB/d)	Total Liq (STB/d)	Line Pressure (psi)	Injection (mscf/d)	Allocation (mscf/d)	Total Gas (mscf/d)	GLR (mscf/STB)	Tubing (psi)	Casing (psi)
2022	2970	A1	22.35	72.20	17.05	89.25	132.39	192.27	227.70	419.97	2.55	67.50	170.08
2022	2614	A2	22.07	77.19	9.81	87.00	154.12	188.07	258.64	446.71	2.97	48.94	150.96
2022	2447	A3	22.81	96.30	12.33	108.63	281.96	114.12	267.17	381.29	2.46	47.82	156.94
2021	730	B1	23.03	56.04	15.91	71.94	123.04	182.43	103.54	285.97	1.44	34.55	98.08
2021	730	B2	22.44	63.01	1.43	64.44	42.94	182.71	347.12	529.83	5.39	47.33	112.89
2021	730	B3	22.55	28.46	3.27	31.73	62.24	151.69	299.96	451.65	9.45	60.79	117.92
2021	730	B4	22.60	19.36	4.50	23.86	58.17	229.95	218.87	448.81	9.17	49.58	100.34
2021	730	B5	22.42	36.55	1.75	38.29	62.66	226.11	327.79	553.91	8.56	59.05	106.04
2021	730	B6	21.12	14.71	2.70	17.41	41.55	130.00	222.18	352.19	12.76	43.93	104.89
2021	730	B7	22.73	351.99	32.79	389.78	120.90	274.23	784.28	1058.52	2.01	143.71	438.30
2021	730	B8	22.95	355.65	77.82	433.47	147.90	385.53	753.22	1138.75	1.74	170.42	451.43
2021	730	B9	22.74	40.36	6.19	46.55	58.88	244.86	314.99	559.85	6.77	51.04	121.77
2021	730	B10	23.45	347.69	31.04	378.73	135.13	264.38	579.06	843.44	1.53	150.82	469.13
2021	730	B11	23.46	375.38	24.38	399.76	135.76	275.85	621.80	897.65	1.56	148.89	496.90
2020	2003	C1	n/a	35.08	7.56	42.64	138.01	229.77	134.53	364.30	3.15	48.94	114.08
2020	1738	C2	n/a	82.45	10.74	93.19	59.84	192.38	413.10	605.49	4.43	67.73	165.40
2020	1865	C3	n/a	55.29	14.54	69.83	59.14	320.42	390.40	710.81	5.59	75.87	191.13
2020	1906	C4	n/a	83.16	16.96	100.12	272.11	325.87	120.55	446.42	1.20	62.42	164.58
2020	897	C5	n/a	22.22	1.48	23.70	274.70	68.51	241.95	310.46	10.21	27.62	69.63
2020	1918	C6	n/a	46.73	10.73	57.46	74.16	202.78	439.78	642.56	7.65	94.31	183.45
2020	1003	C7	n/a	155.37	22.61	177.97	91.72	153.86	1060.47	1214.33	5.96	106.60	315.25
2020	897	C8	n/a	458.51	48.64	507.15	148.42	105.18	1168.02	1273.20	2.30	169.57	469.96
2020	1915	C9	n/a	76.44	16.38	92.82	83.38	331.16	432.43	763.59	4.66	90.69	229.68

Figure 1: The average production rate for each well from the field data.

Gas-liquid ratio (GLR) is important parameter for artificial lift selection. Higher GLR values may cause separation, cooling, and gas lock issues for ESPs and rod pumps whereas low GLR values may not be ideal for gas lift and plunger lift. Minimum GLR of 400scf/bbl per 1000 ft of well is a widely used metric for conventional plunger lift applications which requires a shut-in period to build up casing pressure for plunger upstroke. Considering all the wells in this study have a true-vertical depth of more than 5000-ft, this metric would require more than 2000 scf/bbl of GLR for these wells to be able to surface with a shut-in. Intuitively one can expect a significantly higher GLR ratio required to surface a plunger without a shut-in period for PAGL. The field data show that two-piece plungers could surface with GLR less than 1000 scf/bbl without a shut-in and pressure buildup. This shows that PAGL is not limited to gas production dominated wells.

2.PAGL Tool Simulation

The artificial lift selection and design stage offer a significant amount of production optimization and cost-cutting opportunities for production engineers who also ensure safe operation and flow assurance. Multiphase flow simulation and nodal analysis provide the foundation for many artificial lift calculations, including gas lift design, ESP, rod pump, etc. The industry lacks tools based on mechanistic continuous flow plunger lift models to design and optimize the plunger lift operation. Lack of analytics and relying on vendor experience and suggestions may cause the deployment of continuous flow plungers to be months or years late. Improper plunger lift applications may cause many workovers and time-consuming operations. Plunger lift controllers, field personnel, and data analytics solutions can only optimize a plunger cycle for the given plunger lift completion. Determining the candidate well, setting bumper spring location at optimum depth, and selecting the proper plunger type for different completions, reservoirs, and fluid properties require plunger lift models based on dimensionless parameters. PAGL and GAPL applications require the gas lift to be considered with multiphase flow simulation.The experimental studies showed that dimensionless plunger characteristics, such as drag coefficient, gas slippage, and liquid fallback coefficients, are needed to estimate plunger dynamics in field conditions (Akhiiartdinov et al., 2020a; Sayman et al., 2021).

In these studies, state-of-the-art experimental facilities are used to investigate all influential parameters of the plunger lift cycle. Drag-based fall and upstroke models are developed for continuous-flow plunger lift and PAGL. PAGL Tool discretizes the wellbore into smaller segments and conducts multiphase flow simulation with fluid properties calculations to run plunger lift mechanistic models. The tool offers a fall model, upstroke stage simulation, BHA location, afterflow, plunger cycle optimization, nodal analysis, and gas injection sensitivity with an inflow performance curve.

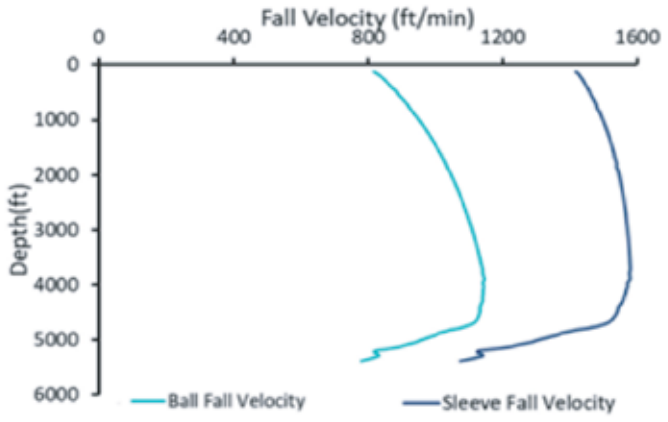
The fall model focuses on the different fall mechanisms of both conventional and continuous flow plungers (Sayman et al., 2022). Three different phases of the fall stage are defined as follows:

•Fall against static gas and liquid columns
•Fall against the multiphase flow.
•Hybrid fall.

.During the shut-in stage, liquid droplets and film accumulate at the bottom hole, whereas gas stays at the top of the liquid column. Initially, the plunger falls against the static gas, and then the plunger hits the liquid column, which falls much slower than the gas column. The fall velocity profile in the static gas and liquid columns does not change significantly.

The fall against the flow is related to the multiphase flow conditions, which change along the wellbore. Plungers fall velocity estimation in continuous flow requires the multiphase flow conditions to be determined. The utilization of steady-state multiphase flow simulation methods with well-established pressure drop correlations is practical to estimate flow conditions along the well. After assigning the multiphase flow conditions, the fall model and drag characteristics are applied to determine plunger fall velocity.

The transition phase from shut-in to production-on and production-on to a shut-in is referred to as the hybrid fall. As the well is shut-in, it is expected to take time for the pressure profile, liquid, and gas columns to settle. During the fall stage of plungers, shut-in may end, and production may start. Instead of considering fully developed steady-state flow conditions, the pressure profile and flow conditions of both the flowing and shut-in wells are employed. Consequently, plunger fall velocity calculations are performed. The fall model allows plunger selection, shut-in/after flow time setting input, and provides the fall velocity profile with operational suggestions if needed. (Figure 2).



	Sleeve Results		Ball Results	
Fall Duration	0:03:40	h:mm:ss	0:05:21	h:mm:ss
Fall Velocity (Avg)	1469.67	ft/min	1006.74	ft/min
Fall Velocity (Max)	1579.62	ft/min	1145.21	ft/min
Kinetic Energy	63.80	J		
Separation (Afterflow) Time Needed			0:01:41	h:mm:ss

Figure 2: Snapshot from the fall velocity results and suggestion of PAGL Tool.

The upstroke simulation is based on the dimensionless drag coefficient and Reynolds number relation (Sayman et al., 2020). The upstroke model simulates the well from the BHA location to the surface. In each well segment, the gas and liquid velocity, liquid holdup, gas and liquid density, and pressure are considered. The plunger upstroke velocity and the total liquid slug caught by the slug front for each segment are calculated iteratively. The plunger upstroke velocity, liquid slug profile, and total duration of the upstroke stage are calculated. The upstroke velocity at the lubricator gives important information to avoid high kinetic energy impacts. In Figure 3, the total liquid slug removal for a given cycle and its comparison to the total liquid inventory of the tubing are shown. Moreover, upstroke simulation offers customization of inputs for users.

Upstroke Results		
Upstroke Duration	0:05:48	h:mm:ss
Upstroke Velocity (Avg)	929.92	ft/min
Impact Velocity (Max)	1410.84	ft/min
Kinetic Energy	110.03	J

Hydrodynamics		
Hydrostatic Removal	26.63	psi
Liquid Slug Weight	0.42	bbl
Tubing Liquid Inventory	0.89	bbl
Sweep Ratio	0.470	(-)

Manual Input	Drag Coefficient	1500	(-)
	Liquid Fallback	1	(-)
	Local Sweep Rate	0.98	(-)
	Initial liquid accumulation	0	(ft)

Figure 3: Snapshot from the upstroke stage results and upstroke stage simulation manual input options.

PAGL Tool results are benchmarked with the available field data for the plunger cycle. The plunger liquid slug unloading, and downhole pressure sensor data are compared. A field case (Burns, 2018) is reproduced with the PAGL Tool to estimate bottom hole and casing pressure with continuous bypass plunger cycles. Potential improvements in continuous flow plunger lift modeling are discussed.

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