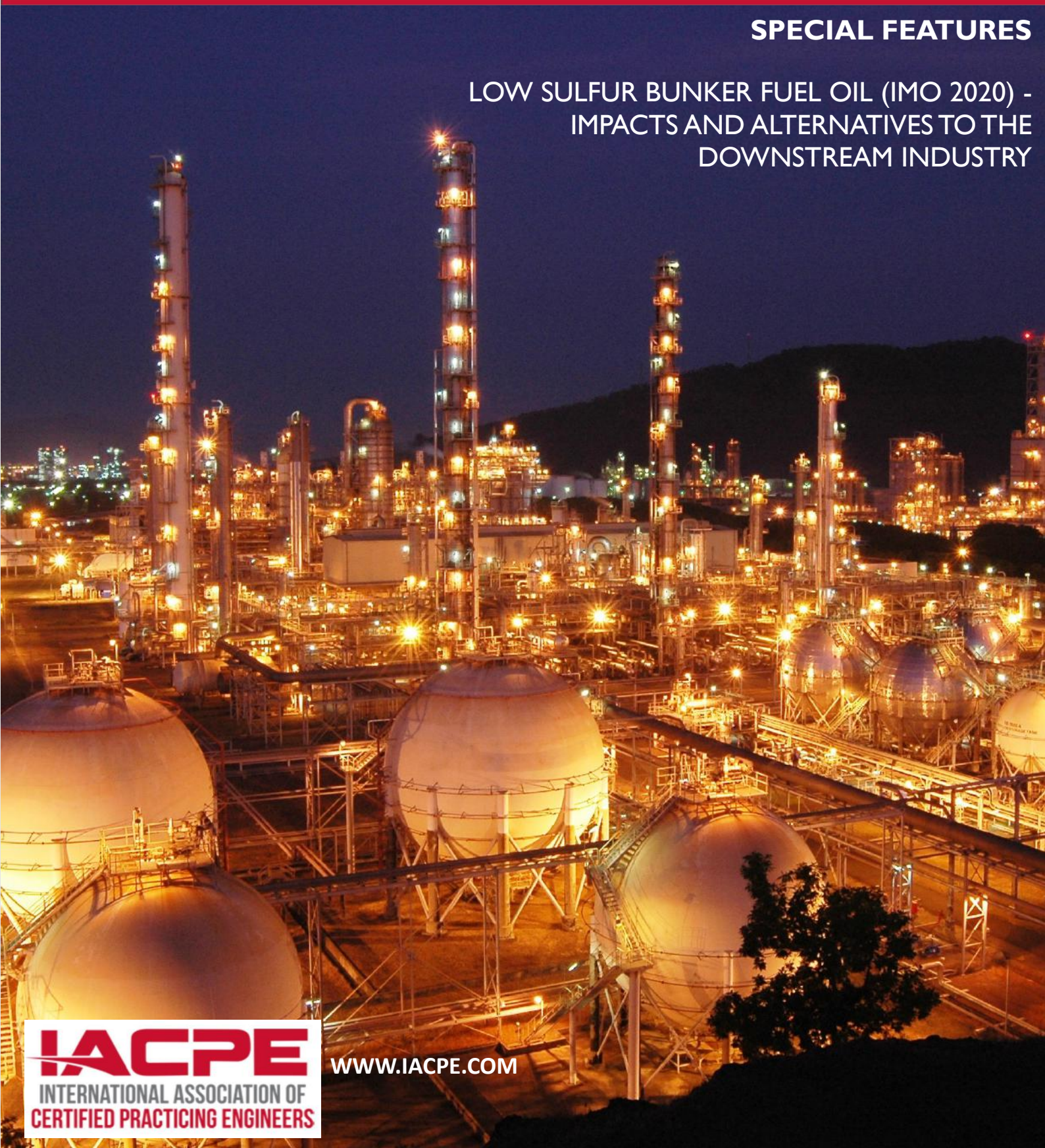
ENGINEERING PRACTICE

VOLUME 5 NUMBER 16

JANUARY 2019

SPECIAL FEATURES

LOW SULFUR BUNKER FUEL OIL (IMO 2020) - IMPACTS AND ALTERNATIVES TO THE DOWNSTREAM INDUSTRY



IACPE
INTERNATIONAL ASSOCIATION OF CERTIFIED PRACTICING ENGINEERS

WWW.IACPE.COM

ENGINEERING PRACTICE

VOLUME 5
NUMBER 16
JANUARY 2019

WWW.IACPE.COM

INFO@IACPE.COM

KNOWLEDGE
CERTIFICATION
NETWORKING

ABOUT

International Association of Certified Practicing Engineers provides a standard of professional competence and ethics. Identifies and recognizes those individuals that have meet the standard. And requires our members to participate in continuing education programs for personal and professional development.

In additional to insuring a professional level of competency and ethics the IACPE focuses on three major areas of development for our members: Personal, Professional, and Networking.

HISTORY

The International Association of Certified Practicing Engineers concept was formulated by the many young professionals and students we meet during our careers working in the field, running training courses, and lecturing at universities.

During question and answer sessions we found the single most common question was: What else can I do to further my career?

We found, depending on the persons available time and finances, and very often dependent on the country in which the person was from, the options to further ones career were not equal.

Many times we found the options available to our students in developing countries were too costly and or provided too little of value in an expanding global business environment.

The reality is that most of our founders come from countries that require rigorous academic standards at four year universities in order to achieve an engineering degree. Then, after obtaining this degree, they complete even stricter government and state examinations to obtain their professional licenses in order to join professional organizations. They have been afforded the opportunity to continue their personal and professional development with many affordable schools, programs, and professional organizations. The IACPE did not see those same opportunities for everyone in every country.

So we set out to design and build an association dedicated to supporting those engineers in developing in emerging economies.

The IACPE took input from industry leaders, academic professors, and students from Indonesia, Malaysia, and the Philippines. The goal was to build an organization that would validate a candidates engineering fundamentals, prove their individuals skills, and enhance their networking ability. We wanted to do this in a way that was cost effective, time conscience, and utilized the latest technologies.

MISSION

Based on engineering first principles and practical real world applications our curriculum has been vetted by academic and industry professionals. Through rigorous study and examination, candidates are able to prove their knowledge and experience. This body of certified professionals engineers will become a network of industry professionals leading continuous improvement and education with improved ethics.

VISION

To become a globally recognized association for certification of professional engineers.

IACPE
INTERNATIONAL ASSOCIATION OF
CERTIFIED PRACTICING ENGINEERS

LETTER FROM THE PRESIDENT

KARL KOLMETZ

Applying Fundamentals to the Real World

Dear Friends,

In December of 2005 we wrote an article on "Design Guidelines for Using Distillation Simulation Software in the Field." Here is a quote from the article:

> *"It is important to remember that computer hardware advancements have only improved the speed of the calculation. Despite rapid progress in computational speed and user friendly interfaces, understanding the rules and limitations of simulation tools is still a pre-requisite to obtain simulated results close to those measured in the field. The engineer must supply the correct input data, interpret errors that occurred and make critical judgment on the results. Mastering these techniques often requires substantial field experience and practice."*

It takes real field experience and practice to correctly apply known fundamentals to the real world in any situation — process simulation, equipment design, education, medical care, and management of people. Knowledge is knowing what to do, wisdom is knowing how and when to do it. Many times in our lives we have had the knowledge of what to do, but lack the skill and timing of when to do the correct thing.

The Kolmetz Handbook of Process Equipment Design (2007) was written to take engineering fundamentals (the knowledge) with an effort to apply them in the real world (attempt at wisdom) and some troubleshooting (what did not work so well). IACPE (2014) was also founded to help students and professionals apply the knowledge to the real world and become wise.

The World Economic Report issued a "2018 Future of Jobs" report. They listed the top 10 skills demand for 2020:

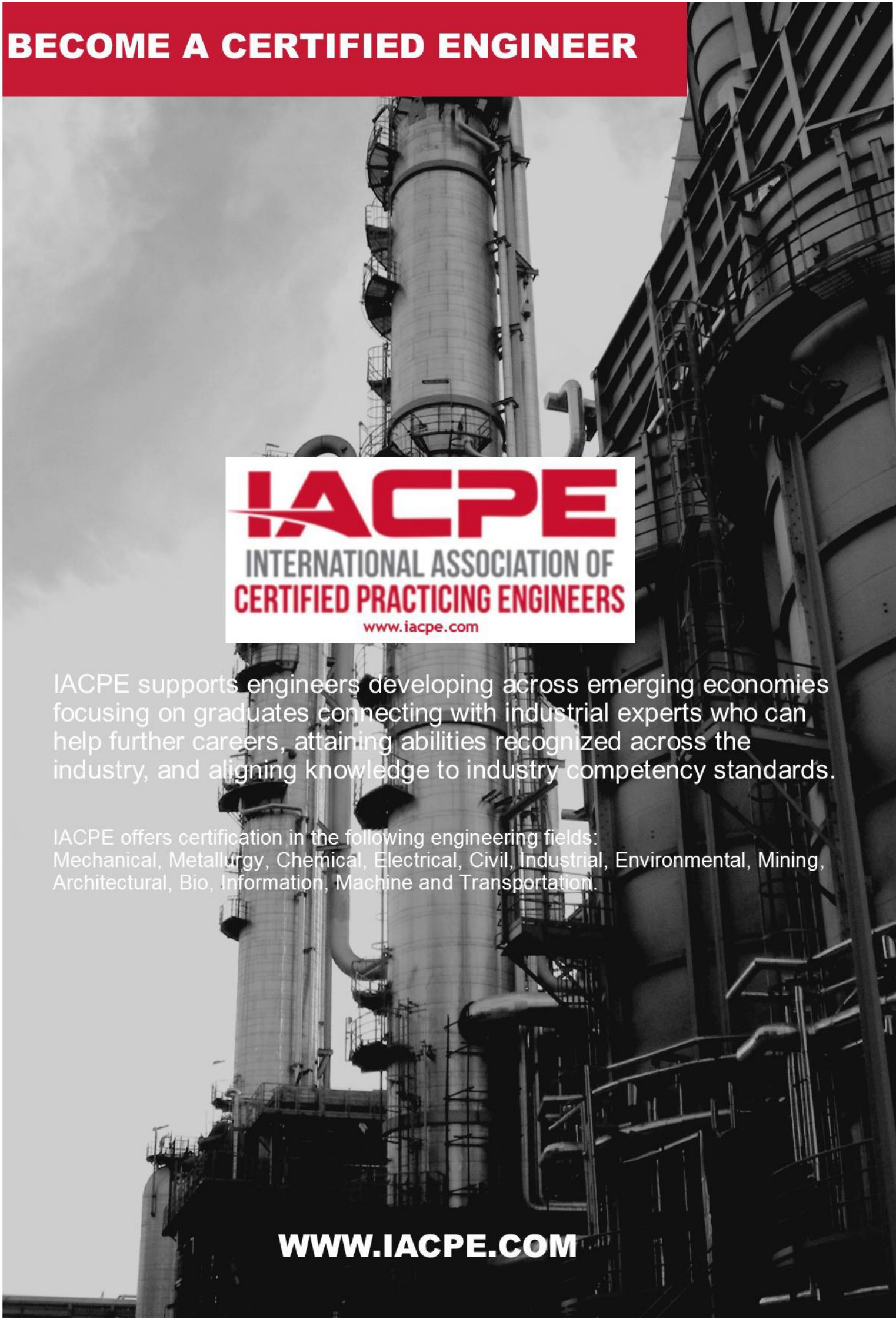
- Analytical thinking and innovation
- Active learning and learning strategies
- Creativity, originality and initiative
- Technology design and programming
- Critical thinking and analysis
- Complex problem-solving
- Leadership and social influence
- Emotional intelligence
- Reasoning, problem-solving
- Systems analysis and evaluation

Many of these key skills are being currently taught in the IACPE Training Modules. As we update the training modules we will include additional items to address these key required skills. We will address some in the continuing educations requirements. We want to assure that we are applying the fundamentals correctly in the real world.

Knowledge is knowing what to do, wisdom is knowing how and when to do it.

All the best in your career and life,
Karl

BECOME A CERTIFIED ENGINEER



IACPE
INTERNATIONAL ASSOCIATION OF
CERTIFIED PRACTICING ENGINEERS
www.iacpe.com

IACPE supports engineers developing across emerging economies focusing on graduates connecting with industrial experts who can help further careers, attaining abilities recognized across the industry, and aligning knowledge to industry competency standards.

IACPE offers certification in the following engineering fields:
Mechanical, Metallurgy, Chemical, Electrical, Civil, Industrial, Environmental, Mining, Architectural, Bio, Information, Machine and Transportation.

WWW.IACPE.COM

NEWS

RECENT IACPE ACTIVITIES

During November 16-22, 2018, IACPE President - Mr.Karl Kolmetz Presented "Keys to Become a Successful Engineer" Seminar

Engineering Faculty, Universitas 17 Agustus 1945 - Semarang, Central Java
November 17, 2018
Seminar and re-new MOU signing ceremony

Universitas Pandanaran - Semarang, Central Java
November 17, 2018
Seminar and MOU Signing Ceremony

Engineering Faculty, Universitas Pamulang, South Tangerang-Banten
November 19, 2018
Seminar

Sekolah Tinggi Teknologi Fatahillah, Cilegon-Banten
November 19, 2018
Seminar and re-new MOU signing ceremony

Universiti Malaysia Pahang
November 16, 2018
Seminar

Engineering Faculty, Universitas 17 Agustus 1945 - Cirebon, West Java
November 22, 2018
Seminar, MOU and MOA signing ceremony

Partners to the Top

Summit Technology Management is a technical consultancy group, providing specialized services and training to improve process plant operational efficiency, profitability and safety. We provide engineering solutions by offering training, technical services, best practices, and equipment to meet the specific needs of our partner clients.

- **Basic Design Packages**
- **Detailed Design Packages**
- **Commissioning of Process Units**
- **Process Engineering Studies**
- **Bench Marking of Process Units**
- **Regional Training Conferences & In -House Training**
- **Singapore & Malaysia Company Registration & Set Up**
- **Specialty Equipment: Distillation Equipment, Filter Skid Packages, Compressor Knockout/Scrubber Skid Packages, Mercury Removal Skid Packages**

www.summit-tech-mtg.com

IACPE PARTNERS

Universitas 17 Agustus 1945 Semarang (UNTAG) is located at Pawiyatan Luhur street, Bendhan Dhuwur, Semarang, Central Java.
UNTAG Semarang was established in August 17, 1963. Currently it has 3 majors in the Faculty of Engineering:

1. Chemical Engineering
2. Civil Engineering
3. Architecture

UNTAG Semarang signed MOU and MOA with IACPE since 2015 and has been updated on November 17, 2018

Sekolah Tinggi Teknologi Fatahillah (STTF) is located at Waringin Kurung street no.229, Serdang, Kramatwatu, Serang-Banten.
STTF was established in 1992. Currently it has 3 majors in the Faculty of Engineering:

1. Electrical Engineering
2. Chemical Engineering
3. Mechanical Engineering

STTF signed MOU with IACPE since 2015 and has been updated on November 19, 2018

Universitas 17 Agustus 1945 (UNTAG) is located at Semolowaru.street no.45, Surabaya, East Java.
UNTAG Surabaya was established in August 17, 1958. Currently it has 6 majors in the Faculty of Engineering:

1. Industrial Engineering
2. Civil Engineering
3. Architecture
4. Electrical Engineering
5. Informatics
6. Mechanical Engineering

UNTAG Surabaya signed MOU and MOA with IACPE since 2015 and has been updated on November 29, 2017

Universitas Wage Rudolf Supratman (UNIPRA) is located at Arif Rahman Hakim.street no.14, Keputih, Sukolilo, Surabaya, East Java.
UNIPRA was established in July 2, 1985. Currently it has 2 majors in the Faculty of Engineering:

1. Industrial Engineering
2. Chemical Engineering

UNIPRA signed MOU with IACPE on April 5, 2016

Universitas Wahid Hasyim (UNWAHAS) is located at Menoreh Tengah street X/22, Sampangan, Semarang, Central Java.
UNWAHAS was established in August 8, 2000. Currently it has 3 majors in the Faculty of Engineering:

1. Chemical Engineering
2. Mechanical Engineering
3. Informatics

UNWAHAS signed MOU and MOA with IACPE on November 16, 2016 And has been updated on November 30, 2017

Institut Teknologi Indonesia (ITI) is located at Puspiptek Serpong street, Setu, South Tangerang, Banten. ITI was established in June 2, 1984. Currently it has 7 majors in the Faculty of Engineering:

1. Chemical Engineering
2. Civil Engineering
3. Architecture
4. Mechanical Engineering
5. Industrial Engineering
6. Informatics
7. Electrical Engineering

Chemical Engineering Faculty ITI signed MOU with IACPE on March 6, 2017

Universitas Muslim Indonesia Makassar (UMI) is located at Urip Sumoharjo street km.5, Panaikang, Panakkukang, Makassar, South Sulawesi. UMI was established in June 2, 1954. Currently it has 4 majors in the Faculty of Engineering:

1. Mechanical Engineering
2. Civil Engineering
3. Electrical Engineering
4. Architecture

And 3 majors in the Faculty of Industrial Technology

1. Industrial Engineering
2. Chemical Engineering
3. Mining Engineering

Industrial Technology Faculty UMI signed MOU with IACPE on October 2, 2017

Universitas Sultan Ageng Tirtayasa (UNTIRTA) is located at Jendral Sudirman street km.3, Purwakarta, Cilegon, Banten. UNTIRTA was private university and established in October 1, 1981 and which later turned into public university on March 19, 2001. Currently it has 6 majors in the Faculty of Engineering:

1. Chemical Engineering
2. Mechanical Engineering
3. Industrial Engineering
4. Metallurgical Engineering
5. Civil Engineering
6. Electrical Engineering

Engineering Faculty UNTIRTA signed MOU with IACPE on November 21, 2017

Universitas Kadiri (UNIK) is located at Selomangleng street no.1, Kediri, East Java. UNIK was established in October 1, 1980. Currently it has 2 majors in the Faculty of Engineering:

1. Industrial Engineering
2. Civil Engineering

UNIK signed MOU and MOA with IACPE on November 27, 2017

Universiti Malaysia PAHANG
Engineering • Technology • Creativity

Universiti Malaysia Pahang is located at 26600 Pekan Pahang. UMP founded in 16 February 2002
Currently has 6 majors in faculty of engineering

1. Chemical Engineering
2. Civil Engineering
3. Mechanical Engineering
4. Computer Systems Engineering
5. Industrial Engineering
6. Manufacturing Engineering

UMP Signed MOA with IACPE July 2018

Politeknik Kediri (Poltek Kediri) is located at Mayor Bismo street no.27, Kediri, East Java.
Poltek Kediri was established in April 8, 2008. Currently it has 2 majors in the engineering field:

1. Informatics
2. Engine maintenance and Repair Technic

Poltek Kediri signed MOA with IACPE on November 28, 2017

Universitas Pandanaran (UNPAND) is located at Banjarsari Barat street no.1, Pedalangan, Banyumanik, Semarang, Central Java.
UNPAND was established in 1996. Currently it has 6 majors in the Faculty of Engineering:

1. Architecture
2. D3 Civil Engineering4
3. D3 Electrical Engineering
4. D3 Environmental Engineering
5. D3 Chemical Engineering
6. D3 Mechanical Engineering

UNPAND signed MOA with IACPE on November 17, 2018

Universitas 17 Agustus 1945 (UNTAG) is located at Perjuangan street no.17, Karyamulya, Kesambi, Cirebon, West Java.
UNTAG Cirebon was established in September 2, 1962. Currently it has 2 majors in the Faculty of Engineering:

1. Electrical Engineering
2. Mechanical Engineering

UNTAG Cirebon signed MOU and MOA with IACPE on November 22, 2018

KLM Technology Group is a technical consultancy group, providing specialized services and training to improve process plant operational efficiency, profitability and safety. We provide engineering solutions by offering training, technical services, best practices, and engineering designs to meet the specific needs of our partner clients. Since 1997, KLM Technology Group has been providing engineering, operations, and maintenance support for the hydrocarbon processing industry.

WWW.KLMTECHGROUP.COM

Engineering Solutions, Standards, and Software

KLM Technology Group

LOW SULFUR BUNKER FUEL OIL (IMO 2020) - IMPACTS AND ALTERNATIVES TO THE DOWNSTREAM INDUSTRY

Dr. Marcio Wagner da Silva

Introduction

The necessity to reduce the environmental impact and the higher sustainability of the industrial processes normally is translated in stricter regulations and higher control upon the industries activities, mainly to those that have a high environmental footprint as the crude oil production chain. This fact is positive and welcome, in view of the necessity to preserve the natural resources and the needed technological development to meet these regulations.

One of the most impacting regulations to the downstream industry in the current and short-term scenario is the necessity to reduce the sulfur content in the maritime transportation fuels, known as MARPOL 2020 or IMO 2020, this regulation establish which from January of 2020 the maximum sulfur content in the maritime transport fuel oil (Bunker) will be 0,5 % (m.m) against the current 3,5 % (m.m). The main objective is to reduce the SOx emissions from maritime fleet, decreasing significantly the environmental impact of this business.

Available Alternatives

The maritime fuel oil, known as bunker, is a relatively low viscosity fuel oil applied in diesel cycle engines to ships movement. Currently, the bunker is produced through the blending of residual streams as vacuum residue and deasphalted oil with dilutants like heavy gasoil and light cycle oil (LCO), due to the new regulation, the major part of the refiners will not be capable to produce low sulfur bunker through simple blend.

Due be produced from residual streams with high molecular weight, there is a tendency of contaminants accumulation (sulfur, nitrogen, and metals) in the bunker, this fact make difficult meet the new regulation without additional treatment steps, what should lead to increasing the production cost of this derivative and the necessity to modifications in the refining schemes of some refineries.

The first alternative to meet the MARPOL 2020 is the control of the sulfur content in the crude oil that will be processed in the refinery, however, this solution limits the refinery operational flexibility and restrict the slate of crude suppliers which can be a threat in scenarios with geopolitical instabilities and crude prices volatility. According to related by McKinsey Consultancy and presented in Figure 1, just only a small part of crude oils are capable to produce an atmospheric residue that meets the new requirement to the bunker sulfur content.

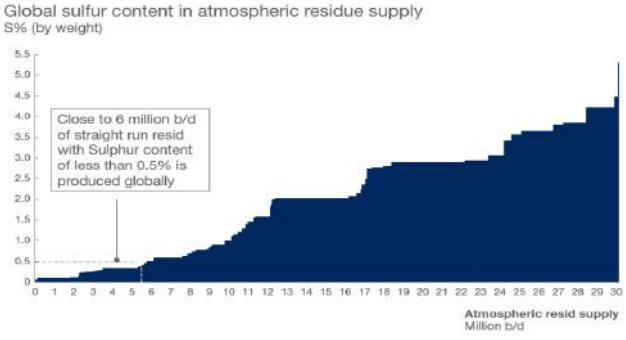


Figure 1 – Availability of Low Sulfur Atmospheric Residue (Source: McKinsey Energy Insights' Global Downstream Model

Due to the limitation in the supply of low sulfur crudes, the use of residue upgrading technologies aiming to adequate the contaminants content in the streams applied in the production of the bunker is an effective strategy.

Available technologies to processing bottom barrel streams involve processes that aim to raise the H/C relation in the molecule, either through reducing the carbon quantity (processes based on carbon rejection) or through hydrogen addition. Technologies that involve hydrogen addition encompass hydrotreating and hydrocracking processes while technologies based on carbon rejection refers to thermal cracking processes like Visbreaking, Delayed Coking and Fluid Coking, catalytic cracking processes like Fluid Catalytic Cracking (FCC) and physical separation processes like Solvent Deasphalting units.

Process Technologies

The deasphalting process is based on liquid-liquid extraction operation where is applied light paraffin (propane, butane, pentane, etc.) to promotes resins solubilization inducing the asphaltenes precipitation, that correspond to the heavier fraction of the vacuum residue and concentrate the major part of the contaminants and heteroatoms (nitrogen, sulfur, metals, etc.). The process produces a heavy stream with low contaminants content called deasphalted oil (Extract phase), that can be directed to produce low sulfur fuel oil (bunker), and a stream poor in solvent containing the heavier compounds and with high contaminants content, mainly sulfur, nitrogen and metals called asphaltic residue (Raffinate phase).

The processes ROSE™ licensed by KBR Company, UOP-DEMEX™ licensed by UOP and the process SOLVAHL™ licensed by AXENS are examples of deasphalting technologies in supercritical conditions. Figure 2 presents a basic process scheme for a typical deasphalting unit under supercritical conditions.

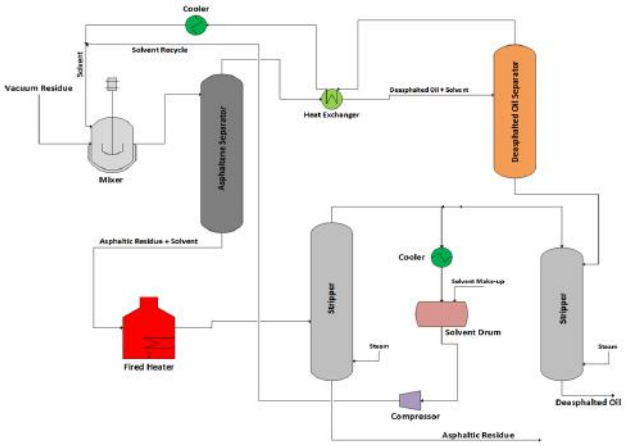


Figure 2 – Typical arrangement to solvent deasphalting unit under supercritical condition

Delayed coking technology applies the carbon rejection through thermal cracking of the residual streams, however, the streams from this unit still present high contaminant content and chemical instability and require additional treatment steps to allow his use in the production of final derivatives or as intermediate streams to produce low sulfur bunker.

Among the processes that involve the hydrogen addition, the residue hydrotreating, normally applied to reduce contaminants in feed streams to deep conversion processes as RFCC (Residue Fluid Catalytic Cracking) and hydrocracking, can be applied to treat the atmospheric residue allowing the production of the low sulfur bunker and the compliance with the MARPOL 2020. Figure 3 presents a process flow diagram for a typical high severity hydrotreating unit.

PROCESS
ENGINEERING ASSOCIATES, LLC

"Excellence in Applied Chemical Engineering"

Process Engineering Associates, LLC
Process Engineering International, LLC

We provide engineering services exclusively via highly qualified chemical engineers and we specialize only in process engineering. Our industrial process design and plant operations experience are extensive. Our companies provide only Chemical Engineering process design and process safety services and currently employ over 50 highly qualified, full-time chemical engineers.

Our services are provided to most industrial process markets including chemical / petro-chemicals, petroleum refining, alternative fuels, power generation, metals/mineral processing industries, foods, pharmaceuticals, and more.

PROCESS' personnel are experienced, highly-motivated Chemical Engineers with track records of significant achievement in the process engineering field.

PROCESS has experience in providing exceptional process design services for the development of conceptual and detail process design, process modeling and simulation, and operations support. Typical services include process option screening studies/evaluations, preliminary process designs (FEL & FEED), comprehensive Schedule A process design packages, detail engineering process support, process construction oversight, startup assistance, and more.

Corporate Office

700 South Illinois Ave.
Suite A-202
Oak Ridge, TN 37830

Phone: +1 (865) 220-8722

Overview of Services

We specialize in process chemical engineering, process design, and process safety.

- Process Design
- Process Modeling/Simulation (CHEMCAD / AspenPlus / HYSYS / etc.)
- Operations Support
- Process Safety Management
- Safety Instrumented Systems / ISA Compliance
- Additional Capabilities

Please visit our websites at
http://www.ProcessEngr.com
and http://www.ProcessEngr-Intl.com.

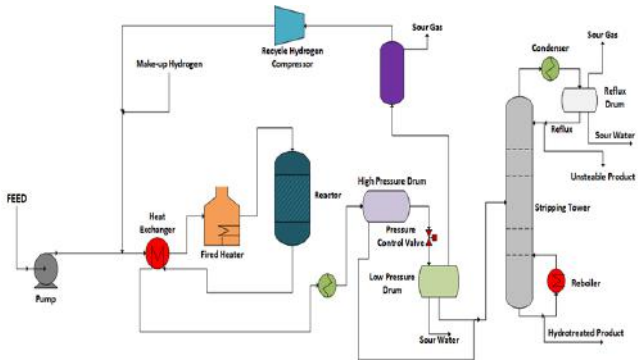


Figure 3 – Basic Process Flow Diagram for High Severity Hydrotreating Process Units

Bottom barrel hydrotreating units demand high severity and increase significantly the hydrogen consumption that normally is a high-cost utility, in refineries without hydrogen surplus will be need capital investment to revamp existent process units or to build new hydrogen generation plants. However, to the long-term, technology licensers like Axens, UOP, Exxon Mobil, CB&I, Lummus, Haldor Topsoe, Albemarle among others, still invest in researches to improve the technology, mainly in the development of new arrangements that can minimize the hydrogen consumption (high cost raw material) and that apply lower cost catalysts and more resistant to deactivation process.

Extra-Heavy crude oils or with high contaminants content can demand deep conversion technologies to meet the new quality requirements to the bunker fuel oil. Hydrocracking technologies are capable to achieve conversions higher than 90% and, despite, the high operational costs and installation can be attractive alternatives.

The hydrocracking process is normally conducted under severe reaction conditions with temperatures that vary to 300 to 480 oC and pressures between 35 to 260 bar.

Due to process severity, hydrocracking units can process a large variety of feed streams, which can vary from gas oils to residues that can be converted into light and medium derivates, with high value added.

Figure 4 shows a typical process arrangement to hydrocracking units with two reaction stage and intermediate gas separation, adequate to treat high streams with high contaminants content.

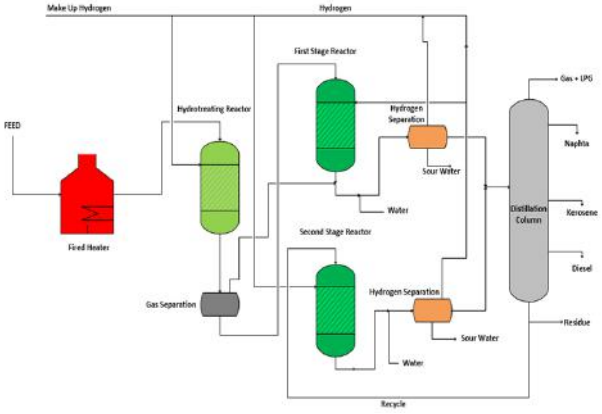


Figure 4 – Typical Arrangement for Two Stage Hydrocracking Units with Intermediate Gas Separation

The residue produced by hydrocracking units have low contaminants content, able to be directed to the refinery fuel oil pool aiming to produce low sulfur bunker, allowing the market supply and the competitiveness of the refiners.

Technologies that use ebullated bed reactors and continuum catalyst replacement allow higher campaign period and higher conversion rates, among these technologies the most known are the H-Oil technology developed by Axens and the LC-Fining Process by Chevron-Lummus. These reactors operate at temperatures above of 450 °C and pressures until 250 bar.

An improvement in relation of ebullated bed technologies is the slurry phase reactors, which can achieve conversions higher than 95 %. In this case, the main available technologies are the HDH process (Hydrocracking-Distillation-Hydrotreatment), developed by PDVSA-Intevep, VEBA-Combicracking Process (VCC) developed by VEBA oil and the EST process (Eni Slurry Technology) developed by Italian state oil company ENI.

SOx/NOx Abatement Alternatives

An alternative to the use of low sulfur fuel oil is the installation of SOx and NOx emissions abatement in the exhaustion systems of ships, the called gas scrubbers. In this case, the engines keep to burn high sulfur bunker (3,5 % of sulfur) and emissions the reduction will be achieved washing the exhaustion gases with alkaline solution, among the available technologies we can quote the process BELCO-MS ™ developed by Dupont Clean Technologies Company and the EGCS™ process, commercialized by YARA company. Despite the available technologies, the installation of these systems is expensive and does not there seems to be enough time to adapt to all the maritime fleet by January 2020, which should further pressure the refining industry to produce bunker oil that meets the new specifications.

Aiming to meet the new bunker quality requirements, noblest streams, normally directed to produce middle distillates can be applied to produce low sulfur fuel oil, this can lead to a shortage of intermediate streams to produce these derivatives, raising his prices. The market of high sulfur content fuel oil should strongly be reduced, due to the higher prices gap when compared with diesel, his production will be economically unattractive.

Conclusion

Comply the MARPOL 2020 should pressure the refining margins of low complexity refineries and reduced conversion capacity, once there is the tendency to raise the prices of low sulfur crude oils, furthermore, the higher operational costs depending on the technological or optimization solution adopted by the refiner. The option by hydroprocessing routes will raise de demand for hydrogen, leading to a higher natural gas consumption and CO2 emissions that can lead to a higher pressure from environmental authorities, in this sense, a better integration between refineries and petrochemical process plants can be even more needed, once that normally, these units have a surplus of hydrogen and could supply a part of the refiners demand. Another attention point may be the trend of higher costs of shipping as a result of the transfer of costs by transporters.

On the other hand, the new legislation may represent an excellent trading opportunity for countries with easy access to low sulfur oil reserves. An example is Brazil, which has low sulfur reserves and refining facilities capable of producing bunkers within the specifications of MARPOL 2020 from the national crudes, which may make the country a relevant player in the supply of this derivative in the coming years.

The reduction of sulfur content in marine fuel oil represents an important step forward in reducing the environmental impact of our current way of life, but it represents a major challenge for the downstream industry, fortunately there is no doubt that we have the technology and qualified professionals to meet and overcome this and the new challenges that will arise.

References

FAHIM, M.A.; AL-SAHHAF, T.A.; ELKILANI, A.S. ***Fundamentals of Petroleum Refining.*** 1st ed. Elsevier Press, 2010.

GARY, J. H.; HANDWERK, G. E. ***Petroleum Refining – Technology and Economics***.4th ed. Marcel Dekker., 2001.

ROBINSON, P.R.; HSU, C.S. ***Handbook of Petroleum Technology***.1st ed. Springer, 2017.

FITZGIBBON, T.; MARTIN, A.; KLOSKOWSKA, A. ***MARPOL implications on refining and shipping market***, 2017.

Dr. Marcio Wagner da Silva is Process Engineer and Project Manager focusing on Crude Oil Refining Industry based in São José dos Campos, Brazil. Bachelor in Chemical Engineering from University of Maringa (UEM), Brazil and PhD. in Chemical Engineering from University of Campinas (UNICAMP), Brazil. Has extensive experience in research, design and construction to oil and gas industry including developing and coordinating projects to operational improvements and debottlenecking to bottom barrel units, moreover Dr. Marcio Wagner have MBA in Project Management from Federal University of Rio de Janeiro (UFRJ) and is certified in Business from Getulio Vargas Foundation (FGV).

Your Partner for Fabrications

BROADWIND ENERGY. SOLUTIONS FOR THE ENERGY NEEDS OF THE FUTURE.

Broadwind Energy is a precision manufacturer of structures, equipment and components for clean tech and other specialized applications. Our technical expertise, manufacturing footprint and collaborative processes produce high quality fabrications and welded assemblies for strategic partners within the North American market.

300 Wall Street

Abilene, TX 79603

General: 325.437.5950

Sales: 325.201.7067

info@bwen.com

www.bwen.com

Broadwind ENERGY

ASME

INDUSTRIAL FABRICATIONS | TOWER MANUFACTURING | GEARING

Sending a Sick Employee Home

By: Chris Palmisano January 2019

Can you do it? Can an employer send a sick employee home, if the person is visibly ill? It's a question that many Safety and HR Managers have to deal with at one time or another.

A written policy helps to set a precedent. As the great Benjamin Franklin said, "Failing to plan is a plan to fail." So, if you want to have an option to send a visibly sick employee home, you will need a **Written Policy**. Employees must understand that when they become sick at work their employer can send them home.

In the absence of such a policy, there are a few things an employer should think about and can lean on as leverage in deciding on sending a sick employee home:

1. First determine what you are dealing with. Ask yourself, if the employee is sick or perhaps dealing with stress? It's clear that a large proportion of safety violations and/or human errors resulting in workplace accidents can be related to stress.

   There is a direct correlation between an increase in worker stress and an increase in workplace accidents. Some warning signs of stress that employers should not ignore, or confused with general flu or illness include:

   - Fatigue
   - Low morale
   - Anxiety
   - Irritability or short temper
   - Alcohol or drug use
   - Changes in appetite
   - Frequent headaches
   - Fighting in the workplace
   - Difficulty concentrating

   To reduce workplace stress, employers can implement administrative controls such as flex time, reducing shift length or physical demands of job tasks. Employees can also take advantage of the company's EAP (Employee Assistance Programs) or other forms of Stress Management.

   Workplace Wellness Programs have also been proven to help employees not only cope with sources of work and/or personal related stress but also help in reducing workplace injuries. It is important to remember that a fit and healthy employee not only gets hurt less often but when they do get hurt, they return to work much faster than an unfit employee. So Workplace Wellness Programs have a lot of benefits for everyone.

2. You can consider the CDC (Center for Disease Control) guidance, which suggests that workers who have a fever with signs of respiratory symptoms stay at home and/or see a doctor. The CDC recommends that workers stay at home until 24 hours after their fever ends (100 degrees Fahrenheit [37.8 degrees Celsius] or lower), without the use of medication. Not everyone who has the flu will have a fever. Other symptoms could include a runny nose, body aches, headache, tiredness, diarrhea, or vomiting.

3. The OSH Act (Occupational Safety and Health Act of 1970) can also be relied on. It covers most private sector employers and their employees in the 50 states, the District of Columbia, Puerto Rico, and other U.S. territories. The Act states that employers must provide a safe and "healthful" work place. Therefore, an employee exhibiting signs of illness that can potentially spread to others, can be viewed as a hazardous exposure to the staff or your clients. Using the "OSH Act" as leverage, the employer can ask staff that are sick not to report to work or even ask them to go home.

4. OSHA recommends that employers implement a combination of controls to protect workers and reduce the transmission of the seasonal flu virus in the workplace.

   Workplace controls can include:

   - Promoting vaccinations; (this has some limitations/restrictions) Know the law!
   - Encouraging sick workers to stay home;
   - Promoting hand hygiene and cough etiquette;
   - Keeping the workplace clean;
   - Address concerns when illness occur if employees are traveling.

The BIGGER problem for some employers however can be in dealing with, how the employee is compensated for the missed time, because YOU sent the employee home.

Do we have the right to make an employee use their Sick Time or PTO (Paid Time Off) if we decide to send them home? Well the answer to that question is difficult and dynamic, varying by state laws, if unions are present, an employee's available PTO or Sick Time, if the employee is exempt/nonexempt, disabled, or it can even be an FMLA issue, etc.

It is best that employers have an approved written policy, to assure that employees know in advance, that they will be sent home if they come in with the "crud" and hopefully they will use good judgment, and apply for personal Sick Time or PTO when they are sick.

Employers can have limitations in deducting employee's salary for "ordered home" absences. Your HR Department should look into all relevant laws, regulations and standard and develop flexible leave/work policies that encourage workers to stay home, without penalty, when they become sick at work. Be transparent and discuss your policies with staff, including administrative leave transfer between employees, working from home, pay policy for sick leave, childcare options, and what to do when they become ill while or business travel.

Chris is a Professional Risk Management Consultant, a former Philadelphia Fire Department Haz-Mat Lieutenant and former OSHA Compliance Officer. He is the creator of the InSite GHS Hazcom Workplace Labeling System for Secondary Chemical Containers. https://stop-painting.com/ghs-secondary-labels-roll-of-100/ for questions about this article or his workplace chemical labeling system to meet the OSHA's GHS June 2016 requirement, you can reach Chris on LinkedIn at https://www.linkedin.com/in/chris-palmisano-696b3b6/

EMPOWERING PROCESS SIMULATION

Improve the past. Optimize the present. Design the future.

VISIT

virtualmaterials.com/GetVMGSim
to find out more.

As a process engineer you need innovative tools to see your vision come to life.

VMGSim™ is a comprehensive steady state and dynamic process simulator that provides flexibility and control to help design new processes and improve your existing plant's efficiency and bottom line.

Our PIONA molecular structure based oil characterization system allows high fidelity modelling of light to heavy hydrocarbons from the gathering system to refinery products and distribution.

VMG

U.S. • Canada • Japan • Europe • Australasia • Egypt • China • Middle East • Brazil

FRONT END LOADING FOR EFFECTIVE PIPELINE PROJECT MANAGEMENT

Jayanthi Vijay Sarathy

Abstract

With growing clamour for clean energy globally, the midstream industry becomes crucial for any hydrocarbon exporting country. To have an effective midstream network, would mean construction & production costs also have a role to play in ensuring globally competitive & affordable prices of oil & gas products. One could argue that short term and long term barrel prices apart from supply and demand is a motivating factor for operators to invest in hydrocarbon projects, but it can also be equally said, that despite what the global price or supply & demand is, effective project management & execution also determines the economic success for all project stakeholders.

A key stage in midstream project management is Front End Loading (FEL) where strategic information that addresses internal and external risks, resource availability, allocation and commitment is made before sanctioning or making a final investment decision (FID) on the project. Simply put, the more homework you do in the early stages of a project decides how much success can be achieved. Although project management is a vast subject, the following article focuses on the some of the repercussions of poorly executed front end loading (FEL) steps in midstream activities.

Front End Engineering (FEED)

1. ***Choosing Pipeline Sizes***:

The starting point to design any oil & gas pipelines is the well production, pressure & temperature profile in addition to the composition of the contents that the pipeline will carry. Production profiles are needed to estimate the peak flow rates which the pipeline experiences and in turn determine the pipeline size, whereas the pressure and temperature profiles determine the pipeline wall thickness. When your reservoir engineer and production technologist are indecisive about the Stock Tank Oil in place (STOIP), how much & at what rate the recoverable volumes from the wells are going to be extracted, chances are that you are going to underestimate/over estimate the pipeline sizes. In case of multiphase flow, whether 2 or 3 phase, the pipeline sizes significantly effect your flow regimes and carry the risk of slug formation. The slug volumes decide the size of your slug catcher & underestimating its size can cause equipment failure. Hence work it out with your subsurface team to arrive at

MASTER OF SCIENCE IN PROCESS PLANT OPERATION

(MQA / PA 9578)

A Hands-On Master Programme

Universiti Malaysia PAHANG
Engineering • Technology • Creativity

In collaboration with:
INSTEP®
INSTITUT TEKNOLOGI PETROLEUM PETRONAS

KEY HIGHLIGHTS OF THIS MASTER PROGRAMME

- ONE year programme with three semesters (minimum)
- A "bridge to PhD" programme
- Courses are designed and delivered by senior academicians and industrial experts
- Flexible and various delivery modes including on-site activities, industrial case studies, industrial-based problem-based learning and etc.
- Weekends or evening classes are available for busy professionals at UMP Gambang Campus, INSTEP, and other potential locations*.
- 10-days hands-on experience in an upstream/downstream plant environment at INSTEP Upstream Downstream Training Plant

*Gebeng industrial area (Pahang), Kerteh industrial area (Terengganu) or RAPID PETRONAS Pengerang (Johor) depending on the demand.

CONTACT US
Head of Master Program
Faculty of Chemical and Natural Resources Engineering
Universiti Malaysia Pahang
Lebuhraya Tun Razak
26300 Gambang, Kuantan
Pahang Darul Makmur

Tel: +09 549 2888 / 2873
Fax: +609 549 2889
Email: fkksa@ump.edu.my

WEBSITE
Application: http://ips.ump.edu.my/index.php/en/
Information of the course: http://fkksa.ump.edu.my/index.php/en/

a conclusive and accurate production profile prior to performing pipeline FEED.

2. ***Material Costs Overrun***: Nothing can be more disastrous than realizing as the project progresses that your pipeline actually costs more because of underestimating the pipeline's wall thickness. Wall thickness is a key value that depends on the design pressure & eventually determines the pipeline weight. Since pipeline weight is proportional to the square of the outer diameter (OD), for every millimetre increase, so does the weight increase. When the parabolic increase of per unit pipeline weight is multiplied with the total kilometres of pipeline length, the pipeline material costs are going to probably overrun the project budget. Therefore, it is not just the engineering standard chosen, but following this crucial step as part of a check list prior to finalizing the pipeline sizes is a must.
3. ***Pipeline Corrosion***: Various Engineering design practices offer solutions as to what should be the corrosion allowance for a given pipeline application. Produced water and Hydrogen sulphide (H_2S) are the popular enemies that contribute to pipeline corrosion. In addition to pipeline contents, sand from well fluids that escape sand traps, hydrate particles and fluid flow rates exacerbate metal erosion.

   However engineers sometimes fail to account for the effect of external forces. In offshore pipelines, sea waves and sand underneath the soil act upon the pipeline components such as risers thereby inducing stress. Human error also needs to be taken into account where, when ships collide with platforms, can cause dents from where corrosion propagates. Pigging operations and depressurization to dislodge hydrates can also contribute to pipeline corrosion simply because pigs can cause dents when their velocities are not regulated properly resulting in the pig getting stuck. When hydrates get dislodged during a depressurization, there are good chances that a high velocity column of hydrate can collide with pipeline bends thereby cracking and exposing metal to corrosion effects.

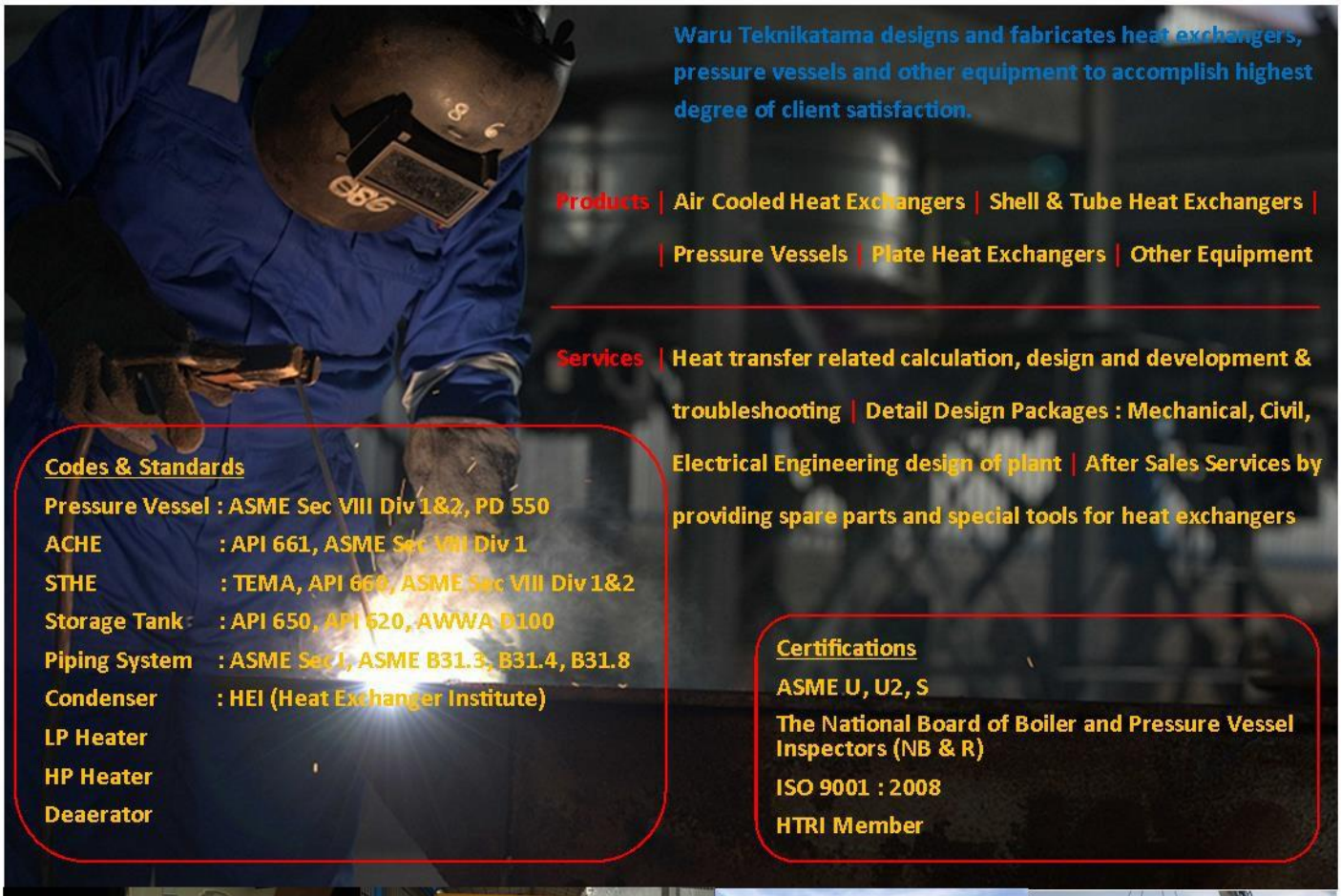
Therefore, a key step during FEED is for engineering teams to take time out and allocate resources to do a pipeline stress analysis, on-bottom stability analysis, a basic corrosion management plan covering pipeline coatings & cathodic protection, a risk assessment report and pipeline Integrity Management (PIM) report to ensure that the wall thicknesses & supporting structures chosen is adequate to meet all internal and external risks that the pipeline can experience. If one argues that this is a far fetched vision during early FEED, wait till you see blame game that starts during detailed engineering stage because of material cost overruns.

Contract Management

1. ***Vendor Contracts***: As much as the top management works on the terms and conditions of a production sharing contract (PSC), taxation, governmental regulations, etc. that shows its effects on the company's balance sheets, so must the procurement department spend time due diligently to ensure that the right vendors are available to deliver material and equipment which affects project schedule and costs. A classic case of project cost overrun is when the procurement department realizes that there is only one particular vendor to meet your project requirements after the project has been sanctioned. If a procurement strategy and supply chain is not in place, it can leave the project to the mercy of the sole vendor. Hence ITT (Invitation to Tender) documents must be prepared at the earliest to receive competing offers from various bidders which in turn allow project managers to prepare realistic schedules and costs incurred.
2. ***Interface Management***: Project management also includes interface management. In midstream projects when facilities such as booster compressors, sectionalizing valves & burn pit lines are vendor items, it is important for contractors to keep a constant open line of communication with vendors to ensure that the engineering & hook-up drawings and data-sheets have been followed to meet project specifications prior to execution. There is nothing more upsetting for project managers to watch their tables pile up with Change Orders (CO). When equipment that is already manufactured & delivered to the site but do not conform to the project specifications because of poor communication with the vendor, it is the homework of developing a contracting strategy, regular project review by engineering teams at the early stages which can minimize the damages to the project's cost & schedule. Otherwise even your legal department might be left out in the open to dry under the sun.
3. ***Man-hours Billing & LSTK***: Between Projects awarded on man-hour billing vs. Lump sum Turn key (LSTK) contracts, in reality, it depends on factors such as - how well the project owner defines the scope & shares the project vision. During FEL stage of long term projects, if project charters that have requirements changing dynamically and frequently, chances are that the engineering contractor would hesitate to engage with the project owner on LSTK basis (unless the contractor is desperate for the money to keep his company afloat). Basically, if the project requirements are not expected to change much during the course of the project, the project owner can negotiate to put the budget and schedule risks on the contractor on LSTK terms.

PT. WARU TEKNIKATAMA

HEAT TRANSFER TECHNOLOGY



Waru Teknikatama designs and fabricates heat exchangers, pressure vessels and other equipment to accomplish highest degree of client satisfaction.

Products | Air Cooled Heat Exchangers | Shell & Tube Heat Exchangers | | Pressure Vessels | Plate Heat Exchangers | Other Equipment

Services | Heat transfer related calculation, design and development & troubleshooting | Detail Design Packages : Mechanical, Civil, Electrical Engineering design of plant | After Sales Services by providing spare parts and special tools for heat exchangers

Codes & Standards

Pressure Vessel : ASME Sec VIII Div 1&2, PD 550
ACHE : API 661, ASME Sec VIII Div 1
STHE : TEMA, API 660, ASME Sec VIII Div 1&2
Storage Tank : API 650, API 620, AWWA D100
Piping System : ASME Sec I, ASME B31.3, B31.4, B31.8
Condenser : HEI (Heat Exchanger Institute)
LP Heater
HP Heater
Deaerator

Certifications

ASME U, U2, S
The National Board of Boiler and Pressure Vessel Inspectors (NB & R)
ISO 9001 : 2008
HTRI Member

Head Office
Unimas Garden Regency
Jl. Imermotors F-18
Waru, Sidoarjo 61256 – Indonesia
Phone : +62 (0) 31 853 3643,
853 3591, 854 9184
Fax : +62 (0) 31 853 3591
www.waruteknikatama.com
waru@waruteknikatama

Workshop
Desa Domas. Km 11, Trowulan, Mojokerto, East Java, Indonesia

Cert. No. JKT 6006851

ASME - S AND U Stamp

But to be practical, there is no project, where complete clarity is always available prior to Sanctioning/FID. Hence it is prudent for project owners to keep their options open to enter into a mixed contract where both man-hour billing and LSTK methods provide flexibility, transparency, accountability and ease of management to the project. Typically FEED follows a man-hour billing cycle & Detailing work follows LSTK terms. For such mixed contracts, the onus is on the engineering contractor to prove transparency and accountability during and after the man-hour based FEED by maintaining clear open book records on the project progress & work delivered. This is important for the project owner to assess, if the scope of work (SoW), quality and execution schedule has been met to satisfaction and avoid feeling like cab passengers who constantly suspects if the cab meter is functioning correctly. This also allows project owners to assess if re-work through change orders will become a habit during the detailing phase of engineering.

4. ***Under/Over Quoting***: When contractors lack experience with similar projects in the past to determine what it takes to execute a project, it either ends up working for free on all that 'extra' SoW or losing the E&C contract to a brighter guy. Therefore if you are a small contractor, start small.
5. ***Take Benchmarking Seriously***: High FEL projects or projects that have clear vision, clarity and scope are expected to have shorter schedules, predictable costs, and completion in all respects. Benchmarking with similar projects that had sound contracts with reputed suppliers gives a good idea where your project is heading towards, quicker and confident final investment decisions (FID) and also aids in eliminating uncertainties that warrant excess contingencies.
6. ***Project Economics & Standardization***: When projects run on low profit margins, instead of cutting corners and getting into trouble, it is more sensible to first understand how project economic factors such as direct & indirect costs, revenue, margin, overheads, taxation, etc affect the project's profitability. Contracts made with vendors who employ Product Standardization, maintain sound balance sheets, ready availability of credit better bet to ensure your project's vendor items are delivered on time to meet project schedules and quality. Therefore, it is preferable during FEL for procurement teams to refer back to previously approved contractors who meet project owner's business objectives because they better understand the Project Owner's requirements.

Local Laws & Regulations

1. ***Pipeline Location Markers***: It is no doubt a momentous joy in meeting project requirements, executing, completing, running a guarantee test, handing over the keys of the facilities to the project owner & closing the business deal. But if a buried natural gas pipeline that runs through large localities of human occupation without any pipeline location markers & the local government body in-charge of laying roads & electrical cables hit the gas pipeline while digging up, in all likelihood the incident will hit the tabloids when there is an explosion. Hence always have an emergency response plan of action as part of the project plan with constant communication with local civic authorities.
2. ***Right of Way (ROW)***: Project Owners, Project Managers, project engineers and all relevant stake holders have the duty to follow all local laws and meet environmental regulations. When project owners skip such an early FEL step & Engineers are busy proving their calibre laying an above-ground gas pipeline laden with high H_2S content through a forest area with no

cognizance of the local habitat or environmental regulations, one wouldn't want to see an elephant stepping on it. When the pipeline ruptures, with all that hydrogen sulphide laden gas spewing out killing the surrounding habitat due to poisoning & explosions, the project owner can be sure to become the next subject of a Hollywood movie or a Greenpeace Activist's Documentary.

In protected habitats, the ROW of local flora & fauna gains first priority over Project Owner's ROW. Therefore, project managers have the mandatory task of keeping track of Local environmental regulations from the earliest stage of Front End Loading.

3. ***Planning ROW Path***: Not all projects are expected to receive the kind of budgets to build oil & gas facilities in one go and hence projects are implemented in phases. Sometimes, though budgets are sanctioned, projects are not implemented considering unforeseeable poor market demand. In the event where the project is expected to go through a later stage expansion or when an underestimation of market demand causes downsizing the infrastructure but market demand increases at a later stage, the existing pipeline capacity becomes insufficient to transport. In such cases, it is prudent to plan early during the FEL stage to acquire and accommodate additional ROW for future pipeline expansions. However to do so, local landowners and governmental authorities must be consulted early to acquire the requisite land and approvals for gaining ROW rights.

References

Lessons Learned from UKCS Oil and Gas Projects 2011-2016, Oil & Gas Authority

Vijay Sarathy holds a Master's Degree in Chemical Engineering from Birla Institute of Technology & Science (BITS), Pilani, India and is a Chartered Engineer from the Institution of Chemical Engineers, UK. His expertise over 10 years of professional experience covers Front End Engineering Process Dynamic Simulation and Subsea/Onshore pipeline flow assurance in the Oil and Gas industry. Vijay has worked as an Upstream Process Engineer with major conglomerates of General Electric, ENI Saipem and Shell.


IACPE
INTERNATIONAL ASSOCIATION OF
CERTIFIED PRACTICING ENGINEERS
Www.iacpe.com