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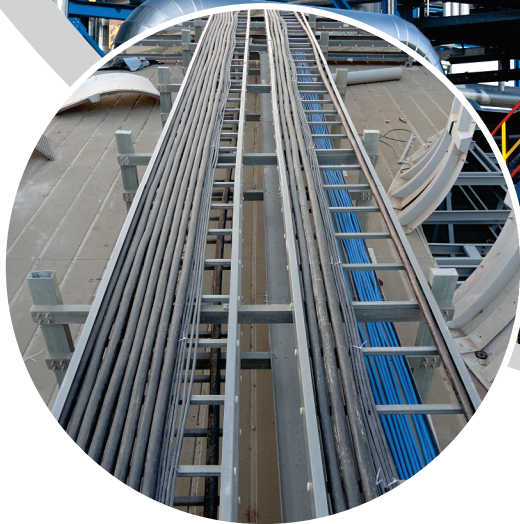
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Gujarat Unfolding India's Natural Gas-based Economy Model

- Rakesh Roy

Natural gas accounts for just 6.2 percent of India's energy basket as compared to the global share of 24 percent in the world energy mix. Looking at the potential of natural gas, being a clean & green fuel, and the environmental and COP 21 commitment, the Indian Government has taken initiatives to increase the share of the green fuel to about 15 percent in the energy basket by 2030. Though the domestic gas production has not been so remarkable, the demands have been increased year-on-year due to various reasons. The growing demand of cooking gas by households, demands from Industry like; Power, Fertiliser, Chemical & Petrochemicals, and the changing customer behaviour & business dynamics in the Automotive Industry from Petroleum vehicles to Gas vehicles, are the few obvious reasons for the growing significant of natural gas. Of course, all the demands are driven by the Government Policy initiatives towards the use of clean energy resources.

The roadblocks to achieve the ambitious vision to the growth of natural gas market are not funding; however, the stranded domestic production, pricing and allocation of gas, and mostly the requisite infrastructure development - pipelines, import terminals and city gas distribution (CGD) networks.

India's Focus to Shifting to a Gas-based Economy

Honourable Prime Minister Narendra Modi recent statement 'The country will be shifting to a gas-based economy in a few years,' is a welcome development from the point of both costs of energy and betterment of the environment. Recently, Prime Minister has laid the foundation for the ninth bidding for city gas distribution (CGD) projects, under the Petroleum and Natural Gas Regulatory Board (PNGRB), covering 129 districts and 65 geographical areas (GAs). The PM also launched tenth CGD bidding round in 50 GAs spread over 124 districts in 14 States.

With this it is expected that 200 lakh households will have piped gas connectivity very soon. Natural gas, predominantly methane, is a cheap and environment-friendly fuel and currently the country consumes around 45 million tonnes of oil equivalent (mtoe) of natural gas, which comes to nearly 6.2 per cent of its primary energy consumption.

As of November 2018, there were 1,491 CNG stations, 1,90,836 CNG vehicles, and 46,40,998 domestic, 27,097 commercial and 8,278 industrial connections in the country. Currently, there are 16,226 km of gas pipelines having a capacity of 368.5 million standard cubic meters per day (mmscmd). Another 11,216 km of pipeline is under construction.

As per a recent statement by **Dharmendra Pradhan, Oil Minister, Govt of India:** India is investing over USD 60 billion in developing natural supply and distribution infrastructure as it chases the target of

more than doubling the share of natural gas in its energy base to 15 per cent by 2030.

While globally, natural gas constitutes 24 per cent of the primary energy consumption, in India, Gujarat is the only state which has relatively better access to natural gas, is having a share of 25 per cent in its energy basket.

Green Gujarat – Unfolding India's Gas-based Economy Model

Presently, in Gujarat natural gas comprises 25 percent of the energy mix which is higher than world average of 24 percent (India average is 6.2 percent). Seven gas companies are operating and cover approximately 85 percent of the state through 469 CNG stations (32 percent), catering to 0.9 to 1 million NGVs (30 percent) daily out of a national total of 1491 CNG stations and 3.2 million NGVs.

Companies like Gujarat Gas, Adani group, Torrent Group, Petronet LNG, Shell Group, Gujarat State Petronet Ltd, Shapoorji Group, IRM Energy and Sabarmati Gas have invested in various infrastructure facilities from LNG terminals to CGD networks to pipeline infrastructure to power plants, creating an ecosystem for a gas-based economy.

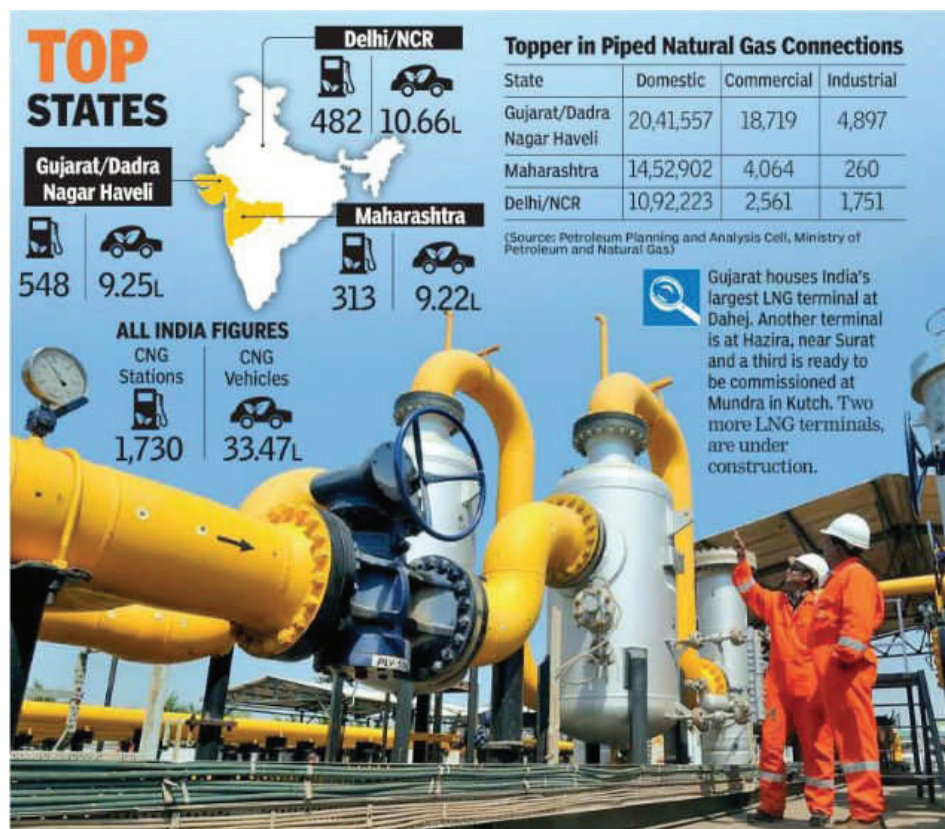
In promoting the green fuel initiative of the state, **Vijay Rupani, Chief Minister of Gujarat**, recently announced the 'CNG Sahbhagi Yojana'. It aims to resolve the issue of long queues at CNG stations by adding another 300 stations in two years. Further, the state government recently gave its nod for what it claims to be the world's first compressed natural gas (CNG) port terminal. The facility, to come up in Bhavnagar, will be set up jointly by the UK-based Foresight Group and the Mumbai-based Padmanabh Mafatlal Group.

The central government, while planning to cut down on oil imports, is shifting to creating a gas-based economy. Gujarat, which is considered a gas hub for over two decades now, may offer some answers. With new infrastructure facilities coming up and the state pushing for cleaner fuel options, Gujarat is likely to consolidate its position further.

It became the first and only Indian state so far to be completely covered under the piped gas distribution network after the ninth round of bidding by petroleum and natural gas regulator in 2018.

Producing 47 percent of the nation's natural gas, it is home to 19.6 lakh piped natural gas users who account for 42 percent PNG customers in India.

In his statement, **Saurabh Patel, Energy Minister, Government of Gujarat**, said that 'Gujarat has been a pioneer in creating a gas-based economy and natural gas usage across various applications has grown



exponentially over the last two decades. Continuing with our firm belief in the future of natural gas and in line with our prime minister's vision of turning India into a gas-based economy, the Torrent Group has recently forayed into the CGD sector with the mission to supply clean fuel to its authorised areas spread across 32 districts in seven states.'

"Torrent group has a long-standing commitment to promoting natural gas, going back more than 25 years, when we set up India's first private sector gas-based power plant. Torrent has the largest gas-based power capacity of 2,730MW in the country, all of which is in Gujarat," says **Jinal Mehta, Managing Director, Torrent Power Ltd.**

Gujarat-based companies bagged rights to retail CNG and PNG in a number of cities during the 9th and 10th round of auctions by PNGRB. Torrent Gas bagged licences for 18 cities, while Adani Gas won 15 areas on its own and 10 in joint venture with Indian Oil Corporation. State-run Gujarat Gas bagged rights for 7 cities. The cumulative investments by these players to develop CGD networks in these cities will be more than ₹ 25,000 crore over the next few years.

Praising the Gujarat leadership for its policy initiatives towards the growth of Natural Gas drive, **Pranav Adani, Managing Director - Oil and Gas at Adani Group**, said: 'Thanks to the visionary leadership, Gujarat is a role model for the gas-based economy. Today, Gujarat is the only state with 100 percent coverage of CGD development authorisation. The enabling state policies and its conducive eco-system made Gujarat Gas the largest city gas distribution company in India.' Apart from developing natural gas pipeline supply infrastructure, Gujarat is the only state with two operational LNG terminals — Dahej, run by

Petronet LNG, and Hazira terminal by Shell Group. It currently holds about 25 percent share of natural gas consumption in total gas supplies on pan-India basis. While these two terminals handle about 70-80 percent of total gas and LNG supply in the country, a third one, set up jointly by Gujarat government, is all set to be commissioned soon. Two more LNG terminals, one by Shapoorji Pallonji group and another one by Swan Energy are under construction. Another terminal with a re-gasification capacity of 5 million metric tonnes per annum (mmtpa), built jointly by Gujarat Government and Adani Group at Mundra, is expected to be commissioned shortly. The state also houses 10 gas-based power projects with a capacity of 4,050 megawatts that have been developed by government and private companies.

"The presence of LNG terminals has acted as a catalyst and enabled Gujarat to position itself as the prominent gas corridor of the country with majority of LNG imports being sourced through these terminals," added

Saurabh Patel, Gujarat Energy Minister.

Looking at the requisite infrastructure like; LNG Terminals and Gas grid Gujarat has to support the LNG value chain, **Nitin Patil, CEO, Gujarat Gas Limited**, rightly said: 'About 70-80 percent of the country's LNG comes from terminals in Gujarat. Very soon, more terminals will get operational. To back this up, we have developed a gas grid covering all districts. With gas-based power plants and fertilizer units, the state has an entire ecosystem ideal for a gas-based economy'.

While Gujarat Gas is the largest CGD of the country in terms of volumes and customer base, the Adani Group, which forayed in 2004, is biggest in terms of licenced areas. The group aims to add 9 lakh households and set up 100 additional CNG stations in next few years.

After setting up a huge pipeline network in the state, Gujarat State Petronet is currently implementing two cross-country natural gas trunk pipelines for an estimated investment of ₹ 6,500 crore.

The overarching aim of entering this domain was to make cleaner and affordable fuel available to the remotest corners of India and the state of Gujarat has played a pivotal role in this journey. Going forward, the strategic partnership with world's energy major Total would bolster this ambition. By contributing to India's vision of becoming a gas-based economy, Gujarat has been and continues to be a model state and leader to shoulder the nation's climate goals. ●

Sources: TOI, Business Standard

India's Oil Demand Doubling, Import Dependence Rising to 90 percent by 2040: IEA

India's oil demand will double to more than 9 million barrels a day, marking largest absolute consumption growth for any country, and its dependence on imports will rise to 90% by 2040, according to the International Energy Agency's latest World Energy Outlook.

This means the Indian economy will continue to depend in the near term on oil or fossil fuels in spite of the government's stress on renewable energy and electric vehicles. This does not augur well as the suggested price trends in business as usual or stated policy environment scenarios do not offer much comfort on the price front in spite of subdued demand growth from other economies and rising exports from new players such as the US and Brazil.

Oil is one of the key elements of the government's fiscal math. Costlier fuel cramps government's fiscal room for social spending or stimulus as it disturbs macro-economic parameters by raising costs for consumers, farmers, transporters and manufacturers.

The report says a third of the growth in India's oil will come from trucks. Another quarter will come from passenger cars, with the Indian car fleet growing by a factor of seven between now and 2040. Use of oil as a petrochemical feedstock will contribute the remaining 15% demand. On the global stage, the Outlook sees the oil trade becoming increasingly centred on Asia, with China soon overtaking the European Union as the world's largest oil importer and holding that position to 2040, despite the flattening of its oil demand in the 2030s. But this also poses a challenge as the growing concentration of trade flows to Asia increases the amount of oil passing through major global chokepoints, with implications for global oil security.

The Outlook also sees the influence of traditional players on the oil market waning, with the US output pushing down the share of OPEC countries and Russia in total oil production. This share drops to 47% in 2030, from 55% in the mid-2000s, implying that efforts to manage conditions in the oil market could face strong headwinds. Pressures on the hydrocarbon revenues of some of the world's major producers also underline the importance of their efforts to diversify their economies.

“A third of the growth in India's oil will come from trucks and another quarter will come from passenger cars, with the Indian car fleet growing by a factor of seven between now and 2040. Use of oil as a petrochemical feedstock will contribute the remaining 15% demand.”

The era of fossil fuel is not going to over now and there is already a disparity between the oil prices and the geopolitical situations, therefore, he would be surprised if the prices see any severe spike,' says Fatih Birol, Executive Director, International Energy Agency.

“Next few years based on the understanding of the current situation and the growth slowdown trend, it is unlikely that oil prices will see an extreme spike,” he added.

“The calmness which we see in the oil market despite the recent challenges in the key producing nations -- like sanctions on Iran and Venezuela, attack on an oil facility in Saudi Arabia, and unrest in Iraq --, it is an indication of a disconnect between the price and geopolitics,” he added.

On the supply side, Birol pointed out that a reason for this calmness could also be the availability of the American shale oil. Commenting on Iran's latest announcement of oil discovery, Birol said “All new investments will boil down to the price. A significant amount of oil at low cost without political challenges is available in the market.”

Heavy Reliability from Middle East

The outlook states that “Whichever pathway the energy system follows, the world still relies heavily on oil supply from the Middle East. The region remains by far the largest net provider of oil to world markets, as well as an important exporter of LNG (liquefied natural gas). This means that one of the world's busiest trade routes, the Strait of Hormuz, retains its position as a crucial artery for global energy trade, especially for Asian countries such as China, India, Japan and Korea that rely heavily on imported fuel”.

India Story

Talking about India story, the stated policies scenario given in the outlook says, India's net oil import requirements will more than double between 2018 and 2040 and its level of import dependency will reach roughly 90 per cent making it one of the world's highest importer. It also says that India's reliance on imported fuels becomes a major factor in global trade and energy security.

The Outlook says that "Demand for natural gas has been growing fast as a fuel for industry and (in China) for residential consumers, spurring a worldwide wave of investment in new LNG supply and pipeline connections. In our projections, 70 per cent of the increase in Asia's gas use comes from imports – largely from LNG – but the

20 years." He expects this to put downward pressure on LNG prices.

Most of the projected growth in electricity demand is met by a combination of renewables (especially solar) and coal, with gas confined mainly to a balancing role.

Growth in Global Oil Demand to Slow from 2025

Growth in global oil demand is expected to slow from 2025 as fuel efficiency improves and the use of electric vehicles increases, but consumption is unlikely to peak in the next two decades, according to the IEA.

It stated that demand growth would continue to increase even though there would be a marked slowdown in the 2030s. The agency's central scenario – which incorporates existing energy policies and announced targets – is for demand for oil to rise by around 1 million barrels per day (bpd) on average every year to 2025, from 97 million bpd in 2018.

"Demand is then seen increasing by 0.1 million bpd a year on average during the 2030s to reach 106 million bpd in 2040."

Demand is then seen increasing by 0.1 million bpd a year on average during the 2030s to reach 106 million bpd in 2040.

No Emissions Peak

The IEA outlook sees primary energy demand growing by a quarter by 2040, with renewable energy accounting for half of the rise and gas for 35%.

The IEA's central scenario also does not see energy-related carbon dioxide emissions peaking by 2040 due to economic growth and population increases.

An expected rise of just over 100 million tonnes a year between 2018 and 2040, although lower

than the average rate of increase since 2010 of 350 million tonnes a year, would not be enough of a reduction to curb global temperature rises.

The IEA expects there will be 330 million electric cars on the road by 2040, up from an estimate of 300 million in last year's outlook. That would displace around 4 million bpd of oil use, it said, compared to the 3.3 million bpd forecast previously.

The largest increases in oil production are seen coming from the United States, the world's biggest producer, as well as Iraq and Brazil.

US tight crude oil production is seen rising to 11 million bpd in 2035 from 6 million bpd in 2018.

The share of oil production by members of the Organization of the Petroleum Exporting Countries plus Russia is seen falling to 47% for much of the next decade, a level not seen since the 1980s.

"The oil price required to balance supply and demand in this scenario edges higher to nearly USD 90 a barrel in 2030 and USD 103 a barrel in 2040," the report said of the IEA's central scenario.

To meet their energy requirement consumers like India are playing around with their energy basket. The Outlook states that "Critical fuel choices hang in the balance. A three-way race is underway among coal, natural gas and renewables to provide power and heat to Asia's fast-growing economies."

On Coal

As regards coal the Outlook states that "Coal is the incumbent in most developing Asian countries: new investment decisions in coal-using infrastructure have slowed sharply, but the large stock of existing coal-using power plants and factories capacity under construction worldwide, provides coal with considerable staying power in the Stated Policies Scenario."

Birol is clear when he says coal cannot be ignored in India context. But, he believes that India will do proper working towards low carbon resources.

India is the most significant overall source of energy demand growth in this year's Outlook, a cost-effective combination of cheaper battery storage and solar PV could reshape the evolution of India's power mix in the coming decades. India's renewable power investment has doubled over the past five years, reaching nearly USD 20 billion in 2018, and now exceeds that for coal power.

competitiveness of this gas in price-sensitive markets remains a key uncertainty."

In India, the prospects for natural gas are limited by supply constraints and affordability issues, as well as by the lack of infrastructure, it says. According to Birol, "India will be one of the major drivers for the gas demand in next

Ambitious targets, supportive policies with competitive bidding and falling costs have lowered risks for investors and led to reductions in power purchasing tariffs for utility-scale solar PV and wind. Better financing terms also played a key role, he said. ●

'Chemical Process Piping (CPP) Foray into Design, Manufacture and Installation of GRE Piping for Oil & Gas Industry'

Glass Reinforced Epoxy (GRE) piping has been used for the Marine & Offshore, Oil & Gas and Petrochemical markets. The article details about CPP foray into Design, Manufacture and Installation of GRE Piping for Oil & Gas Industry.

Oil & Gas industry has been using Glass Reinforced Epoxy (GRE) piping for several years now. These pipes are used in Fire Water service, Produced water, Brine, Hydrocarbon drains, Water/ Oil mixtures, Injection water, Process water, Sour water, NaOH, Potable water, HCL amongst others. The American Petroleum Institute (API) has two classes for GRE pipes namely API 15 LR and API 15 HR besides the API Monogram program. Several major Oil & Gas companies have their own specifications namely Shell DEP, Norsok, ONGC spec amongst others. Hence GRE has proven to be a reliable material of construction in the Oil & Gas industry.

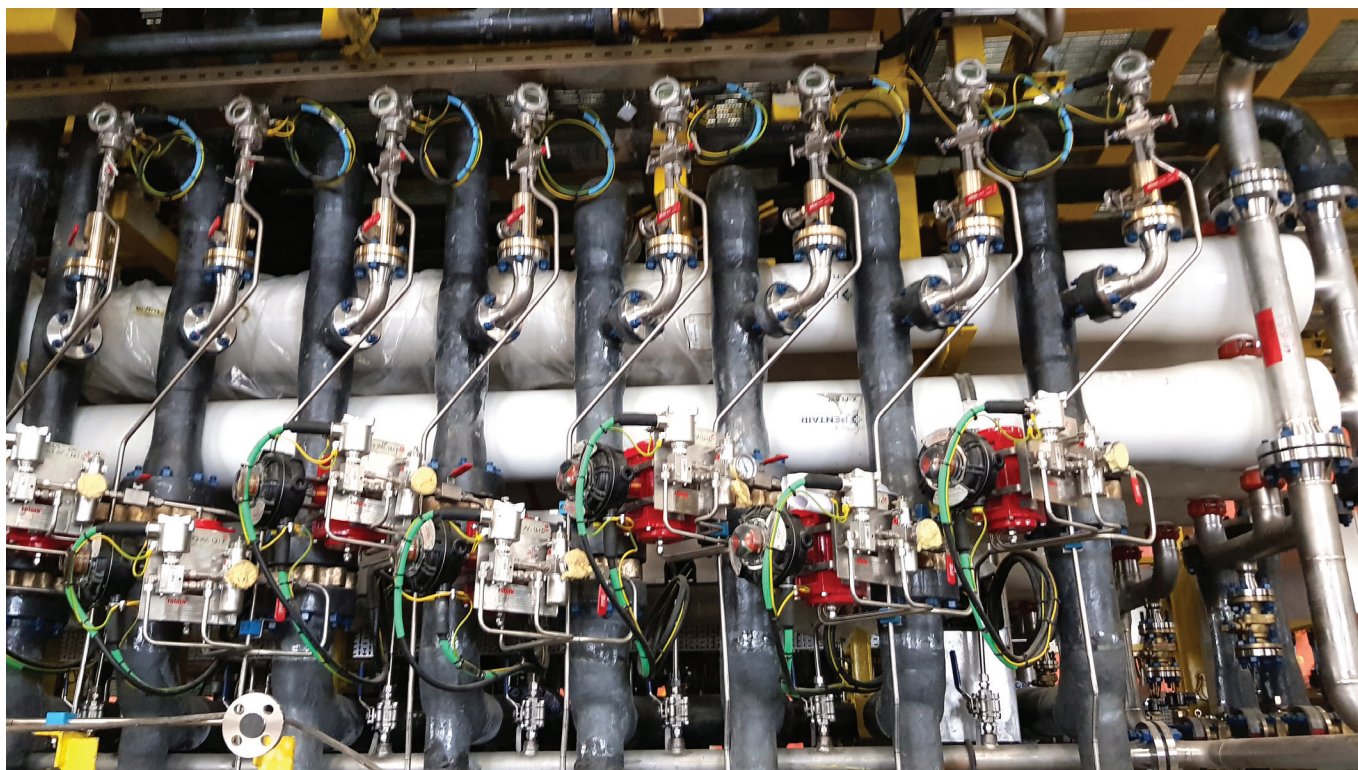
CPP has been in the forefront of GRP and Thermoplastic lined GRP Piping for the Chemical, Power, Desalination and Water conveyance for over 50 years.

Our foray in the Design, Manufacture and Installation of GRE piping for the Oil & Gas industry is relatively new however we have had considerable success in this industry.

In the year 2015 CPP first delivered GRE piping for an LNG plant in India for Fire Water service. The job involved Stress analysis, Surge analysis, manufacture, supply and installation along with excavation. This was the first project involving GRE piping executed entirely by an Indian vendor.

CPP followed by supplying over 50 kms of GRE piping for Fire Water service to Petronas for their RAPID project in Malaysia.

Several other projects in the Offshore as well as Shipping industry followed and CPP has made a mark in the industry as a reliable supplier and installer of GRE piping.





While carrying out these projects, CPP has done extensive cutting edge work in the field of design and manufacturing. We have used very efficient filament winding techniques which resulted in stronger laminates capable of sustaining very high pressures along with high chemical resistance.

We have composite pipe designs that can sustain design pressures up to 60 bars.

CPP has developed fire retardant piping as per ASTM E 84 as well as ABS standards. These pipes can also be made electrically conductive to dissipate static charges.

Unlike metal, GRE material has a wide range of properties which changes with fibre orientation, lay up sequence, glass content etc.

Physical Properties:

Pipe property	Units	Value
Thermal conductivity	W/mK	0.3
Thermal linear expansion	10^{-6} mm/mm/°C	18-24
Flow coefficient	Hazen-Williams	150
Absolute roughness	10^{-6} m	5.3
Density	Kg/m ³	1800

Mechanical Properties:

Pipe property	Units	Value
Hoop tensile Modulus	N/mm ²	18000-24000
Axial Tensile Modulus	N/mm ²	9000-12000
Shear Modulus	N/mm ²	3500
Ultimate Hoop Tensile Strength	N/mm ²	150-360
Axial tensile strength	N/mm ²	Min. 50

CPP carries out Stress analysis, Surge analysis (wherever required) & Static calculations before start of manufacture.

Stress Analysis

This is done to calculate the stresses, displacements, forces and moments acting on the piping under various conditions/ cases (eg : sustained, operating, hydrotest) due to the combined effect of internal pressure, max differential temperature, bending, and external loads. The system is modelled and analyzed using Caesar II Pipe Stress Analysis software version 6.10 according to ISO 14692 or BS 7159.

Several design conditions are used for the analysis for eg : Design Pressure, Hydro test Pressure, Design Temperature, Average Installation Temperature, Co-efficient of Friction.

Besides the above, Material Properties such as Pipe and fitting thickness, Tee dimensions, Elastic Modulus (Axial and hoop), Poisson Ratio, Shear Modulus, Long Term Axial Stress and Hoop Stress, Biaxial Stress ratio, qualified stress for Bends, Thermal factor are used as input for the stress analysis.





Surge Analysis

Water hammer analysis is carried out to investigate the following potential problems;

- **Surge due to Liquid Column Separation and Re-jointment:**

Simultaneous shut down of the water pumps may cause excessive water hammer due to liquid column separation and re-jointment, especially round outlet pipes of the elevated piping portions.

- **Pressure Surge due to Slam-shut of Tripped Pump Check Valve:**

Shut down (or unintentional stop) of a water pump is followed by sudden closure of its discharge check valve. Sudden closure of the check valve is likely to generate severe water hammer especially when one of the operating pumps shuts down and stand by pumps automatically starts.

Long-term Hydrostatic Design Basis (HDB)

Pipes are subjected to a long term hydrostatic tests wherein several samples are pressurized till failure over a period of time to derive the long term HDB and HDS. This is used in the Stress analysis and static calculations to come up with the thickness for each pressure class.

Manufacture

All pipes are manufactured on CNC controlled Filament Winding Machine which helically wind glass rovings at predetermined angles on a rotating mandrel. The rovings pass through a bath where they get impregnated with the epoxy resin. Thereafter the pipes are taken

to an Oven to heat them up to temperatures ranging from 100° C upto 200° C depending on the type of system used.

Tests:

CPP in-house laboratory can carry out the following tests:

- Tensile Strength test
- Stiffness Test
- Ring Split Test
- Beam Strength
- Lap Shear Strength Test
- Bond Strength Test
- Peel Strength Test
- Glass Content Test
- Barcol Hardness Test
- Hydro test

Oil & Gas industry in India is on the cusp of growth with

constant capacity expansions and new refineries are being planned in Rajasthan and Maharashtra. With GRE being specified for Fire Water service and other areas of a Refinery by global EPC and Owners, we believe that the market for GRE piping will increase considerably. ●

GRE PIPING



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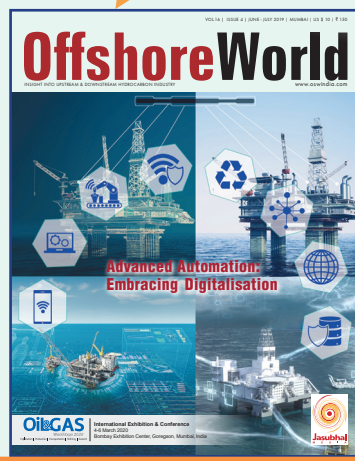
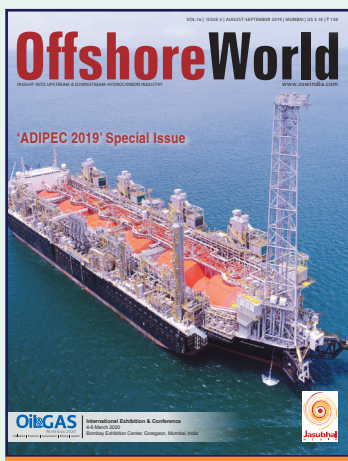
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OffshoreWorld

INSIGHT INTO UPSTREAM & DOWNSTREAM HYDROCARBON INDUSTRY

Offshore World is an all-encompassing magazine for the hydrocarbon and allied industries. A bi-monthly magazine, launched in December 2003, Offshore World disseminates authentic, critical and well-researched information on global hydrocarbon industry innovations. The magazine offers latest and strategic information on the upstream and downstream hydrocarbon industry. The endeavour of Offshore World is to become a vehicle in making "Hydrocarbon Vision 2025" a reality in terms of technologies, markets and new directions, and to stand as a medium of reaction of the achievements and aspirations of Indian hydrocarbon industry.

Circulation: 28,000

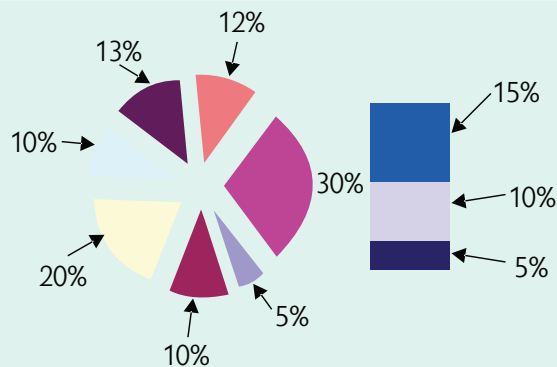


OSW Region-wise Presence

- 53% Western Region [including Mumbai, Gujarat, Pune, etc]
- 23% Northern Region [including Delhi, UP, etc]
- 10% Southern Region [including Bangalore, Hyderabad, Chennai, Coimbatore, etc]
- 9% Eastern Region [including Kolkata, Assam, etc]
- 5% International [includes USA, MiddleEast, Russia, Brazil, Iran, China, Germany, Italy, France, etc]

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| Hydrocarbon Processing | Plant, Machinery and Equipment Providers |
| Drilling and Equipment Manufacturers | Technology Solution and Service Providers |
| Development and Production Companies | Safety, Health and Environment |
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- 5% Hydrocarbon Exploration
- 10% Hydrocarbon Processing
- 20% Drilling and Equipment Manufacturers
- 10% Development and Production Companies
- 13% Transportation and Logistics Companies
- 12% Refining and Marketing Companies
- 15% Plant, Machinery and Equipment Providers
- 10% Technology Solution and Service Providers
- 5% Safety , Health and EnvironmentZA

Waste to Wealth with KVT

The article shares insights on KVT process technologies that help various industries to recycle and valorise waste and creating wealth of it.

Kanzler Verfahrenstechnik (KVT) strives to upgrade processes to aid their customers in the struggle of competing in an accelerated world where economic and ecologic pressures have never been higher.

An increased demand for technologies encompassing recycling of wastes, waste valorisation and integrated continuous solutions has been observed in three areas:

- Sulphur-containing exhaust gases
- High TOC sludges
- Waste brines

Sulfuric acid is the most widely used and consumed inorganic acid. Pure sulfuric acid is a highly corrosive, colourless, viscous liquid. Growth rates in consumption are at 4-5% per year. Its consumption is an indicator of the development of chemical industry in a country. Today there is practically only the contact process for production of Sulfuric Acid.

The sulfur dioxide used in the sulfuric acid plants typically comes from:

- Combustion of elemental sulfur
- Roasting gases from sulfide ores
Pyrite FeS_2 (as sulfur source for this purpose removed intentionally), as a by-product from the smelting of copper ore (CuFeS_2 , Cu_2S , CuFeS_4), zinc and lead ores (ZnS , PbS) and others (Ni, V, Mo ...)
- Sulfur cleavage of sulfates or sulfuric acid waste

WET SULFURIC ACID TREATMENT

Further, there is also the possibility to recover sulfuric acid from various off-gas streams. The OXYSULF Technology is used for waste gas desulfurization with recovery of pure, concentrated sulfuric acid. The OXYSULF process can handle wet gases containing sulfurous components such as H_2S , CS_2 and SO_2 to convert them to sulfuric acid. In a world where the ecological aspect needs to be integrated with efficiency and profitability, this process technology created a space for itself: sustainability with guaranteed emissions go together with the economical convenience.

Sulfur containing exhaust gases can originate from various sources. KVT originally developed this wet process to produce sulfuric acid from off gas

containing sulfur bearing compounds for a viscose production company in 1992. Ever since, the field of application has grown and with every new requirement, solutions were found which were integrated in the core of the technology. Nowadays it is applicable in:

- Refineries & Petro-chemical Industry (SRU)
 - After the Gas Sweetening Unit based on amine wash system
 - After Sulfur Burner in sulfuric acid production plants
 - Spent acid regeneration after the alkylation phase which uses sulfuric acid
- Coal based Fertilizer and Chemical Industry (Syngas SRU)
- Cokes Manufacturing
 - Coke oven gas treatment
- Non-Ferro Metallurgical Industry (Mo, Pb...)
 - Off-gas treatment coming from metal roasters
- Power Industry
 - Off-gas coming from sulfur recovering unit for burning pet coke
 - In the Sulfur Recovery Unit in IGCC Plant
- Viscose Industry
 - Off-gas coming from the spin bath unit and from spinning machine as well as from the CS_2 production plant that can be linked to the viscose production plant.
- Natural Gas Processing
 - Treatment of acid gas coming from the sour gas treatment unit
 - Tail gas treatment of Claus Process

Process

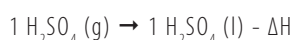
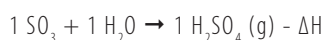
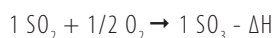
The OXYSULF Process is a customized, highly energy efficient technology used for cleaning wet waste gases (no preceding drying step process is required) containing sulfur compounds, that produces a sellable product: sulfuric acid.

The process is based on the Catalytic or the combination of Thermal and Catalytic Conversion of sulfur-bearing compounds into sulfuric acid. It is able to handle contaminants such as SO_2 , H_2S , COS or CS_2 , at a wide concentration range.



OXYSULF Wet Sulfuric Acid Plant

The following reactions and processes take place in the plant:



The off-gas passes over the Gas Conditioning System that can be a prefilter, a scrubber, Dryf-Fil hot gas filter or a preheater (KVT Exclusive), depending on the raw gas compositions and concentrations.

For low concentration (with a low calorific value of the gas) in order to reach the operating temperature of the catalyst, the stream gas needs preheating. The preheating is part of the Gas Conditioning System and

takes place through the Heat Recovery System that recovers the excess heat from the condensation column and from the reactor.

For high sulfur compounds concentrations, the first step is done with a combustion chamber where the thermal oxidation to SO_2 takes place. In order to reach the operating temperature of the catalysts, the gas stream passes a steam generator. The steam generator (Waste Heat Boiler) is part of the Heat recovery System that recovers the excess heat from the condensation column, from the reactor and after the combustion chamber.

The gas passes over the reactor with multi-bed catalysts, where the Catalytic Oxidation of sulfur compounds to SO_3 takes place. Optionally, in the first catalyst bed of the reactor, a DeNOx catalyst converts the NOx with the upstream added NH_3 to N_2 . Secondly, a noble-

catalyst converts SO_2 partly to SO_3 . This exothermic process increases the gas temperature further above 400°C . The following catalyst bed(s) contain(s) a V_2O_5 -catalyst which converts the remaining SO_2 to SO_3 . The resulting SO_3 together with the water vapor in the off-gas forms gaseous sulfuric acid.

Downstream of the reactor, a finned tube heat exchanger cools the gas close to condensation point of sulfuric acid, which typically is 250°C . The heat transfer medium in the finned tube heat exchanger is liquid salt, which is used to preheat the off gas.

The gas containing gaseous sulfuric acid enters the concentration column, where it is cooled to about 70°C by passing over the tube side of the

FEATURES



THERMODEC - Sludge Treatment Plant

glass tubes, in which a heat exchanger for preferred use is integrated. Sulfuric acid condenses and gets concentrated up to 99%, while running counter-flow against the hot gas.

The gas leaving the concentration column at the top contains sulfuric acid mist, which is precipitated in the downstream wet electrostatic precipitator (WESP). The acid mist collected in the bottom of the WESP, having a typical concentration in the range of 50%, is injected into the top of the condensation column to get highly concentrated acid. A second reactor stage makes possible to obtain sulfur oxidation efficiency up to 99.8% and recovery of sulfur as 99.7% sulfuric acid. The tail gas complying with the current international emissions regulations is discharged to the atmosphere through the main stack.

Each plant is customized for the different customer's requirements. Generally, the type of OXYSULF technology to be used is dictated by the off-gas sulfur compounds concentration. The carbon absorbs un-reacted SO_2 and oxidizes it to SO_3 . The SO_3 is washed out with demineralized water from the activated carbon to form weak sulfuric acid. This acid is collected and reinjected into the gas stream entering the WESP. This cools the gas further and increases the acid concentration.

Advantages

The existence of a technology, enabling the operators to produce sulfuric acid additionally to improving off gas quality, has been a welcomed tool in boosting plant figures, besides optimising efficiency and lowering costs. It simultaneously improves environmental impact, corporate social responsibility and economics.

SLUDGE TREATMENT

Sludges of all kinds pose a problem to operators. Often expensive disposal contracts burden otherwise well-designed production sites. The alternative of energy consuming drying has been extended to thermal decomposition, able to treat sludge under the aspect of energy recovery and in cases recovery of materials. Originally developed for Glycerine MONG (matter organic non Glycerine), the area of application now encompasses resin production and many other industrial sludges. The technology has the advantage of separating solid compounds from challenging sludge streams, generating energy and allowing for recycling of sludge components (salt, carbon black...) or gaseous components. The vapor stream and the remaining system gas – if applicable – together with other waste gases can be fed into an



SEABRINE Waste Brine Treatment Plant

incinerator to provide full oxidation of the combustible compounds. If required, liquid or gaseous waste streams from other sources can also be added to the incineration unit. Organic compounds are converted to H_2O and CO_2 . Sludge disposal costs can vary with geographic location, whilst the loss of material with potential for recovery is often neglected altogether in calculations. Production sites are dependent on disposal service providers and their prices.

Process

The sludge is conditioned and pre-dried using the processes own energy and heat. It is then fed into the THERMODEC reactor which is operated at optimal conditions between 300-500°C. Here the thermal separation of the organic components takes place. The mixture separates into a gas phase and a dry solid phase. The gas flows into the combustion chamber. Depending on the composition, the dry product stream can be further treated in the residue treatment or easily disposed of if it is not suitable for recycling itself. Depending on the field of application even the gas can be further treated for increased recovery of valuable substances.

WASTE BRINE TREATMENT

Originating from the Epichlorohydrin Production from Glycerine, brine purification is now a technology used to treat salt containing waste waters from many different origins. An especially beneficial synergy

can evolve, when a chlor-alkali electrolysis is near a chemical production site with large volumes of waste brines. In this case the chemical producer saves disposal costs, and the electrolysis operator gains access to ensured and inexpensive water supply.

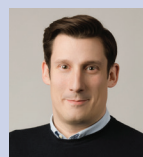
Process

First pH-levels are adjusted with HCl. The brine is then fed into a high-pressure part where the reaction takes place together with the catalyst and oxygen. Here hydrocarbons and chlorinated hydrocarbons are oxidized. Due to the exothermic nature of the reaction, energy and heat can be used to sustain the process itself and for external use. After decompression the formed vapor is condensed. Finally, the catalyst is separated for reuse.

Reaching low TOC values <7 The process is especially well suited for high TOC brines with critical components which complicate traditional biological treatment or crystallisation. Where a biological treatment, which would require a dilution factor of 20-50, or a high chemical consuming multistage cleaning process after crystallisation fail to deliver proper solutions, this process valorises a classical waste stream.

Conclusion

KVTs own technologies OXYSULF, THERMODEC and SEABRINE aim at reducing waste, increasing efficiency and recycling all possible parts of typically cumbersome and expensive to manage waste streams. Often dismissed sources for energy and recyclable resources are exploited tapping in the synergy of unusual solutions approaches. ●



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Recent Land and Marine Equipment Mitigate Environmental Footprint of Seismic Acquisition

Environmental rules & regulations, coupled with the recent COP 25 Climate Commitment, have mandated the Seismic Industry to reduce its impact to the environment. The article shares insights on two recently released products for land acquisition and marine acquisition to reduce the Environmental Impact and Carbon Footprint.

For many years, the seismic industry has strived to reduce its impact to the environment. This issue is increasingly topical as the awareness of both public and governments increases. The COP25 summit, ongoing when writing this paper, reminds us that regulations will go ever stronger with time, and that all companies, whatever their business, now have to take all necessary measures to mitigate their environmental footprint.

In land acquisition, the main environmental concern is generally related to vehicle traffic, be it the source vehicles roaming thousands of kilometers in often fragile soil and ecosystems, or the vehicles required for the logistics of the field operation.

In marine seismic, the potential impact of anthropogenic sound generated during geophysical surveys on marine mammals is receiving increased attention from government regulators of several countries, leading to the introduction of mitigation and monitoring guidelines aimed to reduce the potential impact of marine seismic sources on marine mammals.

To adapt to this new paradigm, manufacturers focus their efforts to reduce the environmental impact of their equipment, and help contractors mitigating their environmental impact on prospected areas. This article presents two recently released products: for land acquisition – a compact vibrator, designed to reduce the impact of seismic sources; and for marine acquisition, a system that detect and localize marine mammals in the vicinity of seismic operation.

REDUCING THE FOOTPRINT OF SEISMIC SOURCES

A compact vibrator (Figure 1) was designed to reduce the vibrator's environmental impact, improve accessibility and enable broadband performance. Called Nomad 15 and having a 17,000 lbf peak force, it completes the range of heavier vibrators of the Nomad family (Nomad 65 with 62,000 lbf, and Nomad 90 with 90,000 lbf).

Emission Standards Compliance

The Nomad 15 engine complies with Stage 3b and Tier 4i emission standards. Stage and Tier norms are respectively the European Union and



Figure 1: Nomad 15

United States regulations that define the acceptable limits of exhaust emissions (mainly nitrogen oxides (NOx) and particulate matter (PM)), applicable to non-road equipment powered by diesel operating within their territories. For the Nomad 15 class of engine, NOx have been reduced by 50% and PM by 90% compared to the previous Stage 3a/Tier3 standard. Compared with the Tier1/Stage1 in force until 1999, the reduction reaches 90% for NOx and 95% for PM. The large majority of vibrators currently available on the seismic market are equipped with engines compliant with lower steps of Stage/Tier norms, than Nomad 15.

Fuel Consumption Reduction

In Vibroseis operation, vibrator groups usually pass through production/stand-by cycles. The stand-by periods are due to various factors: for example, short weather stand-by, line testing and repair, or third-party interferences. Vibrator stand-by is also dependent on the topography of the survey area (flat desert requiring less stand-by than detour intensive small fields or uneven terrain), and on the methodology used (single source blended acquisition yielding less stand by than single fleet or flip-flop). So while some Middle East or North Africa crews may dramatically reduce stand-by time, it remains significant in many other areas.

Unlike road vehicle engine operation, the engines used on vibrators are driven at a constant speed measured by the Rotations Per Minute (RPM).

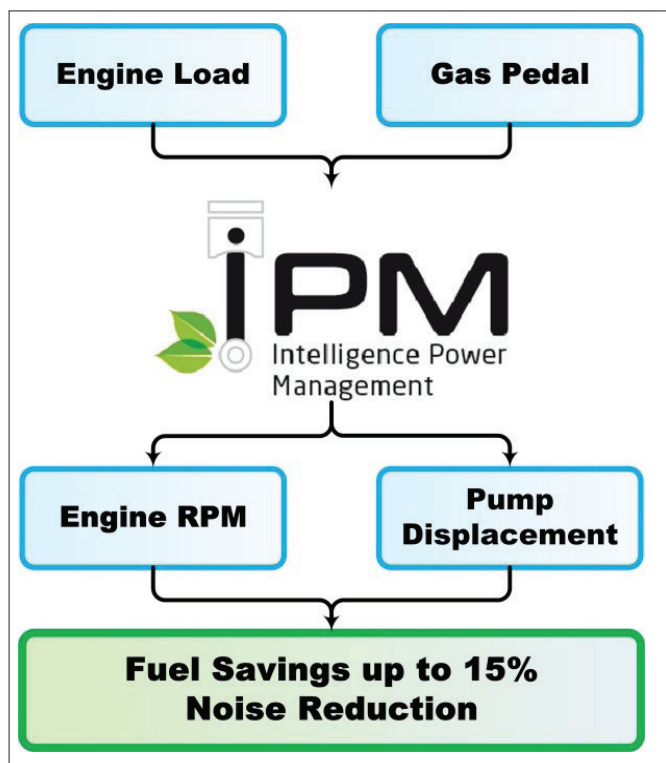


Figure 2: The Intelligent Power Management concept

Even when vibrator is in stand-by, the engine runs at its full RPM, thus greatly exceeding the power requirements of the vibrator at that given moment. Idling the engine is possible, but requires a driver intervention that is rarely performed during short stand-by periods.

The Intelligent Power Management (IPM, Figure 2) is a unique feature developed for the Nomad 15, and made available for the entire Nomad family. The IPM automatically adjusts the engine RPM to equal the power required for the vibrator's current mode of operation, without any action from the driver. This is accomplished through measurement of the engine load and the signal denoting the accelerator pedal position. This

Nomad 15 Specifications	
Peak force output	17,364 lbf (7,724 daN)
Hold down weight	16,135 lbf (7,177 daN)
Frequency range	1 - 400 Hz *
Length	6566 mm
Width	2441 mm
Height	3110 mm
Gradeability	55% (29°)
Turning circle (curb to curb)	7814 mm
Turning circle (wall to wall)	9860 mm
Gross Vehicle Weight	9 T
* Full drive from 7 Hz	

Table 1: Nomad 15 main specifications

innovative feature can significantly reduce fuel consumption, as well as noise and exhaust emissions.

A field test carried out by a seismic crew using five vibrators, each operated for more than 2,000 hours, showed fuel savings of up to 15% on the two vibrators equipped with IPM. A second large-scale test enabled to confirm the 15% savings on fuel consumption enabled by the solution.

Noise Mitigation

Another important aspect in Vibroseis operation is noise emission, as the power required to shake the ground necessitates the use of large engines. The vibrators available on the market, in their standard configuration, do not come equipped with noise mitigation devices. Optional soundproof covers are available, but are rarely purchased by contractors. Note that soundproof covers are now mandatory for operation in some areas, such as the European Economic Area, and that is requirement is likely to spread. Noise assessment in the field is not easy, as it is highly dependent on

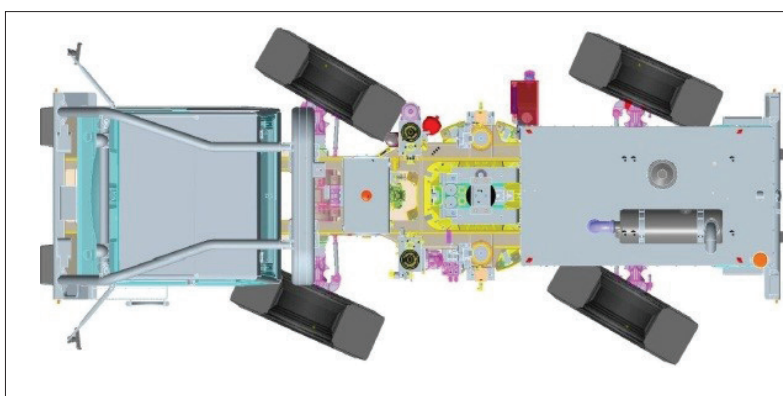
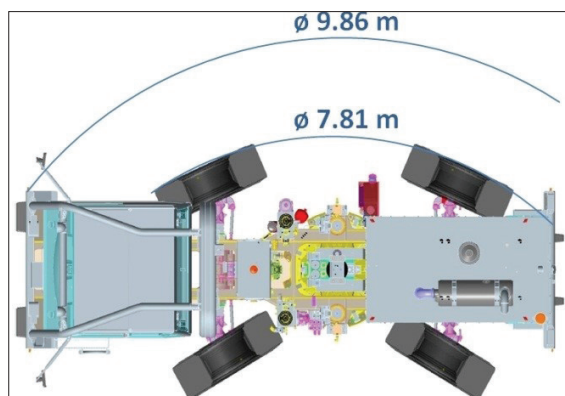


Figure 3: Directional steering modes: in addition to the standard mode, where only the front wheels provide steering, the Nomad 15 has two special directional modes to ease access to difficult areas: coordinated mode (left), the wheels turn in opposition offering an unequalled turning radius, and synchronized mode (right), which allows the vibrator to move in a sideways direction, often referred to as "crabbing".

FEATURES

measurement distance and location, surrounding noise, engine load, engine cooler and air conditioning operation. Manufacturers do not communicate much on vibrators noise level. Nonetheless, without an engine soundproof cover, it is common to have noise levels above 95 dB one meter from the engine, and 85 dB seven meters away. Such levels of noise become an important issue when operating in populated or fragile wildlife areas.

On the Nomad 15 vibrators, noise reduction is ensured by the means of an included soundproof engine housing, as well as the IPM system that reduces engine noise during stand-by periods. The maximum noise level is then reduced to 77 dB seven meters from the side of the vibrator, and less than 70 dB seven meters in front of the vibrator.

Accessibility and Broadband Capacity

The compact vibrator proposed offers unequalled accessibility to numerous areas usually closed to larger or heavier vibrators. Compact dimensions, high maneuverability and an excellent turning radius (Table 1) enabled by four directional wheels and several direction modes (Figure 3) ease access to the tough areas that constitute a large part of seismic operation playgrounds in India, such as settlements, narrow access agricultural lanes, roads where oversized vehicles are not permitted or mountainous areas. The different directional modes offer the best chance to get out of difficult terrains or mud stuck without external winching or assistance. A powerful hydraulic transmission makes it also a capable climber of even the steepest slopes (over 55%).

To foster the development of broadband acquisition, Nomad 15 offers high performance at both low and high frequencies. The Nomad 15 can initiate a sweep at 1 Hz with reduced force, reaching full force at 7 Hz. High frequencies of up to 400 Hz are achievable, depending on ground characteristics, and are made possible by an extra stiff circular baseplate and an hydraulic peak force of 17,364 lbf that exceeds the hold-down weight (16,135 lbf). Then latter feature helps to compensate for the mass-to-baseplate phase shift above the ground cutoff frequency, thus enabling to gain an extra bandwidth of high-fidelity signal in the high frequencies.

QUIETSEA MARINE MAMMAL MONITORING SYSTEM

Over the years, we have seen an ever-growing number of regulatory agencies requiring or encouraging the use of Passive Acoustic Monitoring (PAM) for real-time detection and localization of marine mammals (Figure 4) within an Exclusion Zone (EZ) around source vessels, in order to minimize the environmental impact of marine seismic sources to the wildlife present in the survey area.

The Exclusion Zone, usually defined as the radius around the seismic sources within which mitigation measures (such as seismic source shutdown) applies is generally set at 500 m.



Figure 4: Sperm Whale

Previously Available PAM Systems

Previously available PAM systems were typically comprised of a dedicated towed array containing several hydrophones, an onboard signal conditioning and data acquisition device, all of them connected to a dedicated computing system.

Although the potential value of Passive Acoustic Monitoring as a real-time mitigation tool has been recognized by most regulatory agencies, the previously available PAM systems, while well suited for research and scientific use, were quite limited in terms of effectiveness for commercial marine seismic surveys. Indeed, on the acquisition vessel, the management of a dedicated PAM towed array poses safety concerns for operators during the deployment and retrieval phases. These PAM systems also greatly increased the risk of entanglement with lead-ins and streamers, which increases the likelihood of unnecessary downtime and equipment replacement costs for the seismic contractor (Figure 5).



Figure 5: PAM towed array entanglement with lead-in

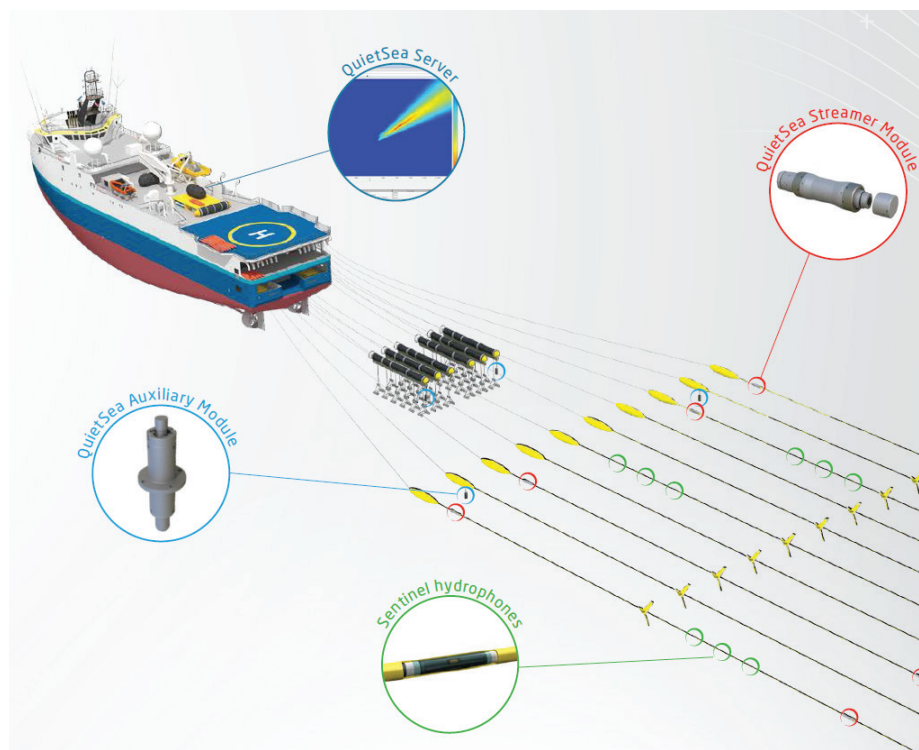


Figure 6: QuietSea in-sea architecture

PAM towed arrays are usually deployed a few hundred meters from the back deck of the seismic vessel. Thus, the boat-induced noise masks the vocalization of marine mammals and the vessel wash acts as an acoustic barrier, both of which hinder the system's ability to detect cetaceans.

Besides, these PAM systems typically rely on a single linear antenna containing a limited number of hydrophones, which leads to several restrictions in terms of system performance:

- Limited detection and localization performance in the vessel forward direction (while it is a direction of particular interest), and inability to solve the port/starboard localization ambiguity.
- The limited number of hydrophones may not provide enough information for proper localization in some cases, and does not offer any redundancy in case of hydrophone malfunction.
- The use of a single antenna results in operational downtime at night in case of entanglement. Indeed, PAM being the only mammal-monitoring tool available at night (as marine mammal observers cannot visually check the presence of mammals), its unavailability leads contractors to wait until dawn to resume operations.
- Towed arrays do not provide any QC status concerning their state of health, thus increasing the risk of operating a malfunctioning system.
- Poor low frequency response that may exclude some whale species from being identified through acoustic monitoring.

Previous PAM system software are also quite not intuitive, making it unfriendly to configure and operate:

- Expert PAM operators are required for configuration and operation as there are no standard software settings for optimal results. System performance is inconsistent and highly dependent on the skills, ability and experience of the operator.
- Expert skills are required to analyze the data, confirm acoustic detections, reject false alarms, provide range estimates, etc. This subjective interpretation is operator-dependent and results in inconsistent, unreliable performance.

The QuietSea Solution

A recent fully integrated passive acoustic monitoring system, called QuietSea, overcomes most limitations of the current PAM systems. Designed to integrate with the Seal 428 seismic acquisition system and SeaProNav navigation system, and incorporated in the

Sentinel streamer (Figure 6), this system offers various benefits to seismic contractors.

By eliminating the need to deploy additional PAM antennas at sea, the QuietSea system mitigates the probability of accidents during deployment, retrieval and operation, thus reducing the subsequent probability of downtime and equipment replacement cost.

The bidirectional communication with the navigation software, coupled with the network of broadband in-sea modules seamlessly integrated within the Sentinel streamers, provides improved cetacean localization accuracy and real time reporting of detected events for faster decision making (Figure 7). QuietSea offers an enhanced monitoring of the Exclusion Zone (EZ) and beyond. Thanks to the very low noise Sentinel hydrophones, the system utilizes up to 512 sensors to monitor baleen whales, such as blue whales, down to 10 Hz.

Additionally, numerous broadband hydrophones seamlessly integrated within the streamers and placed in strategic positions (on streamer heads, outside the vessel wash and close to the center of the EZ) constitute a large, redundant array that provides good detection and localization of baleen and toothed whales, regardless of the listening direction.

QuietSea relies on advanced automated detection and localization algorithms, which drastically decrease the false alarm rate, delivering truly

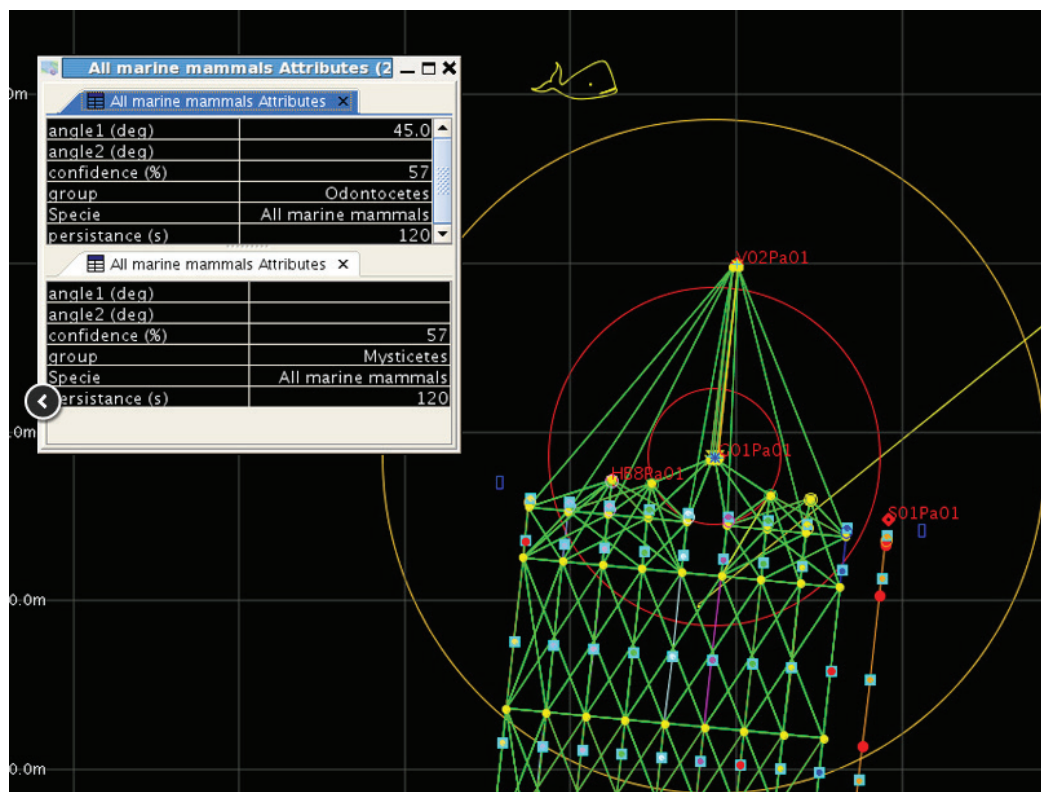


Figure 7: SeaProNav display showing the Exclusion Zones and a cetacean localized by the system, at the front starboard side of the vessel. This cetacean, located in front of the vessel, would not have been detected by traditional PAM systems.

objective, consistent and reliable information for decision making, regardless of the skills, ability or experience of the operator.

The QuietSea GUI is also designed to be intuitive and user-friendly, requiring minimal settings and relying on self-adjusted software parameters to deliver stable performance across various environments. The rugged and reliable in-sea modules are based on a field proven design, with a built-in Quality Control capability that allows the system to assess the health of the hydrophones as well as the detection performance of the modules.

QuietSea provides seismic contractors with a reliable PAM system that optimizes the control of their environmental footprint. It already equips numerous vessels in the seismic industry, and its performance and benefits have been recognized and underlined by all users.

Conclusion

New equipment accompanies the efforts of seismic exploration industry to reduce its environmental impact.

In land acquisition, noise, particle emissions as well as fuel consumption are significantly reduced thanks to compact vibrators that include features such as IPM, engines complying with emission reduction standards and soundproof housings. Combined with high accessibility and broadband capacity, such vibrators are ideal seismic sources for various applications,

such as shooting in the limited access areas widely encountered in India, mixed source shooting (where large and small vibrators operate according to terrain type for optimal productivity) or imaging of shallow targets with high frequencies (e.g., for mining or Smart Cities). It proves a good solution also to replace partially or completely explosive, by using safer and more productive sources. As environmental regulations are becoming more and more stringent, manufacturers have to adapt their equipment in order to fulfill the latest requirements.

In marine acquisition, the traditional Passive Acoustic Monitoring is recognized as a promising tool to complement the mitigation measures adopted

during marine seismic acquisition. QuietSea integrated Passive Acoustic Monitoring system addresses most of the limitations encountered in previous PAM solutions, making it the most intuitive PAM system available for marine seismic surveys. By carefully balancing both the expectations of the regulatory agencies and the operational constraints of the seismic contractor, systems such as QuietSea will help Passive Acoustic Monitoring gain the wide acceptance it deserves among the marine seismic industry while actively contributing to the reduction of the environmental footprint of marine seismic surveys. ●

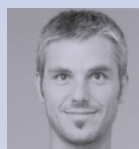


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Next Frontier for Digital Technologies in Oil & Gas Industry

Digital Technologies are the new frontiers for the entire ecosystem of Oil & Gas Industry to transform the work process, business & operational process, real-time access and decision-making procedure. Though the pace of Digital Technology adoption is quite slow in the oil & gas industry, it is imperative to understand how the disruption of digital technologies in oil & gas can enable organisation to keep afloat in competitiveness and growth. The article enlightens the current & next trends of digital technology that can impact the entire oil & gas industry in the coming years.

- Rakesh Roy

Over the past several years, the global oil & gas industry has been passed through rough & choppy waters due to price slump, high and growing rig counts, mega-capital-expenditure projects, and plentiful capital to support investment, etc.

A recent price rebound has increased optimism slightly, and efforts are under way to contain costs by reducing headcount, postponing projects, and cutting spending. Still, in the face of uncertain long-term forecasts, it is time to explore more drastic strategies to boost efficiency.

In response to recent technological advancements, oil executives should consider digital technologies with the potential to transform operations and create additional profits from existing capacity. Here are few next frontiers for digital technology that can unleash new hydrocarbon resources and delivered operational efficiencies across the value chain.

Artificial Intelligence: Next Productivity Revolution in Oil & Gas

Artificial Intelligence (AI) has been used by various oil & gas companies to achieve operational and business performance. Pattern recognition,



Global Digital Technology Oil & Gas Market

- Artificial Intelligence (AI) in Oil & Gas Market was USD 1.42 Billion in 2016 and is expected to grow at a CAGR of 12.66% from 2017 to 2022 to reach a market size of USD 2.85 Billion by 2022.
- Global cumulative Capex (capital expenditure) of inspection robots in oil & gas industry will advance to USD 17.83 billion during 2019-2025, representing a robust growth at 15.9% per annum between 2018 and 2025.
- The drone and robotic market has tremendous growth potential, with an estimated market size of USD 81.4 billion by 2022.
- The global big data market in the oil and gas sector will grow at a CAGR of over 15% during 2018-2023, and the market size will increase by USD 3.8 billion during 2019-2023.
- The global oil and gas cloud applications market size to grow from USD 4.9 billion in 2019 to USD 9.4 billion by 2024, at a Compound Annual Growth Rate (CAGR) of 14.2% during the forecast period.
- The overall market size of blockchain is estimated to be around USD 2.3 billion by 2021.
- The Digital Twin Market is estimated to grow from USD 3.8 billion in 2019 to USD 35.8 billion by 2025, at a CAGR of 37.8%.
- The global IoT in oil and gas market is expected to reach USD 39.40 billion by 2023, rising at a CAGR of 24.17% from 2018 to 2023.

natural language processing, and image analysis and recognition are the most common use cases in AI to help oil & gas industry in aiding the decision-making process. While Oil & Gas industry is highly labour-intensive, technologies like Artificial Intelligence (AI) and Machine Learning (ML) can automate tasks that benefit from reducing human error and increasing efficiency. AI-powered bots and drones help to map & access the potential of reservoirs presenting in extreme environments or high-risk regions.

AI & ML can optimise production through algorithms to collect data from numerous sensors and other devices to give a real-time update thus providing the optimum operating environment. Important data from the reservoir equipment and integration of various aspects surrounding the facility including information on geology, reservoir engineering, production techniques can be used to feed the AI systems that can improve the functioning of reservoirs.

Big Data and Data Analytics: An Emerging Trend in Oil & Gas

The concept of 'Big Data', defined as increasing volume, variety and velocity of data, is familiar to the oil and gas industry. The industry generates a huge quantity of data, whether it is 3D seismic surveys, drilling data, production data or the monitoring of production facilities (pressures, flow rates, temperatures etc).

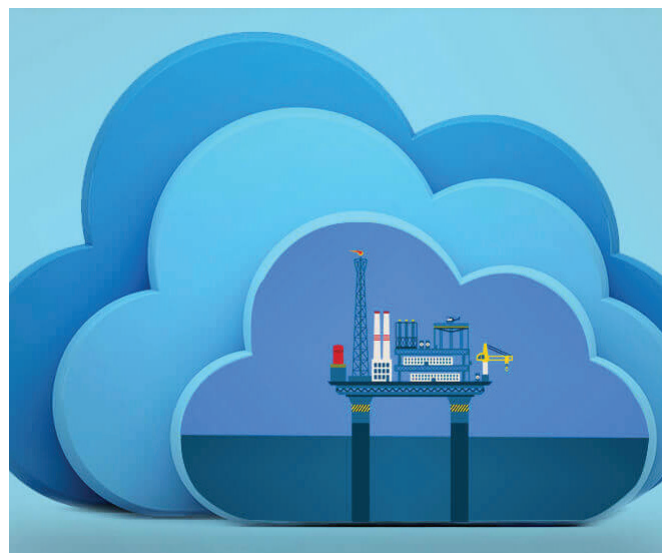


While generation, collection and storage of data has continually increased, this has brought with it problems with managing and analysing such vast quantities of information. Analysis of such data has been a major area of focus and innovation within the oil and gas industry with a view to potential improvements in exploration and production efficiency and safety.

“Artificial Intelligence (AI) & Machine Intelligence (MI) can optimise production through algorithms to collect data from numerous sensors and other devices to give a real-time update thus providing the optimum operating environment.”

Big Data refers to the new technologies in handling and processing these massive datasets. These datasets are recorded in different varieties and generated in large volume in various operations of upstream and downstream oil and gas industry.

Cloud Computing: The Next Big Investment in Oil & Gas



Most upstream oil and gas companies are now moving to cloud-based platforms where they can host their business applications related to areas like sub-surface, land and production systems. Any new workload and innovation projects are mostly being taken up in the cloud, where IT is enabling infrastructure management, data interfacing with on-premise legacy systems and security management.

While oilfields are connected to each other in a same area, the flow of data is increased to accumulate in data storage. Cloud storage offers highly scalable storage to meet the needs of even the most connected oilfields. Cloud computing offers data storage as a service, tailored to those companies that want to take advantage of data but do not have the expertise, the capital, or the need for on-premise servers.

The cloud also supports oilfield intelligence by ensuring they have access to the latest data anytime, anywhere. This supports mobility and AI initiatives in the oilfield and delivers insights for quicker and more informed decision making on the go.

Blockchain: Transforming Data & Information Sharing Process in Oil & Gas

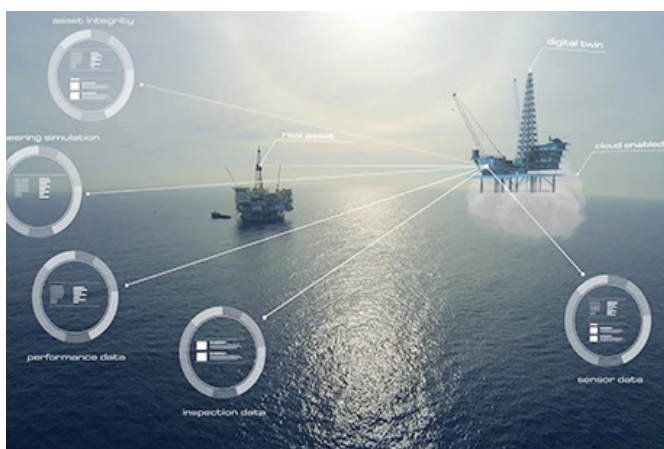


The oil & gas industry is a multi-stakeholder industry involving E&P, EPC, Shipping & Logistics, and Refining, etc. So multiple stakeholders, vendors will also have to participate in the business process of buying, selling, etc. Blockchain will allow the passing of title among the stakeholders without going through the massive paperwork of bills of transaction.

In the Oil & Gas industry, with its global reach, complexity, and complex regulations – simplifying and improving the paperwork and processes of global product movement is a business imperative. Here, Blockchain technology is coming into the picture for the value proposition.

Block chain, an improved ledger platform, also helps digitalisation of transactions among stakeholders more secure, transparent manner. Additional benefits would include lower overhead costs, reduced cash cycle times, and fewer cost intermediates.

IoT and Digital Twins to Monitor Assets Conditions & Evolution of Work in Oil & Gas



As routine tasks become automated, the ways oil and gas companies are managing their physical assets are rapidly evolving. Technology such as the IoT and digital twins will enhance companies' ability to monitor asset conditions and predict problems and future behavior. A change in business models can also be expected, as companies will inevitably need to develop new ecosystems, operating models, skill sets and culture to support the evolution. Within the oil and gas industry, IoT devices and sensors can provide real time data on machinery, pipes, storage, transportation and employee safety. The applications for IoT in the oil and gas industry, as with other digital technologies, centre on improvements in efficiency and safety.

Robotics: Automate Exploration and Production in Oil & Gas



Recent technological advancements are enabling operators to deploy robots in terrestrial, aerial and underwater configurations to carry out tasks that may be too risky to be undertaken by field personnel. Other applications include remotely-operated aerial drones, automated underwater vehicles, robotic drills and much more. Downtime on an oil rig or other drilling site is expensive – robots are helping solve this problem to boost productivity. The robot is capable of inspecting offshore sites, and is equipped with visual and thermal cameras, microphones and gas detection sensors that allow it to generate a 3D map of its surroundings to carry out inspections and operations more efficiently.

Moreover, aging infrastructure is necessitating regular inspection of these assets, and autonomous drones are being used due to their sheer number and issues related to accessibility. ●

OffshoreWorld

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Next Focus Issue - December 2019-January 2020

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Why Peristaltic (Hose) Pumps Excel in Oil-and-Gas Production

World's most demanding industries – from oil-and-gas production to mining and water/wastewater management to chemical processing – have come to rely on peristaltic (hose) pump technology when handling thin to viscous, particle-laden, aggressive, abrasive and corrosive liquids in potentially explosive atmospheres is required. The article shares on the technological advancement; and construction, method of operation of peristaltic (hose) pump in the harsh operating atmospheres in the Oil & Gas Production.

It's said that looks can be deceiving, but when it comes to considering the appearance of peristaltic (hose) pumps, that is definitely not the case. The pump's heavy-duty construction coupled with the indestructible look of its hoses and the shoes that are affixed to the pump rotors give the pump the look of a machine that is capable of handling anything that is thrown at it or, more precisely, passes through it.

And the operators in some of the world's most demanding industries – from oil-and-gas production to mining and water/wastewater management to chemical processing – have come to rely on peristaltic (hose) pump technology when handling thin to viscous, particle-laden,

aggressive, abrasive and corrosive liquids in potentially explosive atmospheres is required. In other words, peristaltic (hose) pumps can successfully pump just about anything.

The Peristaltic Principle

The design and operation of peristaltic (hose) pump technology, which was patented in 1925 in France, satisfy the requirements of such a wide range of industrial liquid-handling applications because the pump's operation relies on the alternating contraction and relaxation of the hose, which force the contents to move through the pump and into the discharge piping.

A smooth-wall, flexible hose is fitted in the pump casing and is squeezed between shoes on the rotor that is positioned inside the pump casing. This rotating action moves the product through the hose at a constant rate of displacement. The hose restitution after the squeeze also produces a strong vacuum effect that draws product into the hose from the intake piping. The vacuum that is created by the hose's restitution can build discharge pressures of as much as 16 bar (232 psi) without damaging or deforming the hose, or causing it to rupture.

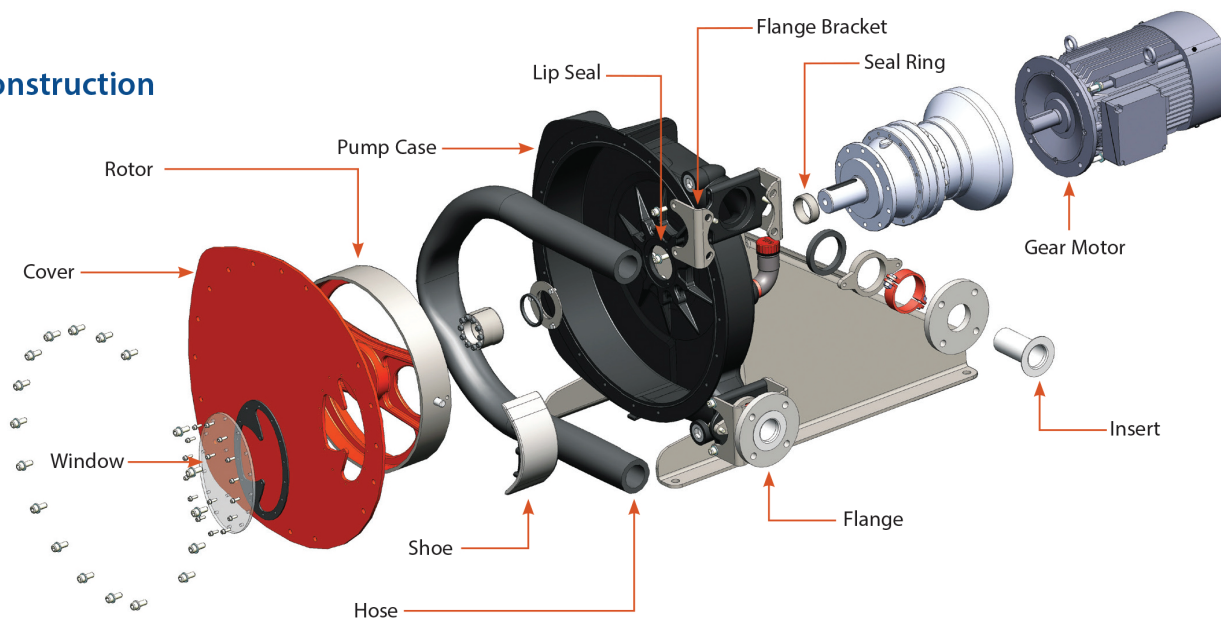
The pump casing is also lubricated to cool the pump and lengthen the service life of the shoes and hose. Since the product only contacts the hose and inserts, and not the internal pump components, this pumping technology is very suitable for abrasive and corrosive applications. The pump's reversible operation also allows for pumping in both directions.

This pump style also maintains excellent volumetric consistency, making it ideal for the strict dosing and 24/7 operating cycles that can be required in many industrial applications while typically providing suction-lift capabilities of as much as 9 meters (29.5 feet). Peristaltic (hose) pumps are also easy to operate and easy to maintain with no seats, valves, glands or mechanical seals needed, which leaves the hose as the pump's only replacement part.



Peristaltic (hose) pumps are able to operate safely, efficiently and reliably in many of the harsh liquid-transfer applications that are prevalent in oil-and-gas production.

Construction



The simple, seal-free design and construction of peristaltic (hose) pumps makes them dry-run, self-priming and low-slip capable while eliminating the chance that any leak paths will form of cross-contamination points created. These are critical considerations in oil-and-gas liquid-transfer applications.

A critical advantage to peristaltic (hose) pump operation is its seal-free design that makes it dry-run, self-priming and low-slip capable. This design also eliminates the chance that any leak paths will form or cross-contamination points will be created.

The peristaltic pump's hose and inserts – which, because of the pump's seal-less design, are the only components to actually come into contact with the pumped medium – need to achieve the highest level of material compatibility, while also being able to reliably deliver the millions of pumping cycles that are required during its lifetime. That's why peristaltic (hose) pump manufacturers have taken great pains to work with hose suppliers who can offer products that are compatible with a wide array of chemical compositions, knowing that leaking acid, or some other potentially harmful or dangerous liquid, will be a disaster for the operator.

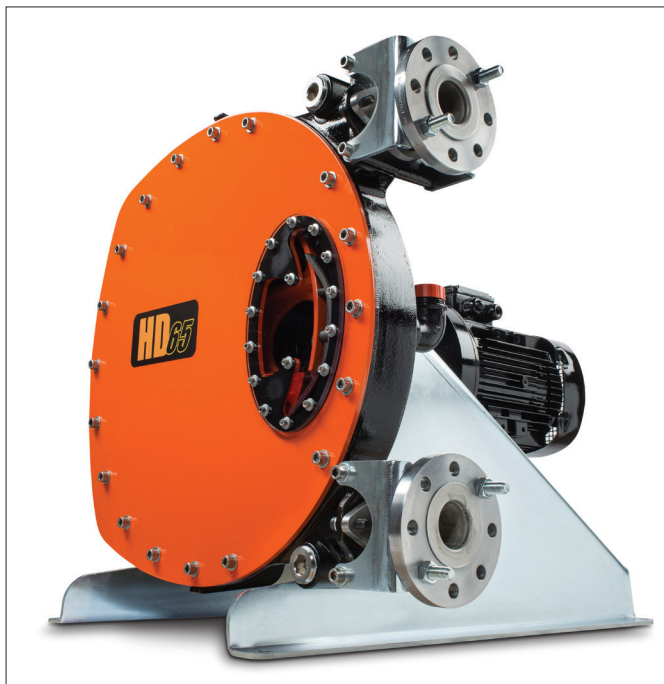
Another consideration when selecting a hose material is its "fatigue resistance." This trait defines how resistant to failure the hose material is as it runs through its millions of pumping cycles. A hose material that is susceptible to developing cracks and holes early in its operational life is not as desirable as a material that can reliably handle the demands of the repeated contraction and relaxation of the hose, especially when particulate-laden liquids are being pumped.

The reinforced construction of the peristaltic hose and its use of rubber compositions that have been specially designed for the stresses within

the peristaltic hose allow for the optimum life cycle and performance. The following materials have gained wide acceptance for use in the construction of peristaltic pump hoses:

- **Natural rubber (NR):** highly resistant to abrasion
- **Natural rubber ATEX:** for applications in explosive-atmosphere areas
- **Buna-N (NBR):** provides wear resistance when used with oily liquids
- **Buna-N FDA:** for hygienic applications
- **NR FDA 1935/2004:** for food-grade applications
- **EPDM (ethylene propylene diene monomer) rubber:** optimized chemical resistance when handling concentrated acids, alcohols and ketones
- **EPDM ATEX:** for EPDM applications in explosive atmospheres
- **Hypalon®:** high resistance to oxidants, concentrated bases and acids

“Heavy-duty construction, wide compatibility ranges and ease of maintenance, can make them a first-choice technology in harsh oilfield operating conditions.”



The peristaltic (hose) pump's ability to maintain excellent volumetric consistency and provide suction lift up to 9 meters (29.5 feet) makes it ideal for the 24/7 operating cycles that are common in oil-and-gas production.

Oil's Well That Ends Well

The peristaltic (hose) pump's construction, method of operation, liquid-handling range and low maintenance requirements make it ideal for use in harsh operating atmospheres. One of the harshest – and most complex – is oil-and-gas production. The operations are usually located in some of the world's most rugged, unforgiving and trying climates and landscapes. Within each operation, numerous liquid-handling functions need to be completed reliably and flawlessly in order for the production operation to be fully optimized.

The bottom line is that everywhere oil-and-gas products are being recovered from the Earth's core is the result of a massive, complicated undertaking that requires extremely large amounts of fuel and other liquids to keep them running effectively and efficiently.

An example that is common to today's oil-and-gas production universe is the hydraulic-fracturing process that is being used to produce much of the shale oil and natural gas that is found in the United States and Canada. The "fracking" process requires thousands and thousands of gallons of water to be sent down the wellbore. This water delivers the chemicals and frac sand that open up the reservoir and allow the trapped oil and natural gas to flow to the wellhead on the surface.

Once the fracked oil and gas is collected, the water that was sent down the well – which can contain a large amount of particulates and contaminants – must also be delivered to the well's surface and either disposed of or recycled for further use. Also, when the actual oil and natural gas rushes

to the wellhead, it can feature varying liquid viscosities and particulate levels, depending on the geologic makeup of the well.

So, the oilfield operator requires a pump that can do three things: handle the pressures that are required to complete the pumping operation; handle large volumes of liquids with varying viscosities and particulate levels; and maintain volumetric consistency while producing flow rates that can be as high as thousands of liters per minute.

For many years, internal gear and lobe-style pumps have been a common technology choice in various oilfield fluid-handling applications because they had proven to be capable of handling basic liquid-transfer operations. However, both styles feature mechanical shortcomings that can ultimately compromise a liquid-transfer operation's efficiency, reliability, safety and cost-effectiveness over time.

Specifically, the constant wear of gear pumps adversely affects the pump's flow capacity and volumetric consistency, resulting in energy-robbing product "slip." Any abrasives that may be contained in the liquid will also harm a gear pump's internals and compromise performance. Similarly, lobe pumps also wear constantly, resulting in an overall decrease in the pump's efficiency and a corresponding increase in its cost of operation due to the higher speeds needed to deliver desired flow rates.

As highlighted previously, these are not concerns that affect the operation of peristaltic (hose) pumps.

Conclusion

When looking for a pump technology that checks all of the operational and compatibility boxes that contribute to an effective oilfield production system, peristaltic (hose) pumps can prove to be a first-choice technology. The pump's design, construction and operation make it ideal for many of the unique – and harsh – liquid-handling applications that help define success in the world's oilfields. ●



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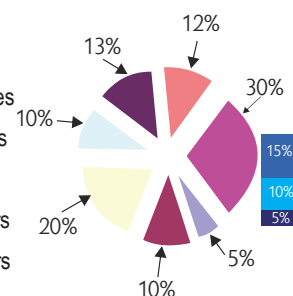
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Innovating Supply Chain Collaboration to Create New Value for Oil & Gas Industry

The continuous plunging crude price since last few years due to various reasons has raised the bar on investments over RoI in the Oil & Gas sector. This article stresses on building of a collaborative supply chain that interweaves the myriad stakeholders in the O&G ecosystem to drive greater efficiencies by reducing operational cost while simultaneously increasing productivity. Also, the article emphasises on adoption of Digital Technologies is the need of the hour to deliver astounding cost savings through automation and predictive analytics, giving companies more wriggle room to increase profits.

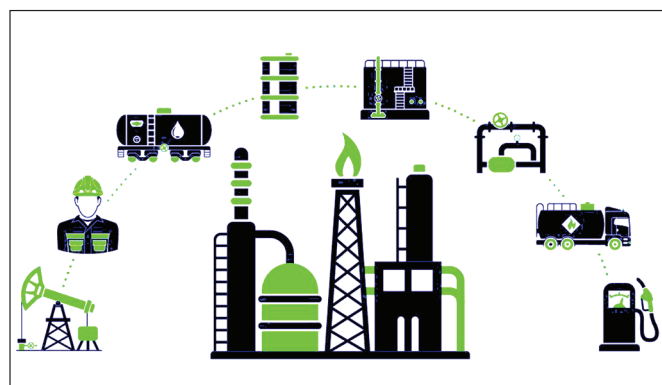
The 2014 price crash shocker is a good example of why the word 'volatile' is often used to describe the oil and gas sector. With a voracious appetite to fuel economic growth, developing countries like China and India sent prices soaring in the early part of the new millennium. Then came the 2008 recession, where prices plummeted in a historic plunge. Whatever recovery the industry could salvage in the aftermath was lost a few years later in 2014, when a host of factors – political turmoil in major exporter nations, economic sluggishness in high consumption markets like Europe and Japan, plateauing growth rate in China and rising North American domination in oil production – signalled a steady downward spiral in demand.

Consumer windfall in O&G is never a good idea – being a 'price inelastic' sector, a supply glut of crude oil or natural gas can be the dominoes falling for the global economy. Singed by lowering prices, if oil companies scale back on new production, they cannot immediately address fluctuations in demand, causing upheaval in oil hungry sectors that run an economy – electricity and transport being the most crucial. For oil exporting nations, there is also the impact on GDP and employment.

In the current scenario, the growing focus on renewable energy and escalating trade tensions have only accentuated the market sensitivity of the oil and gas sector.

While we are still a long way off from being a zero carbon world, O&G companies are feeling the heat. A recent report by Carbon Tracker, a UK-based not-for-profit organization that tracks the impact of climate change on fossil fuel companies, called out the dangerous new trend in the sector where executive pay is linked to increasing production avenues rather than maximising returns with existing reserves. In other words, leaders are rewarded for risking investment in what could potentially turn out to be dead assets, instead of aligning their strategy to the demands of the Paris Agreement on climate change.

Driving Value over Volume – Streamlining the Supply Chain is Key



The deep-seated vulnerability of the Oil and Gas sector is ironically, its main strength – the diversity of the ecosystem that defines the role it plays in shaping global geopolitics. Spread across multiple locations and run by a decentralized workforce, the O&G market traverses multiple political, trade, infrastructure, regulatory, labour, environmental and safety considerations.

Given the complexity of the market structure, there is no simple answer to how much it costs to drill an oil well – budget companies have to allocate for capital spending (feasibility study, equipment), production costs, administrative & transport charges and taxation. In totality, the cost may vary anywhere between USD 20 million to 1 billion, depending on the type of rig.

With the cataclysmic changes in demand, shareholders and energy experts are now clamouring for the O&G sector to follow a new mantra – do more with less, strategize value over volume. A crucial factor to achieve this is the building of a collaborative supply chain that interweaves the myriad stakeholders in the O&G ecosystem. Such restructuring drives greater efficiencies by reducing operational cost while simultaneously increasing productivity.

This inevitable reality is not just based on the pressures of an unreasonable market, it has roots in the way the O&G industry is structured. For instance, according to a 2017 report by McKinsey, even in a low price environment, the rise in cost of major projects can only be partly attributed to inflation, about 70 per cent of the expenses are 'self-inflicted'. This is mainly because of the insistence on bespoke requirements for each project rather than standardized specifications.

Through industry-wide collaboration, that harmonizes specifications for material and manufacturing requirements, McKinsey's research has shown that such streamlining the O&G supply chain can 'unlock five-year industry-wide savings of USD 90 billion to USD 240 billion on purchases of commonly used exploration and production equipment'. Citing the example of the synergies in the automotive industry, the report also goes on to state that harnessing collaboration with key suppliers, like engineering and procurement contractors and equipment providers to evolve 'supplier-led solutions' can lead to reduced cost and increase in output.

The Impact of Digitization on O&G Supply Chain



The 'capital project supply chain', as the McKinsey report puts it, is only one part of the picture. The other, more significant aspect, is the impact of digital disruption on the Oil and Gas sector. Next generation technologies like Big Data, Industrial Internet of Things, Machine Learning and Artificial Intelligence are making headway in this legacy ridden sector. Whether upstream, midstream or downstream, these technologies have the potential to deliver astounding cost savings through automation and predictive analytics, giving companies more wriggle room to increase profits.

Take the case of IoT. Considering the low level of digital maturity in the sector, a Deloitte Insights article succinctly spells out the benefits of implementing IoT in O&G companies. "Increased data capture and analysis can likely save millions of dollars by eliminating as many as half of a company's unplanned well outages and boosting crude output by as much as 10 percent over a two-year period. In fact, IoT applications in O&G can literally influence global GDP. Industry-wide adoption of IoT technology could increase global GDP by as much as 0.8 per cent, or USD 816 billion during the next decade, according to Oxford Economics", the report says.

With data being central to derive value from the implementation of technology, O&G companies have to innovate to synergize suppliers in the information supply chain. From the vendor that supplies the sensors to the cloud storage provider and the engineering service company that makes sense of the data to drive operational efficiencies, streamlining the information supply chain presents as many opportunities as it does challenges.

As the sector undergoes the inevitable evolution of digital transformation, what oil and gas players will increasingly look for is a partner that takes the lead in developing a collaborative platform that allows the seamless flow of data.

Being a leader for more than two decades in the oil and gas industry, QuEST is uniquely positioned in this sector. QuEST undertakes projects in its entirety and works on the complete life cycle of a plant and we provide engineering service / solutions during entire concept to commissioning phase of the plant. This helps the team to garner an in-depth knowledge on equipment, processes, systems, and utilities across multi – disciplines. QuEST assists customers in their digital transformation journey as a one-stop solution; right from software installation to its final execution. The company's expertise of the domain makes it a leader in collaborative supply chain management which helps its clients to adopt to latest technologies

such as AI, ML, and DL efficiently. •

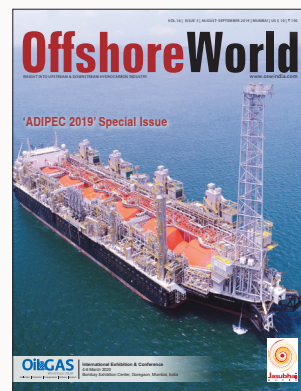
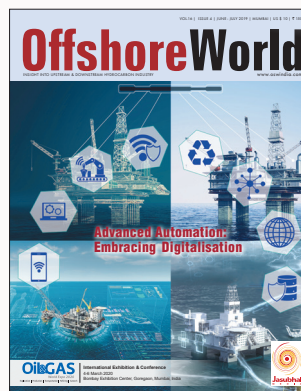
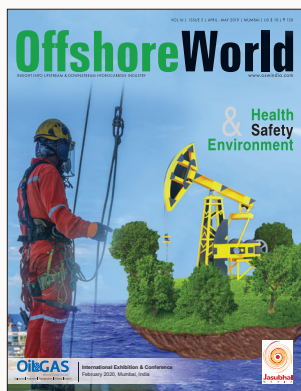
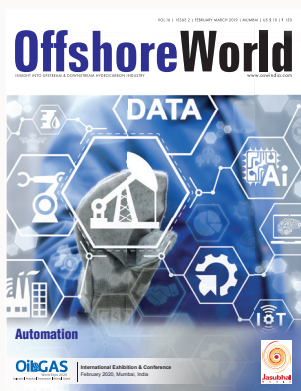


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ExxonMobil and GE Launch Advanced Co-branded Turbine Oil



ExxonMobil and GE said the new Mobil SHC 918 EE gas turbine oil is designed for use in multi shaft 7HA, 9HA, 6FA.01 and 7FA GE gas turbines.

Texas, USA: ExxonMobil and GE today announced the launch of Mobil SHCTM 918 EE gas turbine oil, a new technology that may dramatically improve turbine bearing efficiency by up to 15 percent compared to conventional ISO VG 32 turbine oils.

ExxonMobil and GE said the new Mobil SHC 918 EE gas turbine oil is designed for use in multi shaft 7HA, 9HA, 6FA.01 and 7FA GE gas turbines.

Designed for use in multi shaft 7HA, 9HA, 6FA.01 and 7FA GE gas turbines, this technology can help power plant operators reduce energy consumption, and, thus, the cost to produce power.

Developed in collaboration with GE, this gas turbine oil is the first and only lubricant to meet GE's Energy Efficient (EE) GEK 121603 turbine oil specification, which GE developed exclusively for its high-performance turbines.

In addition to enhanced bearing efficiency, ExxonMobil's research team developed Mobil SHC 918 EE to limit the occurrence of varnish as a result of its excellent thermal stability characteristics, thereby enhancing overall turbine operation reliability.

Haldor Topsoe Wins Award for its TIGAS Gas-to-Gasoline Technology at IChemE Global Awards 2019

Hull, UK: Haldor Topsoe has been awarded the prestigious 2019 IChemE Global Award in the category 'Oil & Gas' for its TIGAS Gas-to-Gasoline Technology at a black-tie event in Hull, UK. With TIGAS, Haldor Topsoe is the only single company in the world that offers an end-to-end gas-to-gasoline solution, including license, basic engineering, catalyst, and hardware. Recently, the world's only natural gas-to-gasoline plant in operation began production in Turkmenistan, based on Topsoe's advanced TIGAS technology.

The Turkmenistan TIGAS plant has a capacity of 15,500 barrels per day of on-spec RON 92 gasoline. Several other companies around the world have shown interest in the technology.

TIGAS is a viable technology in regions with abundant gas resources where it represents an attractive option to monetize natural gas by producing synthetic gasoline that complies with the highest environmental

standards, contains no sulfur and very little unwanted byproducts, which can be sold into a local or export market.

BPCL Rolls out Digital Fuelling Initiative

Chennai, India: Bharat Petroleum Corporation Ltd has been launched NextGen Digital Fuelling initiatives that aim at providing greater transparency and building customer trust. Some of the initiatives include 100 per cent assured quality and quantity of fuel delivered to BPCL fuel stations through tankers, 100 per cent secured payments, new retail visual identity and automated SMS updates after fuelling transactions.

The roll out of the new NextGen initiatives will happen in six cities, starting with Chennai, followed by New Delhi, Kolkata, Bengaluru, Mumbai and Hyderabad under Phase I. The second phase roll out would take place across 42 'A' and 'B' class cities next year, a press release said.

The advanced technological and digital initiatives offer greater transparency and are aimed at building customer trust.

ADNOC and Total to Deploy Innovate Seismic Acquisition with Unmanned Drones and Vehicle



The automated seismic acquisition system uses autonomous drones and a ground vehicle to drop off and retrieve seismic sensors without human intervention.

Abu Dhabi, UAE: The Abu Dhabi National Oil Company (ADNOC) and Total have announced their collaboration to deploy the world's first automated seismic acquisition system in Abu Dhabi.

This pilot project, performed with Total's Multiphysics Exploration Technology Integrated System (METIS), uses autonomous drones and a ground vehicle to drop off and retrieve seismic sensors without human intervention, therefore at a lower cost. It will be deployed throughout the emirate of Abu Dhabi, to contribute to onshore exploration and appraisal campaigns — a first in the region.

Following successful trials of METIS conducted by Total end 2017 in Papua New Guinea, this new pilot project will be undertaken by ADNOC Onshore to test the versatility and upscaling ability of the system in a 36 sq km desert environment. The seismic sensors will be dropped by six autonomous aerial drones and later be retrieved by an unmanned ground vehicle — whereas they are conventionally manually deployed and recovered by ground based teams.

Worley and Arundo Launch 'The Data Refinery'



The Data Refinery provides a global hub for Worley and its customers to engage with advanced analytics.

Texas, USA: Worley, a leader in engineering, procurement and construction for the energy, chemicals and resources sector, and Arundo, a software company enabling advanced analytics in heavy industries, have come together to launch The Data Refinery, a hub for applied data science and machine learning solutions in the energy, chemicals and resources industry.

The Data Refinery is located in an iconic building at 1600 Smith St. in downtown Houston, Texas.

The Data Refinery combines Worley's industry experience with the software and data science expertise of Arundo. Its focus is to bridge the gaps among operations, data science and information technology to help industrial companies transform their businesses through data-driven decisions. This ultimately helps companies increase revenue, reduce costs, and improve uptime, as well as reduce safety and environmental risks.

The first product launched via The Data Refinery is DataSeer, a product that automates the extraction of information from engineering diagrams such as P&IDs and related schematics. Using deep learning and computer vision techniques, DataSeer can recognize all instances of specific instruments, valves, lines, and other features in a diagram in just seconds. This has immediate applications in bid production and project cost estimation. In addition, DataSeer can improve digital representations of physical systems, and help industrial companies create relevant, usable digital twins for a variety of advanced analytics and operational implications.

Concurrent with the launch of the DataSeer application, Worley is also launching DataSeer Managed Service for customers seeking the turnkey digitization of legacy industrial drawings.

Well-SENSE's FLI Technology Marks its First Round of Offshore Deployments

Aberdeen, Scotland: Well-SENSE has successfully completed its first round of commercial offshore FiberLine Intervention (FLI) projects worth a six-figure sum, demonstrating significant efficiency gains and the acquisition of high quality, rich downhole data.

Over the last six months, Well-SENSE has conducted multiple offshore FLI projects for a range of top tier international supermajors and

applications. These have included Distributed Temperature Sensing (DTS) surveys for flow profiling on two unmanned gas lift wells off the coast of Malaysia, and a selection of leak detection surveys, capturing DTS and Distributed Acoustic Sensing (DAS) data, to determine leak points in producing wells and wells headed for Plug and Abandonment in the North Sea.

FLI's unique bare fiber deployment provided a range of measured downhole data to the operators in a quarter of the time it would usually take with conventional methods. Operations, on average, took around three hours, compared to the expected 12-14 hours for wireline logging.

During the flow profiling project, FLI delivered additional well insights including the optimal temperature of the producing well, the location of water ingress and the flow performance of each gas injection valve, allowing the operator to consider new production optimisation options for the two wells.

Capturing both distributed temperature (DTS) and distributed acoustic (DAS) data during the leak detection projects allowed the operators to verify well integrity or identify leak points and paths, including in the B and C annulus, and plan any remediation work necessary.

Wintershall Dea Selects Eigen Ingenuity for Real-time Information Visualisation Pilot



Visualisation and Integration Platform for Realtime Operational Data

Kassel, Germany: Eigen, Offshore Oil and Gas digitalisation software provider and systems integrator, has been selected by Wintershall Dea to pilot a digitalisation implementation on Wintershall Dea's Brage Digital Twin project on the Norwegian continental shelf.

Eigen's Ingenuity offering is now providing a specialist visualisation and integration platform for realtime operational data. This provides a layer on top of Wintershall Dea's existing systems to enable new digital capabilities and eliminate time spent understanding operational status.

The system is fully cloud based and allows engineers to focus on priority workflows and tasks. The tool kit can also be used as a smart alarm system and to find information more quickly and effectively, understand it in context, make decisions and initiate action.

The pilot is providing new intuitive capabilities alongside support and user training to enable more efficient working practices for Wintershall Dea's operational digitalisation objectives.

Equinor Partners with TechX along with BP and KPMG



Collaboration marks the launch of applications for cohort three 'Pioneers'

Aberdeen, Scotland: Equinor is the new TechX strategic partner to gain the advantages of its TechX Pioneer Programme. The TechX Pioneer Programme – a unique technology accelerator and incubator – helps ambitious start-ups take their solutions to the energy market faster. To date, 21 companies have now graduated from the award-winning programme, developing ground-breaking technologies including a Lab-on-a-chip (RAB microfluidics), machine learning seismic imaging software (Optic Earth) and a complete oil field well surveillance technology (Ai Exploration).

In just two years, EURO 2.8 million has been co-invested into these pioneering companies with a further EURO 1 million of additional investment being secured post-graduation from the programme. Collectively, three field trials have been completed with seven planned over the next year and another 10 on the horizon, while 13 new jobs have been created and two new facilities have been opened.

thyssenkrupp and Paradeep Phosphates Sign Expansion Contract for Phosphoric Acid Plant

Mumbai, India: thyssenkrupp Industrial Solutions has been awarded a contract from Paradeep Phosphates Limited (PPL) for the expansion of their phosphoric acid plant in Paradeep, Odisha (India), based on the Di-hydrate technology from Prayon Technologies of Belgium. PPL is a leading fertilizer company in India and part of the Adventz Group. The project will increase the capacity of the existing plant from 1,000 tons to 1,400 tons of phosphoric acid per day.

The phosphoric acid produced will be utilized by Paradeep Phosphates in the manufacturing of phosphate fertilizers such as DAP (diammonium phosphate) and NPK (compound/multi-nutrient fertilizers). The company is in the process of revamping their DAPNPK

facility as well. The project is planned to be completed within a period of 22 months from the Effective Date of the Contract.

P D Samudra, CEO and Managing Director, thyssenkrupp Industrial Solutions (India) said: "Paradeep Phosphates has been one of our earliest customers in India. Way back in the late eighties and nineties, we built for them what is still one of India's largest cryogenic ammonia storage tank farms. We are proud to be assisting them in this prestigious fertilizer project, by leveraging our experience in the phosphatic fertilizer sector."

Ranjit Chugh, COO of Paradeep Phosphates said: "The setting up of this phosphoric acid plant is aligned with our plans for expanding our footprint in the phosphatic fertilizer industry. We are happy that thyssenkrupp, who has considerable experience in the field is partnering with us in this project."

ExxonMobil Expands Low-Emissions Technology Research with Universities in India



ExxonMobil expands portfolio of research collaboration with India's universities

Mumbai, India: ExxonMobil has signed agreements with the Indian Institute of Technology locations in Madras and Bombay, further expanding its extensive portfolio of research collaboration with India's universities.

The five-year agreements focus on progressing research in biofuels and bio-products, gas transport and conversion, climate and environment, and low-emissions technologies for the power and industrial sectors. The agreements will partner the institutes' areas of expertise with ExxonMobil's research.

These collaborations are recent additions to a series of partnerships ExxonMobil has established to progress innovative, lower-emissions research programs with more than 80 universities, five energy centers and multiple private sector partners. The company has spent USD 10 billion since 2000 developing and deploying lower-emissions energy solutions.

Shapoorji Pallonji Oil & Gas Awarded Two Global Business Excellence Awards



The 'Business Excellence' at the 4th ASEAN-India Business Awards 2019 was received by Ravi Shankar, CEO, Shapoorji Pallonji Oil & Gas from Dato Ramesh Kodammal, HE Ramon M Lopez, HE YB Senator Waytha Moorthy Ponnuswamy and Indian Ambassador to Philippines HE Jaideep Mazumdar.



The Excellent Performance Award of 'FPSO Contractor of the Year' at the 6th FPSO & FLNG & FSRU Asia Pacific Summit 2019 was received by Biswa Mohan Jha, Planning Manager, Shapoorji Pallonji Oil & Gas and Hemant Bedi DGM Commercial, Shapoorji Pallonji Oil & Gas from Nazery Khalid, Head - Planning & Development at Boustead Heavy Industries Corp., Malaysia.

Mumbai, India: Shapoorji Pallonji Oil & Gas Pvt Ltd (SP O&G) has won two global awards commemorating their significant contribution in the Oil & Gas sector. The company was conferred with 'Business Excellence' at the 4th ASEAN-India Business Awards 2019 in Manila, Philippines. In the presence of HE Shri Ram Nath Kovind, Hon'ble President of India and other ASEAN Ministers, the award was received by Mr. Ravi Shankar, CEO, SP O&G, from HE YB Senator Waytha Murthy Ponnusamy, Hon'ble Minister for Trade, National Unity in the Prime Minister's office, Malaysia and H.E Mr. Ramon M Lopez Hon'ble Secretary, Minister for Trade and Industries of Philippines.

The company was also conferred with 'Excellent Performance Award of FPSO Contractor of the Year' at the 6th FPSO & FLNG & FSRU Asia Pacific Summit 2019 in Shanghai. The award was received by Biswa Mohan Jha, Planning Manager, SP O&G and Hemant Bedi, DGM Commercial, SP O&G from Nazery Khalid, Head, Planning & Development at Boustead Heavy Industries Corp., Malaysia. The awards were focused on the 'Rebound of

FPSO & FLNG Global Development and Upgrading' and Design Innovation and Process Optimization of FPSO and Best Industry Practices.

"I commend our teams at Shapoorji Pallonji Oil & Gas for their dedication to engineering & Construction excellence, which has led us to grow and achieve a respectable milestone in this niche industry segment. We are the only company specializing in offshore processing in both floating and fixed platform segments. It goes to prove that our world-class excellence lies not only in our engineering, procurement & construction capability, innovative financing, talented human resources but also our operating philosophy of safety & quality," said Ravi Shankar, CEO, SP Oil & Gas.

India's First Natural Gas Exchange to be Unveiled by March 2020

New Delhi, India: Indian Energy Exchange, India's largest electricity trading platform, plans to unveil the nation's first natural gas exchange by March 2020 as it seeks to tap increasing demand for the cleanest fossil fuel. The world's second most populous nation has been mulling a gas exchange for several years but the move has been reinvigorated by increasing use of the fuel as a global glut damps prices.

Worsening air quality and the nation's dependence on imported crude oil has also spurred a transition in India's energy planning. The country seeks to increase the share of natural gas in its energy mix to 15 per cent by 2030 from the current 6 per cent, drawing interest from global majors including Total SA and Exxon Mobil Corp.

The exchange will help bring down the price of natural gas through competitive trade, boosting usage in a country that relies heavily on cheaper coal for its energy needs. India's gas market needs uniform trading rules and freedom for consumers to buy the fuel wherever they want. A plan to allocate a certain volume of domestic gas for trading at exchanges is also waiting for government approval. Finally, there is the cost of multiple taxation linked to moving natural gas across state borders, with the Petroleum Ministry calling for one countrywide uniform sales tax system.

MNGL to Set up 15 CNG Fuel Stations in Nashik

Nashik, India: Maharashtra Natural Gas Limited (MNGL) is planning to set up 15 compressed natural gas (CNG) stations in Nashik city by March 2020.

Of the 15 stations, 12 will be set up in the premises of existing fuel stations of oil marketing companies like IOC, HPCL and BPCL. The remaining three would be established on the land to be provided by the Nashik Municipal Corporation (NMC). All the stations will be operated by MNGL.

"The infrastructure for supplying CNG at two Indian Oil petrol pumps at Dodi in Sinnar taluka and Talegaon in Igatpuri taluka is ready. We are awaiting the mandatory nod from Petroleum and Explosives Safety Organisation (PESO) before we start supplying CNG to vehicles by end of this year," M V Ramnarayan, MNGL CEO, Nashik.

Qatar to Raise its Gas Output

Doha, Qatar: Qatar has planned to increase its LNG output of current 77 million tonnes per year would increase to 126 million tonnes by 2027. This development based on a rise in its proven reserves of the country and confirmed by Saad al-Kaabi, Minister of State for Energy Affairs and CEO of state-owned Qatar Petroleum.

The Gulf state had previously signalled a rise to 110 tonnes per year by 2024. Kaabi also announced that proven gas reserves in the North Field, which Qatar shares with Iran, had increased to 1,760 trillion cubic feet (50 trillion cubic metres).

Almost all of Qatar's gas reserves are located in the North Field, the world's largest gas field.

"Studies and well tests have also confirmed the ability to produce large quantities of gas" from a North Field extension in the area near the industrial hub of Ras Laffan, the minister said.

In addition, Kaabi said the field contains 70 billion barrels of condensates, or natural gas liquids, and massive quantities of LPG, ethane and helium.

The tiny Gulf state, which has been under boycott by its Gulf neighbours since June 2017, also pumps over 500,000 barrels of crude oil per day.

The new plans will raise Qatar's overall hydrocarbon production to about 6.7 million barrels oil equivalent per day from 4.6 million currently.

Gas has helped fuel Qatar's rise to become one of the world's richest countries, transforming the peninsula state and helping it to successfully bid for the 2022 football World Cup finals.

ONGC Ends Shale Exploration

New Delhi, India: Oil and Natural Gas Corp (ONGC) has wound up its shale exploration programme mid-way after spending five years and hundreds of crores of rupees, concluding that India may not have enough commercially-extractable shale reserve.

This comes as a setback to the country that had hoped to exploit its own shale rocks to augment its flagging oil and gas production, inspired by the American shale revolution that turned the United States into the largest producer of oil and gas and dramatically reshaped the global energy market this decade.

ONGC recently told the government that it was ending its shale exploration programme ahead of schedule as the results hadn't been encouraging, according to ONGC executives and government officials. It also told the government to get the country's shale potential reassessed by a competent international agency, they said. Following this, the Oil Ministry is considering launching a new resource assessment programme for all unconventional hydrocarbons, including shale, coal bed methane and gas hydrate, they said.

In 2013, the Oil Ministry had permitted the exploration of shale by ONGC and Oil India in three phases of three years each. ONGC had to carry out exploration activities in 175 blocks, including 50 blocks in the first phase. Oil India's responsibility included 5 blocks in each phase. Some private players have contemplated but not yet begun shale exploration.

ONGC's exploration programme ended in the first phase itself with ONGC drilling about 26 wells in three hydrocarbon basins of Cambay, KG and Assam-Arakan - spread over Gujarat, Andhra Pradesh and Assam - at a cost of Rs 600-700 crore, executives said. ONGC had to give up its plans of drilling in the fourth basin of Cauvery in the face of strong resistance to shale activities by Tamil Nadu politicians, according to executives.

Egypt Signs Gas Deal with Noble Energy

Cairo, Egypt: Egypt has signed several multimillion-dollar energy investment accords including a USD 430-million deal for Texas-based Noble Energy to pump natural gas through the East Mediterranean Gas Company's pipeline.

Under another agreement with Noble, which will also be financed by the US International Development Finance Corporation, the energy company will manufacture petroleum products in partnership with Egyptian company Dolphin Holdings.

Egypt signed an agreement with the European Bank for Reconstruction and Development (EBRD) worth USD 201 million to improve the Egyptian Electricity Transmission Company's electric grid, and the lender will also finance a new asphalt production unit for the Suez Oil Processing Company worth \$50 million.

The EBRD signed further deals with Sarwa Capital Holding and state-owned Banque Misr to issue 500 million Egyptian pounds (USD 31.13 million) in securitisation bonds for the government's New Urban Communities Authority (NUCA).

China CNPC's \$8.5 bln Gas Storage Project Starts Construction

Beijing, China: China National Petroleum Corp's (CNPC) unit Liaohe Oilfield of CNPC kicked off construction of its gas storage group project in Panjin city in Liaoning province. The project, jointly invested in by Liaohe Oilfield of CNPC and the Panjin government to the tune of about 60 billion yuan (USD 8.5 billion), is aiming for storage capacity of 11.5 billion cubic meters.

The Liaohe project is expected to become the biggest underground natural gas storage centre in northeast China and the Beijing-Tianjin-Hebei region, the media said, without mentioning when construction would be completed.

State energy group CNPC said in January it planned to build 23 more gas storage facilities by 2030 and expand 10 existing ones to secure supplies of natural gas during peak demand seasons.

Libya Plans to Raise Oil and Gas Production

Cairo, Egypt: Libya's National Oil Corporation (NOC) has planned to raise production to 2.1 million barrels per day (bpd) by 2024, Mustafa Sanalla, Chairman, NOC, said in a statement.

Sanalla added that NOC was on track to reach more than USD 20 billion in annual revenue.

There were also plans to restore production at damaged oilfields and to raise gas production to 3.5 billion cubic feet by 2024. The plans will cost USD 60 billion, including USD 15 billion from public funds.

RIL to Set up Crude-to-Chemical Projects at Jamnagar

Jamnagar, Gujarat: Reliance Industries (RIL) plans to invest ₹ 70,000 crore for setting up crude-to-chemical projects adjacent to the existing Jamnagar site, an integrated petroleum refinery and petrochemical complex, as part of its oil-to-chemical strategy, the company said in an application to the environment ministry.

"Aligned to the national Make-in-India objective, RIL plans to optimally leverage the Jamnagar refinery + gasification assets, as a future growth platform, to maximize petrochemicals, termed as crude-to-chemicals. For setting up the crude-to-chemical growth projects in Jamnagar, RIL proposes to develop a total area of 2,000 acres adjacent to the existing Jamnagar supersite," the company said as part of the application.

RIL plans to undertake setting-up a host of oil-to-chemical units including multi-feed steam cracker to maximize chemical monomers, setting-up of Multizone Catalytic Cracking units for conversion of feedstock to high value propylene and ethylene, converting existing fluid catalytic cracking units to Petro FCC for maximizing production of olefins and aromatics instead of gasoline.

The company also said it plans to set-up aromatic complex along with chemical complexes to produce streams of C1, C2, C3, C4 and C6 chemicals.

Asian Oilfield to Acquire Stake in Optimum Oil and Gas

Mumbai, India: Asian Oilfield Services has entered into a share purchase agreement for the acquisition of 51 per cent of equity share capital in Optimum Oil and Gas from its existing shareholder.

The company currently holds 23 per cent of equity share capital in Optimum. "On completion of all closing formalities, Optimum will

become a subsidiary of the company with 74 per cent holding," said a statement issued by Asian Oilfield Services.

IOCL to Invest in Doubling its Base-oil Production from Haldia Refinery

New Delhi, India: Indian Oil Corporation (IOC), the country's largest fuel retailer, plans to double its base-oil production from Haldia refinery in West Bengal by adding a new 270 Thousand Tonne Per Annum (TMTA) Catalytic Dewaxing Unit (CDU) at a cost of ₹ 1,085 crore, the company said in an application to the environment ministry.

"The proposed new plant, which is expected to run on neat-hydrocracked residuum in conjunction with the existing cat-dewaxing plant, should be able to increase the base oil production ex refinery by around 100 per cent," IOC said. Base-oil is a name given to the lubricant grade oil initially produced from refining crude oil or through chemical synthesis.

The availability of a hydrocracker unit and the upcoming coker block has led to substantial potential in the refinery for augmenting the base oil production volume by setting up a new base oil production facility, the company said. It added that the base oil market is more stable than auto fuel market and the proposed project will provide additional flexibility to the refinery during major price swings.

MRPL to Expand Refinery Capacity to 18 MTPA

New Delhi, New Delhi: Mangalore Refinery and Petrochemicals Limited (MRPL), the downstream subsidiary of Oil and Natural Gas Corporation (ONGC), plans to invest ₹ 31,073 crore to undertake expansion of its flagship 16 Million Tonne Per Annum (MTPA) refinery to 18 MTPA and focus on integration of production streams for petrochemicals like ethylene, propylene and butane.

The company said the project is currently facing challenges including processing of heavier and sulphur rich crude, strict environmental regulations, enhanced product specifications for sulphur and aromatics, evolving regional supply and demand dynamics for diesel versus petrol, volatile refining margins, evacuation challenges around petcoke and IMO 2020 specifications, which have necessitated increased capacity and focus on petrochemicals.

MRPL also plans to undertake capacity expansion of its second crude oil distillation unit (CDU) to 9.7 MTPA from 7.2 MTPA currently, conversion of Visbreaker (VBU) into a 0.7 MTPA CDU for swing operations for processing high sulphur or heavy crude directly and utilisation of CDU-I and CDU-III at present capacities. The idea is to utilize maximum crude processing capacity available in primary unit.

Agitated Glass Nutsche Filter Reactor



Ablaze's Nutsche filters are specially designed for effective filtration. It can be conveniently combined with their standard reaction unit to enable solid liquid separation. All contact parts are inert and hence allow the same equipment to be used with a wide range of chemicals and solvents. Appropriate filter is used to separate the solid particles of the slurry, forming a filtered cake.

The filtrate drains to the bottom and can be collected from the bottom outlet valve. The filter

cake can be easily removed.

It finds application in heating and drying, solid and liquid separation, crystallisation, filtration, chromatography, solid phase peptide synthesis, etc.

For details contact:

Ablaze Export Inc

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Gas Scrubber System



Ablaze gas scrubbers are used to defuse corrosive exhaust gases, before being released. The stripping liquid is chosen as per the nature of vapour to be scrubbed. A corrosion-resistant recirculation pump is taken, which ensures constant flow of solvent through the system. The solvent and gas come in contact with each other in the column, which is packed to increase surface area for gas absorption. Scrubbers are available from lab scale up to pilot scale of 500 L.

It finds application in neutralisation of exhaust gases, scale up studies, gas liquid reaction and gas absorption.

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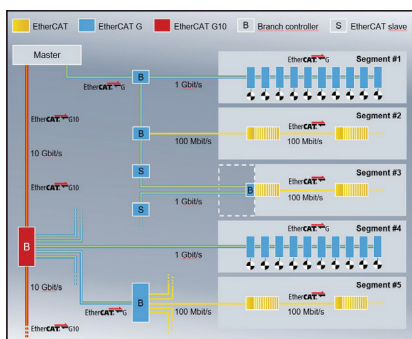
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EtherCAT G



EtherCAT G was introduced by Beckhoff Automation as an extension of the EtherCAT Standard. Beckhoff recently presented the gigabit technology addition to the ETG, and after thorough review, the organization's Technical Committee accepted it. Right now, the ETG is working to add EtherCAT G to the corresponding technology specifications.

The well-known 100 Mb/s EtherCAT technology remains the proven solution for the majority of applications. However, EtherCAT G offers additional user advantages, especially in applications where particularly large amounts of process data must be transported per device. This can include, for example machine vision, high-end measurement technology or complex motion applications that go beyond the scope of classic drive control. As an extension of standard EtherCAT technology, EtherCAT G is fully compatible; existing devices designed for 100 Mb/s can be seamlessly integrated into an EtherCAT G system, and EtherCAT G devices in a 100 Mb/s EtherCAT system

behave like classic EtherCAT devices. The central element of EtherCAT G is the use of EtherCAT Branch Controllers, which essentially fulfil two main functions: On the one hand, they act as a kind of node for the integration of segments from 100 Mb/s devices; on the other hand, they enable parallel processing of the connected EtherCAT segments. This significantly reduces the propagation delay in the system, which increases system performance many times over previous levels.

The integration of EtherCAT G is simple, as the extension is fully compatible with the IEEE 802.3 Ethernet Standard and no software adaptations in controllers are required for the standard mode. The advantages of EtherCAT are well known and include processing on the fly, comprehensive diagnostics, simple configuration and integrated synchronization. These attributes are of course fully retained when EtherCAT G is used.

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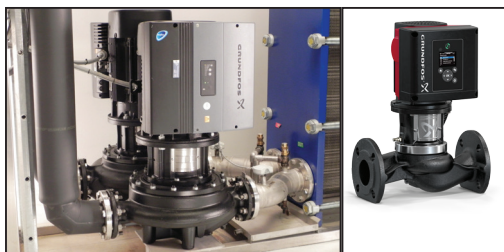
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Vertical In-line Pumps



TPE3 pumps have revolutionized the role of today's pumps. With its intelligent control modes and unparalleled energy efficiency, TPE3 pumps play an integral role in bringing hot water to your faucets and cool air to your ventilators. They are used primarily in commercial buildings such as hotels, airports, office buildings and hospitals, and have a host of heating and cooling applications. In industrial applications, these pumps can be used to control temperature and avoid overheating of heat intensive parts.

These vertical, in-line pumps have excellent built-in features and augmented communication capabilities. They are fitted with a permanent magnetic motor, integrated sensors, advanced control modes and multi-pump functionalities. TPE3 pumps are easy to install, monitor and deliver max efficiency. Their improved hydraulics have provided them with the highest Minimum Efficiency Index (MEI lesser than or equal to 0.70).

Besides this, the TPE3 pumps are also equipped with a TFT colour display for an improved user interface.

Features built-in high energy meter to monitor heat and energy consumption of the pump; integrated temperature and pressure sensors that eliminate the need for any external sensor installation; intelligent control modes that can customize temperature, flow and pressure based on requirements to optimize performance.

AUTOADAPT - helps continuously monitor and change pressure or temperature on the basis of external factors and consumption patterns; FLOWADAPT - this mode controls AUTOADAPT with a flow limiting function that monitors the flow rate and ensures that the max flow rate is not exceeded which will eliminate the need for a pump throttling valve to regulate the flow; uses a sensor to measure the differential temperature between the incoming and outgoing liquid; and uses a sensor to match flow to the actual demand, eliminating the need for a pump balancing valve to maintain a constant flow rate.

It is one of the most energy efficient pumps on the market with a high MEI rating, capable of handling large volumes (from 5 to 80 m³/h Quantity and 3 to 25 m Head), varying temperature range (-25°C to +120°C) and ambient temperature (-20°C to +50°C), and ability to communicate the data from the sensors, other pumps, Grundfos GO remote management app along with BMS and CIM interfaces.

For details contact:

Grundfos Pumps India Pvt Ltd

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Mechanical Vapour Recompression Evaporation System



Mechanical vapour recompressor is used to increase the pressure of the vapours, which are generated in the separator. An increase in pressure in compressor will increase the condensation temperature of the water vapour (steam) rendering it usable to heat the original mixture in a calandria. It is this resulting temperature difference produced by compressing the water that enables a highly-efficient heat transfer to occur. As the water vapours condense in the shell side of calandria, it releases its latent heat to further heat the original mixture, which in turn produces more steam. Found to be the most economical choice when there is no boiler available or when electrical power is priced competitively in comparison to steam.

Features gentle evaporation of the product due to low temperature differences; reduced load on cooling towers since no residual vapours, due to the complete recompression of the process vapour, cooling water consumption is negligible; easy capacity controlling through variable frequency drive; efficient vapour compression technology to minimise operating cost; due to absence of the recycled cooling water, electricity, water and maintenance costs are saved; high water recovery rate up to 98 per cent; recycling the latent heat of the steam and avoiding fresh steam consumption, makes MVR more energy saving.

For details contact:

KEP Engg Services Pvt Ltd

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Ultra Filtration



KEPs filtration offers the widest range of ultra filtration membrane available to provide max flexibility in solving unique process challenges. The membrane has pores that allow the solvent and small molecules to pass through and the larger molecules to be retained. Ultra

filtration may therefore be considered as a selective separation step used to both concentrate and purify medium to high molecular weight components such as plant and dairy proteins, carbohydrates and enzymes.

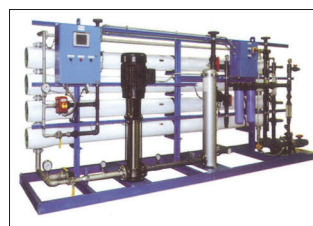
Minimum pumping energy required, thus energy saving; no contaminant residue caused by chemical reaction; recovery ratio up to 98 per cent; and high chemical resistance and temperature tolerance for effective membrane cleaning.

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Reverse Osmosis



Reverse Osmosis is used to remove large majority of contaminants from water by pushing the water under pressure through a semi-permeable membrane. KEP has developed reverse osmosis technology with innovation at an optimised capital and operating cost.

Reverse osmosis is an effective and proven technology to produce water that is suitable for many industrial applications. It is currently considered one of the most economic and effective process for waste water treatment. RO is an effective method of reducing the concentration of total dissolved solids and many impurities found in water.

Features low operating cost, low maintenance, easy to install and service, energy saving separation technique, high recovery and eliminates thermal degradation.

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NSP Series Solenoid Pumps & NXP Series Stepper Motor-driven Pumps



Neptune, part of PSG, a Dover company offers its new NSP Series Solenoid Metering Pumps and NXP Series Stepper Motor-driven Metering Pumps for chemical applications that require reliable and accurate dosing.

Featuring a durable, low-maintenance solenoid drive equipped with double-ball valves, the NSP Series from Neptune ensures consistent and precise dosing of a variety of chemicals, including acids, alkalis, coagulants and flocculants. The compact design and easy-to-use control of the NSP Series provide more efficient operation and shorter setup times for the operator. The small footprint allows it to easily integrate into dosing systems with limited space. The NSP Series is available in manually-, analog- and pulse-controlled models.

Thanks to its compact design and intelligent-drive concept, the Neptune NXP Series combines the advantages of a solenoid-driven pump with the precision of a motor-driven pump. This makes it an ideal solution to safely feed chemicals in highly accurate, reproducible applications. The NXP Series is fully adjustable to produce a constant supply stream during

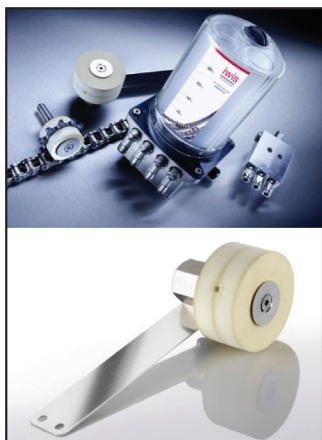
low-pulsation dosing, and the stepper motor with its wear-free tooth belt drive ensures a homogeneous and gentle dosing process. Available in six sizes, the NXP Series is plug-and-play and includes a universal power supply unit.

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Chain Lubrication Application



Regular maintenance and lubrication are essential to ensure low wear and extend the service life of a chain drive. More than two thirds of all chain failures can be avoided with proper relubrication. The new CLA lubrication system from iwis, Chain Lubrication Application (CLA) permanently delivers lubricant to the chain drive and other components and in this way ensures a long chain service life economically, cleanly and with absolute precision.

When developing the new lubrication system for chain drives, iwis Engineering, the in-house R&D department, concentrated on maintenance. The objective was to extend the service life of the chain by ensuring that the chain is lubricated properly. And the result is a highly efficient minimum quantity lubrication system. The special applicator, which is made from a high-performance material, acts as a reservoir via which small quantities of lubricant are continuously delivered to the employed chain drive at the precise locations where it is actually needed. This prevents the operating roller chain from not being supplied with enough lubricant and also prevents unnecessarily large volumes of oil from being dispensed onto the chain and its environment – an environmentally-friendly green solution that also lowers costs and reduces the risk of contamination of plant equipment.

The CLA pumps can be operated separately with time control or can be simply integrated in the machine's PLC. The compact size simplifies the task of retrofitting the device in existing plant and machinery. Thanks to a pump pressure of up to 70 bar, the distributors are able to supply as many as 16 lubrication points with sufficient oil without contaminating the environment and wasting valuable lubricant. The special applicators, which are made from PU foam, are extremely robust and are available in many variants, including custom designs.

For details contact:

Iwis Engine Systems India Pvt Ltd

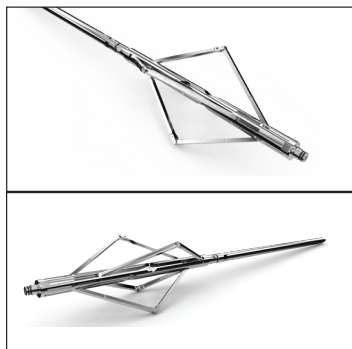
Unit B-604, 5th Flr

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S No: 103, HISS No: 2 to 14

Baner, Pune, Maharashtra 411 045

UHT Dimension XY Caliper for Geothermal Well Operations



Probe, a leading supplier of cased-hole logging and advanced monitoring technology to the global oil and gas and geothermal industries, offers its UHT Dimension XY Caliper, the first XY Caliper Tool specifically designed to operate in ultra-high temperature environments. This new development expands upon the renowned Kuster geothermal logging tool portfolio, used extensively in the global geothermal industry for its performance and reliability.

Developed to operate in hostile environments up to 325°C (617°F), the UHT Dimension tool provides two continuous independent perpendicular measurements (X and Y) of the internal dia of the casing. The tool also produces a high-resolution temperature profile of the well via an external fast-response resistance temperature detector (RTD).

Featuring Kuster high-temperature technology, it is the latest addition to Probe's range of Kuster pressure-temperature (PT) sensors, pressure-temperature-spinner (PTS) sensors, and Protherma (UHT PLT with pressure-temperature-spinner-gamma ray-casing collar measurements). All materials used to produce the UHT Dimension tool meet with the requisite NACE MRO175 specifications for use in corrosive wellbore environment.

The UHT Dimension tool is versatile. It can be run stand-alone or combined with other Kuster geothermal PT and PTS tools. Its robust mechanical design features single roller arms that conform easily to most wellbore conditions. However, if there is a need to run over slotted sleeves or sandscreens, an optional triple roller arm is available for increased run efficiency.

For details contact:

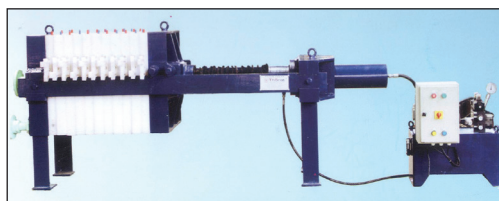
Probe

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Tel: +1 817 568 8528 x1212

E-mail: Justin.galloway@probe1.com

Auto Forward & Reverse Type Filter Press



Electric powered hydraulic pumping units maintain the hydraulic pressure and if the pressure exceeds the relief

setting this pressure is vented keeping the pressure within the specified range.

For press sizes 610 through 2,000 mm, electric hydraulics are optional to decrease filter press opening and closing times. For added operator and equipment protection, the hydraulic power pack includes a high volume/low pressure pump to open and close the plate stack quickly and a low volume/high pressure pump that clamps the plate stack. Once the plate stack is closed, the high pressure hydraulic pump clamps the plate stack with a force, plus a safety factor to counteract the pressure of slurry feed.

For details contact:

Thorat Filtration Pvt Ltd

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TTC Indl Area, Pawane, MIDC

Navi Mumbai 400 705

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Heat Sealable Thermoplastic Elastomer Tube



Imaweld is thermoplastic elastomer opaque tubing designed for fluid transfer in pharma and biotech applications. Imaweld is specially formulated, which meets the requirement of pharma industries with superiority compared to PVC and silicone.

Imaweld complies with FDA 21 CFR 177.2600, USP Class VI and ISO 10993. It is manufactured and packaged under GMP guidelines in dust-free area of ISO 9001 QMS, ISO 14001 and OHSAS 18001 Certified facility. It is heat sealable and weldable. It can be laser etched for traceability. It has excellent flexibility and flex crack resistance. It also has excellent acid and alkali resistance. Its smooth bore surface eliminates particle entrapment. It has superior chemical resistance compared to silicone. It is sterilizable by steam, gamma radiation and ethylene oxide. It has custom dimension and available in length size. It is also available in transparent colour.

For details contact:

Ami Polymer Pvt Ltd

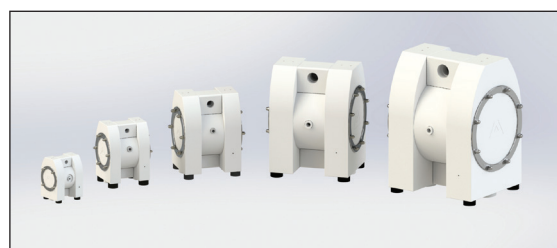
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AODD Pumps with New C 40 and C 50 Models



Almatec, part of PSG, a Dover company has extended its line of solid plastic C-Series Air-Operated Double-Diaphragm (AODD) Pumps to include new C 40 (1-1/2") and C 50 (2") Models. Engineered to be a more cost-effective alternative to similar plastic pumps, Almatec C-Series pumps feature an industry-leading design that increases bolt torque to improve pump safety when compared to competitive pumps. What further separates the C-Series is the incorporation of Almatec's exclusive Perswing P air control system, which offers superior efficiency to optimize production rates and lower energy costs.

Ideally suited for the most difficult pumping applications, C-Series pumps ensure the suction and discharge ports are available as separate housing parts with different footprints. This feature allows the C-Series to be quickly and easily matched to existing installations. C-Series pumps do not have any mechanical seals, drives or rotating parts that cause wear over time, which improves reliability and extends product life. C-Series pumps feature self-priming and dry run capabilities, critical considerations for most pumping applications.

The C-Series pump line now consists of five pump sizes – C 10 (3/8"), C 15 (1/2"), C 25 (1"), C 40 (1-1/2") and C 50 (2"). The wetted housing parts are made of either abrasion-resistant polyethylene or chemically-resistant PTFE. For applications in explosive atmospheres, C-Series pumps are available in versions that conform to ATEX requirements according to the 2014/34/EU directive.

For details contact:

Dover India Pvt Ltd

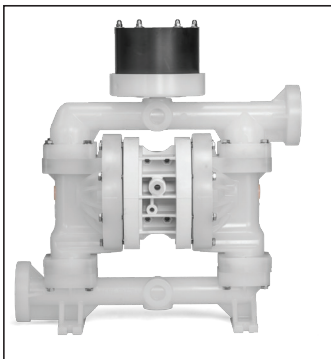
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Equalizer Surge Dampeners



Wilden, part of PSG, a Dover company offers its new bolted plastic Equalizer Surge Dampeners – Integrated SD Series (ISD). The new ISD Series dampeners have been specifically engineered to help extend the life and reduce the noise of Wilden 13-mm (1/2") and 25-mm (1") Pro-Flo Series bolted plastic air-operated double-diaphragm (AODD) pumps while providing users with convenient installation and use.

Wilden ISD Series dampeners utilize an integrated design that allows them to be directly incorporated in the Pro-Flo Series bolted plastic manifold design. They easily screw onto the top of your Wilden pumps without any additional hardware required. There are no additional connecting elements or piping changes needed to install these dampeners, which helps keep operational downtime to a minimum.

These dampeners are available in 13-mm (1/2") and 25-mm (1") sizes in Polyethylene construction, with PTFE and EPDM diaphragm material options. They feature temperature ranges from -51°C to 138°C (-60°F to 280°F) for EPDM and 10°C to 137°C (14°F to 280°F) for PTFE. With a maximum working pressure of 100 psi, they are ideal for use across a variety of markets, including paints and coatings, chemical, hygienic, and general industrial applications.

For details contact:

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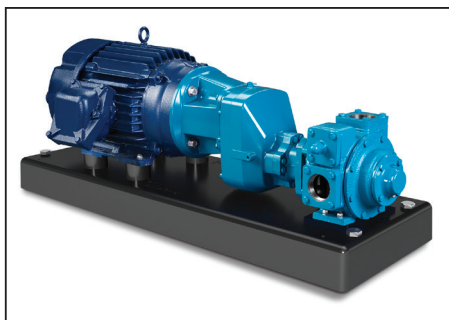
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GNX Series Pumps with 3- and 4-inch Models



Blackmer, part of PSG, a Dover company announce that its GNX Series Sliding Vane Pumps are now available in 3- and 4-inch models. The market's only alignment-free reduced-speed positive displacement pumps, the Blackmer GNX Series have been designed to optimize the transfer of non-corrosive, non-abrasive industrial and petroleum products for both portable and stationary applications.

Originally launched in 2- and 2.5-inch models, Blackmer GNX Series heavy-duty sliding vane pumps include the proven features of Blackmer legacy GX Series pumps but take them to the next level with the incorporation of a commercial-grade, single-stage gearbox, motor and baseplate. This innovative new gearbox fits between the motor and pump and is held in place by a permanent dowelled connection that

creates a structural link between the high-speed and low-speed sides of the system. This results in a pump that will not need to be realigned either at initial installation or following a maintenance procedure, resulting in improved peace of mind for the operator. The 2- and 2.5-inch models have aluminum gearboxes while the new 3- and 4-inch models feature cast iron gearboxes.

GNX Series pumps provide flow capacities ranging from 7 to 500 gpm (25 to 1,893 L/min) at working pressures up to 175 psi (12.1 bar). They are also available with optional steel and composite baseplates. The pre-grouted composite baseplate adds additional value to the pump, gearbox and motor setup by providing unmatched surface flatness, significant vibration damping and reduced installation costs. GNX Series pumps have a 90° porting orientation and GNXH Series pumps have a 180° porting orientation. These pumps are available in a full range of motors from 1 to 50 HP.

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Thermoplastic Elastomer Tube



Imaprene pharma grade thermoplastic elastomer tubing designed for peristaltic pump transfer. Imaprene is opaque tubing especially known for its excellent flexibility and flex crack resistance.

Imaprene is manufactured by using world class thermoplastic elastomer. It is manufactured and packaged in dust-free environment of ISO 9001 QMS, ISO 14001 and OHSAS 18001 Certified facility. It has excellent chemical and solvent resistance (Ex IPA). It is superior flex crack resistance and durable for peristaltic pump application. It has smooth bore to ensure least contamination. It is non-toxic and non-haemolytic.

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SS Cartridges



SS cartridges are designed to overcome the temperature and chemical compatibility limitations of fabric or synthetic fibre media. This will offer high temperature resistance and can withstand high differential pressure. SS cartridges are offered in SS-304, SS-316 and SS-316 L material. These

elements can be plain cylindrical or pleated configuration to increase filtration area. Normally all SS plated and cylindrical filters are supported with coarser filter media to ensure any dirt damages to main filtering media under process upsets. A bubble point tests can be done to certify that no opening larger than the specified pore size exist in product joints or seams. No media migration due to SS material. These elements can be backwashed and reused.

For details contact:

National Card Board Mill

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Probes for Water Cut Monitor



AMETEK Drexelbrook has been working in the oil industry, helping eradicate this silent killer. The knowledge and experience that Drexelbrook holds has been integrated in our level and water cut monitoring instruments. These are manufactured to deliver trustworthy data, and to do so with proven quality even in harsh environments. One of the most reliable instruments on the market is the Universal IV water cut monitor. In fact, it is regarded as one of the toughest protectors of the production budget.

RF Admittance technology is used to ignore coatings and build-up that can plague day-to-day operations. All probes used for the Universal IV water cut monitors are manufactured with patented Cote Shield technology to ensure proper performance under these conditions. This means that even with the sticky materials measured at oil wells, the data is accurate and reliable. A wide selection of probes means customers have the ideal choice for any application.

The length of the probe can vary. Drexelbrook probes typically measure across more than 15 inches of sensing area, whereas many competing products only measure 2 inches, meaning the Universal IV water cut monitor provides a more reliable evaluation of the passing media than the competition. RF Admittance technology measures the differences of dielectric

constants of water and oil in the media passing by the probe.

The monitoring can be performed at up to 1,500 PSI and 230°C/450°F. A primary application for water cut monitors is on LACT skids monitoring the quality of upstream oil flow post separation, ensuring trustworthy data for transferred oil.

For details contact:

AMETEK Drexelbrook

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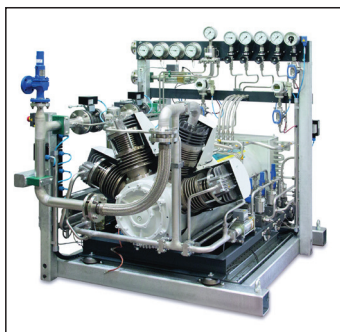
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Oil-free and Gas-tight High-pressure Compressor



With the integration of the former HAUG Kompressoren AG, Sauer Compressors has significantly extended its portfolio to include solutions by the industry's leading expert in oil-free air and gas compression. The HAUG.Sirius NanoLoc marks the latest addition to the product range that combines high pressure with oil-free compression.

Both the crankcase and the compressor stages operate without any oil. This ensures highest gas and process purity. Therefore, the compressors are an ideal choice for sensitive applications such as industrial gases, medical applications and bio technology as well as the chemical, pharma and food industries.

With its hermetically gas-tight construction, the HAUG.Sirius NanoLoc achieves extremely low leakage rates of <0.001 mbar l/s and enables 4-stage compression of almost any gas. The compressor delivers a flow rate of max 66 Nm³/h and a final pressure of up to 450 barg with an inlet pressure of up to 30 barg. Depending on the configuration, it comes with a

motor power of 11-30 kW. In addition, the HAUG.Sirius NanoLoc is ideally suited for booster applications of gases such as helium, natural gas or hydrogen.

The well-proven magnetic coupling drive adds to the machine's exceptional gas-tightness both at standstill and during operation. The technology is a core feature of the HAUG.Sirius Series. Due to the newly developed and unique NanoLoc piston design's friction-free sealing, wear and friction losses in the cylinders have been reduced significantly. Likewise, all the compressor's components are designed for a particularly long service life.

Even in operations with long standstills, frequent interruptions and cold starts, the HAUG.Sirius NanoLoc is highly dependable. The absence of oil serves to significantly lower operating and maintenance costs. Due to its unparalleled process purity, the compressor reduces the need for gas treatment and filtration after compression to a bare minimum. Often, treatment and filtration are not required at all, resulting in significant time and cost savings.

For details contact:

J P Sauer & Sohn Maschinenbau GmbH

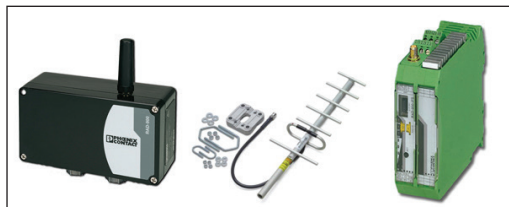
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Wireless Communication for Level Measurement



AMETEK Drexelbrook offers an extensive line of wireless communication products for level measurement, level switches, floating roof tanks and other field instruments providing encrypted data transfer for distances of up to 32 km line of sight.

For this, Drexelbrook has teamed up with Phoenix Contact. By doing so Drexelbrook is now able to provide ideal wireless level measurement communication for industries such as oil and gas, chemical, and general industrial process plants. This new product line is the ideal communication option,

especially for large plants where signal wiring can be prohibitively expensive.

The advantage of acquiring both wireless communication products and level measurement instruments from Drexelbrook is that Drexelbrook ensures that the data transfer works as intended and that the communication hardware will be covered by a comprehensive Drexelbrook warranty.

The new Series of 900 MHz communication transceivers, I/O modules and antennas are available for indoor (DIN rail) as well as outdoor (NEMA4) mounting. Various I/O modules enable the engineer to set up the necessary support of analog and digital communication, secured by 128-bit encryption, and adjustable bit rates up to 500 kbps and signal gain up to 12 dBi.

For details contact:

AMETEK Drexelbrook

205 Keith Valley Rd

Horsham, PA 19044, U.S.A.

Tel: +1 215-674-1234, +1 215-293-4185

Fax: 215-674-2731

E-mail: drexelbrook.info@ametek.com / bob.irving@ametek.com

Oil & Gas World Expo 2020**Date:** 4-6 March 2020**Venue:** Bombay Exhibition Centre, Goregaon (East), Mumbai, India

Event: The 9th edition of Oil & Gas World Expo is scheduled from March 4-6, 2020 in Bombay Exhibition Centre, Goregaon (East), Mumbai, India. The Global Hydrocarbon show is aiming to connect, discuss and comprehend the views of leaders, policy makers, regulatory authorities, and service providers of the Indian and Global hydrocarbon industry. The 3-days Exhibition and dedicated conference will provide a platform to showcase innovative technologies and services, encompassing current and future trends in the entire value chain of hydrocarbon industry ranging from upstream to midstream and downstream.

Oil & Gas World Expo 2020 along with GASTech + Refining & Petrochemicals World Expo 2020 will provide a holistic platform to showcase latest trends in technologies, equipment & services to the right buyers from E&P, Natural Gas, LNG, CNG, CGD, Refining & Petrochemicals along with hydrocarbon infrastructure & services providing sectors.

For details contact:

Jasubhai Media Pvt Ltd

3rd Floor, Taj Building, 210, Dr D N Road, Fort

Mumbai – 400001, Maharashtra, India

Tel: +91-22-40373636

Fax: +91-22-40373535

Email: conference@jasubhai.com

<http://chemtech-online.com/oil-gas-world-expo-2020/about-event>**GASTECH 2020****Date:** 8-10 September 2020**Venue:** Singapore Expo, Singapore

Event: Singapore will provide a home for Gastech in 2020 that balances the truly international nature of our exhibitors, sponsors, delegates and attendees, whilst capitalising on the location's strategic importance as a hub for the growing Asian market. As the gas and LNG market experiences strong growth and change, there has never been a more important time for the community to come together, forge partnerships, do business and define the future of the industry.

Singapore is one of the most important energy and financial hubs in the world and an epicentre for trade across Asia. Singapore's major influence as a gas and LNG hub reflects the excitement and positivity driving growth in the region.

For details, contact:

DMG Events

Email: sales@gastechevent.com

Tel: +44 (0)203 615 5916

Web: <https://www.gastechevent.com/>**OPES 2020****Date:** 8-11 March 2020**Venue:** Oman Convention & Exhibition Centre Muscat, Oman

Event: OGWA is a biennial international exhibition and conference that brings together local and international oil and gas companies from the GCC, technology and service providers, equipment suppliers, and other companies directly serving the industry's requirements.

It is a platform for discussing the latest developments and directions of the industry, as well as for trade and business opportunities among the local and international oil and gas companies. Launched in 1998, it has since been under the patronage of the Ministry of Oil & Gas and has consistently received the support of Petroleum Development Oman (PDO), Oman LNG, and many other leading oil and gas companies.

For details, contact:

Ebrahim Taher Exhibition Director

OmanExpo

P.O. Box: 20, PC:117 Wadi Kabir 1st Floor, SABCO Building, Wattayah, Muscat, Sultanate of Oman

Tel: +968 24660124 Fax: +968 24660125/126

Email: ebrahim.taher@omanexpo.com

ADIPEC 2020**Date:** 9-12 November 2020**Venue:** Abu Dhabi National Exhibition Center (ADNEC) Abu Dhabi, UAE

Event: ADIPEC is the world's largest and most influential event for the oil and gas industry and attracted a record breaking 155,000+ attendees in 2019, bringing together Energy Ministers, global CEOs and leading decision makers alongside the companies that shape the future of oil and gas supply across 4 days of focused business, dialogue and knowledge transfer that addresses today's energy needs and defines tomorrow's energy landscape.

ADIPEC gives 2,200+ exhibitors unparalleled access to the top decision-makers in the oil and gas industry and is the ideal platform to create new business opportunities, strengthen existing relationships and network across the entire energy sector, with an estimated \$17.99 Billion worth of business agreements taking place across the 4 days.

For details, contact:

DMG Events

5th Floor, The Palladium,

Cluster C, Jumeirah Lakes Towers,

P.O. Box 33817, Dubai United Arab Emirates

Tel: +971 4 438 0355

Email: info@dmgevents.com

Oil and Gas Industry: Advanced Technologies

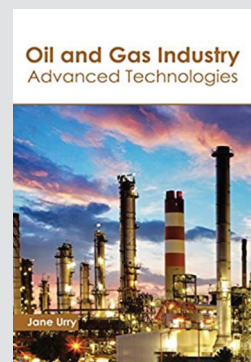
Editor: Jane Urry

Price: USD 80

Hardcover: 249 pages

Publisher: Callisto Reference

About the Book: The oil and gas industry is one of the largest and most advanced sectors of engineering. This book on the oil and gas industry discusses topics related to well logging, reservoir engineering and drilling. Recent developments in the field of oil and gas engineering or petroleum engineering are related to technologies concerning oil and gas recovery and extraction as well as improved computational methods for fluid dynamics. This book discusses the fundamentals as well as modern approaches of this field.



This book elucidates the concepts and innovative models around prospective developments with respect to the oil and gas sector. This text presents researches and studies performed by experts across the globe. This book, which is informed by the latest techniques that are available in oil and gas exploration and extraction, will be of great help to researchers in the fields of petroleum engineering, fluid dynamics and geology. The extensive content of this book on oil and gas industry provides the readers with a thorough understanding of the subject.

New Technologies in the Oil and Gas Industry

Editor: Jorge Salgado Gomes

Publisher: IntechOpen

Price: USD 140

About the Event: Oil and Gas are the most important non-renewable sources of energy. Exploring, producing and managing these resources in compliance with HSE standards are challenging tasks. New technologies, workflows and procedures have to be implemented.

This book deals with some of these themes and describes some of the advanced technologies related to the oil and gas industry from HSE to field management issues. Some new technologies for geo-modeling, transient well testing and digital rock physics are also introduced. There are many more technical topics to be addressed in future books. This book is aimed at researchers, petroleum engineers, geoscientists and people working within the petroleum industry.



Introduction To Petroleum Exploration And Engineering

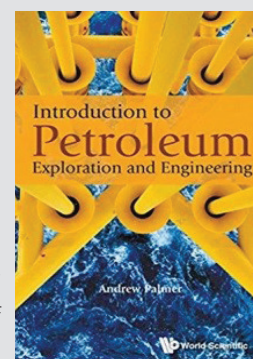
Author: Andrew Clennel Palmer

Price: Paperback \$38.00

No of pages: 154 pages (Paperback)

Publisher: WSPC

About the book: This book is an introduction to oil and gas designed to be both accessible to absolute beginners who know nothing about the subject, and at the same time interesting to people who work in one area (such as drilling or seismic exploration) and would like to know about other areas (such as production offshore, or how oil and gas were formed, or what can go wrong). It begins by discussing oil and gas in the broader context of human society, and goes on to examine what they consist of, how and where they were formed, how we find them, how we drill for them and how we measure them. It describes production onshore and offshore, and examines in detail some instructive mishaps, including some that are well known, such as Deepwater Horizon and Piper Alpha, and other lesser known incidents. It looks at recent developments, such as shale oil, and concludes with some speculation about the future. It includes many references for readers who would like to read further. Mathematical content is minimal.



POWER

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Venue: Bombay Exhibition Center, Goregaon (East), Mumbai, India

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Mr A K Gupta
Director (Commercial)
NTPC Limited

Convener
Power World Expo 2020



Mr A K Jha
Former CMD
NTPC Limited

Head - Technical
Central Advisory Board
Power World Expo 2020



Mr Manoj K Varma
Director (Power),
Bharat Heavy Electricals Ltd

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 - Equipment for Emission & Pollution control
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POWER WORLD 2020 CONFERENCE

Thursday, 5th March , 2020

Venue: Bombay Exhibition Centre, Mumbai

Inaugural Session

Session:I Renewable Energy: Storage Technologies

Session:II Renewable Energy Integration with Conventional Sources: Challenges & Solutions

Session:III Smart Power: Digitalization, Asset Management & Data Analytics

Contact for Delegate Registration: Direct: +91-22-4037 3619

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Concurrent Events

GASTech
World Expo 2020

**Refining
& Petro**
CHEMICALS 2020

POWER
World Expo 2020

INLAND Waterways
PORTS & LOGISTICS
World Expo 2020

SMP
WORLD EXPO 2020



Facts & Figures - Oil & Gas World Expo 2018

 EXHIBITORS 150	 VISITORS 6000	 SPEAKERS 100	 DELEGATES 500	 STUDENTS 100
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Guidance of Leaders

<p>Chairman Central Advisory Board Oil & Gas World Expo 2020</p>  <p>Mr. Sanjay Kumar Moitra Director (Onshore) Oil and Natural Gas Corporation Ltd</p>	<p>Technical Chairman Central Advisory Board Oil & Gas World Expo 2020</p>  <p>Mr. P K Sharma Director (Operations) Oil India Limited</p>	<p>Chairman Central Advisory Board GASTech World Expo 2020</p>  <p>Mr. Rajeev Mathur Executive Director (Corporate Affairs) & OSD to CMD, GAIL Ltd</p>	<p>Chairman, Central Advisory Board Refining & Petrochemicals World Expo 2020</p>  <p>Mr. Prasad K Panicker Executive Director - Kochi Refinery Bharat Petroleum Corporation Ltd</p>	<p>Chairman Central Advisory Board Power World Expo 2020</p>  <p>Mr A K Gupta Director (Commercial) NTPC Limited</p>	<p>Convener Power World Expo 2020</p>  <p>Mr A K Jha Former CMD NTPC Limited</p>	<p>Head - Technical Central Advisory Board Power World Expo 2020</p>  <p>Mr Manoj K Varma Director (Power), Bharat Heavy Electricals Ltd</p>
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<p>Oil & Gas World Conference 2020 Wednesday, 4th March 2020 Theme: "Revitalization of Mature Fields using Innovative Technologies"</p>	<p>GASTech World Conference 2020 Wednesday, 4th March 2020 Theme: "Unlocking Natural Gas Value Chain Potential in India"</p>	<p>Refining & Petro Chemicals World Conference 2020 Thursday, 5th March 2020 Theme: "Transformation of Refining & Petrochemicals: Vision 2030"</p>	<p>Power World Conference 2020 Thursday, 5th March 2020 Theme: "Clean & Affordable Energy Future: Innovation, Integration & Adoption"</p>
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