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Evolution of Gas Lift System

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ABSTRACT: Human development and technological evolution demand more energy and therefore oil and gas business needs to think out of the box to enhance the production and economic life of a field. Artificial lift has been continuously developed and tested to boost the oil production of the well. Gas lift has been used extensively because it is flexible and can handle large range of flow rates ranging from 5 BOPD to 40,000 BOPD. This paper discusses about the historical evolution of the gas lift and continuous efforts made by researchers to develop this system since last few decades. Paper focuses on the idea of gas lift origin and transition from air lift to gas lift system. Paper describes about the various challenges faced during the implementation of gas lift system and approaches to overcome them. Pioneering work done by researchers to maximize the system, to work it in most stable condition, to use it in modern type of completions, innovations made in gas lift system are discussed in this paper. It also focuses on how digitization of the system can bring the gas lift to next level. Along with the overall development in gas lift, the study demonstrates the improvements made in different components and parameters like gas lift valve, injection pressure, optimization of gas lift, sensors in smart gas lift etc. With continuous evolution in gas lift, it can work with even more sustainability and contribute to fulfilling the world's energy supply.

Keywords: Gas lift, Evolution, Nanotechnology, ANN, Artificial lift, Advancements

I. INTRODUCTION

Artificial Lift is an inevitable system for well during its producing life. Artificial Lift methods are crucial to optimize the oil production globally and always tested to increase the oil production of the well (Saurav and Tej, 2015). According to Society of Petroleum Engineers (SPE), around 80% of oil wells in the world are running on artificial lift. As the pressure of the reservoir depletes the oil flowrate reduces provided that a well is operating at constant flowing bottom hole pressure. After a certain limit of reservoir pressure reduction, the well ceases to self-flow, at that time well needs energy supplement, which is provided by the artificial lift system. The purpose of Artificial Lift is to reduce the flowing bottom hole pressure and hence increase the ΔP (Brown, 1980) as shown in the equation 1.

Here, $\Delta P = P_{reservoir} - P_{wf}$ ----------(1)

Where, $P_{reservoir}$ = Pressure of reservoir (psi)

P_{wf} = Flowing bottom hole pressure (psi)

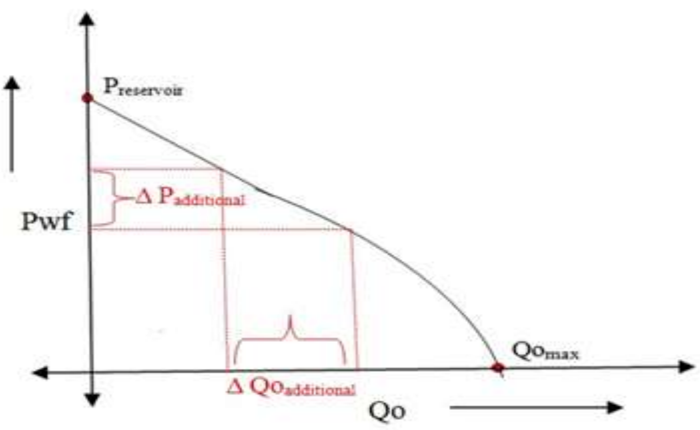

Fig. 1 Effect of artificial lift on oil production

As shown in the **figure 1**, as ΔP increases the production of oil also increases. Hence, artificial lift plays a vital role in the production of oil. There are various types of artificial lifts like:

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(1) Sucker Rod Pump, (2) Gas Lift, (3) Plunger Lift, (4) Hydraulic Pumping, (5) Electrical Submersible Pump Lift, (6) Jet Pumping, (7) Other methods (Brown, 1980).

Gas Lift Method was firstly used in 1864 in Pennsylvania for lifting the oil using the compressed gas. This type of technique was used as early as 1797 in the mines to lift water from mine shafts. This early day's technique used single point injection of air to lift water using a foot valve at the bottom of the string. In 1920, natural gas replaced air to mitigate explosions due to explosive mixture creation by mixing air with oil. From 1929 to 1945, around 25000 patents were registered on different types of gas lift valves that could be used for unloading in stages. In 1944, W.R King patented the pressurized bellow that is used very commonly today. In 1951, Side Pocket Mandrel was used for selectively positioning and retrieving the gas lift valves by wireline kick-over tool (Belamara, 2016).

Gas Lift is used extensively for its higher volume displacement application. The gas lift can be used in wide range of conditions (up to 15000ft depth) and can produce oil in an amount of 30,000 to 40,000 bpd (Mitra, 2012). The deployment of the gas lift system requires a huge magnitude of Capital Expenditure (CAPEX) and it depends on certain factors like the availability of natural gas. Gas lift has shown its huge potential in offshore wells, since in offshore condition there is availability of gas and can be used in gas lift system instead of transferring to onshore which incurs additional cost. Mumbai High field was discovered in 1974 and put under artificial lift in early 1987 on gas lift system (Adesh and Gupta, 2003). So, Indian Bombay high offshore field has more than 80% oil producing wells on gas lift (Moitra et al., 2007). In USA, gas lift dominates the artificial lift sector by occupying 51% share of total artificial lift being used (Production Technology-II, 2011). Gas lift method requires high pressure compressed gas that is circulated through annulus and tubing with the use of Gas Lift Valves. Principle of gas lift technique is to inject gas in tubing and reduce the density of the fluid in tubing. Basic equipment for gas lift technology are : (1) Main Operating valves, (2) Check valves, (3) Mandrels, (4) Wireline adaptation, (5) Compressors, (6) Surface control equipments. The **figure 2** shows the typical schematic of gas lift system.

There are two types of gas lift systems: (1) Continuous gas lift system, in which gas is supplied with relatively slower flowrate and continuously through GLV of smaller port size. Continuous gas lift is being seen as extension of the self-flow period of the well. Generally, the port sizes of GLV used for continuous gas lift are 3/16", ¼" or 5/16" (Mitra, 2012). Continuous gas lift is preferable for the wells having high productivity index and higher reservoir pressure (Mitra, 2012). (2) Intermittent gas lift system, in which gas is supplied at intervals by the virtue of time cycle controller and through GLV of port size of ½", 7/16", 3/8" or 5/16" at relatively higher flowrate (Mitra, 2012). Due to lower oil inflow in the well, it takes certain amount of time to build oil column at the bottom and after accumulation of oil gas is supplied at higher flowrate so that, it lifts the whole oil column above. Intermittent gas lift system is preferred for the wells having: (i) high productivity index and low reservoir pressure, (ii) low productivity index and lower reservoir pressure, (iii) low productivity index and higher reservoir pressure. (Guo, 2017).

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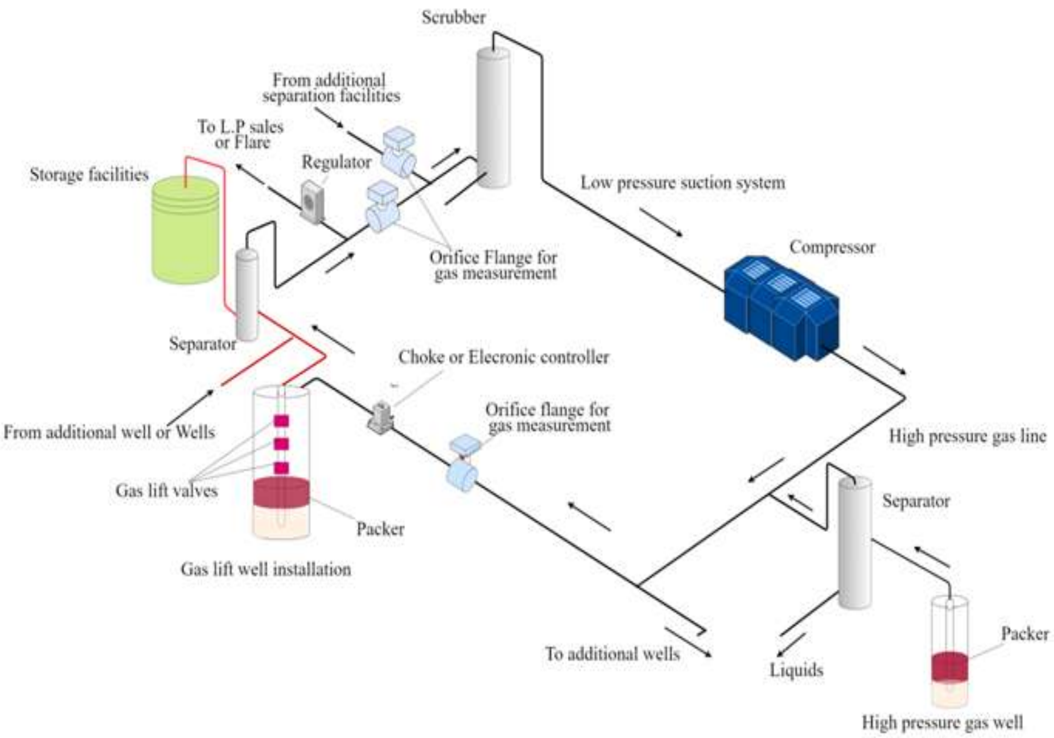

Fig. 2 Schematic of gas lift system

Here in this paper, the evolution of the gas lift system including its design and optimization aspects is discussed in detail. From 1970 to 1980 extensive research has been done on gas lift monitoring and optimization. Till 1970, knowledge regarding gas lift was quite well and adequate but the concept of dual gas lift was new and research had just started in this regime and trouble-shooting of problem encountered in system was being carried out (Davis and Brown, 1972). In 1980's, extensive study was done on intermittent type of gas lift (Schmidt, 1984). Then probe testing technique is made standard for monitoring the gas lift system that is now included in standard procedure in many companies including ONGC (Adiyogi, 2003). From 2010 to 2020, many new Information Technologies have been adopted for monitoring and optimization of gas lift like Smart gas lift valves, real time monitoring system, and implementation of Artificial Neural Network (ANN). This paper discusses about the historical evolution of the gas lift and continuous efforts made by researchers to develop this system since last few decades. Paper focuses on the idea of gas lift origin and transition from air lift to gas lift system. Paper describes about the various challenges faced during the implementation of gas lift system and approaches to overcome them. Pioneering work done by researchers to maximize the system, to work it in most stable condition, to use it in modern type of completions, innovations made in gas lift system are discussed in this paper. However, discussion is not limited to older days of evolution; it will also focus on how digitization of the system can bring the gas lift to next level. Along with the overall development in gas lift, the study demonstrates the improvements made in different components and parameters like gas lift valve, injection pressure, optimization of gas lift, sensors in smart gas lift etc. With continuous evolution in gas lift, it can work with even more sustainability and contribute to fulfilling the world's energy supply.

II. LITERATURE SURVEY

Gas lift is the oldest artificial lift technique among the petroleum lifting methods. Originally this method was used to lift the water from the water wells throughout 1800's. Germen mining engineer Carl Emanuel Löscher (1750–1815) had invented this technique to lift the liquids with the use of compressed air (Bechwith, 2014). J.H.A. Bone came up with an idea to use an ejector or air pump to lift the oil from the oil wells. In 1864, Thomas B. Gunning patented the ejector for oil wells (Bechwith, 2014). This invention proved to be very effective and many wells had been restored to yield production. Generally, the air used to lift oil was collected from the vicinity of the wellbore and therefore this air might contain petroleum vapor as wells as components of natural gas. Hence, it was difficult to understand the interaction between ambient air and petroleum, production equipment and airlift system (Bechwith, 2014).

During early 20th century air lift was fully developed and were used extensively to lift the oil from well. In 1911, first test was conducted to use the natural gas instead of air to serve the purpose. Number of field experiments conducted during late 1920's to understand the effectiveness of gas lift for different temperature and pressure conditions, gas oil ratios and oil gravity. However, majority of advancements were made during 1920 to 1950 and scientists developed large number of equipments to develop gas lift system. Use of natural gas has shown so many advantages. It has reduced the risk of forming explosive mixture of air and oil (Bechwith, 2014).

Till 1975, gas lift was fully developed and two types, continuous and intermittent were used frequently in field applications. Gas lift technology is mainly used in the fields which produce gas along with the oil. However, some implementations have been done in heavy oil fields. Due to its ability to work at greater depths, gas lift is first choice artificial lift in offshore (Bechwith, 2014).

Most of the applications of gas lift continuous gas lift are implemented with single point injection. However, this does not give desired results when the depth of the well exceeds 4000 ft. (Raggio, 1967). Liquid and gas tends to separate from each other due to the phenomena called slippage. To avoid this kind of problem study has been done to inject gas from multiple points as well as it has been implemented and it has given some satisfactory results. Merits of multipoint gas injection include that it reduces the slippage and turbulence in the well, the depth limitations which were present earlier are no longer valid in multipoint injection and the flowing gradients are also reduced significantly (Raggio, 1967).

Design and implementation of single gas lift system was very well understood till 70's, but to design gas lift system for dual completion was still a major concern. With the efforts made by people implication of dual gas lift system has become a reality. Design, types of valves, operations, valve setting procedure has been developed (Davis and Brown, 1972).

In gaseous well, gas lift was implemented with conventional chamber to separate the excessive gas out. But in deep and low pressure wells this conventional chamber system failed, as in such conditions, gas evolution from oil increases abnormally making difficult to handle it. So, the new concept of 'Automatic Vent Chamber (AVC) was introduced. AVC eliminated all the problem that conventional chamber was not able to. Here the chamber system automatically pumps the liquid from chamber in to the tubing, where the pumped liquid is retained in to tubing by standing valve. Then, lift gas is injected and lift the liquid resting in to the tubing and simultaneously, refilled the chamber and extra gas is vented outside the system (DeMoss et al., 1974).

Exxon Production Research Company (EPRCo) facilitated Creole Petroleum Corporation in improving the efficiency of their gas lift systems. EPRCo has done this work as a result of the development of an analytical calculation technique for deciding the optimal distribution of gas to gas lift wells. This technique utilizes well test data and vertical two phase flow behavior calculation to pre-determine well's producing rate response to input gas flowrate and optimum gas distribution can be calculated with the help of data regarding each well's gas production contribution. This all can be done through computers by an algorithm and the whole system can be digitally manages and optimized (Redden et al., 1974).

Even if the gas lift system is properly designed, it may not work with the required efficiency if the gas injection pressure has not been selected properly. To select the optimum gas injection pressure thorough study is required to investigate the parameters which influence the gas injection pressure (Blann and Williams, 1984). These parameters include pressure rating of the surface equipments, wellhead backpressure, bubble point and GOR of reservoir fluid, type of gas lift equipments, gas volume, properties of injected gas volume etc. (Blann and Williams, 1984).

Z. Schmidt, R. Doty, J. Brill from University of Tulsa developed several dynamic models to study gas lift valve performance and hence optimize the performance of gas lift system by controlling the dominant parameters like port size, gas flowrate etc. They had also worked upon optimization of intermittent gas lift by hydrodynamic model for lifting viscous oil. They found that if the injection pressure increased then the liquid recovery rate would also increase at the expense of higher injection gas volumes till a certain limit. Then onwards higher gas rate might cause slippage. The liquid slug was found to accelerate with high magnitude initial but with time acceleration decreases. GOR was found to be affected by liquid viscosity (Schmidt et al., 1984). These were some of the major outcomes of their study, which have helped tremendously to understand the parameters affecting the intermittent gas lift.

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Although the design of gas lift system was well established, the real field implementations show flow instabilities in gas lift systems (Asheim, 1988). In majority of the gas lift systems flow rate and pressures keep varying especially in case of multiphase flow. Uneven gas inflow through the gas lift valve is the major factor that governs the instability of system. In past few attempts have been made to use numerical techniques to quantify the instabilities in gas lift system. Some criteria for inflow response and pressure-depletion response have been developed to provide the stable design of gas lift (Asheim, 1988).

After Piper Alpha incident, the oil industry took leapfrog in the realm of health, safety, and environment. Gas lift was not untouched by this and henceforth D.D. Grasslck and other researchers have done extensive study on blowout and gas leak risk analysis on gas lift completions. This analysis was done with MAROS simulator and with four base cases: (1) Single completion, (2) Dual string completion, (3) Hybrid completion (Dual string completion with single Christmas tree), (4) Concentric completion. In this study they found dual and hybrid completion to be the safer design than the single and concentric completion design in terms of gas leaks as well as blowout risks. They have given utmost importance to SSSV (Subsurface safety valve) and its integrity if the risk of a blowout is to be minimized. They assumed SSSV is to be tested once in an interval of 3 months and shown that as the frequency of testing increases the possibility of blowout decreases (Grasslck et al., 1992).

Quality control of gas lift valve is a very important operation as the gas lift valve being the most crucial element in the success of gas lift system. Probe testing method is adopted in oil companies including ONGC for the quality check of valve by analyzing stem travel with the applied test pressure. This test will check the quality of the bellow of the valve. Researchers have done experimental lab study and analysis of more than 200 probe tests and dynamic test on different GLVs. The major outcome of this study is that the maximum stem travel bellow load rate of the valve has high importance in the performance of the valve. The flow regime under various injection pressures can be predicted with the help of probe test result data. These outcome and test was proved to be very useful in Indian oil industry to maintain the quality of valves (Adiyogi, 1999).

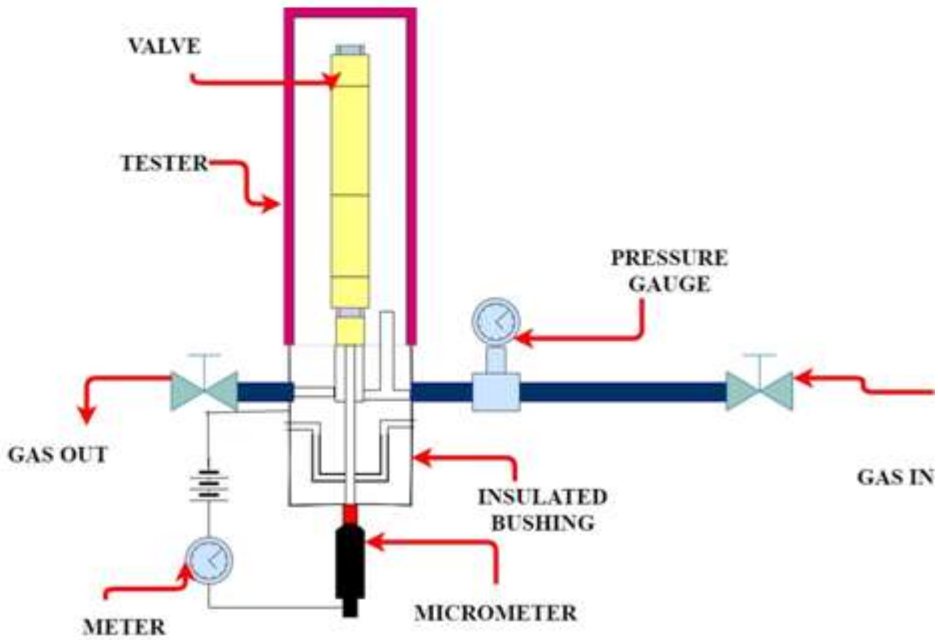

Fig. 3 Typical gas lift valve probe test fixture

The most crucial component in intermittent gas lift is pilot valve. There were many studies been done regarding the performance of pilot valve (**fig. 4**). There are two sections in pilot valve: (1) Pilot section and (2) power section. Pilot section controls the opening and closing pressure of valve. The difference between opening and closing pressure of a valve is called the 'spread' and this is determined by the area ratio of the valve (Ap/Ab). In some of the cases, the lowest commercially available area ratio will still be higher than the need. This will cause large liquid fall back. Minimum area ratio achieved when port size area is increased (Ap), so the more liquid slug velocity is

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being attained and this reduces the liquid fall back. Researchers have redesigned the pilot valve to increase the efficiency of the gas lift system. The new pilot valve combines the spring force and nitrogen pressure in the dome. Nitrogen charged dome acts as supplement to the spring force and makes the operation of valve easy and accurate. This new 1 inch pilot valve was having nontraditional packing and seals which improved the performance of valve by allowing higher gas flowrate and controlling the range of area ratios. This resulted in higher liquid production from well by relatively low gas injection. Well producing at 90 bbl/d with commercial pilot valve, was experimented and installed with this new pilot valve. For the same rate of liquid production the gas injection per day was reduced from 11000 SCF to 6000 SCF (Hernadez, 2001).

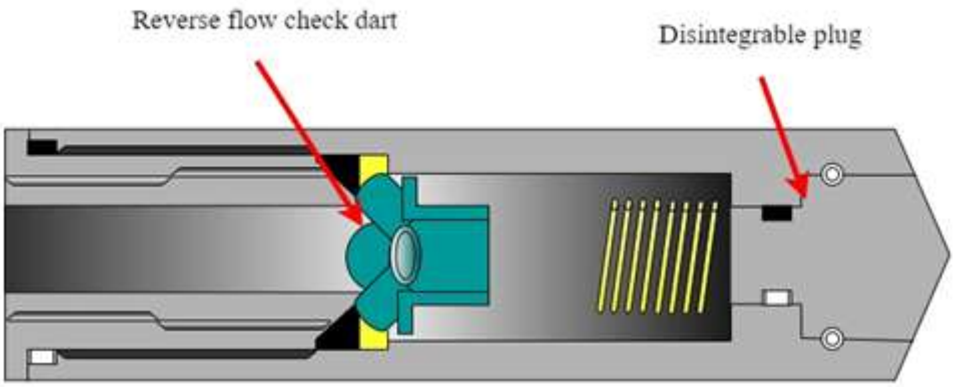

Fig. 4 Pilot Valve main components

Conventionally, dummy valves are loaded first in the side pocket mandrels to isolate the tubing from annulus and whole assembly is being installed in a well then the live gas lift valves replace the dummy valves through wire-line interventions. This whole process is cumbersome and poses risks to infrastructure, delays the production, and hence cost additionally. In starting of 21^{st} century, nanotechnology started to emerge in the oil industry and by virtue of this, a smart gas lift valve (**fig. 5**) was developed which was made with Nano-structured Composite Material (NCM) Technology. This smart valve is deployed as a dummy valve while completion operation and later can be converted in to live valve by disintegration of nano-structured composite plug in brine during well cleanup process. This smart valve eliminates several slickline trips after completion and enables to unload well and start production. More than 1000 smart valves are installed in gas lift wells in Southeast Asia offshore fields (Xu et al., 2014).

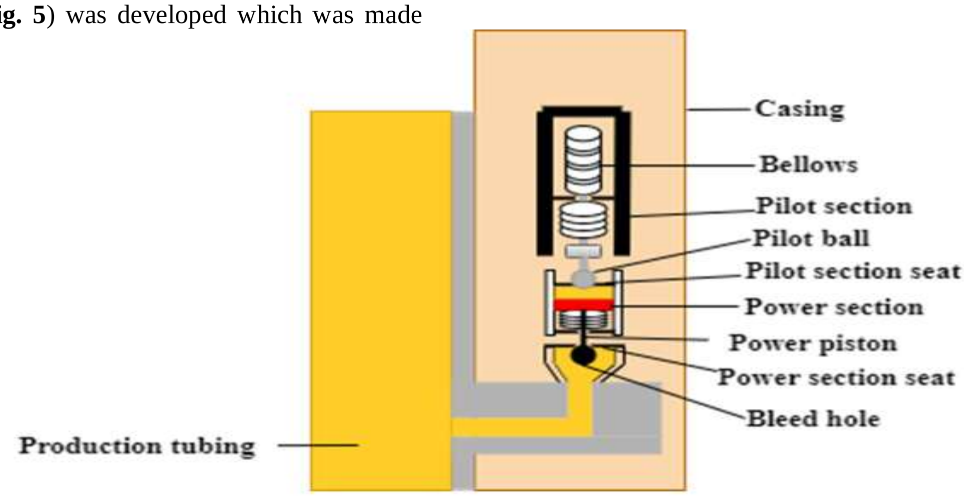

Fig. 5 Smart gas lift valve with time-controlled disintegrable plug

Gas lift optimization is started to be done with fuzzy logic, pattern recognition and intelligent network, but the potential of Artificial Neural Network (ANN) is larger than all others (Ranjan et al., 2015). The use of ANN in gas lift is to increase the hydrocarbon production by selecting the injection gas rate optimally. Nodal analysis, gas lift optimization etc. are the areas where ANN can be used extensively by ANN models with varying numbers of neuron in each layer. It is confirmed that ANN model can do optimization of gas lift system better than any other conventional models (Ranjan et al., 2015).

Gas lift is moving in to an era of digitalization with the creation of digital and smart gas lift systems. Here the digital gas lift is an electronically controlled mandrel which is conveyed through tubing and installed (BenAmara and Silverwell, 2016). These mandrels include 6 independent injection orifices. By this system operator at surface has ability to change the injection rate according to the need by opening and closing of orifice in certain combinations. Mandrels can be controlled by Surface Control System (SCS) through electrical control line. The whole gas lift system is computerized and the use of software systems like Supervisory Control and Data Acquisition (SCADA) system enables the operator to monitor and remotely controlling the system. This will reduce the monitoring time and decision making time and allow operator to give command to system in real time. Also it reduces the physical trips to the individual wells so that the cost of transportation and HSE risk is minimized. SSSV (Subsurface Safety Valve) valve can also be controlled remotely. The smart sensors and controllers installed downhole measure the temperature, pressure, flowrate of liquid and gas in real time and control them respectively and make this system a smart system and reduce the chances of risks by aiding to act faster (BenAmara and Silverwell, 2016).

III. EXAMPLES FROM THE WORLD

3.1. Claymore field case study

Claymore field is located in continental shelf of United Kingdom. The field was discovered by Occidental of Scotland with well which penetrated 158 meters of oil sand at a depth of 2459 meters subsea in 1974. It is 161 km northeast of Aberdeen in central North Sea. The total Original Oil in Place (OOIP) of field is 1452.9 million barrels and estimated reserves are 511 million barrels. To boost the production water injection and gas lift system is applied.

Table 1: Well data of Claymore field

Well No.	Initial Production (BOPD)	Declined production after few months (BOPD)	Production rate after gas injection through top gas lift mandrel (BOPD)	Declined rate after few months (BOPD)	Production rate after gas injection through last gas lift mandrel (BOPD)
C2	14000	9000	12400	8500	10000
C6	8900	6900	10000	6610	12000
C12	6300	3000	Not available	Not available	6700

Present case study discusses about the success of gas lift implementation in Claymore field. A rapid production decline was predicted after the one year, so suitable artificial lift was recommended in completion stage along with water injection to maintain the production rate (DeMoss and Tiemann, 1979). Due to the low Gas-oil ratio of the crude gas lift was found to be most suitable artificial lift. Gas used to lift the oil was supplied from the Piper field and the surface injection pressure of 1850 psi was found to be most effective

3.2. Example from India

Neelam oil field is a field of ONGC in western Indian offshore and around 45 kms Southwest from Mumbai city. The field was commissioned in1994 (Singh, 2009). There are 11 production platform and 2 water injection platform. Early production from southern sector was started in 1990. In 1994-95, full development drilling program was carried out. Bassien formation of upper Middle to Upper Eocene age is oil and gas bearing so oil is produced from Bassien formation. Mukta formation of lower Oligocene age (carbonate rock) contains gas which is responsible for gas production in Neelam field (Prasad, 2011).

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Other details of Neelam field are given in the table 2.

Table 2: Field information data on Neelam field

Field	Neelam oil field in western Indian offshore
Operator Company	Oil and Natural Gas Corporation Ltd.
Discovery year	1987
Initial Oil In Place	109.7 MMT
Ultimate recoverable reserve	32.325 MMT
Current Oil rate	23000 BOPD
Current Gas rate	1.37 MMSCMD
Current average water cut	81%
Cumulative Produced Oil	34.4 MMT (till year 2017-18)
Recovered oil	31.3 % of initial oil in place (till year 2017-18)
Peak production	95000 BOPD (in December, 1994)

The production from this field was started in 1990 from Neelam-01 wellhead platform. After the peak production of 95000 BOPD in December, 1994, rapid production decline was witnessed. The water cut has suddenly shoot up in Neelam-05, 07, 09 and 06 wellhead platforms and led to the ceasures of these wells. So to increase the production and to arrest a rapid decline gas lift was implemented in 1996 instead of 2001 as planned. So gas lift was installed 5 years earlier than schedule.

Northern part of Neelam field which is sector-III (**figure 6**) is geologically very complex and highly unpredictable and found higher GOR in the wells located there. Neelam-10 and 11 was having high GOR and water cut and started ceasing. There are 91 wells in this field. In which 72 are on continuous gas lift, 1 was on self-flow and 18 wells are ceased either due to high water cut (more than 97%) or due to leakage in tubing causing circulating of lift gas only. So around 10 wells were having tubing leaks and they are optimized by repairing of the leaks (Singh, 2009).

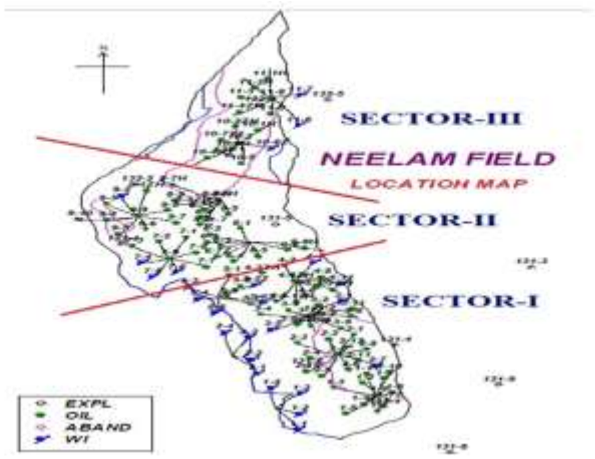

Fig. 6 Location Map of Neelam field

Neelam field needs constant optimization of gas lift and accurate monitoring through the year. Following activities are performed in this field for gas lift optimization:

(1) Fine tuning of injection gas of wells: Flow arm temperature, Gas Injection Pressure, Flowing Tubing head Temperature, Gas Injection rate are continuously monitored through SCADA system and take any corrective action if well seems to be deoptimized. Five to eight wells were optimized each moths and extra gain of 200 BOPD to 400 BOPD is observed as a result of optimization (in a year of 2006-07). Wells are likely to deoptimized due to following general reasons: (i) Disturbance in gas lift header due to shutdown or sudden trip of gas compressor, (ii) Increase in back pressure because of the shutdown of plant, (ii) Leakage in tubing (Singh, 2009).

(2) Performance analysis of a well: Flowing gradient survey of all the wells is done periodically and resulted data is to be analysed and auctioned to be taken if any well underperforms. In a year of 2006-07, 57 wells out of 72 running on gas lift were undergone the flowing gradient survey. Out of which in 50 wells, the gas was found to be passed through GLVs but in other 7 wells, gas was not able to pass through GLV. The reasons behind the inability of gas flow through GLV were: (i) Design of the GLVs was not corresponding to the new changed Productivity Index of a well, (ii) The opening pressure of GLV was higher than the lift gas pressure at the GLV, (iii) Mandrel were being choked with scales. GLV replacement work was carried out in 10 such underperforming wells and this resulted in to the gain of 512 BOPD of oil and saving of lift gas by 71184 SCMD (in a year 2006-07). In 2007-08, 16 wells are undergone flowing gradient survey and GLVs of 9 wells were replaced with new and this resulted in extra gain of 713 BOPD of oil and saving of 71184 SCMD of lift gas (Singh, 2009)

Here as we can see from **figure 7** that after the replacement of GLV on one well resulted in significant gain of hydrocarbon production.

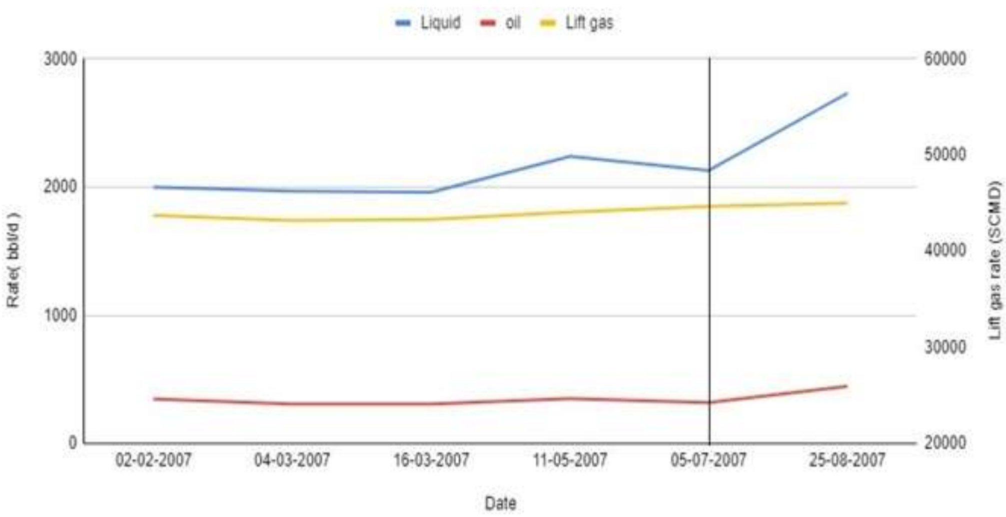

Fig. 7 Gain achieved after carrying out GLV replacement in NLM2#4

IV. DISCUSSION

Gas lift has shown its huge potential in offshore wells where square inch of space matters and cost millions of dollars. Gas lift system also works very well in the gassy wells. Since it occupies less space at the surface it is highly preferable in offshore and urban areas. It can handle certain amount of solids and can be deployed in slightly crooked wells but still the problem with this system is the gas hydrate formation problem but it can be tackled by inhibitors but the conventional inhibitor like methanol and glycol are toxic and they have to be removed from hydrocarbon before transferring to refinery. Environment friendly inhibitors are developed recently but they are very costly (Nengkoda, 2009). So there is a large scope of research in this area.

In smaller field, even after satisfying all the selection criteria, gas lift cannot be implemented because of the need of huge capital investment which makes this project economically unfeasible for smaller fields. On the safety aspects, as discussed, there are studies on gas lift systems

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too, but due to working with high pressure gas pipelines there is always a risk associated with this and the safety standard must be followed. Strength of casing and tubing has to be assessed to a maximum operating pressure limit and meticulous surveillance of casing and tubing has to be performed after fixed interval of time (Mitra, 2012).

Gas lift is not used in the horizontal well profile. In such conditions, injected gas might flow at higher velocity without lifting any liquid because of the gravity segregation of phases in horizontal section of the well.

Future of gas lift as briefly discussed earlier the emergence of ANN, Artificial Intelligence, Machine learning and Internet of Things will happen to increase the efficiency of system by making it simple to operate, quick and accurate.

V. CONCLUSION AND WAY FORWARD

For last few decades, gas lift has proven to be one of the best artificial lift to bring the oil up to the surface which had declined their production. Gas lift provides wide range of production rates and can be applied in deviated wells, deep water wells and gassy wells. In recent time, since the easy oil has gone, industry has moved to deep water to meet the energy requirements. Gas lift provides flexible approach in these harsh conditions to implement gas lift in subsea as well as offshore platform. Early efforts made to implement this technology in modern type completions and optimize the system have given the successful results in later stage. More and more challenges in gas lift have resulted into significant innovations and new ideas which have made gas lift a modern day technology.

Digitization in gas lift technology has potential to bring this technology to an ultimate level. Operators now will have surface control system through which they can take required steps to optimize the system or bring the system in stable conditions. For various well conditions and fluid properties, digital gas lift system will provide greater benefits for development of fields.

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