



IntelliFlex[®]

ADVANCED VERTICAL PUMPING UNIT

IntelliFlex®

Build Best Brand Vertical Pumping Unit Worldwide

In the past 20 years Lift Innovation Universal (LIU) has made unrelenting efforts toward integrating the most advanced technology and the most reliable design into a superior product. In mainland China, North America, South America, the Middle East, Russia, and other regions we will assist our customers in the development of safe and reliable utilization of IntelliFlex vertical pumping units.

By being a global leader in technology LIU has grown from a Chinese oil pumping equipment manufacturer into a multinational company providing excellent solutions to its customers worldwide. IntelliFlex vertical pumping units have been recognized throughout the industry for the development of shale horizontal wells, thermal recovery of heavy oil, and drainage of natural gas wells by winning the favor of global oil and gas customers.

Durable ■

Reliable ■

Energy Conservation ■

DESIGN METHODOLOGY

01 Power Transmission System

Motor,Deceleration Roller(Including reducer,supporter and shell, etc.)

02 Braking System

Electromagnetic Brake、 Brake Holder

03 Suspension System

Beam Hanger、 Load Belt、 Belt Hanger Connector

◆ INTERNET + TECHNOLOGY

As an Internet + Petro-equipment industry leader, LIU integrates cloud computing, Big Data, Internet of Things (IoT), and Mobile Internet to achieve an Internet Petro-equipment. Similarly, LIU innovates by combining Petrol-Control-Integration and Monitoring-Maintenance-Analysis (MMA) 3-in-1 Data Link for cost saving purposes. Additionally, LIU provides a low cost, highly reliable, and super intelligent digital control platform on the cloud-based system. As a result, it can offer system upgrades to meet customers' requirements.

◆ OPERATION AND PERFORMANCE

When using the Alternating Current Variable Frequency Drive (AC VFD) control technology, the controlled motor drives a deceleration roller back and forth to complete the reciprocating motion of the load belt. On the other hand, the movement of the output roller through forward and reverse rotation produces a back and forth movement of the load belt. As a result, the roller's motion creates an up and down movement of the counterweight box and the downhole load. The variable control of the motor and the deceleration roller mechanism provides unrivaled digital control of stroke and frequency of the Intelliflex®. As long stroke pumping unit with derrick frame, the Intelliflex® is developed using an advanced technology series which comprises torque control, intelligent control theory, and vector control.

Significantly, the simplified mechanical structure and premier operating methodology of the Intelliflex® can effortlessly adjust the stroke frequency and stroke length providing maximum reliability with minimum maintenance costs. When well service is needed, four abdicating lifting wheels in the base can conveniently allow the product to move away from the wellhead to provide access. After servicing, the wellhead alignment can be done by returning the Intelliflex® unit to its previous location. This ease of mobility results in cost savings by reducing labor costs and increasing operating hours. More so, the control system of the Intelliflex® allows real-time management of wellhead operation by utilizing the programmable logic controller (PLC) technology and remote terminal unit (RTU) technology. Resultantly, it provides continuous monitoring and adjustment for parameters such as stroke length, effective pumping length, and stroke frequency resulting in optimum liquid production. With a series of advanced technology combined with precision manufacturing, the Intelliflex® ensures unrivalled reliability and efficiency while providing simplicity of operation and maintenance.

04 Control System

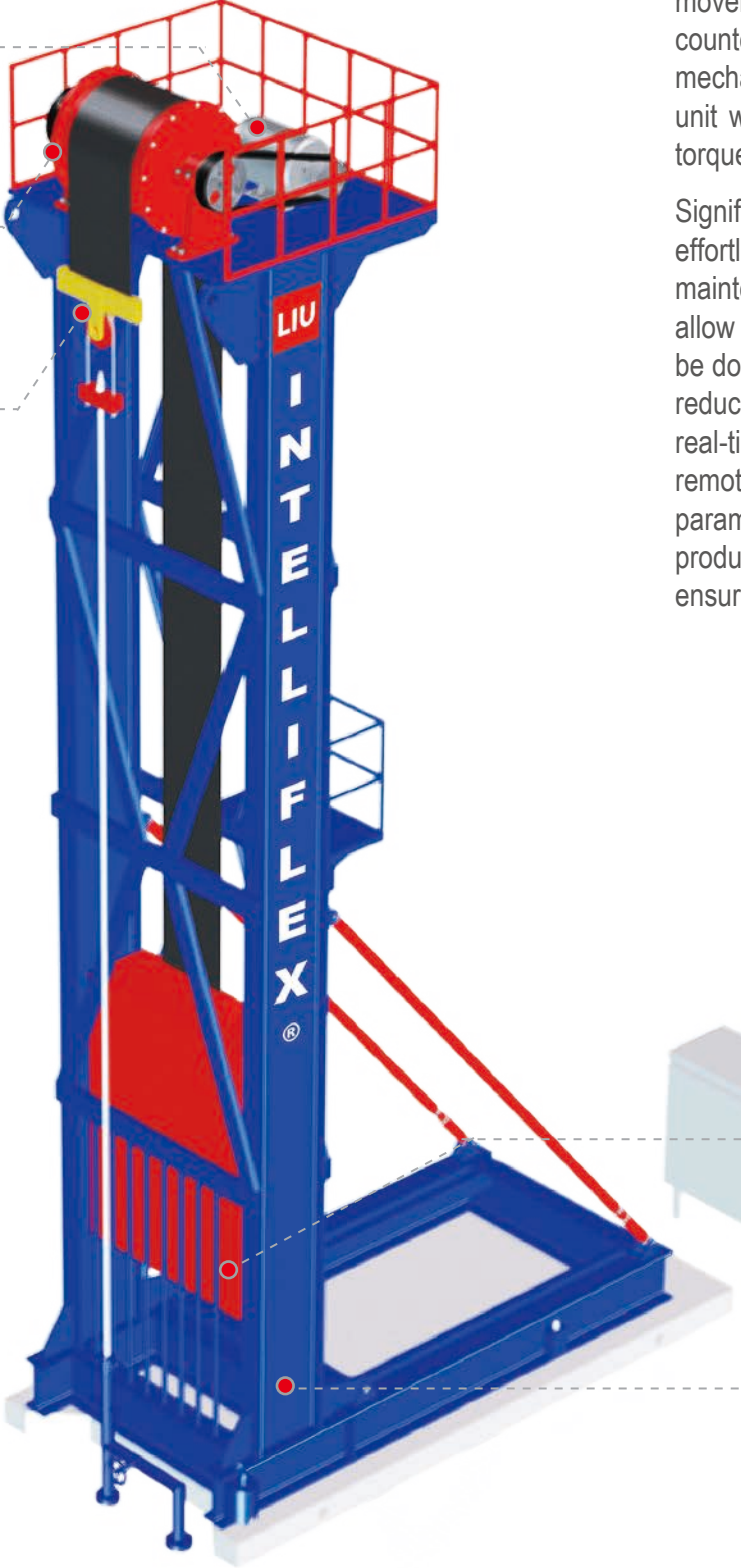
AC VFD Control Cabinet、 Proximity Switch、 Sensors

05 Balance System

Counterweight Box、 Anti-fall Device

06 Frame and Base System

Upper Platform、 Derrick Frame、 Base、 Diagonal Bars、 Ladders、 Abdicating Lifting Wheels



PRODUCT ADVANTAGE

◆ Straightforward Structure

A loading belt and a roller are the only transmission components. Notably, the elastic deformation of the loading belt and the friction between belt and roller considerably reduces the influence of changing the direction of rotation. This design extended service life of the belt which can last for more than ten years.

◆ Adaptive, Flexible and Low-Maintenance

A remarkable feature of Intelliflex® is that it has a broad operating range of 0 to 150Hz. This range is provided to the AC VFD to allow the Intelliflex® to operate in a range of environments for example in offshore platforms, ultra-deep wells, conventional wells, prolific wells, heavy oil wells, low permeability wells, and highly deviated and densely packed wells. In particular, its roller motor oil only needs two changes in a year, therefore, making its maintenance very simple. Similarly, its modular components reduce labor-costs and enhanced operational hours.

◆ Fast, Easy and Safe

LIU always puts safety as the number one priority. Its top roller, built-in counterweight, and power loss brake/protection ensures Intelliflex® is the most reliable and safe pumping unit. More so, an integrated safety system continuously monitors any overload, load-loss, phase failure, and power-off. Its operational parameters can be modified either using an interactive panel inside the control cabinet or remotely via the internet.

◆ High Mechanical and Energy Efficiency

Intelliflex® uses a specially designed AC VFD control technology. Its operating motor can dynamically produce power to match the load requirements providing continuous energy savings. On the other hand, the short drive chain and adjustable symmetrical balance further contributes to energy savings. This pumping unit delivers a minimum mechanical efficiency of 85%, and minimum system efficiency of 35% is the result.

◆ Long Stroke Length and Adjustable Frequency

Another significant feature of Intelliflex® is its efficiency which is maximized, resulting in the extended lifespan of its downhole tool. Also, with its modular design, the custom-tailored frame is conferred globally because it ensures an exact scale of stroke for wells. On the other hand, during its operation, the variable frequency drive (VFD) control system adjusts the stroke length, stroke number, and operating speed.

◆ Internet Accessible

The integrated PLC and RTU allow the control of the Intelliflex® remotely or via the internet. These features allow the operational parameters to be detected, analyzed, and modified.



Specification

Parameters						
Model	Maximum polished rod load	Stroke length	Maximum stroke per minute(SPM)	Minimum stroke per minute(SPM)	Shipping weight	IntelliFlex ® dimention at installation LxWxH
Intelliflex ® 5	11, 200 lb(5, 000 kg)	197 in.(5 m)	3	0.1	7, 700 lb (3, 500 kg)	11.2 ft x 5.3 ft x 25 ft (3.4 m x 1.6 m x 7.7 m)
Intelliflex ® 8	18, 000 lb(8, 000 kg)	197 in.(5 m)	3	0.1	12, 300 lb (5, 600 kg)	11.2 ft x 5.9 ft x 27 ft (3.4 m x 1.8 m x 8.2 m)
Intelliflex ® 10	22, 500 lb(10, 000 kg)	236 in.(6 m)	3	0.1	15, 400 lb (7, 000 kg)	14.8 ft x 6.9 ft x 32 ft (4.5 m x 2.1 m x 9.6 m)
Intelliflex ® 12	27, 000 lb(12, 000 kg)	236 in.(6 m)	3	0.1	18, 500 lb (8, 400 kg)	14.8 ft x 6.9 ft x 32 ft (4.5 m x 2.1 m x 9.6 m)
Intelliflex ® 14	31, 500 lb(14, 000 kg)	236 in.(6 m)	3	0.1	21, 600 lb (9, 800 kg)	114.8 ft x 6.9 ft x 32 ft (4.5 m x 2.1 m x 9.6 m)
Intelliflex ® 16	36, 000 lb(16, 000 kg)	315 in.(8 m)	2.5	0.1	24, 700 lb (11, 200 kg)	14.8 ft x 7.4 ft x 39 ft (4.5 m x 2.3 m x 12 m)
Intelliflex ® 18	40, 500 lb(18, 000 kg)	315 in.(8 m)	2.5	0.1	27, 800 lb (12, 600 kg)	14.8 ft x 7.4 ft x 39 ft (4.5 m x 2.3 m x 12 m)
Intelliflex ® 20	45, 000 lb(20, 000 kg)	315 in.(8 m)	2.5	0.1	30, 800 lb (14, 000 kg)	16.4 ft x 7.4 ft x 44 ft (5 m x 2.3 m x 13.5 m)
Intelliflex ® 22	49, 500 lb(22, 000 kg)	315 in.(8 m)	2.5	0.1	34, 000 lb (15, 400 kg)	16.4 ft x 7.4 ft x 44 ft (5 m x 2.3 m x 13.5 m)
Intelliflex ® 24	54, 000 lb(24, 000 kg)	394 in.(10 m)	2.5	0.1	37, 000 lb (16, 800 kg)	16.4 ft x 7.4 ft x 44 ft (5 m x 2.3 m x 13.5 m)
Intelliflex ® 26	58, 500 lb(26, 000 kg)	394 in.(10 m)	2.5	0.1	40, 100 lb (18, 200 kg)	16.4 ft x 7.4 ft x 44 ft (5 m x 2.3 m x 13.5 m)
Intelliflex ® 28	63, 000 lb(28, 000 kg)	394 in.(10 m)	2.5	0.1	43, 200 lb (19, 600 kg)	16.4 ft x 7.4 ft x 48 ft (5 m x 2.3 m x 14.5 m)
Intelliflex ® 30	67, 500 lb(30, 000 kg)	394 in.(10 m)	2.5	0.1	46, 300 lb (21, 000 kg)	16.4 ft x 7.4 ft x 48 ft (5 m x 2.3 m x 14.5 m)



GRAVITY BALANCE

Balance



UP/DONW SPM ADJUSTABLE SEPERATELY

SPM Adjustment



AC 380V ~ 480V
50Hz ~ 60Hz

Operating Voltage



FRIGID ZONE
- 50 °C 0 °C 50 °C

TEMPERATURE ZONE
- 25 °C 0 °C 40 °C

Operating Ambient Temperature

Maximum Production by Vertical Depth

IntelliFlex® 16	10	12	14	16	18	20	22	24	26	28	30
Vertical Depth	Pump Size	SPM	Stroke Length	Structural %	Maximum Production						
2,000 ft(609 m)	5.75	4.50	315 in.(8 m)	98.5	5,213 bbl/d (828.8 m³/d)						
3,000 ft(914m)	4.75	4.50	315 in.(8 m)	99.9	3,377 bbl/d (537.0 m³/d)						
4,000 ft(1,219m)	3.75	4.50	315 in.(8 m)	99.9	2,154 bbl/d (342.5 m³/d)						
5,000 ft(1,524 m)	3.25	4.50	315 in.(8 m)	100.0	1,567 bbl/d (249.1 m³/d)						
6,000 ft(1,828m)	2.75	4.50	315 in.(8 m)	100.0	1,139 bbl/d (181.2 m³/d)						
7,000 ft(2,133m)	2.5	4.50	315 in.(8 m)	99.5	909 bbl/d (144.6 m³/d)						
8,000 ft(2,438m)	2.25	4.50	315 in.(8 m)	100.0	712 bbl/d (113.2 m³/d)						
9,000 ft(2,743m)	1.75	4.50	315 in.(8 m)	100.0	485 bbl/d (77.2 m³/d)						
10,000 ft(3,048m)	1.5	4.50	315 in.(8 m)	100.0	360 bbl/d (57.3 m³/d)						
11,000 ft(3,352m)	1.25	4.50	315 in.(8 m)	99.7	263 bbl/d (41.8 m³/d)						
12,000 ft(3,657m)	1.25	4.50	315 in.(8 m)	91.9	247 bbl/d (39.4 m³/d)						

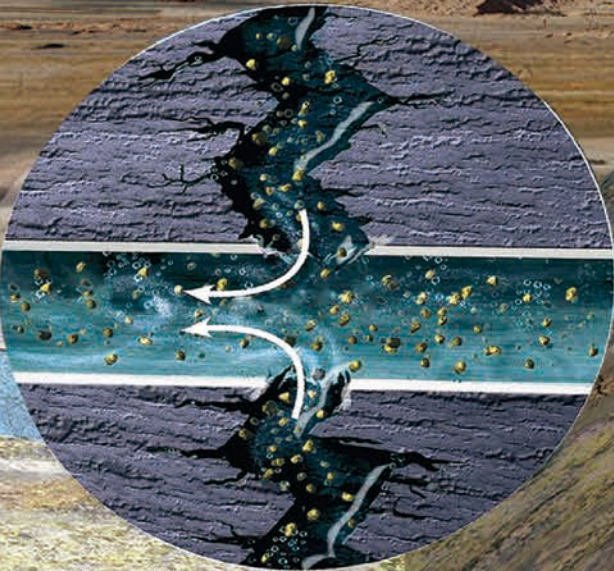
IntelliFlex® 18	10	12	14	16	18	20	22	24	26	28	30
Vertical Depth	Pump Size	SPM	Stroke Length	Structural %	Maximum Production						
2,000 ft(609 m)	5.75	4.50	315 in.(8 m)	99.5	5,341 bbl/d (849.2 m³/d)						
3,000 ft(914m)	4.75	4.50	315 in.(8 m)	99.6	3,574 bbl/d (568.3 m³/d)						
4,000 ft(1,219m)	4.25	4.50	315 in.(8 m)	100.0	2,853 bbl/d (453.5 m³/d)						
5,000 ft(1,524 m)	3.75	4.50	315 in.(8 m)	100.0	2,082 bbl/d (331.1 m³/d)						
6,000 ft(1,828m)	2.75	4.50	315 in.(8 m)	100.0	1,576 bbl/d (250.6 m³/d)						
7,000 ft(2,133m)	3.25	4.50	315 in.(8 m)	99.7	1,154 bbl/d (183.5 m³/d)						
8,000 ft(2,438m)	2.75	4.50	315 in.(8 m)	99.0	961 bbl/d (152.8 m³/d)						
9,000 ft(2,743m)	2.50	4.50	315 in.(8 m)	98.2	750 bbl/d (119.3 m³/d)						
10,000 ft(3,048m)	2.00	4.50	315 in.(8 m)	96.9	610 bbl/d (97.1 m³/d)						
11,000 ft(3,352m)	1.75	4.50	315 in.(8 m)	94.7	479 bbl/d (76.2 m³/d)						
12,000 ft(3,657m)	1.50	4.50	315 in.(8 m)	91.2	368 bbl/d (58.5 m³/d)						

IntelliFlex® 20	10	12	14	16	18	20	22	24	26	28	30
Vertical Depth	Pump Size	SPM	Stroke Length	Structural %	Maximum Production						
2,000 ft(609 m)	5.75	4.20	355 in.(9 m)	99.5	5,635 bbl/d (895.9 m³/d)						
3,000 ft(914m)	4.75	4.20	355 in.(9 m)	99.9	3,799 bbl/d (604.0 m³/d)						
4,000 ft(1,219m)	4.25	4.20	355 in.(9 m)	99.9	2,959 bbl/d (470.5 m³/d)						
5,000 ft(1,524 m)	3.75	4.20	355 in.(9 m)	99.2	2,277 bbl/d (362.1 m³/d)						
6,000 ft(1,828m)	3.25	4.20	355 in.(9 m)	100.0	1,703 bbl/d (270.7 m³/d)						
7,000 ft(2,133m)	2.75	4.20	355 in.(9 m)	99.9	1,245 bbl/d (197.9 m³/d)						
8,000 ft(2,438m)	2.50	4.20	355 in.(9 m)	99.0	1,002 bbl/d (159.3 m³/d)						
9,000 ft(2,743m)	2.25	4.20	355 in.(9 m)	97.0	816 bbl/d (129.8 m³/d)						
10,000 ft(3,048m)	1.5	4.20	355 in.(9 m)	96.0	778 bbl/d (123.7 m³/d)						
11,000 ft(3,352m)	2.00	4.20	355 in.(9 m)	94.7	629 bbl/d (100.0 m³/d)						
12,000 ft(3,657m)	1.75	4.20	355 in.(9 m)	92.9	484 bbl/d (77.1 m³/d)						

IntelliFlex® 22	10	12	14	16	18	20	22	24	26	28	30
Vertical Depth	Pump Size	SPM	Stroke Length	Structural %	Maximum Production						
2,000 ft(609 m)	5.75	4.20	355 in.(9 m)	100.0	5,712 bbl/d (908.1 m³/d)						
3,000 ft(914m)	5.25	4.20	355 in.(9 m)	99.9	4,445 bbl/d (706.6 m³/d)						
4,000 ft(1,219m)	4.50	4.20	355 in.(9 m)	99.9	3,235 bbl/d (514.4 m³/d)						
5,000 ft(1,524 m)	4.00	4.20	355 in.(9 m)	100.0	2,522 bbl/d (401.0 m³/d)						
6,000 ft(1,828m)	3.50	4.20	355 in.(9 m)	100.0	1,887 bbl/d (300.1 m³/d)						
7,000 ft(2,133m)	3.00	4.20	355 in.(9 m)	99.5	1,412 bbl/d (224.4 m³/d)						
8,000 ft(2,438m)	2.75	4.20	355 in.(9 m)	98.0	1,153 bbl/d (183.3 m³/d)						
9,000 ft(2,743m)	2.50	4.20	355 in.(9 m)	97.3	950 bbl/d (151.0 m³/d)						
10,000 ft(3,048m)	2.25	4.20	355 in.(9 m)	96.2	790 bbl/d (125.6 m³/d)						
11,000 ft(3,352m)	2.00	4.20	355 in.(9 m)	93.2	637 bbl/d (101.3 m³/d)						
12,000 ft(3,657m)	1.75	4.20	355 in.(9 m)	90.1	491 bbl/d (78.1 m³/d)						

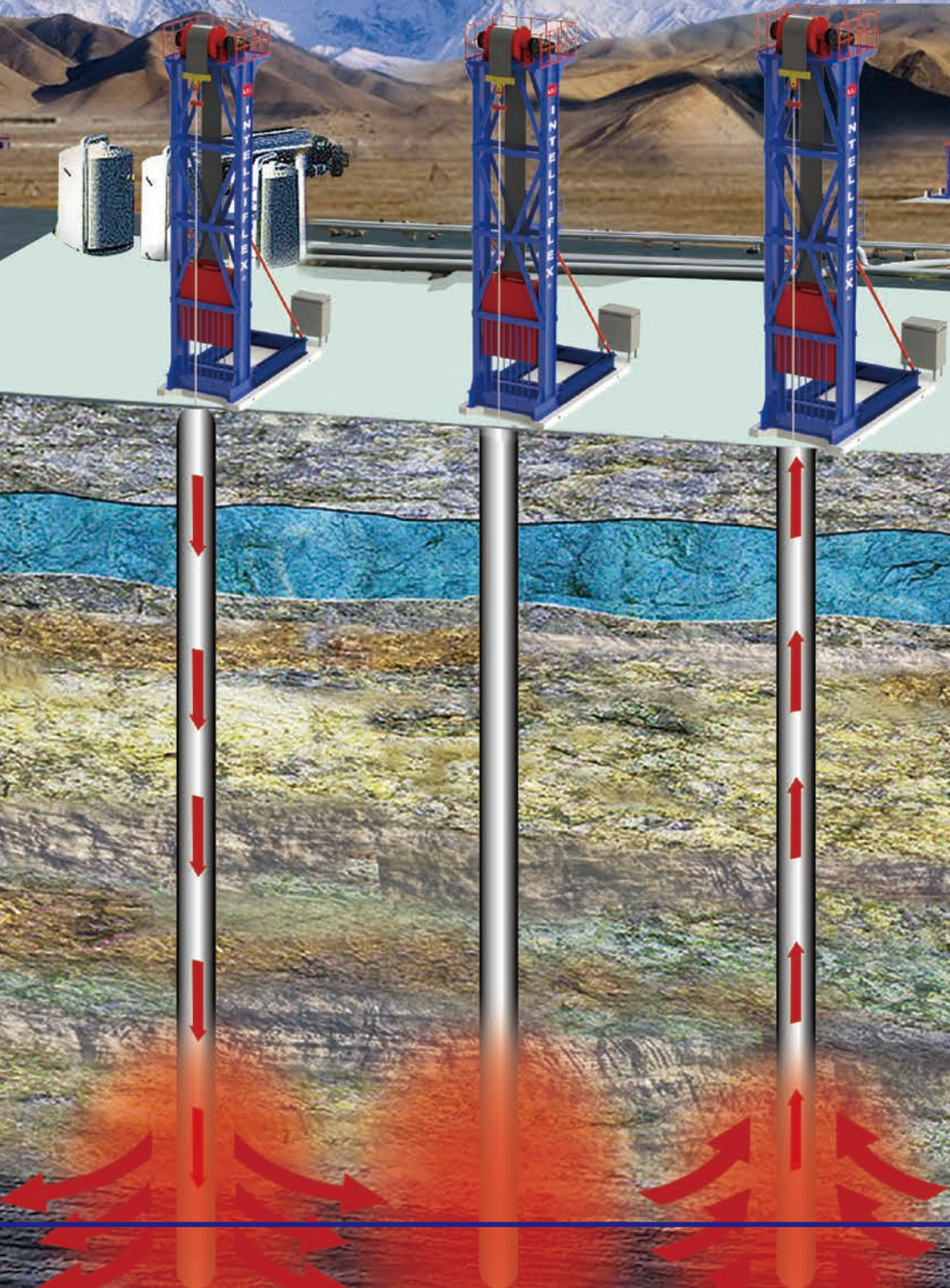
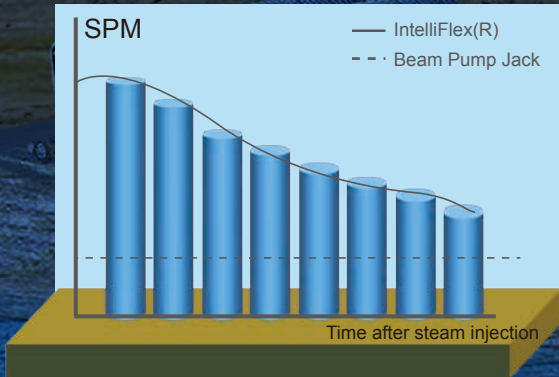
HIGH-PRODUCTIVITY FEATURES

LIU integrates long-stroke, high-load, and intelligent parameter control. IntelliFlex can modulate to long-stroke and high-load mode at the early stage of the fracking flowback which is comparable to an electric submersible pump (ESP). At the later flowback stage IntelliFlex can modulate to normal lifting mode. IntelliFlex eliminates the need for an ESP in certain production scenarios which reduces cost for our clients compared to a conventional pumping unit that requires periodic ESP use.



HEAVY OIL PRODUCTION AND THERMAL RECOVERY PRODUCTION

Intelliflex® uses different pumping rates for the downstroke and upstroke, to pump viscous oil-water fluid from dense oil wells. During this process, a slow downstroke and fast up-stroke mode can be activated in the production of heavy oil. Most importantly, Intelliflex® can modulate the frequency and stroke rates based on different viscosity and fluid levels. For example, a higher frequency could be set when pumping heavy oil from steam injection wells. Similarly, frequency can be set to decrease progressively while the viscosity of fluids gradually increases.



EFFICIENCY DESIGN
AND ENERGY SAVINGS



An outstanding characteristic of the AC VFD is that the motor varies power yield based on the load size and operating speed. As a result, it has much higher energy efficiency in comparison to the beam pumping units. Notably, for all the pumping units, the power consumption of the AC VFD control technology is the lowest.

Its short mechanical transmission chain and the proportionate balance offers excellent balance and ease of adjustment for the consumers. Its mechanical efficiency can reach exceed 85%, and the system efficiency can be greater than 35%. When Intelliflex® is compared with beam pumping units, its energy savings are consistently greater than 70%. Also, it offers consistent energy savings than ESP with a margin of about 25%.

SAVE UP TO
70%
on your
electricity cost





EXTREME OPERATING CONDITIONS

The Intelliflex® lifts are mostly used in the Gobi Desert of North Western China. The winter season there is freezing (i.e., below -40° F) while summer is scorching (i.e., above 113° F). IntelliFlex® units integrate various original all-weather designs to ensure progressive efficient and safe operations of the entire system. This region is also characterized by strong winds where more than a third of the year often experiences sandstorms and thunderstorms. Therefore, the open frame used for Intelliflex® reduces the wind resistance. On the other hand, the string steel structure on either side of the unit offers better stability compared to other vertical pumping units. As a result, its construction can withstand winds blowing at 58 knots, without disrupting its operation. Similarly, the Intelliflex® design protects it from the sand problem where dust accumulation may reduce its reliability and mechanical stability.

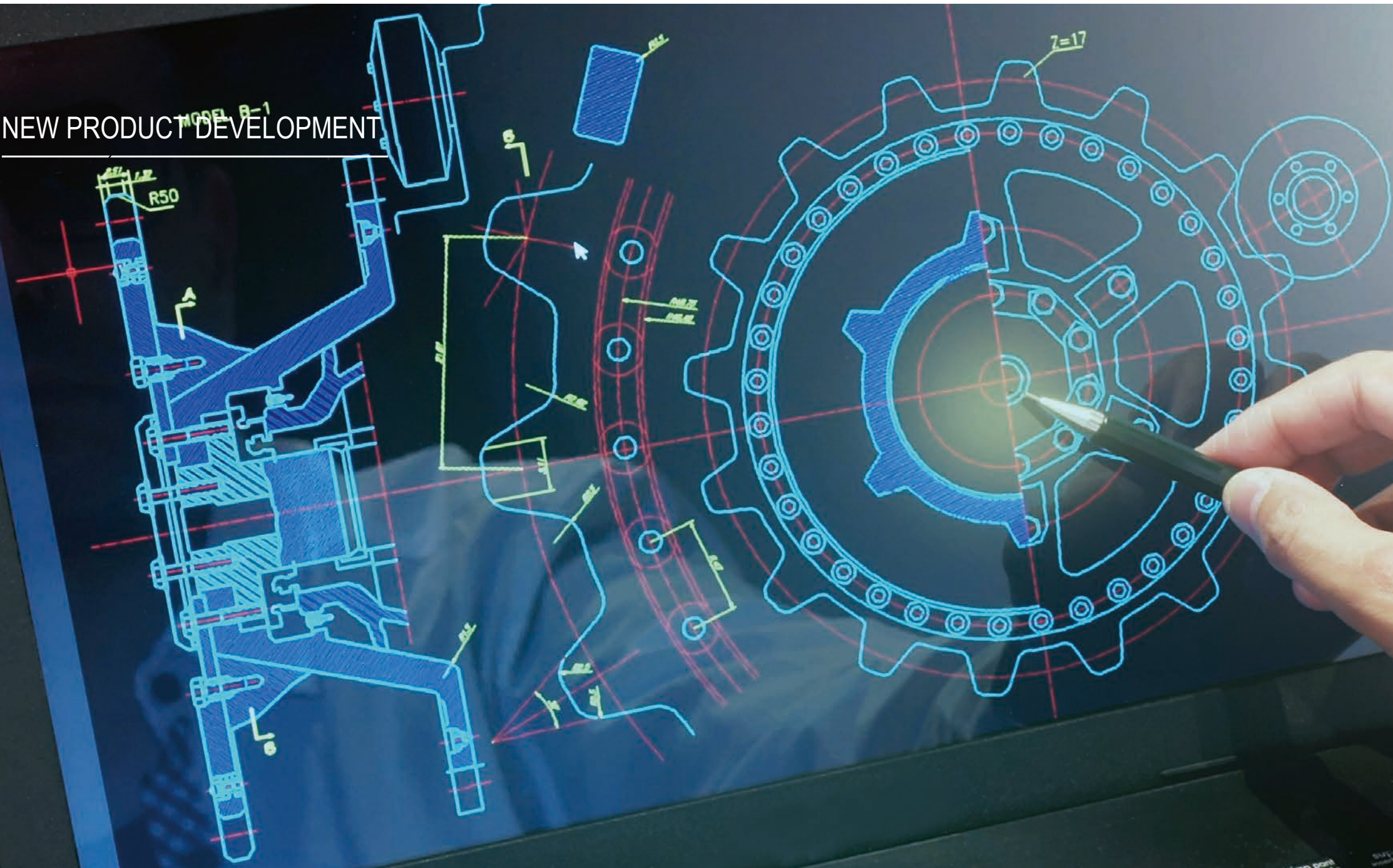
The very first batch of Intelliflex® units started being used in 2006 in Xinjiang, China. They have progressively been in operation for about 11 years. During this time, each unit has worked for more than 50,000 operational hours. Currently, more than 1,000 Intelliflex® units in operation have been deployed in the region.

Operating Temperature Range

-40°F
Min.

113°F
Max.

NEW PRODUCT DEVELOPMENT



LIU is devoted to developing upgraded product that satisfying needs of market and consumers. New Models of Intelliflex® designed by our team are equipped with permanent magnet motor, enforced synchronous belt, and significantly increased transmission efficiency. As a result, energy saving advantages of this product have been emphasized to next level, meanwhile its low-noise operating status makes maintenance and routine well inspection much more effective. For consumers who are interested in new product technologies and configurations, LIU is always eager to provide updated information and reliable solution with customizations.



HIGH-TECH CLOUD SYSTEM

Intelliflex® units utilize the remote cloud for Big Data systems control and monitoring. This connection is made via a distinct high-speed data link communication using cellular and satellite networks. Similarly, connections can be made via Bluetooth and wireless LAN. In that respect, our Big Data platform uses cloud data and can be deployed for remote control and monitoring of the operation of the unit. Additionally, other user-specified parameters for example downhole conditions can be set. In this case, the intelligent control customizes the operation and production rules based on the user needs. Lift Innovation Universal big data cloud system identified this need and implemented the "patrol and control integration" concept, for the first time in the oil and gas industry. It perfectly combined the idea of "made in China 2025" and that of international information industry 4.0, with its products.

SERVICE



Product Selection
and Technical
Support

Intelliflex® units come with free technical support for 90 days after purchase. We provide customized service to ensure the unit to be compatible with tubing design.



Operation Training

Free training courses are available for Intelliflex® consumers, including operation basics, parameters adjustment and troubleshooting, etc.



Maintenance

To keep Intelliflex® units running in perfect status, we interact and communicate with our consumers till their requirements are clear to us. Our maintenance personnel keep on standby for consultation, scheduled maintenance and part replacement services.



PROJECT CASES

Case A Well

The relative density of crude oil in this well is 0.83(api 39/59 ℉), test production was 660 bbls in 26 hours with 1spm and the well started flowing afterward. The water cut of production is 40%, daily oil production is 73 bbls, gas production is 530 mcf. The tubing pressure was 580 psi, sustained 72 hours and installed IntelliFlex® 22 at the point. The IntelliFlex unit was applying cloud-based tubing pressure monitoring, when the tubing pressure gets lower and the well stops flowing, the IntelliFlex unit will start running automatically. The settings of this well were 3 spm upstroke and 1.5 spm downstroke with 27.5 ft stroke length, the well might resume flowing after 1-hour artificial lift.

The acreage is CO2/water injection oilfield, the water cut is as high as 98%, CO2 saturation is 88%. For this specific well, its targeted production was 730 bbls fluid and 350 mcf gas. The expected pump efficiency was 50%. The expected flowing period was 1-2 months. The total production will be increased afterward as the pump efficiency increases. The maximum production of IntelliFlex® 22 with 4'-1/4 tubing pump is around 2050 bbls. It fulfilled the need and the spm/stroke length can be adjusted accordingly via cloud-based online system. This remote control/monitoring platform also massively saved the cost of pumping unit adjustment and other maintenance works and greatly reduced downtime of the well.

For this specific well, IntelliFlex® also showed its advantages of long stoke length and low spm. It relatively increased pump efficiency in high gas-fluid ratio scenario, comparing with beam pumping unit and jet pump (30% pump efficiency on average). It also reduces the chance of gas-lock, which also made the rods and pump more durable, effectively increased the stability and reliability of facilities and production.



Case B Well



The relative density of crude oil in this well is 0.9496D204(20 ℃); The viscosity at 30 ℃ is 29740m2/s, at 40 ℃ is 10039m2/s, at 50 ℃ is 3852m2/s. The freezing point is 22 ℃; Wax content is 2.29%; The gum content is 3.98%; Salt content is 10241mg/l; Sediment concentration 0.09%; Sulfur content of 0.13%; The initial distillation point is 232 ℃. Initial production of daily liquid production 35t, daily oil production 15t, the cumulative production of 1330 days, accumulative oil producing 12761.56t, the average water cut is 62.33%.

As an electromechanical integrated pumping unit, the Intelliflex unit has the characteristics of high efficiency, energy saving, no polarization adjustment in the rated range, and more, the speed of polished rod upward or downward can be regulated separately.Intelliflex has intelligent processing mode with perfect protection function, making it a safe and reliable machine, simple operation, easily adjust parameter, high efficiency in motor power factor and system. It also just need simple and convenient maintenance, without any disadvantages of beam pumping unit, such as difficulty of adjusting reference, high energy consumption. Accordingly, the labor work is required very little, which improve the production efficiency of oil wells and low the relative cost. The total maintenance cost of the oil well is only 1/5, compared with one with a beam pumping unit. The electrical part adopts the advanced frequency converter to optimize the operation of the motor, which reduces the electromagnetic loss. So its power factor is more than 85%, which reduces the reactive loss and improves the efficiency of the whole system.

Case C Well



The relative density of crude oil in this well is 0.9584D204(20 ℃); The viscosity at 30 ℃ is 19000m2/s, at 40 ℃ is 7409m2/s, at 50 ℃ is 2805m2/s. The freezing point is 16 ℃; Wax content is 1.28%; The gum content is 5.99%; Salt content is 2461mg/l; Sediment concentration 0.13%; Sulfur content of 0.06%; Bituminous content is 0.53%; he initial distillation point is 132 ℃. The cumulative production of 348 days, accumulative oil producing 2577.19t, the average water cut is 29.61%. Stroke Per Minute (SPM) of the units is directly related to the energy consumption. It is more complicated to adjust the SPM of the beam pumping unit, which usually need replace the belt or a speed regulating motor, which means labor intensive and the SPM can not match accurately the change of downhole fluid volume thus resulting in the large times of strokes with low yield (The unit volume of liquid consumes a lot of electricity). On opposite, IntelliFlex is easy to adjust and can be adjusted in a few seconds without down time. The SPM can be adjusted according to the amount of liquid in a timely manner, which significantly reduces the energy consumption.It has been over one year since IntelliFlex was installed in this oil well. Based on the records on our remote monitoring platform, we have adjusted parameters 49 times according to different needs, safely, smoothly, satisfactory and accurate.