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ANTON WORKOVER & WELL TESTING

TECHNOLOGY SERVICE





01 COMPANY PROFILE

02 TECHOLOGY AND SERVICE



COMPANY PROFILE

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ANTON Well testing and Workover Technology provides customers with workover and completion, formation/production test, milling and fishing, Casing Damage Restore, special oil recovery, TRS operation and other technical services to promote oil and gas well production recovery and stimulation. With the international completion standard management system, high-quality global service team and rapid global resource mobilization capability, we will provide customers with a new experience of safety, quality, efficiency and cost reduction.

- > Workover & well test process design and scheme optimization
- Shut-in well reactivation technical service
- Technical service for increasing production of low permeability and ultralow permeability oil reservoirs
- Inefficiency block stimulation technical services
- Casing damage well restore technical service
- Technical service of integrated workover & completion
- Integrated technical service for gas storage wellbore preparation
- > Shut-in well repeated transformation of integrated technical services







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DST Well Testing Technology

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ANTON DST(APR) testing technology can be performed operation by combined with perforating, well testing, acidizing, injecting and CTU through one trip string. With the characteristics of shortening well test period and saving operation cost, which is suitable for high temperature, high pressure and high sulfur oil and gas wells in onshore or offshore platform of oil fields.

> Service ability

Have a complete DST(APR) test technical service team, experienced SWT, APR, DST, MFE technical experts, engineers and so on. In Iraq, Chad, Central Asia and other countries and regions, the company has provided more than 130 Wells testing services



Scop of work

- DST(APR) combined perforation and testing design.
- DST(APR) single packer testing
- DST(APR) straddle testing
- PR+TCP combined testing.

> Technical characteristics

- Open and close LPR-N tester by control pressure to perform multiple opening and shut in wells to obtain formation data and information.
- Full opening, open and close OMNI valve to achieve circulating, perform acidizing or squeezing operation for the formation, and effectively shorten the operation time.
- Suitable for pressure range: 0~15,000 psi and casing size: 5-1/2" to 9-5/8".
- To obtain formation pressure, skin factor, permeability and other parameters by interpreting well testing data and provide the evidences for scientific development of oil fields.



Surface Well Testing Technology

Anton surface well testing technology is useing the surface testing equipment to control and divert the formation fluids to separate, measure and handing these fluids by separators, gauge tank or surge tank and burner, measure the pressure and flow rate of formation fluids accurately, and provide accurate information and data for the evaluation of oil and gas reservoirs.

Technical characteristics

- High-accuracy, separate and measure the flow rate of oil, gas and water by three phase separator.
- Modern measuring instruments, computer data acquisition system, data complete and accurate.
- Handing and testing crude oil & gas with high efficiency green burner, protect environment, harmless
- To obtain formation pressure, skin factor, permeability and other parameters by interpreting well testing data from data acquisition system and PVT sample testing, and provide the evidences for scientific development of oil and gas fields.



Scope of Service

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- Surface measuring and testing design
- Surface measuring and testing services
- Surface flow back and testing services







Slick-line Operation Technology

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Slick line technology can sent special wire-work tools to Wellbore under pressure to perform corresponding work. The purpose is to quickly, reliably, and safely complete various downhole operations without tool stuck or tooll breaks.

Fechnical characteristics

- High accurate memory electronic pressure & temperature gauges, more accurately to record the formation pressure and temperature data.
- To obtain formation pressure, skin factor, permeability and other parameters by interpreting well testing data from accurate memory electronic pressure & temperature gauges and combined with other testing data, and provide the evidences for scientific development of oil and gas fields



Scope of Service

- Pressure test for completion string.
- Running and pulling plug
- Open & close SSD
- Downhole PVT sampling.
- Hanging memory electronic P/T gauge
- Survey flow or static P/T gradient
- Running and retrieved gas lift valve
- Slickline fishing operation





Abandoned Well Sealing Technology

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With the later stages of the oilfield development life cycle, or laws and regulations related to natural ecological reserves, more and more Wells need to be properly disposed of to ensure well integrity and safety during shut-in and abandoned, and to protect the reservoir, groundwater and environment.

Mathing technology

- Abandoned well sealing technology solution
- Bridge plug+Cement sealing technology
- Squeeze plugging technology
- Milling casing section+Squeeze sealing technology
- Wellhead treatment technology of abandoned Wells
- Squeeze plugging technology with pressure
- Downhole Tools and techniques for sealing wellbore
- Sealing cement slurry system



Technical advantage

- Preventing leakage of oil and gas fire and explosion ground
- Preventing the poisonous and harmful gas leakage
- preventing reservoir of oil and gas leak to the surface
- preventing environmental pollution impact on groundwater resource system
- Avoiding abandoned Wells and waste of land resources



Complex Fishing Technology

ANTON oil has an experienced professional fishing technical team, equipped with a complete range of fishing tools, including milling and fishing, and has accumulated more than 700 welles fishing experience in China and other countrys, so as to design the best fishing plan and efficient and high-quality technical services for customers



> Technology application

 Has provided technical services for more than 700 Wells leading the industry in salvage success rate

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- > Technical characteristics
- Experienced global expert support system, with remote real-time support capability
- Optimize design and process measures for different falling objects
- Special tools R & D, design and processing, with special tools to support the ability
- To provide from design to tools,and operations integrated fishing technical services

Service scope

- High pressure, high sulfur content, high-risk areas
- Wells overhaul technology
- Remove sticking
- Blocking channeling and plugging technology
- Technical service for horizontal well overhaul
- Efficient milling technology services
- Technology of abandoned engineering well



Stuck CT Fishing Technology

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Coiled tubing operation process for various reasons (such as sand stuck, clastic stuck) led to the Stuck is a common complicated accident, if the stuck is invalid, maybe need to use workover equipment for the fishing operations, often by pull and down the string, large flow rate circulatory cleanout, liquid nitrogen solution lift such as conventional release stuck technology.

- Mathing technology
- Slim hole tool technology
- Fishing technology inside of Coiled tubing
- Fishing technique through tubular column
- Cuting Coiled tubing technology
- External sealing technology for CT
- Releasing stuck point by pressure



fluctuation out of string

Casing Damage Restore Technology

Can use Optical fiber logging, downhole eagle eye system and other three-dimensional imaging detection of casing deformation, for various types of casing deformation casing damage Wells, respectively, using hydraulic pressure and impact expanding, milling and opening after squeezing cement plugging, expansion tube subsidy reinforcement, liner cementing and other repair processes.

Series of matching casing restore technology

- Drilling small diameter channel technology
- Rotating jar expanding technique
- Eccentric roll expanding technology
- Casing rolling expanding technology
- casing hydraulic multistage expanding technology
- Casing free section leak sealling technology
- Casing NST enpanding technology
- Liquid casing technology

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- Flexible casing subsidy technology
- Broken casing section squeeze sealing and reinforcement technology

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Three-dimensional imaging detection of casing deformation







Wellbore Restoration Technique

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Has an experienced professional wellbore restoration technical team, equipped with a full range of fishing tools, casing expanding tools and wellbore restoration tools, to provide the best restoration solutions and efficient and highquality technical services for deviated Wells, horizontal Wells and other Wells

- Wellbore condition diagnosis technology
- Wellbore leakage detection technology
- Wellbore leakage plugging technology
- Casing expanding technology
- Casing patch technology
- Wellbore fishing technique
- Wellbore reinforcement technology
- Wellbore rebuild technology









The horizontal Wells are generally put into operation by the repeated staged fracturing technology. After a period of time, with the decline of production, the production casing in the horizontal section will also be deformed, damaged and broken, which brings many problems to the further exploitation of the potential of horizontal Wells.

Technical countermeasures and application scope

- Expansion tube subsidy technology: It is suitable for no or slight deformation of the casing after workover. It is recommended to use the whole section expansion tube subsidy technology to reconstruct the wellbore. It is characterized by low wellbore requirements, minimization of inner diameter loss, simple operation, and strong applicability
- Liquid casing technology: After the casing is repaired, there is no deformation, but the damage is serious. Special plugging agent is used to squeeze and reinforce each damaged section, and then the casing plugging agent is drilled to rebuilt the wellbore, and then the bridge plug fracturing technology is adopted to carry out the second transformation.
- Liner hanging secondary completion technology: After casing repair, there is a slight deformation, but the casing damage is serious, using the liner hanging secondary completion technology to rebuild the wellbore. It is characterized by simple process, convenient operation and enhanced wellbore strength



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For heavy oil Wells, high waxy oil and gas production Wells production string easy to the matter of paraffin deposit, through the oil casing annulus the temperature above 80 °C oil injection reservoir, to dissolve or melt of the near wellbore area, to improve the reservoir percolation channel near wellbore area, the purpose of increase production of crude oil, as well as cleaning the production casing, tubing and rod, extended the well production cycle.

- Special Technology
 - Hot-Clean loss-proof string technology
 - Efficient wax melting equipment services
 - New chemical wax removal and prevention technology: the use of wax removal agent flash point ≥60 °C, wax dissolution rate ≥0.016 g/min, freezing point ≤-20 °C, wax prevention rate ≥ 30%, no organic sulfur, organochlorine, will not cause corrosion to the field equipment

> Technical Advantage

- Hot oil washing does not affect production
- Low circulating pressure, less loss
- The well cleanning fluid has good compatibility and high efficiency
- Reduce pumping unit load, energy saving and consumption reduction
- Prolong the production cycle, good economy





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Iow-Pressure Wells Sand Removal Technology

At present, the phenomenon of sand production exists in some oil Wells, forming sand column at the bottom of the well, burying the production zone, and reducing the production of Wells. In addition, it can erode and damage downhole and surface pipelines, especially precipitate or scale in ground oil pipelines, which affects oil and gas output. For mechanical lift production Wells, sand entering the pump barrel causes a high probability of sand stuck, which seriously affects the service life and efficiency of pump, resulting in frequent workovers and increasing oil recovery costs

- Technical Solution
- Nitrogen + Foam liquid sand removal technology
- Nitrogen sand removal technology
- Production zone blocking and sand removal technology
- Mechanical sand swabbing technology
- Negative pressure sand removal technology

Application Range

- The depth of the well is more than 2000 meters when Negative pressure sand removal, and the static liquid level in the well is not less than 1500~2000 m.
- Production casing is not less than 5 1/2 "
- The formation pressure factor is less than 1.0
- No casing diamater variation, or casing diamater variation less than the outside diameter of the sand removal string and tool



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TRS Technical Service



ANTON provides the most advanced technical service of running oil/casing at all of the world. Through special equipment and instruments and strict technical standards, we can accurately monitor the torque of connecting of tubing or casing. To ensure high pressure/high temperature/high H_2S and other special oil and gas well safety and environmental protection production, prolong the service life of the string, save the development cost.

Service scope

- Provide 2 7/8 "-5 1/2" tubing TRS technical services
- Provide 7 "-14" casing TRS technical services
- Meet the requirements of VAM TOP, BGT, FOX, 3SB and other special thread drilling tools
- Providing matching gas tightness testing service of pipe string

> Technology application

Served more than 300 Wells in 8 domestic and foreign oil and gas markets in China, Middle East and Africa.





Low-Density Completion Fluid Technology

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ANTON workover & completion fluid technology services to carry out operation fluid technology solutions, and solid control, environmental protection and waste disposal services, including micro bubble leakproof workover fluid system using salt, efficient, stable foam agent, foaming agent, can satisfy 130 °C high temperature using the environment (12h) and density of 0.85 g/cm³, has the very good shear thinning, thixotropy is strong, is advantageous to the suspended solid particles.

Technology application

- Over 1200 Wells have been completed each year with technical services for well workover and completion fluids for many years.
- Provide technical consultation and support for complex well fluids in China, Middle East, Africa and other regions

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> Technical characteristics

- It has the right density to ensure safe operation and prevent damage to oil and gas reservoirs
- With good rheological properties, can effectively carry cuttings, clean the wellbore, and can be suspended weight material, keep the fluid density stable
- It has certain high temperature resistance and shear resistance stability
- The corrosion of drill pipe, casing and metal equipment is weak
- Service scope
- Completion fluid technical services
 - No solid kill fluid, low density workover fluid
 - Water based, oil based, and synthetic based liquid systems
- EFS (solid control, environmental protection and waste disposal) services
- Liquid technical support and training technology application
- To provide effective solutions to a variety of fluid related downhole complications

Environmental swabbing technology

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Casing Swabbing technology is generally applicable to remote, inefficient, shut-down Wells of crude oil recovery operations, to a certain extent, instead of the traditional pumping production, with flexible mobility, easy to nipple down and up, single well swabbing time is short, a wide coverage of single vehicle coverage, can effectively reduce the daily operation and management cost of inefficient Wells.

Range of application

- No deformation and diameter reduction of casing
- There is no rod column in the wellbore, and the well structure is complete
- Hydrogen sulfide is below 7ppm
- Maximum operating well depth: 2000m
- Tubing/casing size: between 2 7/8 "and 9"



Technical feature

- Wide range of applications, no extra preparation is required
- The oil fishing equipment is flexible and easy to install
- Meet the needs of remote, real estate and shut-down Wells
- Real-time monitoring, digital oil extraction
- Safety and environmental protection



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Electric heating reduce viscosity Technology

Through electromagnetic induction and skin effect, Anton Electric heating viscosityfication technology can realize efficient conversion from electric energy to heat energy, so as to make up for the heat loss of heavy oil and high condensate oil in the production process and ensure the fluidity of crude oil.

Technical Feature

- High power, high thermal efficiency: power up to 160W/m, cable temperature up to 150°C within 1 minute, heating uniform
- High degree of automation: signal through optical cable or wireless upload DCS, remote monitoring and control, unattended
- Long service life, safety, energy saving and environmental protection: the designed service life of 20 years

Application Range

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- The technology of electric heat tracing, reduce visicosity and blocking prevention in ground gathering and transmission pipeline
- Wax removal technology of gas well production string by electric heating
- Wax removal technology by electric heating from gusher production string
- Electric heating of ESP well viscosity reduction and wax removal technology
- Hollow rod electric heating + thickening pump lifting technology
- Production string electric heating + thickening pump lifting technology



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18

Power Ultrasonic Stimulation Technology

Ultrasonic removal plug stimulation technology is one of the high and new technologies based on physics, mechanical vibration, electronic materials and other disciplines. It is based on ultrasonic energy to make the object or physical properties of some state changes in the application of technology. After ultrasonic treatment, a series of comprehensive effects such as mechanics, heat, chemistry and cavitation can be produced to improve seepage conditions and increase oil well production.

Application effect

- 30% increase in production per well for more than 90 days
- Single well will continue to be effective 90 days after daily oil increase of 1.0 tons or more
- Single well accumulated oil increase of more than 130t
- The geological injection volume can be maintained for more than 180 days
- The cumulative injection increase per well is greater than or equal to 1600 cubic meters
- Wellhead water injection pressure drops more than 2.0MPa (greater than 2.0MPa)



- > The technology principle
 - Break energy balance to restore stationary oil to flow, increase the available reserves
 - Vibration effect on the reservoir micro cracks increase reservoir permeability, improve the seepage conditions
- Thermal cracking lower crude oil viscosity, improve crude oil mobility
- Cavitation lower crude oil viscosity



Ground instrument
Cable
Power switching device
Magnetic positioner
Gamma meter
Monitoring module
Transducer

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Water regulating and plugging technology

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Water regulating and plugging technology: block oil well high water seepage channel, adjust liquid production profile, reduce water Outline of oil well, increase oil production; block or reduce water absorption capacity of high permeability layer, increase low permeability layer, adjust formation water absorption section; improve the development effect of high or high water bearing fields, prolong the stable production time of reservoir, and realize the potential of remaining oil.

- Mechanical water plugging and cutting control technology
- Chemical water plugging and section regulation technology of oil well
- Profining technology of injection Wells
- Deep section technique
- Deep control technology
- Oil and water well correspond to water plugging and cutting control technology
- Technology of oilfield block

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Around the wall	Near the well	Far well	Deep
of the well	zone	location	formation
≤0.5m	0.5m ~ 3.0m	3.0m ~ 20m	≥20



Near the well strip leakage



Water drive into



Bottom water coning



One connection of oil and water Wells

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A Model of Efficient & Harmonious

Development Between Human & Environment

Help Others Succeed...