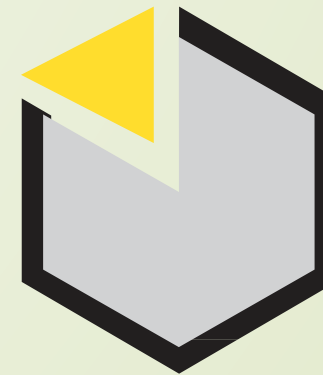


Introduction.

Currently, the main industries, shipbuilding and oil and gas sectors are increasingly paying attention to alternative materials that serve as a substitute for metal. In our time, the diversity of technologies has also affected the oil and gas sector. The main problems in oil production are such harmful factors as corrosion, paraffin deposits. Due to the development of the well fund, the problem of further deepening arises. All these problems need to be solved, and here one of the solutions is the use of composite materials. The transition to the use of fiberglass pipes and pumping rods instead of steel is due to their following advantages:

- high specific strength;
- high corrosion resistance;
- inactivity to paraffin deposits, which reduces hydraulic resistance, thereby increasing throughput and reducing energy consumption;
- increased service life (according to various estimates-from 25 years or more);
- the possibility of forming.

We offer you to get acquainted with the list of equipment offered by LLC Promtekhkomplekt to solve the voiced problems in oil production



ПРОМТЕХКОМПЛЕКТ
ПРОМЫШЛЕННАЯ ГРУППА





**Equipment for well stock, complexed by corrosion and asphalt, resin and paraffin deposits:
Fiberglass sucker-rod**

Immediacy of the problem

With every coming year an issue of downhole equipment durability hits up oil and gas producing industry. Corrosion failure of the metal turns to be the main problem, which leads to break-and-shutdown of the well.

Except for corrosion failure of the metal, there are salts and paraffin depositions – also leading to the well shutdown.

corrosion damage of metal rods



paraffin deposits on metal rods



CORROSION AND ASPHALT/RESIN/PARAFFIN DEPOSITS PREVENTION

HMP HANGER DEEPENING

ENERGY PROVIDING

Main recommended indication for Mud-pump stations:

1. High corrosion activity of produced liquid, average OT of new steel drill rods is less then 1 year;
2. High reduced stresses in a rod string and also stresses in walking beam cap;
3. Ability or/and necessity to increase a depth of pump running;

Mud-pump station use limitations:

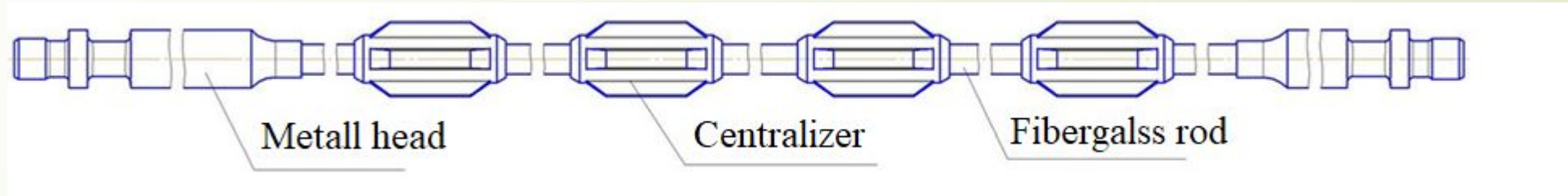
1. Presence of emulsions and a risk of having high-visosity emulsions (water intrusion from 35% to 75%).

Fiberglass rods before starting work


We note the absence of paraffin deposits after lifting the rod column

Fiberglass rods after extraction from the well

Construction. General characteristics.



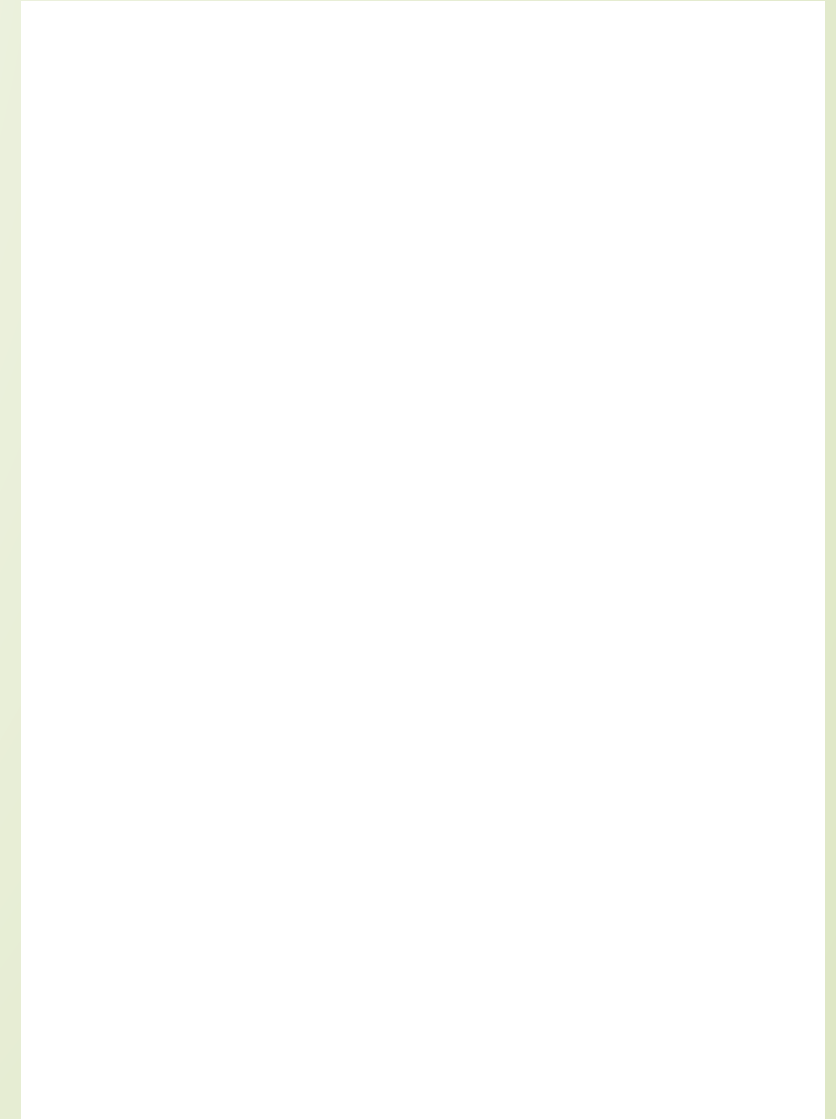
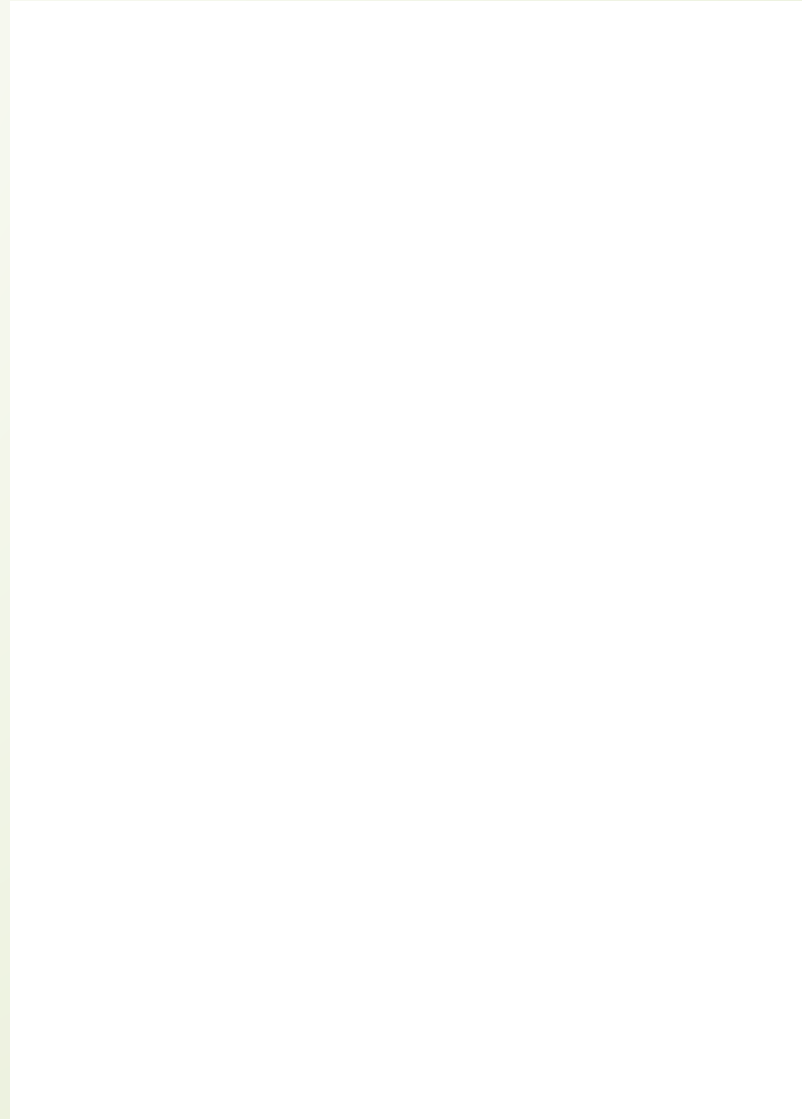
Sucker rod type	Mass, kg	Guarantee time, month	Resource, mln. cycl.	Chance of failure-free performance	Length, m.
Fiberglass sucker rod pump FSR25-8000-D-2	11	24	7,5	0,999	to 15
Steel sucker rod	33	6 (12)	5 (7,5)	0,996	to 9,2



The photograph shows several sucker rods stacked together. In the foreground, a fiberglass rod is visible, connected to a metal head. The metal head has some markings, including "01122-112/ 02/14". The rods are arranged in a way that shows their different materials and components.

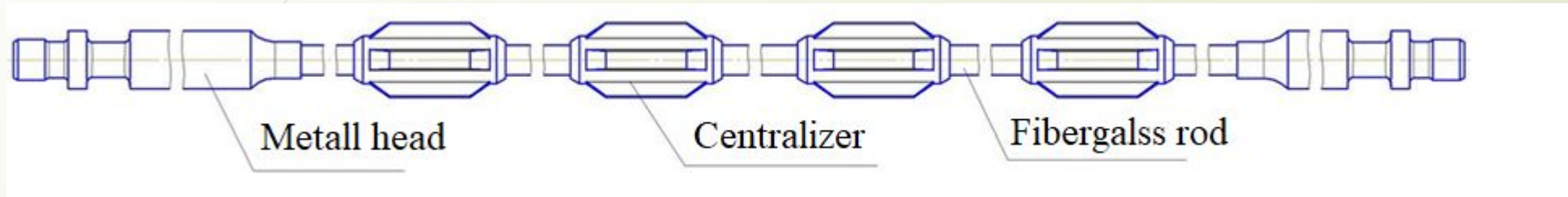
Identifier name	Constructi on steel	Composive materials
Tensile strength, MPa	900	1200
Density, kg/m ³	7800	2000
Roughness coefficient	0,03	0,0015
Elasticity coefficient	210 000	46 000
Thermal conductivity, W/mK	50	0,15
Operating temperature, C	to 300	to 130
Cold resistance, C	- 60	- 60
Corrosion resistance	X	✓
Torsion resistance	✓	X
Rubbing resistance	✓	X

Fiberglass pumping rods are manufactured using a unique technology of joining metal and fiberglass. The production is fully certified by international ISO and OHSAS certificates



Comparison with global competition. Fiberglass rod manufactured by Weatherford and John Crane.

The design of the fiberglass pumping rod produced by LLC UK Promtekhkomplekt and the world leaders Weatherford and John Crane is visually similar.



However, due to the improvement of the internal structure of the joint, it was possible to achieve an increase in technical indicators for the maximum load on the rod and the working load, as well as significantly reduce the cost of the rod.

Working load, tons.

Weatherford	John Crane	Promtekhkomplekt
12...19	12...19	min 19

Maximum short-term load, tons.

Weatherford	John Crane	Promtekhkomplekt
18...27	18...27	up to 45

Price \$ / pc. at the average rate of 2021

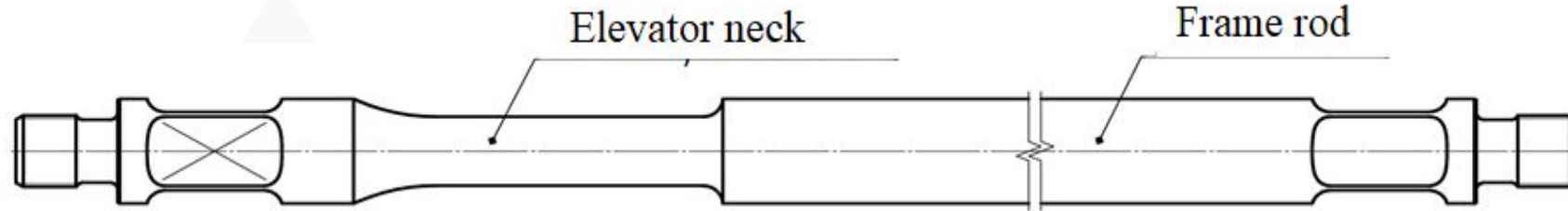
Weatherford	John Crane	Promtekhkomplekt
270	245	150

Corrosion prevention with 50/50 fiberglass sucker-rod pumps and steel sucker rods composed

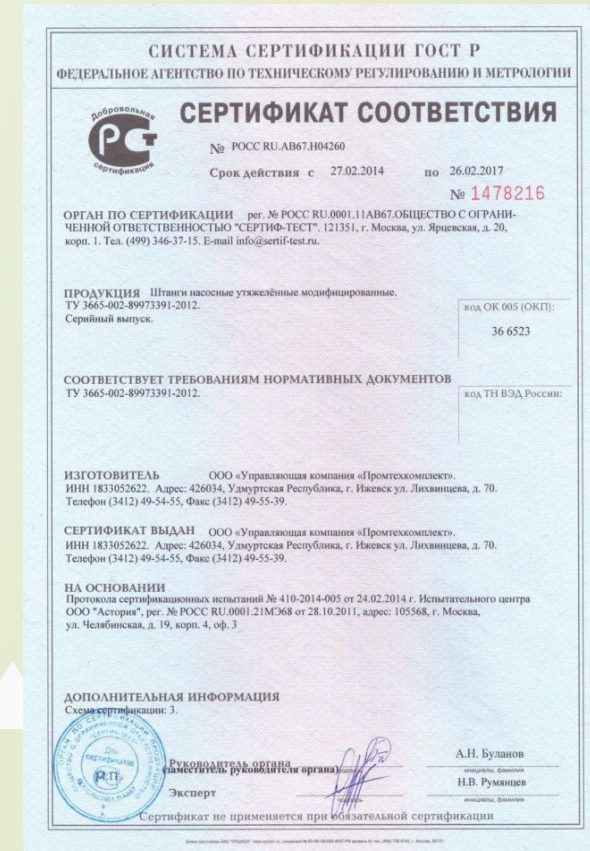
Identifier name	1		2		3	
	before	after	before	after	before	after
Date of implementation	09.11.2012		09.09.2013		03.11.2010	
Pump running depth, m	1072	970	952	1032	1042	1042
Plunger pump diameter, mm	44	44	57	44	57	57
Rod string composition	SR22 – –565m	FSR22 – 516m	SR22 – 528m	FSR25 – 480m	SR22 – 1042m	FSR22 – 400m
	SR19 – 507m	SR22 – 454m	SR19 – 424m	SR22 – 552m		SR22 – 642m
Maximal load of piston rod, t	4,08	3,56	4,59	3,78	5,76	4,3
Fluid debit, m ³ /day	15	17	11,7	14	21	33
Well average runtime, days	134	672+	101	489+	98	210+

Conclusion: multial increasing of well average runtime with constant level of fluid withdrawal, currently more than 600 wells are in operating.

Weighted modified pump rod usage



Weighted rod	Mass, kg	Elevating neck diameter, mm	Fishing neck diameter, mm	Thread	Final size, mm	Roughness, mkm
WMPR44-6100 (ТУ)	71,6	29	-	22	33	Ra 1,25
WPR44-6100 (ГОСТ)	71,2	25	25	22	38,1	no machining



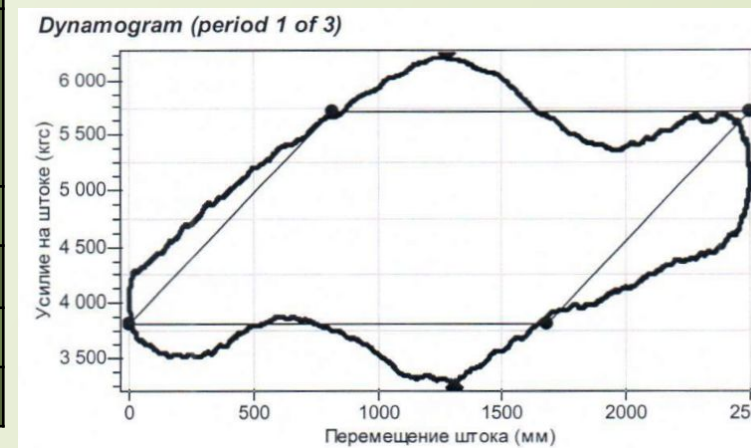
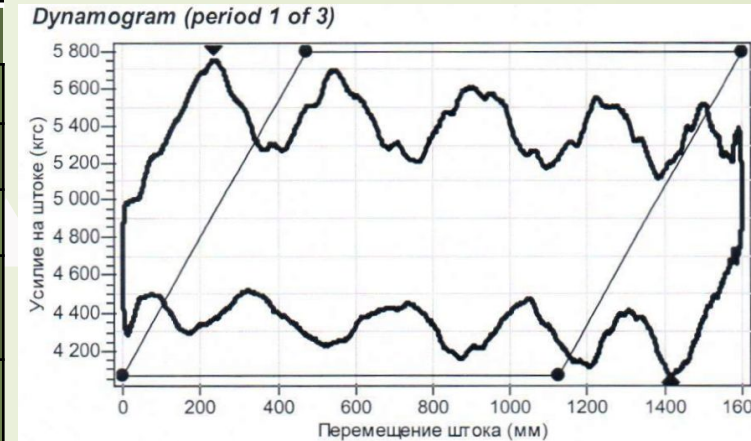
Corrosion and asphalt, resin, paraffin deposits prevention with 90/10 fiberglass sucker-rods and weighted pump rods composed

Identifier name	1		2		3	
	before	after	before	after	before	after
Date of implementation	15.03.2015		02.04.2015		12.08.2014	
Pump running depth, m	940	940	893	1000	1260	1413
Plunger pump diameter, mm	44	57	44	57	44	44
Pump rate, min ⁻¹	6	6	4,4	5,8	3	3
Walking beam stroke, m	2,5	2,5	3	3	3	3
Maximal load of piston rod, t						
Fluid debit, m ³ /days	25	27	20	25	10	15
Average run time to failure, days	217		130		231	
Current run time, days		442+		431+		668+

Conclusion:
Increasing of run time to failure with constant level of fluid withdrawal, currently 500 wells of this composition are in operation.

Slip hanger deepening, using standard surface drive and fiberglass sucker-rod string

Identifier name	3	
	before	after
Date of implementation	2015	
Pump running depth, m	1600	1900
Plunger pump diameter, mm	1121	1390
Walking beam stroke L / Pumping speed N	32	44
Rod string composition	2 m / 4 min ⁻¹	2,5 m / 4 min ⁻¹
Maximal load of piston rod, t	SR25-524	FSR25 – 992
	SR22-560	SR22 – 896
	SR19 – 486	SR19 – 8
Fluid debit, m ³ /day	5,8	6,1
Oil debit, t/day	4,8	6,4
Run time, day	3,11	5,28
Date of implementation	221	446+



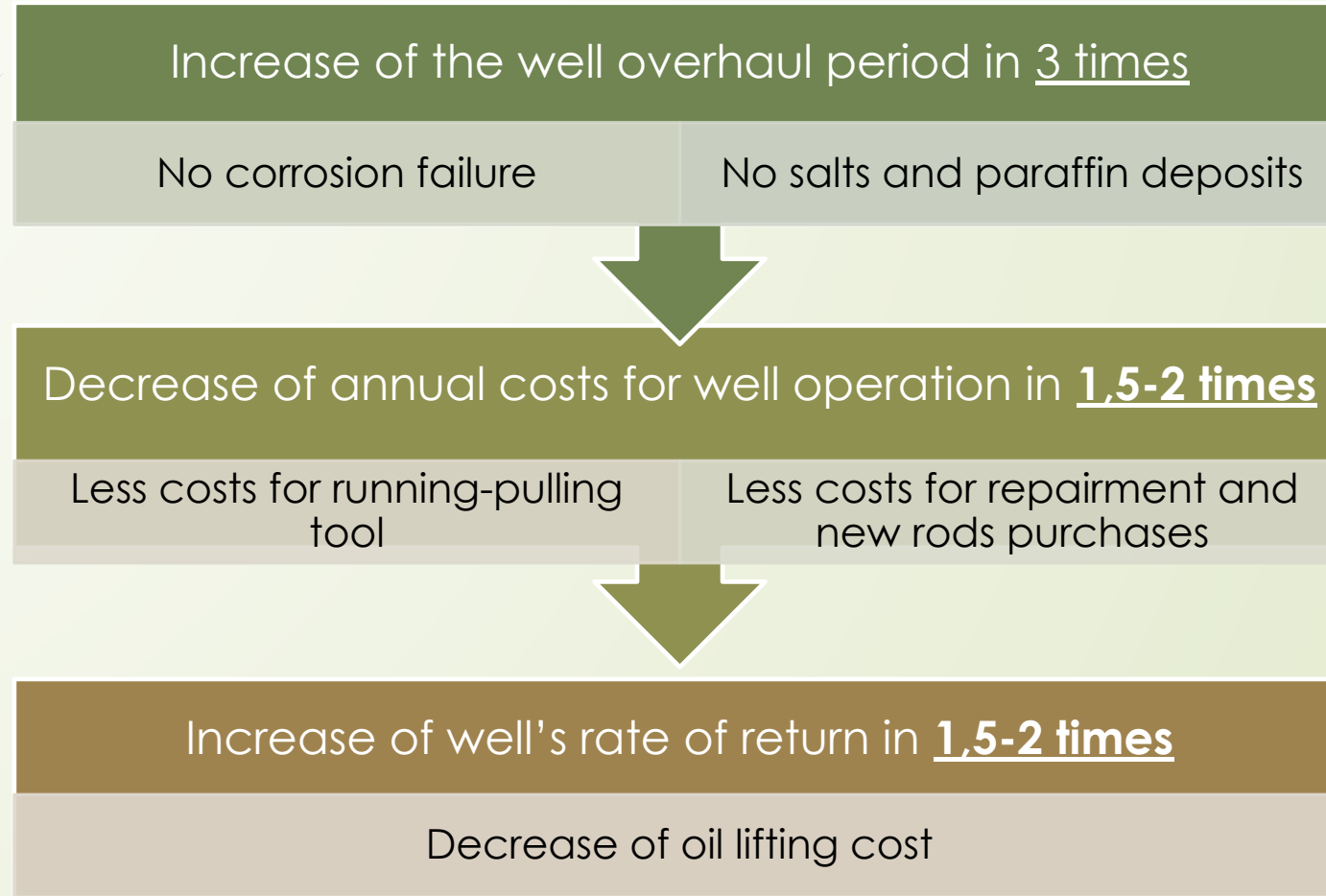
Conclusion : Increasing of pump running depth on 300 m with following decreasing of oilwell gas impact (gas factor: 152m³/t) on pump's operating. Increase of oil production on 2,17 t/day.

Fiberglass sucker-rod application results



1. Efficiency of mud-pump station applying is proved on well stock, complicated by high aggressivity of producing fluid. Short and multiple increasing of well average runtime and run time to failure of the rod string.
2. At least 5% decreasing of specific energy for 1 m³ of producing fluid.
3. No troubles when running-pulling operations and station minor&major repairs. Using of standard technologies and tools.
4. From 2011 year succesful field tests were performed in 6 companies. Currently more than 1000 wells with fiberglass sucker-rods are being successfully operated in oil companies of Russia: PJSC Rosneft Oil Company, PJSC Tatneft im. V.D.Shashina, Bajteks etc.), LUKOIL and also near abroad – KazMunaiGaz(Kazakhstan), Shirvan Operating Company Limited(Azerbaijan).

Implementation of fiberglass sucker-rods leads to the following points:



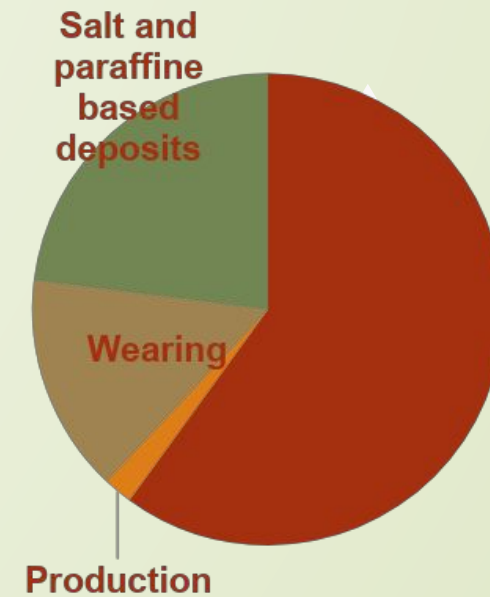
Fiberglass oilwell tubing and casing string pipes



With each passing year oil and gas extraction industry faces cutting **issue of durability** of casing strings and oilwell tubing in production and injection wells.

The biggest problem is **corrosion failure of material** (metal) that leads to further loss of piping integrity and premature well shut-down.

Besides corrosion failure, there's also an **issue of salt and paraffin based deposits** under the conditions of high-viscosity oil production. Further, this leads to decrease of pipeline drift diameter, and usually, to decrease of produced fluid amount.



Currently, **ways of solving the problems** that arise while using oilwell tubing and casing strings are the following:

- Usage of non-corrosive metals (doesn't exclude salt and paraffin based deposits development);
- Usage of various internal and external pipe coverings; (in our experience, as protection covering destructs, further metal corrosion appears)
- Usage of composite materials (fiberglass) when producing pipes;

Parameter/variant	Pipes made of non-corrosive metals	Pipes with covering	Fiberglass pipes
Working life, years	5	7	25
Reliability of operation	✓	✓ X	✓
Chemical corrosion resistance	X	✓ X	✓
Electrochemical corrosion resistance	X	X	✓
Salt and paraffine based deposits resistance	X	✓ X	✓
Price of ready-to-use pipe	✓	✓	X

- When comparing prices, non-corrosive pipes made of high-grade 30CrMo Steel, MajorPack pipes with covering and fiberglass pipes were used;

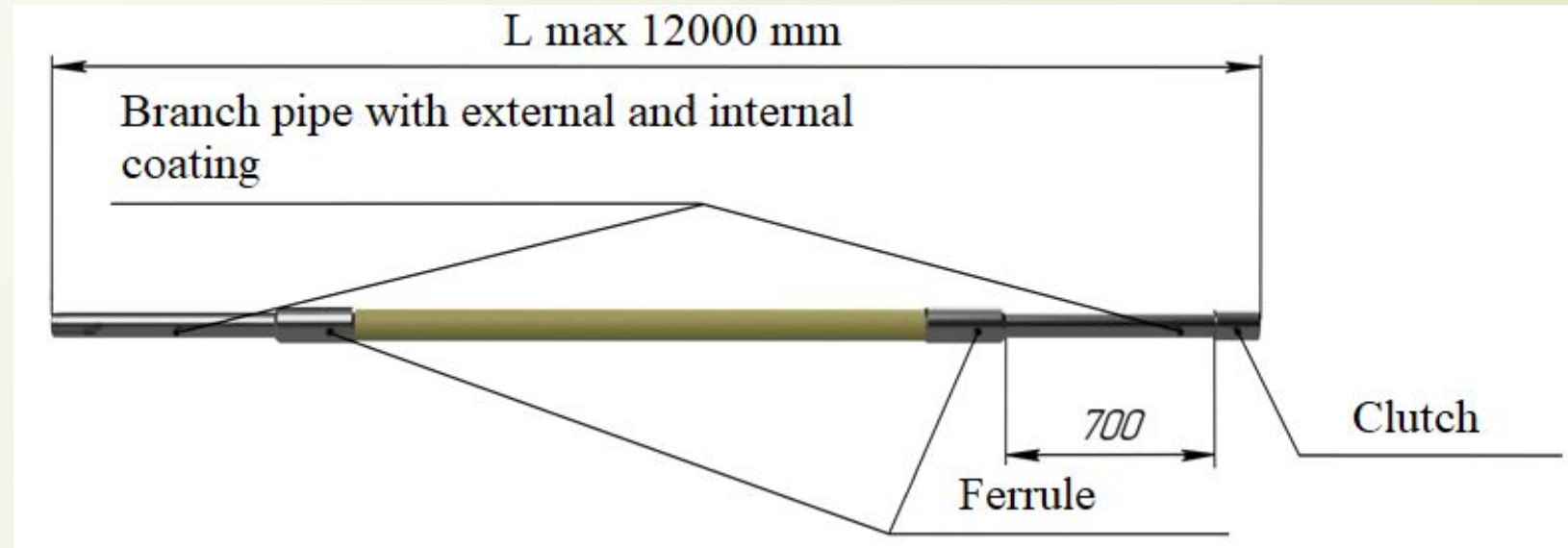
At the moment, there are three suppliers of oilwell tubing and casing strings:

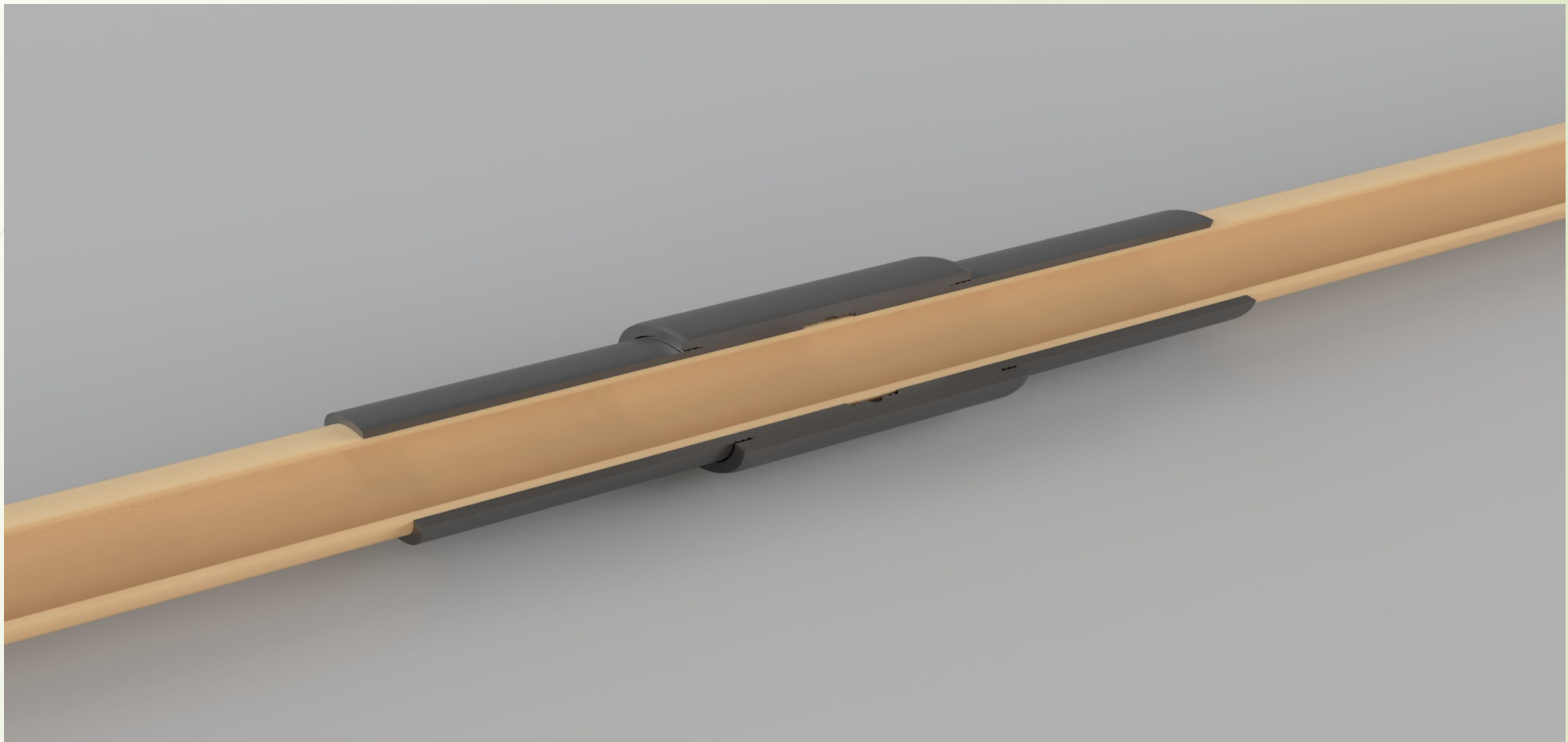
- Joint manufacture of fiberglass pipes with metallic threaded heads LLC “GP Promtekhkomplekt”, Izhevsk, and LLC “GFB”, Biysk;
- LLC “FPP”, Kazan (Fiberglass pipes plant of Kazan)
- LLC “FiberGlassRus”, USA

Criteria/Producer	LLC “FPP”	LLC “FuberGlassRus”	LLC “GP Promtekhkomplekt” and LLC “Glass factory of Biysk”
Number of running-pulling tools, times (according to screw joint life)	4	4	Min 10
Number of screw joint repair operations, times*	2-3	2-3	More than 3
Usage of standard equipment for running-pulling tools operation	×	×	✓
Opportunity to conduct screw joint repair work at the well itself**	×	×	✓
Usage of standard lubricants for screw joint	×	×	✓

- Number of repair operations comes from pattern of damage and total length of fiberglass pipe;
- ** Conduction of screw joint repair work depends on pipe construction type;

In 2012 LLC GP “Promtekhkomplekt” produced 3 suspensions of fiberglass oilwell tubing (henceforth FOT) to operate at well stock with abnormally high level of corrosion. Before fiberglass equipment has been implemented, average run time to failure of oilwell tubing made 120 days. After FOT and fiberglass sucker rods had implemented, well operated for 437 days with subsequent breakdown of pump plant. Further well operation monitoring has not been conducted.

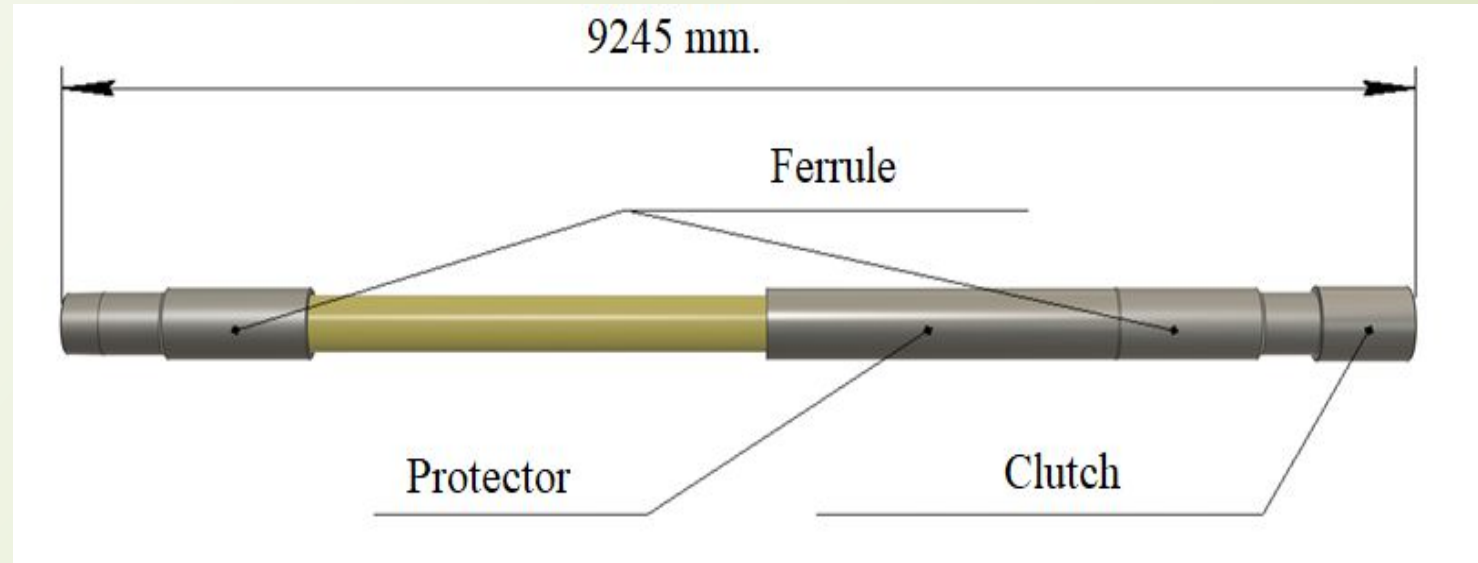




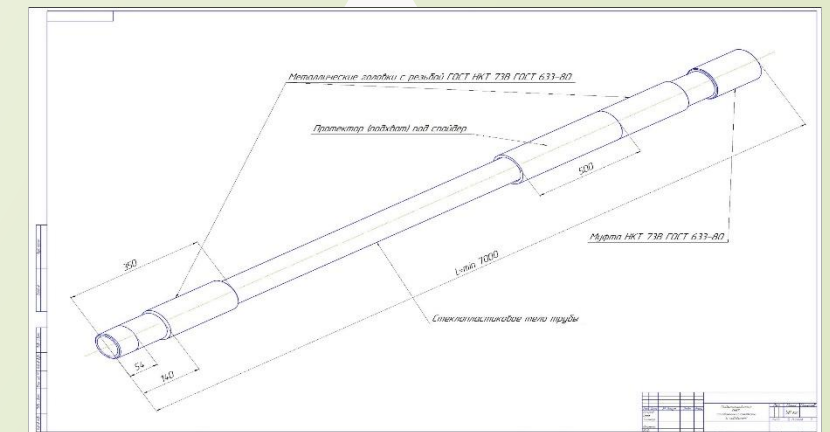
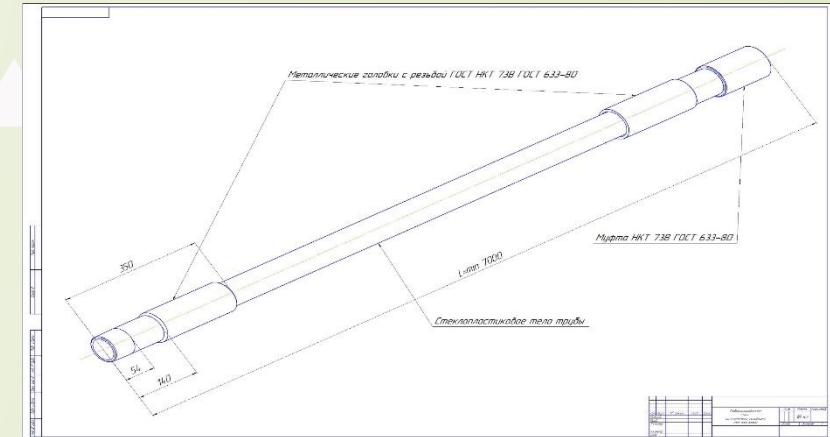
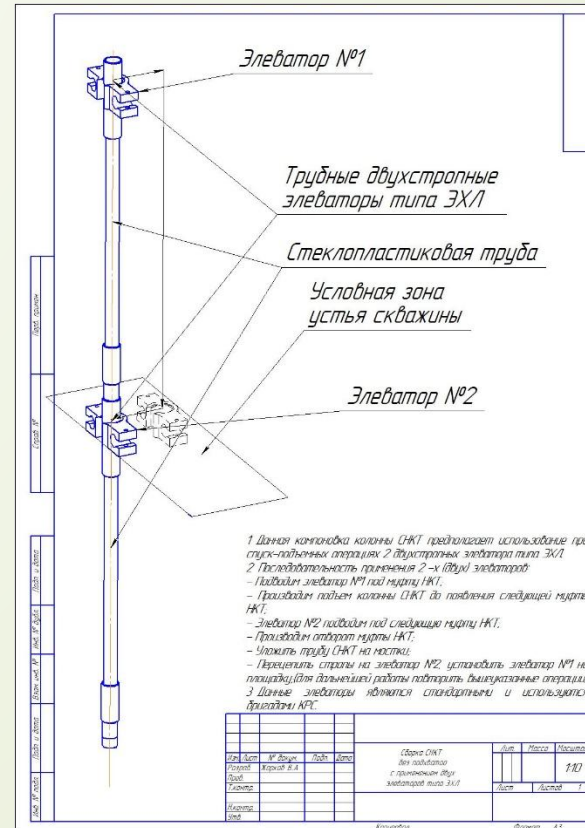
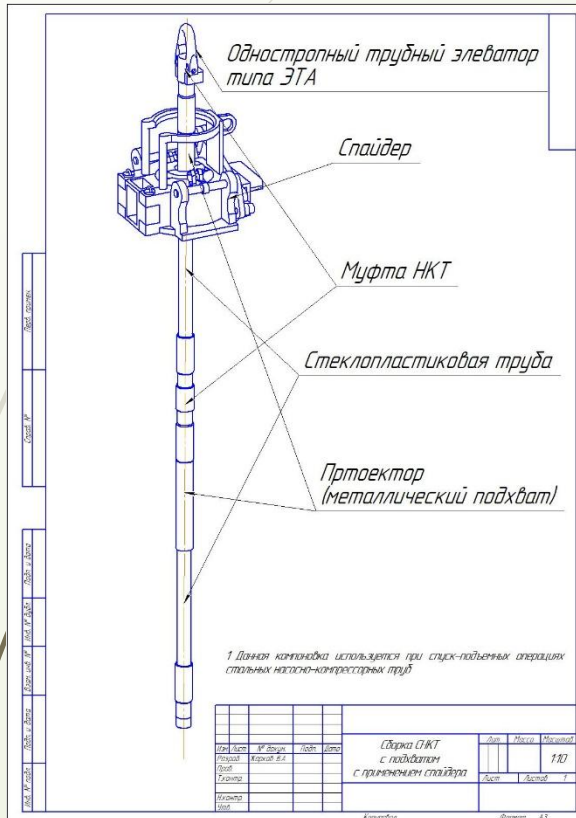
The patented non-separable connection of fiberglass and metal allows for the complete absence of liquid-metal contact, and the perceived axial loads correspond to the strength groups C90, T95, P110.

From 2014 to 2017 a number of construction works have been done. There are to develop constructional, technological, physical and operational properties of the FOT.

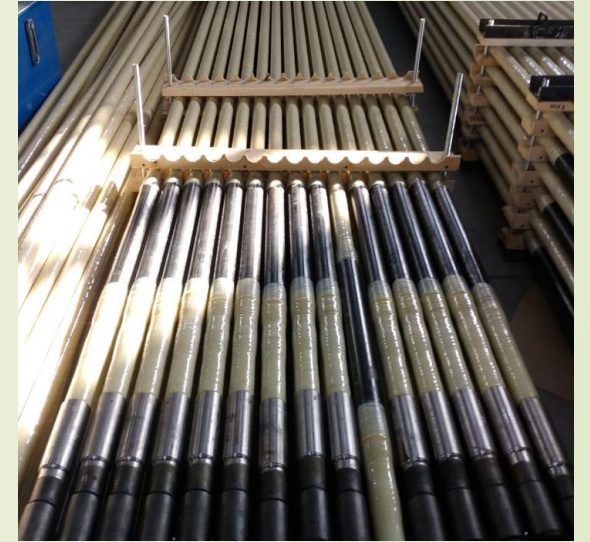
Criteria	Value
Pump plant running depth, m	3500 (5500 with packer hold-down)
Rated operating pressure, MPa	up to 35
Test hydraulic pressure, MPa	up to 53
Working axial stress, kN	up to 250
Test axial stress, kN	up to 380
Fluid temperature, °C	up to 90
Internal surface roughness coefficient	-0,001



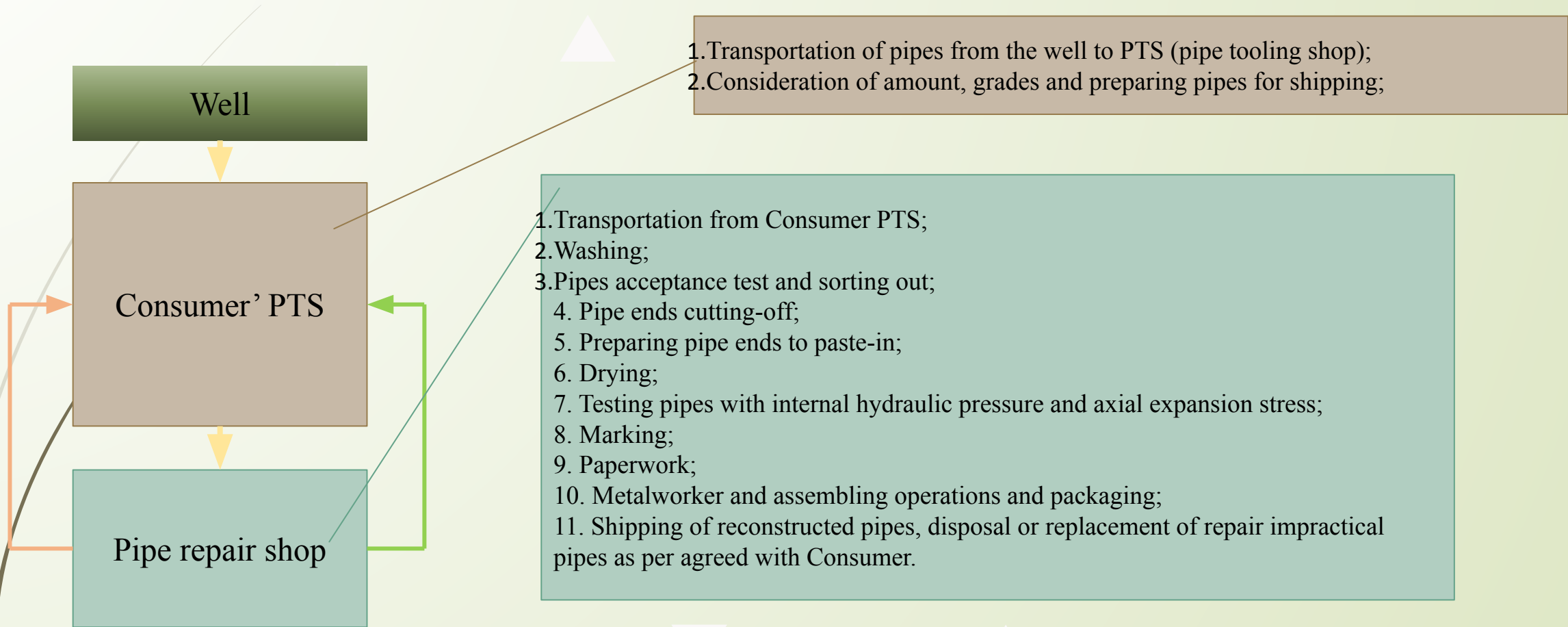
On the analogy of new FOT production process, there has been developed new technology of repair/remanufacturing of currently existing on the market fiberglass oilwell tubing, made by LLC "FPP" and LLC "FiberGlassRus". Conception of repair/remanufactured FOT is approved on customer preference.



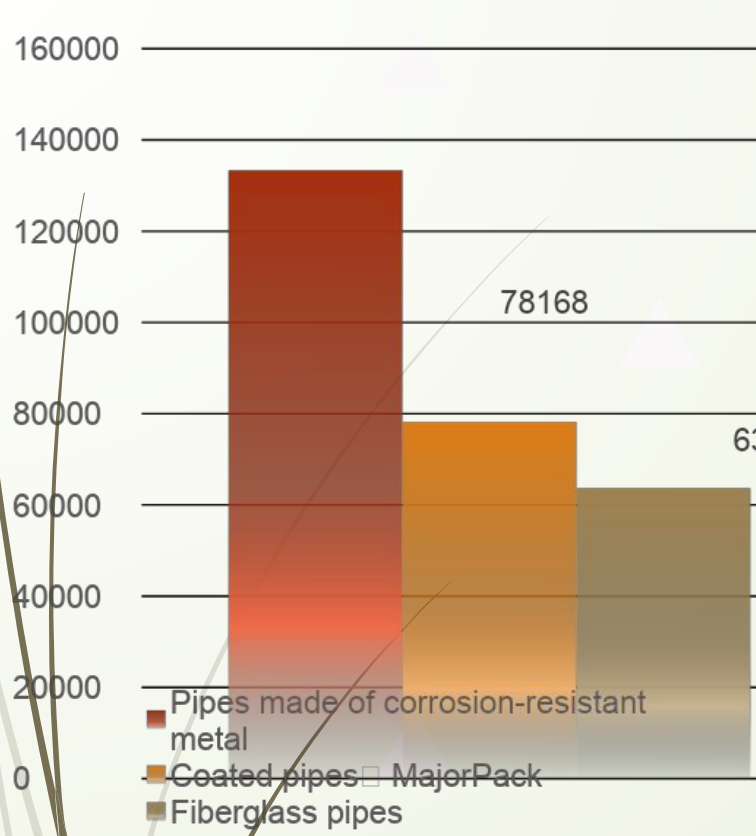
The finished products go through all the stages of quality control and are packed in separate boxes



Technology of repair/remanufacturing of FOT presumes removal of used screw joint, removal of fiberglass pipe body defective areas, and paste-in of metallic caps with screw joint according to GOST 633-80, 31446-2017



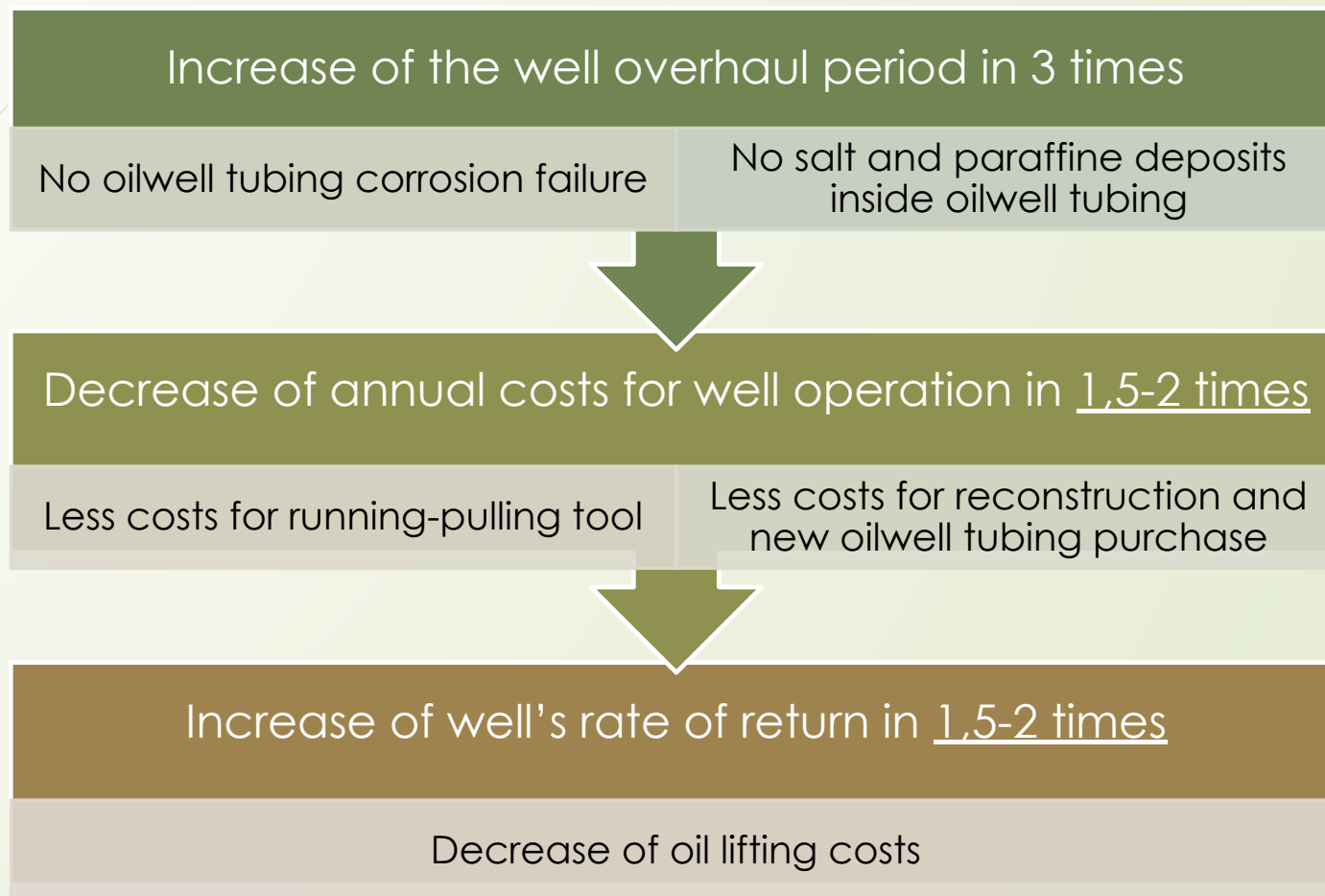
Compare of annual well service according to its complete set



Parameter/case	Pipe of high-grade 30CrMo Steel	MajorPack pipe with covering	Fiberglass pipe (pipe weight 60-65kg)
Pipe cost, \$/m	23,00	26,00	42,00
Running-pulling tool cost, \$	4650,00	4650,00	4650,00
Flush out a well of asphalt, resin and paraffine deposits, rub	150 000,00	×	×
Average well flowrate, m3/days**	15	15	15
DPE running depth, m	2000	2000	2000
Number of failures per year, caused by oilwell tubing (corrosion or asphalt, resin and paraffine deposits)***	3	2	×
Oilwell tubing repair costs and purchasing of new ones, upon condition that 30% is sorted out, \$.	44500,00	37255,00	×
Corrosion prevention chemicals costs, \$/year****	657 (60 gr/m3)	330 (30 gr/m3)	330 (30gr/m3)
Average time of well shutdown during reconstruction, days*****	9	6	×
Average cost of raw oil, \$/m3	270,00	270,00	270,00
Total: annual costs for well service, rub/year	133363,00	78168,00	63660,00

- While calculations we used average market prices for equipment and service upon condition that wells work at Povolzhye and Ural districts;
- ** Averaged well flowrate data per day;
- *** While calculation we used average run time failure of Steel oilwell tubing (120 days);
- **** Average market price for corrosion prevention chemicals is 2000 \$/tn;
- ***** Average time of well shutdown during reconstruction is 3 days.

Implementation of fiberglass oilwell tubing of LLC "GP Promtekhkomplekt" leads to the following points:





- We produce standard wellhead rods and modified with special properties;
- Corrosion-resistant design for use in aggressive environments;
- High surface hardness to reduce erosion wear;

Technical specifications:
Standard sizes of rods: 28, 32, 38 mm
Rod lengths: up to 12,000 mm.
Strength classes: C, K, D.
Steel grades: ASTM 1045, 5140, 4130,
4140 and special anti-corrosion steel.



Another development of the technology of connecting metal with fiberglass was the creation of filters for deep rod pumps and pipes.

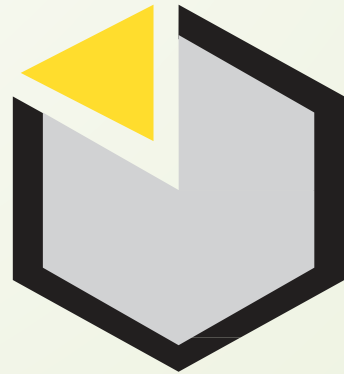
For fiberglass pipes, the operating time for 2 years showed a minimum content of paraffin deposits on the walls, which does not reduce the efficiency and throughput. increases the time to failure.



As a result of the introduction of fiberglass filters in the company of PJSC "Rosneft", this technology was included in the list of recommended applications and is actively used in the configuration of rod pumps.

In conclusion, we add that our company builds relationships with each customer on an individual basis. We are ready to select the equipment specifically for your needs based on the individual operating conditions of the wells. Attention to detail and willingness to work and supply your company with exclusive equipment designed for individual conditions will allow us all to achieve success.

Thank you for your attention and time.



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**Industrial cluster of
the Republic of
Tatarstan**

**With respect to you and your business, LLC
Promtekhkomplekt**