

## Effective Drilling Solutions for a Combined (Tapered) Production String

**A. A. Nalgiev**, a.nalgiev@sc-tph.ru  
**B.B. Bulguchev**, bekhan.bulguchev@sk-protek.ru  
**A.K. Gatiyatullin**, gatiyatullin@sc-tph.ru  
/TatProm-Holding Service Company, Moscow/

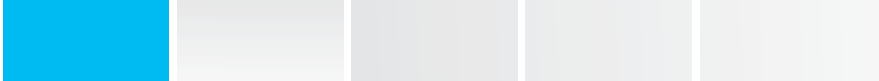
ENG

A.A. Nalgiev, B.B. Bulguchev, A.K. Gatiyatullin  
/TatProm-Holding Service Company, Moscow/

The authors present an innovative technology, i.e. drilling for a combined casing string, the main advantage of which is a much shorter well construction time since instead of two operations — drilling for the production casing and the liner— only a single operation, i.e. drilling for the combined production string, is required.

The paper dwells on a case study of running a combined production string. It describes the use of a combined production string that is adapted to drilling conditions and of the equipment for combined strings. The technological solution proposed involves installing a high-capacity centrifugal pump in the combined string, allowing for achieving the maximum well production rate. The paper shows the prospects of the combined production string technology that can be used not only in wells with a screen liner completion, but also in wells stimulated with hydraulic fracturing.

By implementing this innovative technology, operators can significantly expedite well construction processes, reduce costs, and lower the risks of drilling troubles or accidents.



In recent years, the geopolitical situation has significantly impacted the development of the Russian economy, including the oil and gas sector. Russian oilfield service companies are compelled to find ways to reduce costs while enhancing the efficiency of their operations. Consequently, the development and implementation of innovative solutions aimed at optimizing well construction have become paramount. One such solution is running a combined production string (tapered string), which allows for substantial reduction of well construction time while significantly lowering overall costs.

The conventional approach would have involved construction of a three-section well: first, drilling a 220.7 mm hole for the 178 mm casing, running and cementing the string, and subsequently drilling a 155.6 mm hole for the 114 mm liner. The use of an innovative combined string design was essential for optimizing the well construction process (see Fig. 1). This innovation allowed running a 178 mm production casing together with a 114 mm production string (tapered string), enabling a more efficient two-section well design. The borehole was initially drilled with a 220.7 mm drilling bit, and thus, necessary conditions were created for the safe and reliable trip of the combined string. The RIH and cementing operations were completed as designed.

TatProm-Holding Group (TPH Group) particularly focuses on the development and implementation of new technologies aimed at enhancing and optimizing production processes. One of these is the promising technology of drilling a hole to subsequently run a combined production string, which has already demonstrated high efficiency in a number of projects. Its primary advantage is a much shorter construction time since instead of two operations — drilling holes for the production casing and for the liner— only a single operation, i.e. drilling for the combined production string, is required.

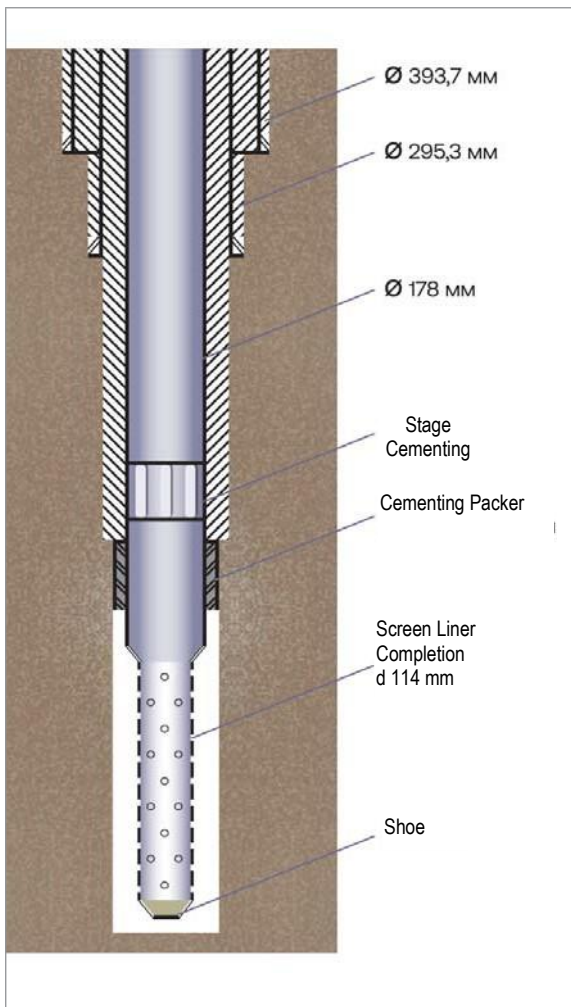
Since 2021, TatProm-Holding Group has actively utilized the combined production string technology with over 600 operations successfully completed using this method. The most commonly used configuration is a 178 mm production casing in combination with a 114 mm tapered string configuration is a 178 mm production casing in combination with a 140 mm liner. The holding company now manufactures a wide range of equipment for 168 mm and 178 mm combined strings with various liner diameters: 146 mm, 140 mm, 127 mm, and 114 mm.

In 2025, the combined string method proved its worth while drilling a water well in the Cenomanian stage of Western Siberia. The project required the installation of a high-capacity 114 mm electric submersible centrifugal pump inside a 178 mm production casing, while the liner screen section outer diameter had to be 114 mm.

Due to this approach, the time required for the construction of a water well was reduced by 20%. Furthermore, the high-capacity pump installed inside the 178 mm column allowed achieving the well's maximum flow rate, which is a critical factor in planning. Adoption of this engineering solution marked a significant move towards improving overall process efficiency and reducing well construction costs.

Despite being novel for this well type, the upgraded design proved to be a very promising option for future applications (see Fig. 2). A subsequent analysis of the technical performance and economic viability of a well construction process with the use of a 178 mm casing string in combination with a 114 mm liner showed that the new technology offers a number of advantages:

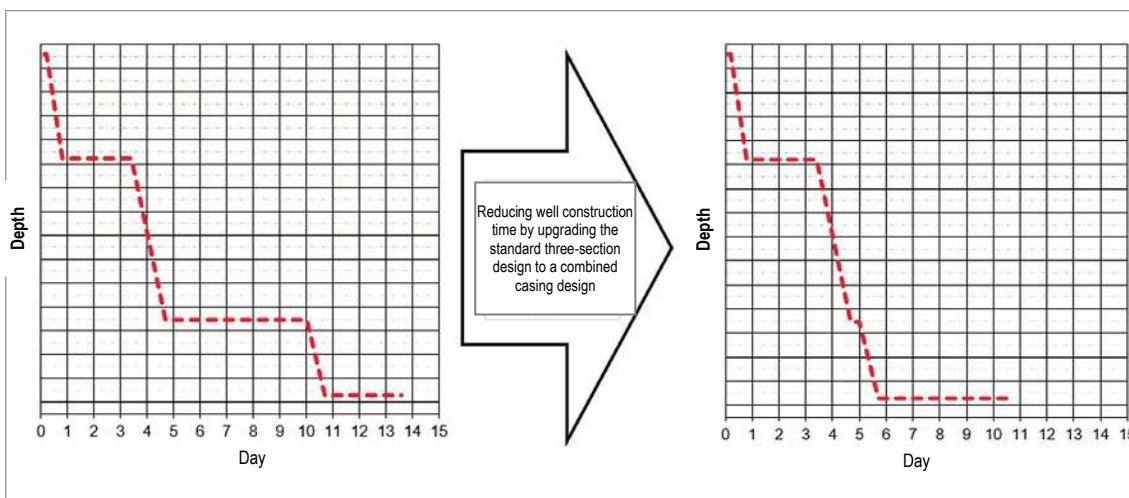




**Figure 1.** A well design with a combined production string

- Significant reduction in well construction time: the simplified RIH procedure and relief of additional drilling phases expedite the overall process.
- High well productivity: the installation of high-capacity pumps inside a 178 mm casing ensures the well can be produced at a higher flow rate.
- Minimizing risks when running completion: the significant difference in diameter between the drilled hole (220.7 mm) and the liner (114 mm) makes running easier and reduces the risk of drilling troubles or accidents.

The combined production string can be used not only in wells with a screen liner completion, as described, but also in wells where the hydraulic fracturing method is employed using various types of frac sleeves (ball-drop, hydraulic, or burst-port). The primary limitation for using such a design can be incompatible drilling conditions. In such a case, additional zonal isolation measures must be taken. The implementation of the combined production string method represents a significant advancement in the engineering aspect of well construction. By utilizing this technology, the construction processes may be significantly accelerated at lower costs. Therefore, the replication of this engineering solution and tailoring combined production strings to various drilling conditions promise significant potential for shortening the overall well construction time, which will facilitate further development of the oil and gas industry.



**Figure 2.** Time-depth curves developed in the course of drilling a three-section well using the conventional drilling method and a two-section well using the innovative combined string technology

#### REFERENCES

1. A.G. Ramozanov Baker Hughes's Solutions for Reducing Horizontal Well Construction Time in Western Siberia / A.G. Ramozanov V.V. Vasiliev // Neftegaz.RU. – 2020. – No. 6. – pp. 100–102. – URL: <https://magazine.neftegaz.ru/articles/tekhnologii/555966-tekhnologii-baker-hughes-dlya-sokrashcheniya-tsikla-stroitelstvagorizontalnykh-skvazhin-v-zapadnoy-/?ysclid=m7wbf0qmmv492050923>. -
2. A.S. Tikhonov. Analysing Measures Aimed at Reducing Well Construction Time at the Sites of RN-Yuganskneftegaz LLC / A.S. Tikhonov // Problems of Geology and Exploitation of Mineral Resources: Proceedings of the XXIV International Symposium named after Academician M.A. Usov for Students and Young Scientists, dedicated to the 75th anniversary of the Victory in the Great Patriotic War;