

# CASE STUDY

Fixed Casing Centralizer Solution Enables Record Completion Rate in Marcellus ERD Run



## The Challenge

- Previous attempts to run 24,800 ft measured depth 5.5" 23ppf P110 production strings were time-consuming despite the use of a floatation sub, floating centralizers and techniques that involved rotating the pipe during certain intervals.

## The Objective

- Deliver a fixed centralizer solution that maximizes the benefit of string rotation to improve running efficiency and reliability in ERD wells in excess of 29,000 ft while managing the risk of obstructions and poor hole conditions, enabling the operator to successfully reach TD and to consider extending the reach of future wells.

## The Delivery

- Volant's engineering team utilized VolantRED™ software to benchmark data from several prior casing runs to torque and drag analysis results, establishing the observed range of friction factors and assessing the effect of floating centralizers on downhole friction. This data was then used to model a longer future planned well and predict the impact of crimped centralizers on running performance.
- Volant's TRUE™ Analysis showed the prior runs slowed significantly during rotation over a 7,900 ft interval, even though rotation with floating centralizers was originally expected to provide greater efficiency.
- Centralizer installation took place at the customer's yard and involved crimping of Volant HydroFORM® centralizers to the casing. Operations were optimized with a reliable computer-aided crimping system resulting in an installation rate of over 300 centralizers per day.
- Two subsequent casing strings with floatation subs and crimped HydroFORM centralizers were successfully landed to target depths of over 28,000 ft using a Volant CRTe-1.0GM5.5 external grip casing running tool. Rotation for much of the horizontal section resulted in efficient progress with sustained hookload.
- TRUE Analysis and VolantRED software were used to monitor and analyze the run data to measure efficiency improvements and confirm the crimped centralizers increased the effectiveness of the casing run as predicted.

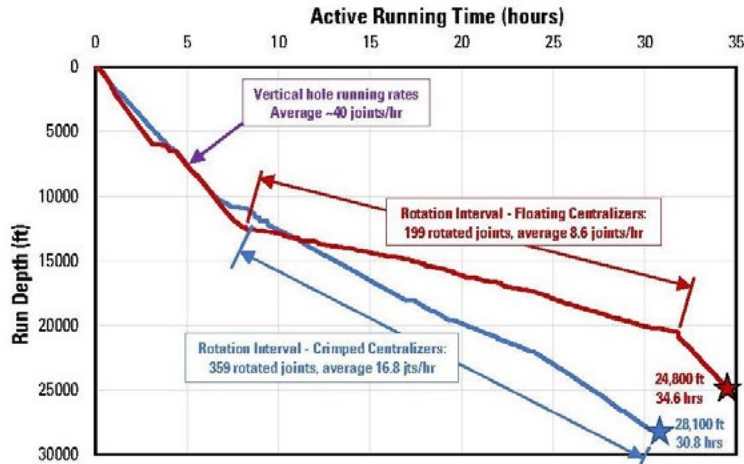


## The Value

- Hookload recovery was observed immediately with string rotation as a direct result of the crimped centralizer turning with the pipe, creating opportunity for the operator to more effectively overcome downhole obstructions and extend the reach of future wells.
- The crimped centralizers functioned as predicted, improving the running speed by 95% in the rotation interval compared to prior runs.
- The use of Volant HydroFORM® crimped centralizers reduced run time by 10 hours compared to what would have been expected if using floating centralizers, establishing a new completion rate benchmark for the customer.

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## TRUE™ Analysis Comparative Run Summary



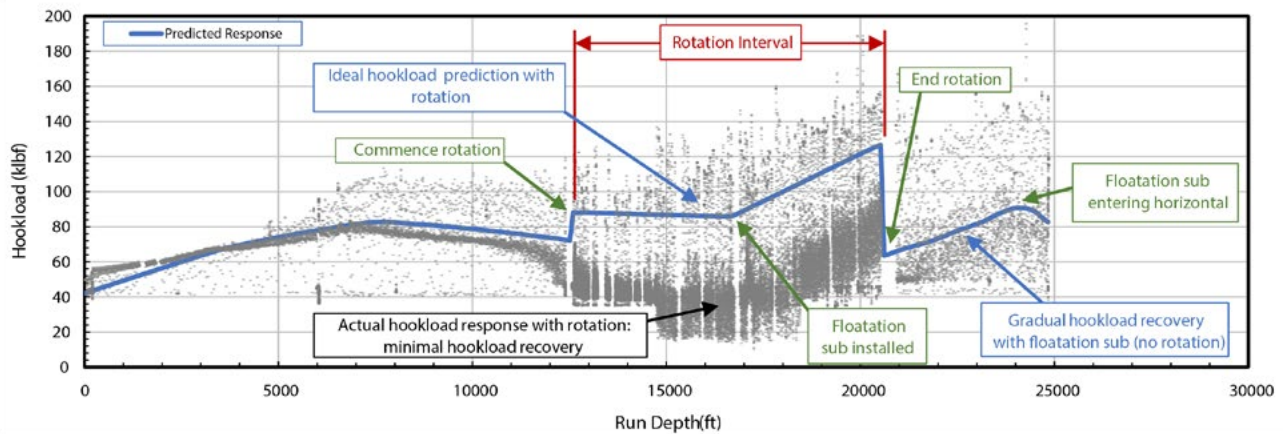
## WELL HIGHLIGHTS

- Marcellus Formation (West Virginia)
- ERD Well, 3:1 horizontal reach to vertical depth
- 7,500 ft TVD and 28,500 total measured depth
- 5.5" 23 ppf P110 production string w/ flotation sub

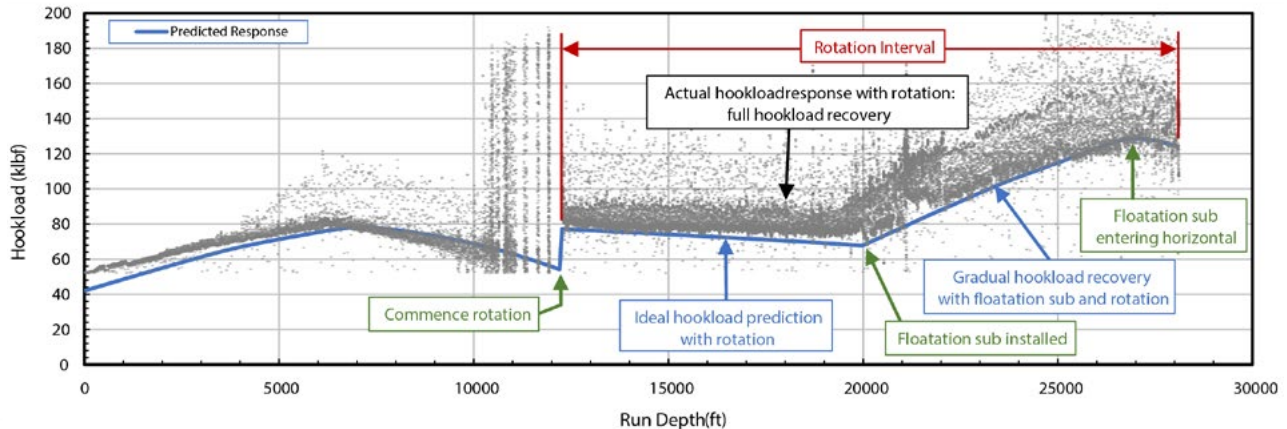
## TECHNOLOGY & SERVICES

- 5.5" x 8" Crimp-on HydroFORM® Centralizer
- Radial Tubular Forming Tool w/ computer
- CRTe-1.0GM5.5 tool
- TRUE Analysis
- VolantRED™
- Consulting Engineering

## VolantRED: Actual vs Predicted Hookload Response w/ Floating Centralizers



## VolantRED: Actual vs Predicted Hookload Response w/ Fixed Centralizers



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