

Driving Efficiency with Encapsulated Drilling Lubricants: Technology for Operational and Economic Improvements

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Abstract

As low oil prices continue to impact the economic viability of drilling oil & gas wells in the Williston Basin, finding ways to improve operational performance is increasingly critical. Reducing friction and torque can lead to such operational benefits, lowering overall drilling costs. While many lubricity additives are available to reduce frictional force, these additives may present challenges ranging from adversely affecting properties of the drilling fluid (e.g., liquid lubricants that may change rheology or interact with other additives) to interfering with drilling equipment (e.g., glass beads that plug valves in mud pulse telemetry systems). To address these challenges, Solazyme, Inc. developed a biotechnology-based method for encapsulating oil in polysaccharide-based polymers that selectively delivers a highly effective concentration of lubricant at areas of high shear, pressure, and friction.

This method, sold as Encapso™, has been used in over 35 North American oil and gas wells, including about 15 in the Williston Basin. It has been successful in the region as a lubricity additive while drilling the horizontal section of wells. Due to the protection afforded by encapsulation, Encapso™ does not grease out or lose effectiveness as it circulates. Therefore it is proactively added to drilling fluid systems, circulating inertly until conditions are met to break the capsule and release lubricant. This release delivers targeted lubrication that decreases friction between the drill bit or drill string and the formation. Furthermore, Encapso™ is not affected by temperature, which makes use of heated lubricant trailers unnecessary, saving cost.

Field observations suggest using Encapso™ leads to operational improvements. For example, Encapso™ outperformed incumbent lubricants in the horizontal section of two Williston Basin wells using water-based mud. Compared to nearby wells drilled under similar conditions on the same rig using incumbent lubricants, Encapso™ was associated with a 20% ROP increase, 10-15% torque reduction, and about 50% less NPT on average. This translated to an average of two days saved. With challenging oil well economics, saving time is critical.

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