

**Case study:** Colombia

# OMNI-LUBE V2 and MIL-GLIDE successfully delivered casing to target, saved \$100,000 USD

The operator planned to drill an exploratory well in the Colombian foothills. The formation contained intercalated intervals of hard and soft rock, which caused staggering conditions that slowed casing running rates and increased the risk of mud losses.

The geometry of the wellbore presented additional challenges to getting the casing to target depth. A 13 5/8-in. casing was to be run in the 17 1/2-in. hole to a depth of 10,470 ft (3191 m) and ending with a tangent greater than 4,000 ft (1291 m) and an inclination of 29°. These conditions, coupled with the weight of casing string, exceeded the rotation capacity of the casing and operating torque of the top drive equipment.

The operator asked Baker Hughes to develop a fluid solution that would help run the 13 5/8-in. casing, with rotation and circulation, through the 29° inclined hole and intercalated formation to planned depth.

## Collaborating on an optimal fluid solution

Baker Hughes assembled a team of drilling and completion fluids (DCF) experts to collaborate with the operator on developing the solution.

The team did not find any records for similar casing running applications in offset wells. As a result, a simulated model of the operation was created to

generate the necessary data required for fluid formulation and testing.

The simulation confirmed that without the proper application of chemical lubricants, the casing string would not rotate once it reached the top of the intercalated formation interval (approximately 9000 ft). As a result, the likelihood of getting the casing to the planned depth was very low by mechanical means alone.

Several formulations were tested in the Baker Hughes fluids laboratory using high-temperature/high-pressure (HT/HP) lubricity equipment. The testing evaluated the performance of various lubricant formulations under simulated operating conditions, with particular focus on fluid performance at the interface between rock and metal surfaces.

The laboratory results showed that of the various fluid formulations tested at 150°F (65.6°C) and 200°F (93.3°C), a combination of OMNI-LUBE™ V2 (lubricant) and MIL-GLIDE™ (mechanical lubricant) delivered the lowest coefficient of friction and the best chance at getting the casing to depth.

## Getting casing to TD with high efficiency

This casing running operation represented several firsts in Colombia, including the first time 13-5/8-in. casing operations were performed at depths greater than 10,000 ft (3048 m)

## Challenges

- Higher risk and costs associated with mud losses if casing did not reach planned depth
- Risk of significant rig time and costs to reinforce exposed formation
- High operating torque and increased risk of equipment failure while running casing in hole

## Results

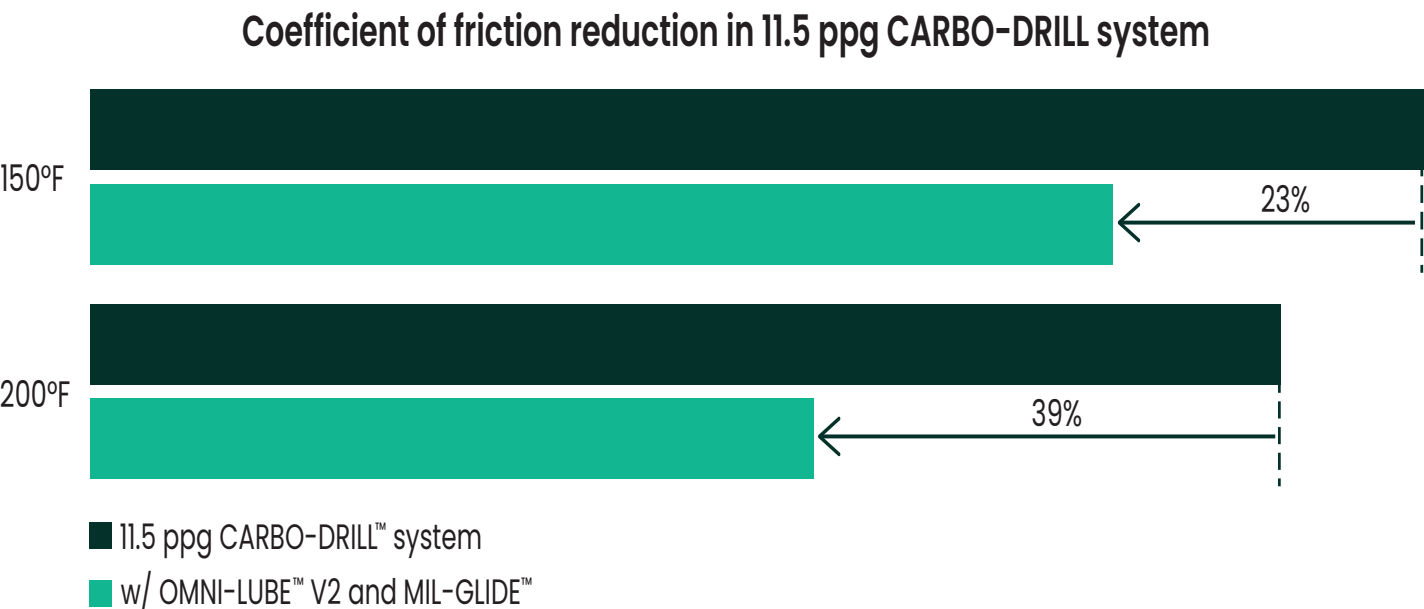
- Saved \$100,000 USD in rig costs by avoiding cement plugs and stress pills to cover the exposed open hole
- Isolated intercalated formation, ensuring the integrity of sandy intervals with low fracture pressures
- Eliminated the risk of involuntary sidetrack by having exposed cement for long periods of time

and in such a geomechanically complex formation. It was also the first application of the OMNI-LUBE V2/ MIL-GLIDE formulation in conjunction with CARBO-DRILL™ invert emulsion drilling fluid system.

The formulation and the operation worked flawlessly. The 13 5/8-in. casing was run to planned depth, with rotation and circulation, and without any operational delays or health,

safety, and environmental (HSE) risks. And by successfully isolating the formation behind the casing, the operation saved \$100,000 USD by avoiding the time and costs of running cement plugs or additional remediation work.

Satisfied with the performance of the fluid in this well, the operator plans to apply this same solution in the future to similar projects.



In HT/HP lubricity testing, the OMNI-LUBE V2/MIL-GLIDE formulation demonstrated superior lubricity and the greatest reduction in the coefficient of friction of any other fluid tested.