TA Instruments

Thermal Analysis & Rheology

RHEOLOGY SOLUTIONS

CHARACTERIZATION OF DRILLING MUDS

PROBLEM

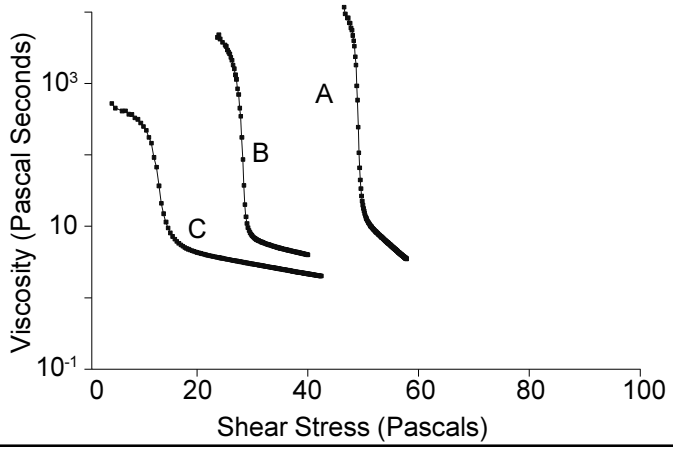
An oil exploration company was interested in optimizing efficiency at a deep well drilling project. Selection of the proper drilling mud was a critical aspect of this optimization process.

SOLUTION

In deep well drilling, drilling mud under pressure is forced down the inside of the drill shaft to the area of the bit at the bottom of the hole. As the drill bit penetrates rock and soil, particles are created which are removed by the upward exit of the drilling mud between the outside of the drill shaft and the sides of the hole. For optimum efficiency, the viscosity of the drilling mud must be sufficient to support and "float away" those particles. Controlled stess rheology (CSR) which meausres the viscosity of fluids as a function of shear stress provides a rapid method for comparing drilling muds.

Figure 1 shows the CSR results for three muds that were considered for this deep well project. In general, muds which exhibit a higher viscosity-breakdown stress will support larger particles. Calculations from these curves indicated that muds A, B, and C would support particles as large as 10mm, 5mm and 2mm respectively. Mud A was chosen for the project because earlier geological core tests had indicated quartz-based rock (known to fragment into large particles) was the primary material that would be encountered.

Figure 1. DRILLING MUD COMPARISON



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