A Permian Basin operator was struggling to control production declines at a 40-year-old field. The key to maintaining production rates was pumping large volumes of water from the reservoir. However, the downhole conditions were challenging, including the presence of iron sulfide solids and a high gas-to-liquid ratio (GLR). An ESP system was necessary to lift the large volumes of water and the system was set below the perforations to allow for natural separation of the gas before it could enter the ESP system and cause cycling or gas lock conditions. However, landing the ESP system below the perforations meant there was inadequate fluid flow past the ESP motor, causing the motor to overheat.

Lowering the ESP in the well, below the perforations, increases the intake pressure to force more gas into solution and reduce the free gas percentage in the pumped fluid. Initially, shrouded ESP systems were installed, but they had limited success, prompting the operator to look for another solution. Baker Hughes engineers recommended an ESP solution with a patented integrated recirculation system. The recirculation system, which uses a standard ESP pump with a recirculation port built into the modified pump head, redirects fluid flow past the motor to ensure adequate motor cooling.

The ESP solution incorporating a recirculation system was set deeper in the well below the perforations, allowing for natural gas separation before the fluid entered the pump intake and eliminating any motor overheating concerns. As a result, the ESP system was able to deliver flow rates up to 6,100 BFPD, achieving greater fluid level draw down in the well to release additional oil and gas production from the reservoir. With the Baker Hughes ESP solution featuring an integrated recirculation system, run time increased 382 days or 79%.