

## SMARTEN VSD controls permanent magnet motor with no modifications to the drive

CASE HISTORY

### CHALLENGES

- ▶ Permanent magnet motors require an entirely new variable speed drive (VSD) or significant engineering and software modifications to existing drives, including:
  - Special parameters to control the motor
  - Modifications to ensure stable ESP operations across the cable, step-up transformer, and sinewave filter
- ▶ There are safety concerns due to back spin created when a PM motor shuts down

### SOLUTIONS

- ▶ The UNBRIDLED® ESP Systems controls engineering team conducted testing protocol to determine if the standard SMARTEN™ variable speed drive could operate a PM motor
  - Tested the drive for hundreds of hours at full load
  - Accumulated nearly 100 starts and stops
  - Tested “high-load start” to simulate a stuck pump: 0 to 150% torque in less than two seconds
- ▶ Field tested an ESP system using a PM motor controlled by the SMARTEN drive
- ▶ Tested a method to mitigate the potential safety risks associated with back spinning when the PM motor shuts down

### RESULTS

- ▶ Proved the SMARTEN drive’s capabilities with PM motors in all test well operations
  - Tested successfully at full load, through multiple starts and stops and in stuck pump simulations
  - Confirmed stable ESP operation with little vibration
  - Confirmed motor control with no oscillation
- ▶ Installed a field test with no issues; SMARTEN successfully started and controlled the PM motor
- ▶ Installed an extra safety feature to prevent back spinning when the PM motor shut down, mitigating a potential shock hazard





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