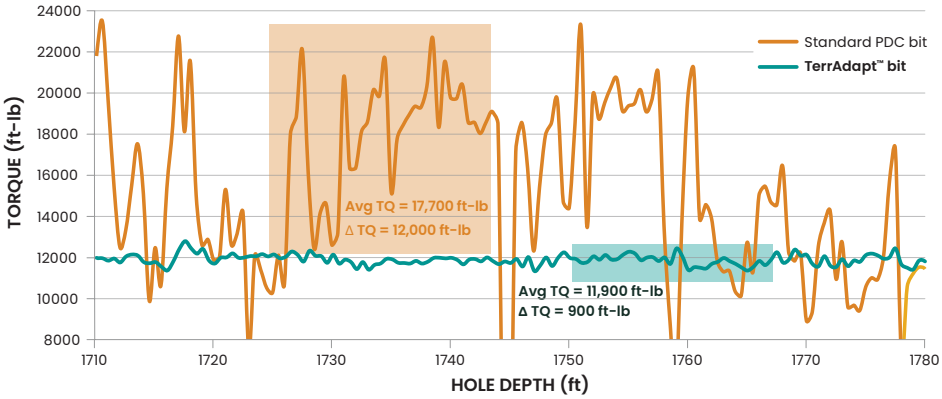
**Case study:** Delaware Basin, Texas

# TerrAdapt adaptive drill bit mitigated stick-slip, increased efficient drilling time by 45%




By automatically adjusting DOC control throughout the run, the TerrAdapt adaptive bit was able to mitigate vibrations to smooth out drilling performance, enabling a longer, faster run with consistently lower surface torque compared to an offset with a standard PDC bit.

An operator in Reeves County, Texas was experiencing erratic drilling performance in 12¼-in. intermediate sections running through interbedded shale, limestone, and salt. Extremely high torque fluctuations and stick-slip were affecting drilling efficiency, and downhole tool failures were driving up NPT and costs. Looking to minimize downtime and complete the next sections as quickly as possible, the operator contacted Baker Hughes.

Based on the operator's challenges, Baker Hughes proposed using a **TerrAdapt™ adaptive drill bit** to improve drilling performance and reduce non-productive time by proactively mitigating stick-slip and impact loading. It incorporates self-adjusting depth-of-cut (DOC) control elements to mitigate torsional instability—which can lead to stick-slip—and to absorb sudden impact loads from formation variations. The bit limits DOC when sudden loading is experienced at the bit face, and increases DOC during smooth drilling to maximize ROP.

The TerrAdapt bit completed the 3,355-ft (1023-m) section in one run, increasing ROP by 27% compared to ROP on offset wells drilled with standard PDC bits. ROP averaged 168 ft/hr and the surface torque generated by the TerrAdapt bit was 45% lower on average and 90% more consistent. This translated to more efficient drilling, with up to a 45% improvement in mechanical specific energy recorded. These results indicated dramatically reduced stick-slip and torsional oscillations, and the section was completed with no damage to the BHA.

The TerrAdapt bit showed a very good dull condition after the run because its adaptive elements mitigated stick-slip and absorbed impacts to protect the cutters.

## Challenges

- Improve ROP and mitigate downhole tool failure through stick-slip-prone formations
- Maintain stable drilling through interbedded formations with stringers

## Results

- Mitigated vibrations and stick-slip
- Protected the bit from impact damage
- Drilled 27% faster
- Increased efficient drilling time by 45%
- Reduced average torque by 35%, and torque variations by 90%