

MH™ Soft Torque-Z

Delivering Smoother & Faster Drilling

MH™ Soft Torque-Z system mitigates oscillations on the drill bit and torsional vibrations, with ease. The Soft Torque-Z incorporates Shell's proven Z-torque technology with a user-friendly automated interface, designed to reduce well cost and optimize rig efficiency.

Product Description

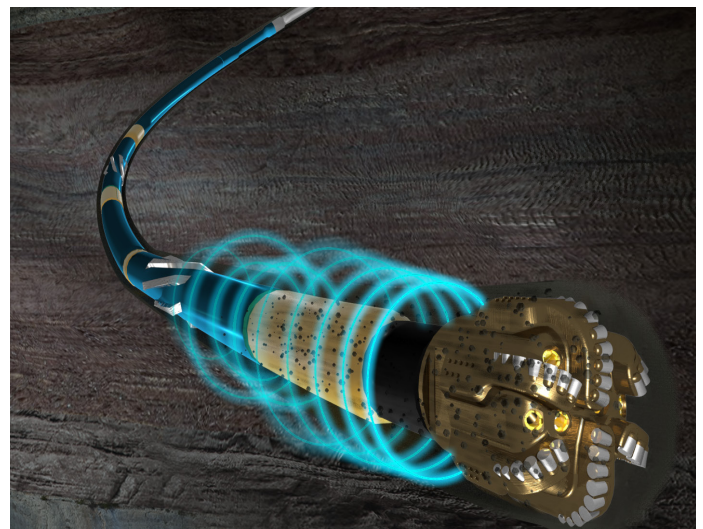
During drilling, the Top Drive delivers continuous torque and RPM to the drill string. Because formations vary and bit friction changes, this constant input does not result in a constant output at the drill bit. The bit can experience large fluctuations in torque and RPM at the Bottom Hole Assembly (BHA), creating torsional vibrations—commonly known as stick-slip. Stick-slip reduces drilling performance and increases wear on drilling equipment.

Soft Torque-Z is based on Shell's Z-torque technology. The controller continuously detects torsional vibrations in the drill string and adjusts Top Drive speed and torque setpoints in real time. This reduces, and in many cases eliminates, stick-slip by actively damping torsional vibration levels.

Soft Torque-Z is fully operational immediately after installation. The standard delivery includes an operator interface, and the system can also be integrated directly into the existing Top Drive control system. The simple user interface allows the driller to operate the system in a familiar and intuitive way.

Benefits

- Return on investment after drilling just one well
- Up to 70% improved rate of penetration (ROP)
- Less unscheduled trips
- HSSE improvement due to less manual handling of over-torqued connections
- Simple user interface without changes in the operator environment improves operational performance
- Improved borehole quality with smooth walls and exactly positioned boreholes



Key Features

Our Soft Torque-Z system significantly reduces well cost and improves your drilling efficiency by:

- Increasing the operational window for weight on bit (WOB) and speed during drilling, boosting effective drilling time and rate of penetration (ROP)
- Minimizing the stops in circulation due to significantly reduced wear and premature failure of drill bits or tools for measurement while drilling (MWD) tools, etc.
- Reducing the number of over-torqued connections, thereby reducing the need for manual tong operation; additionally, it eliminates the HSSE risk associated with utilizing manual tongs
- Improving the overall borehole quality, minimizing the risk for further completion issues
- Reducing the number of sidetracks required in a well drilled with Soft Torque-Z activated



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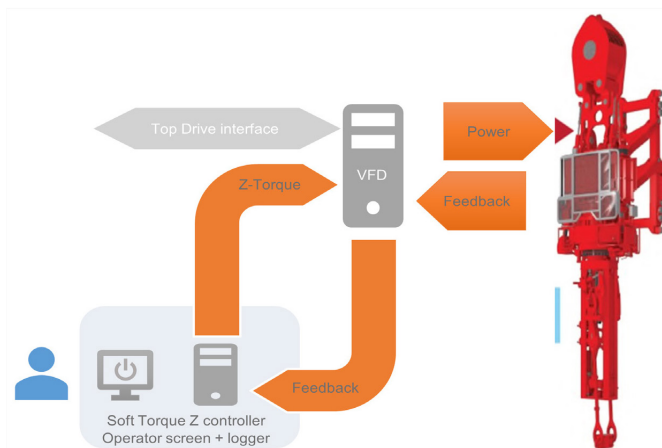
Operational Recommendation (Field Experience)

Soft Torque-Z is recommended to be activated during all drilling operations, from shoetrack to total depth (TD), unless measured drilling performance indicates no beneficial effect.

Where high-quality downhole data is available (e.g., Wired Drill Pipe, WDP), field experience shows clear and consistent reduction of torsional vibrations across most well sections.

In long horizontal intervals, reduced WDP signal quality may limit direct downhole verification; however, drilling performance trends and mud-pulse MWD data typically indicate a positive effect.

Setup & Daily Use

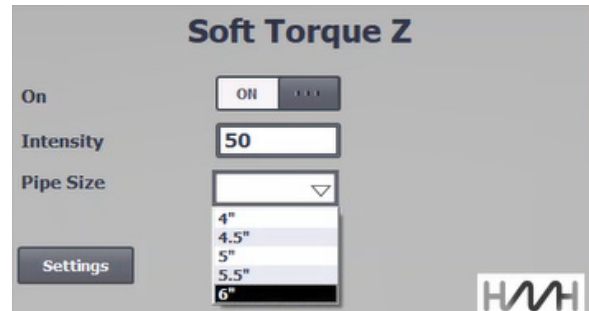


Simple Setup: Soft Torque-Z becomes fully operational immediately after the operator enters two parameters.

Daily Use: Soft Torque-Z is normally kept ON during drilling and may be turned off only if measured performance shows no benefit.

Operator Experience Note: When Soft Torque-Z is active, surface RPM and torque readings will vary. This is expected and indicates active damping of torsional vibrations in the drill string.

Recommended Use & Settings



- Soft Torque-Z should be ON by default during drilling
- Start with a low Intensity Factor (H%), typically 5–10%, and increase stepwise based on observed effect
- Typical operating range: 20–40%
- Observed upper range: 50–60% in long sections, depending on depth and drill pipe size
- Overall recommended range: 10–60%

Adjustment Method

With Wired Drill Pipe (WDP): Increase H% stepwise until the variation between minimum and maximum downhole RPM is minimized.

Without WDP: Increase H% until the lowest achievable stick-slip level is observed using downhole vibration measurements or third-party monitoring systems.

Stability Note: After adjusting H%, a short transient increase in stick-slip may occur before the system stabilizes.

This is normal and does not require action unless it persists.

Operational Considerations & Risk

- System performance is influenced by drill string design, formation characteristics, and the availability and quality of downhole measurements.
- In long horizontals, limited or intermittent downhole signal quality may reduce direct verification of effect.
- Increase the Intensity Factor (H%) gradually to avoid unnecessary transient vibration responses.

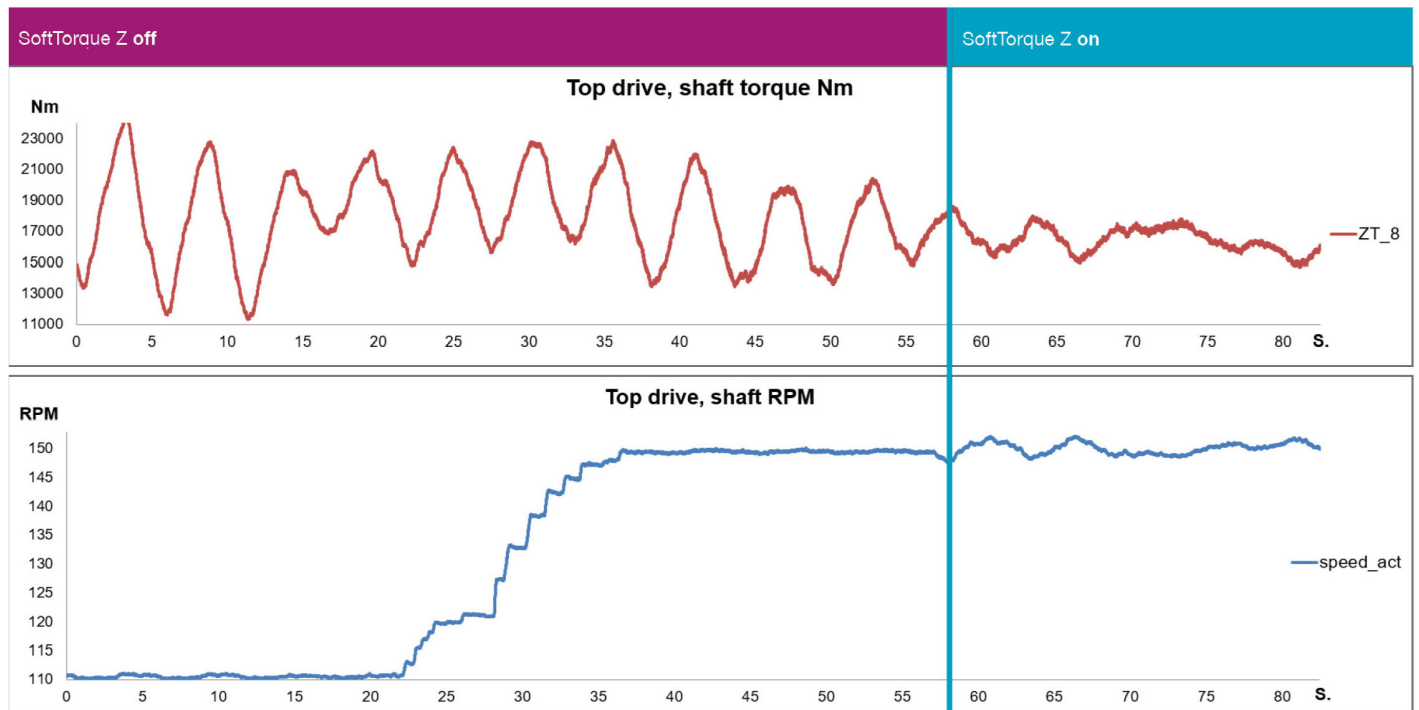
MH™ Soft Torque-Z Active Stick-Slip Control

Performance Example – Soft Torque-Z Activation

Logging data shows a clear transition from Soft Torque-Z OFF to Soft Torque-Z ON.

With Soft Torque-Z OFF, the Top Drive experiences large torsional oscillations and fluctuating torque.

After activation, Soft Torque-Z effectively dampens stick-slip, resulting in smoother torque response and more stable RPM.



Torque-Z activation:

With Soft Torque-Z OFF (left), torque oscillations are large and unstable.

After activation (right), torsional vibrations are significantly reduced and RPM stabilizes.

