

## For MHWirth's top drive control system

**Delivering smoother and faster drilling, MHWirth's SoftTorque Z mitigates oscillations on the drill bit and torsional vibrations, with ease. The SoftTorque Z incorporates Shell's Z-torque technology with an user-friendly automated interface, designed to reduce well cost and optimize rig efficiency.**

During drilling operations, the top drive provides continuous torque and revolutions per minute (RPM) to the drill string unit. Due to varying geological conditions and drill bit frictions, the constant input from the top drive does not go through the drill string steadily, resulting in large fluctuations of torque and RPM down at the bottom hole assembly (BHA). This leads to torsional vibrations or the stick-slip effect with negative impact on drilling performance and equipment deterioration.

MHWirth's SoftTorque Z is based on Shell's Z-torque technology and is beneficial both for drilling at great depth as well as for shallow drillings. It continuously measures torsional vibrations in the drill hole and dynamically regulates around the torque and speed set points accordingly. This mitigates the torque vibrations in the drill string and reduces or even eliminates the stick-slip effect.

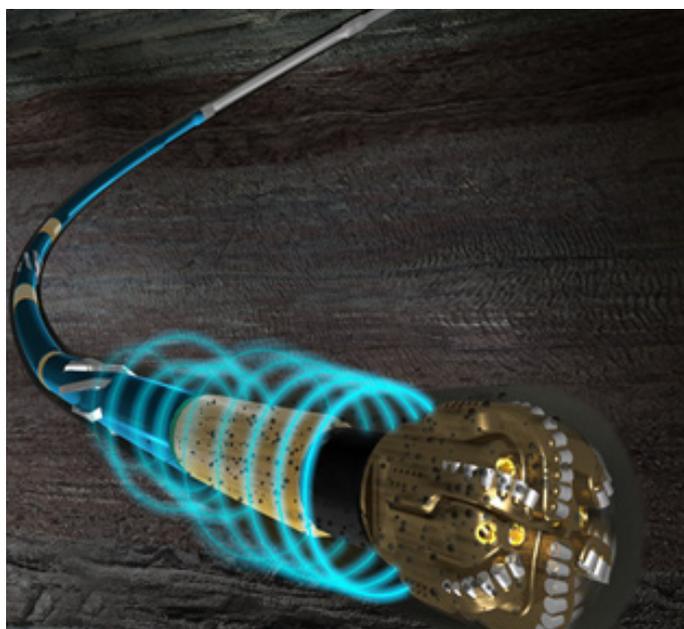
Our SoftTorque Z significantly reduces well cost and improves your drilling efficiency by:

- 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, tools for measurement while drilling (MWD), etc.
- Diminishing 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 and minimizing risk of fracture and kick
- Minimizing further challenges during well completion, such as casing running
- Reducing the number of side steps required in a well drilled with SoftTorque Z activated

SoftTorque Z can be easily integrated into your existing top drive system and is fully operational immediately after installation. The simple user interface allows the operator to continue drilling operation in a familiar manner.

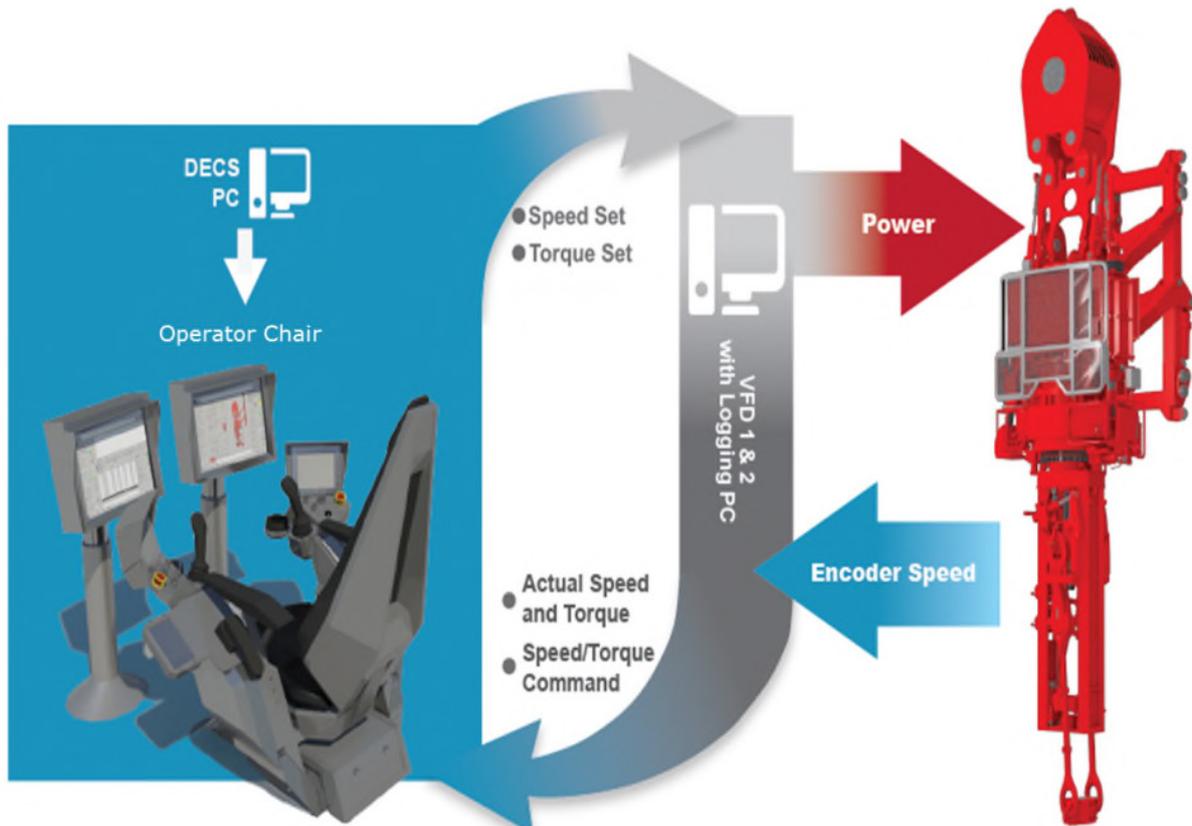
## Benefits

- Return of investment already after drilling one well
  - Up to 100 % 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 borehole
- Reduced drilling fluid consumption
- Additional improvement of rig efficiency in combination with other MHWirth smart modules



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The operator simply enters the drill string's initial data once into the DrillView™ system via the operator chair, becoming operational instantly. During drilling operation, SoftTorque Z is activated and deactivated from the operator chair and the status of the system is also visible there.



Logging data from MHWirth's DrillersAssist showing the SoftTorque Z functionality: shaft torque variance is reduced and shaft RPM is adjusted dynamically, proofing mitigation of the stick-slip effect.

