

Case Study  
i-Con™

# i-Con for Top Drive Torque Calibration and Verification

# i-Con Total Depth Calibration

## Background

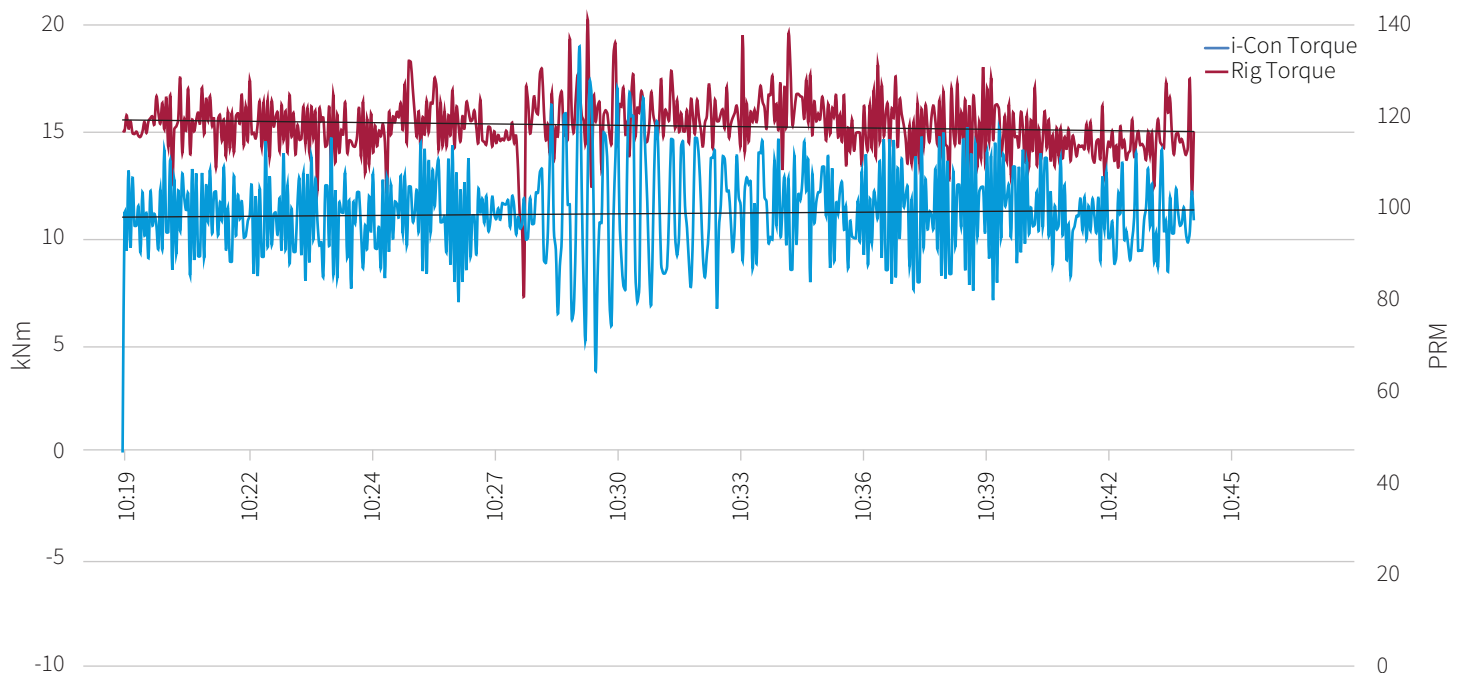
A major operator in Norway ran into repeated trouble getting their liners to target depth and was starting to question the validity of the measured torque output from the top drive on several rigs. The i-Con logging tool was mobilized to provide an independent log of the torque under the top drive during drilling sections and running liners in the well.



i-Con data compared to the surface rig data provided a clear picture to how the liner installation was conducted.

## Case 1:

On this rig pre-job simulations and experience from the operator indicated that the surface torque readings were too high. The logging tool was placed directly under the top drive saver sub while rotating the string into the well.

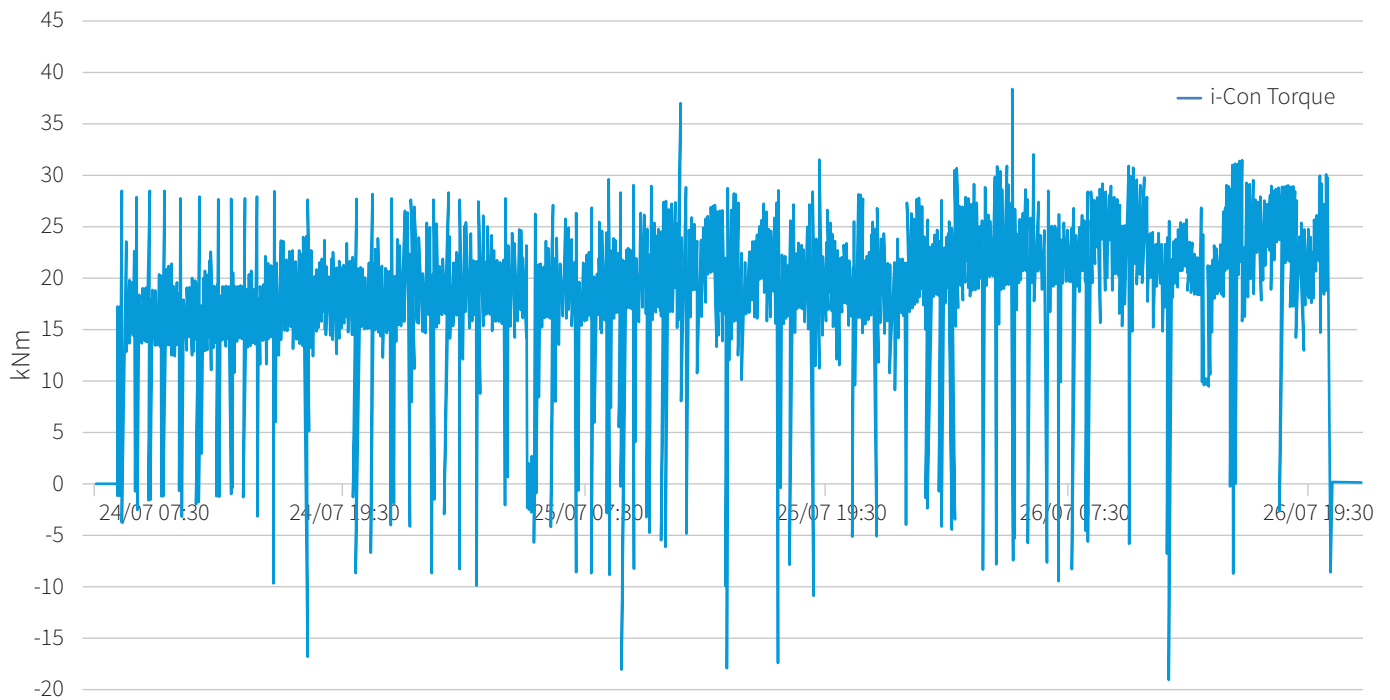


Comparing top drive torque against the logging tool data confirmed that surface values were consistently above the recorded torque from i-Con and thereby limiting the operation. After the job the rig mobilized the top drive vendor to correct the problem.

# i-Con Total Depth Calibration

## Case 2:

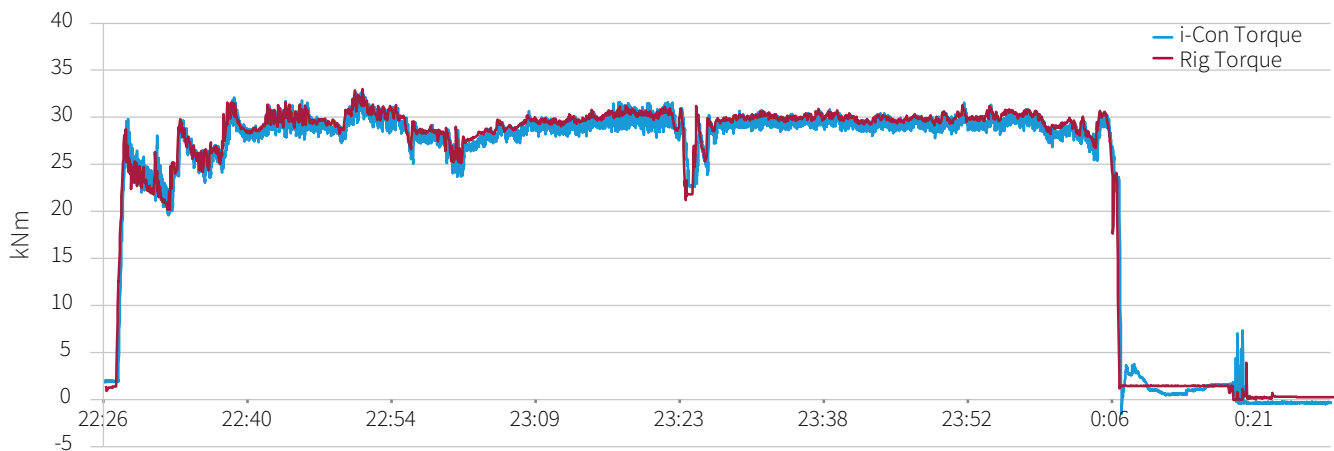
In this case the i-Con XL was mounted under the saver sub while drilling the 8.5" section from 3179 m to 4424 m. The i-Con tool was logging at 1hz and produced the following torque curve.



Measured torque by the i-Con in the start of the section is ~16 kNm rising towards the end of the section to ~25kNm. Rig data was not made available for the service provider on this job and the client provided feedback after comparing top drive and logging tool data. In this period at the same time the torque measured by the i-Con was consistently 20-25% below what was read from the top drive and the trend was following each other on the graphs. The measurements from the logging tool confirmed the operator's suspicion that the torque output reading from the top drive was too high so that further actions could be taken. Correct torque readout is essential for the operator to be sure that the full capacity of drill string is being utilized. On this particular field, several liners have had to be set earlier than expected given the torque values read from the top drive triggering the questioning of the correctness of the read value.

## Case 3:

This time the i-Con XL tool was installed while drilling the 8.5" section at 5000 m, the tool was placed directly under the top drive. The logging tool was logging at 1 data point per second and the tool produced the torque curve in blue and the rig torque is plotted on the red curve.



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On this job the i-Con measured torque fits well with the torque data from the top drive. Further investigation of the top drive torque readout was not started based on the verification given by the logging tool that it was indeed reading the correct torque. This saved time and money for the operator not pursuing with further investigation.

However, data from the i-Con was used to identify an error in the measured hookload. The customer had suspected, that due to low measured block weight and fluctuations in weight and position, they were overestimating the amount of wear on the drilling equipment. By installing a weight cell on the deadline anchor they could rule out these fluctuations, ultimately reducing downtime.

### Results

Using logging tool for verification/calibration can quickly diagnose potential problems with other drilling equipment so that corrective actions can be taken saving cost and time for the operating companies.

## Case Study Snapshot

### Challenges:

- Readings from top drive were not confirmed resulting in limited operations
  - Achieving planned depth when running liners
  - Torque reading from top drive were questioned by operator
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### Solution:

- Placed a drill pipe logging tool directly under top drive during operations
  - Used when drilling sections and running liners
  - Compared top drive and logging tool output quickly confirmed status top drive data
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### Results:

- Accuracy confirmation of top drive data
  - Using the logging tool in the described set did not limit the operation or add extra time
  - End user could use i-Con data as basis to get a calibration of top drive if needed
  - In other cases, the logging tool data confirmed top drive measurements are correct
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