

### 80% REDUCTION IN SHOCK AND VIBRATION

Midland County, Texas US

**\$41k**  
TOTAL SAVINGS  
PER WELL

**80%**  
AXIAL VIBRATION  
REDUCTION

**62%**  
AXIAL SHOCK  
REDUCTION

The Thruster provides consistent force to bit by balancing hydraulic and mechanical forces. This balance provides smooth energy transfer to the bit, even in erratic situations. By providing consistent parameters, the Thruster reduces shock and vibration, BHA damage and failures.

### THE CHALLENGE

A Midland basin operator experienced high shock and vibration in their 12.25" intermediate sections which was causing an average of a bit trip per section.

### THE SOLUTION

After analyzing the recent offset wells (profiles, BHA, vibration), TAQA recommended adding the Thruster to their BHA with a standard spring setting. The final BHA was: PDC + Motor + MWD + Thruster.

### THE RESULT

Over a five well offset comparison, shock and vibration significantly reduced, section times decreased and \$41,000 average savings per well. The Operator has continued to run the Thruster across their drilling program with repeated results.

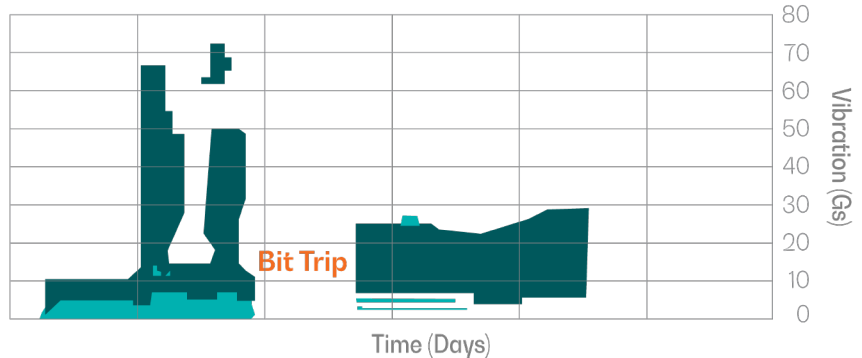
#### Average Vibration and Shock Decrease with Thruster

Axial Vibration	4.18g	<b>0.82g</b>
Lateral Vibration	1.44g	<b>1.01g</b>
Axial Shock	7.88g	<b>2.98g</b>
Lateral Shock	3.15g	<b>1.84g</b>

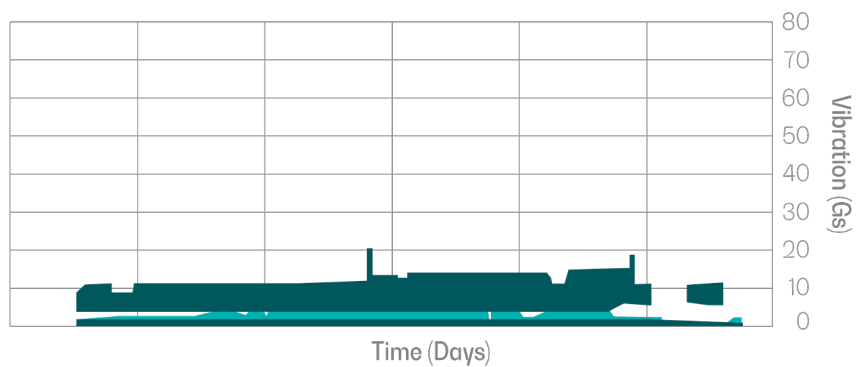
### Axial Shock and Vibration Comparison



No Thruster



With Thruster



■ Axial Vibration    ■ Axial Shock