DEA Project 160
Shoulder Thread Torque Verifier System

Participants:

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Lab Testing Determines:

1. What Constitutes a Properly Made Up Connection.

2. What Constitutes an Improperly Made Up Connection.

3. Compares STV System Results to Torque Turn Results.

4. Allows STV System Test Results to be Recorded For Field Make Up Verification.
Drill Pipe Shoulder Seal Test
Drill Pipe Test performed in Eckel (Tong) Manufacturing Lab.
Stage 1, 5000 #ft……Stage 2, 15000 #ft torque
(click picture)
DPM 69

Good Torque/Shoulder Seal

(click picture)
DPM 54
Tool Joint Make-up

DPM 54 Plot

Cursor at: 25 Mar 2004, 18:21; OSPProf. 1 - Min.: 76.289 °F
DPM 35 OSP

10,000 #ft torque on pin, 0 #ft on shoulder
(click picture)
Tool Joint OSP Line plot
long pin, no torque or seal on shoulder

Cursor at: 29 Feb 2004, 18:12-0600; OSProf. 1 - Min.: 71.185 °F
See tool joint break-out/torque signature
(click picture)
DPR 2

Tool Joint (OSP line) break-out Plot
M C 114

Good collar thread engagement

Each pixel independently within the rectangle area senses the temp. rise beneath it.
Test in VAM Lab
Poor thread engagement with OSP & cross-section overlay
M 18

Good Thread Engagement

5500 #ft torque

(click picture)
Good Thread Engagement
Rectangle area plot
see good temp. average (red plot line)
C120
Poor thread engagement with collar rotation
(click picture)
Poor Thread Engagement

Black plot line depicts max. torque/temp. 142.3 °F, developed on mating threads.

Red plot line depicts ave. temp. 102.9 °F, on verified threads.

Green plot line depicts min. temp. 73.4 °F, on threads with little or no engagement/torque.
Good Connection Thread Engagement
(Connection was separated for inspection by Franks Casing)
4” 11.6 #/ft Chrome
Even torque was applied to seal area and major threads, galling on last run-out thread
Torque Turn Plot
Connection of same mfgr., style & size on test stand in Franks R&D lab.
(Test 1), 4", 11.6 #/ft, Chrome, 5332 #ft torque
Test performed in Franks Casing R&D lab
See STVS seal and run-out thread signature
Test 1A, OSP, 9 chrome, 5332 #ft torque  (click picture)
STV System OSP Plot
Test 1A, OSP, 12:24,
Black plot line depicts max temp & tong torque gauge reading,
Red plot line = average temp.,
Green plot line = lowest connection temp., See 1 degree temp rise on seal

Cursor at: 22 Jul 2004, 12:24; OSProf. 1 - Max.: 97.456 °F; OSProf. 1 - Avg.: 101.001 °F; OSProf. 1 - Min.: 112.689 °F
STV System vs. Torque Turn

Test 1A, Chrome, Plot Overlay 4”, 11.60 #/ft, C 276, 5332 #ft torque

**Black plot line** = max. torque/temp,

**Red plot line** = depicts average temperature in made-up connection,

**green plot line** = lowest temp in connection & poor thread engagement
Franks Casing R&D Lab
Test 1, STVS signature with cross-section overlay
See max. torque on run-out threads
Franks Casing R&D Lab
Test 1A, 4”, 9 Chrome, 5332 #ft torque
(See light torque applied to seal area, torque on only the last 4 or 5 run-out threads, no thread engagement or torque on the major threads)
Thread engagement comparison
(see where threads were engaged & torque was being applied)
4”, 11.6 #/ft, Chrome, 5332 #ft torque

Good Thread Engagement  Bad Thread Engagement
Good Tubing Thread Engagement
Eckel (tong) Manufacturing Lab.
(see even STV System signature/torque develop throughout connection during make-up)
(click picture)
Good Thread Engagement Signatures
(pictures are the upper half of a collar after a make up)
Signatures' depict torque evenly applied to the threads within the collars
(Collars with anomalies)
Proper thread engagement in upper 1/3 of collar
This connection would indicate a good make-up on the tong torque gauge.
STV Systems
Research & Development

All connection Research & Development testing was performed in 5 R&D labs (Grant Prideco, Vam, Franks Casing, Offshore Energy Services, Eckel (Tong) Manufacturing and on working rigs in Texas and Louisiana.
Shoulder Thread Torque Verifier System

STV System Overview (1)

1. The System verifies the thread engagement & torque being applied to the complete length of the mating threads with-in the connection box.

2. The Verifier System detects a .012 degree C, Delta T, beneath each pixel through-out the verified connection.

3. The System verifies the torque applied to the drill pipe shoulder, shoulder seal and tool joint thread.

4. The System verifies break-out torque and can calculate life predictions on drill pipe connections.

5. Real time make-up is displayed on operator & rig monitors,

6. The system sounds alarm warning when real-time STV signature is outside of operator pre-set parameters.
7. The STV System stores all verified connections thread data for future use.

8. The System will utilize satellite communications for world-wide real-time operator monitoring, alarms and file downloading.

9. The System has real-time plot & signature verification capabilities of the made-up connection for visual comparison with archived files.

10. The System is portable and the STV System camera can be placed/mounted up to 50 -100 feet out of the immediate work area.

11. The System monitors can be mounted on the tong, drillers consol, in the dog house, and/or company man office.

12. The STV System is designed for oilfield onshore, offshore and bucking machine use.
DEA Project 160

Connection Testing Determination

1. Each Participant Will Chose One size/type Connection to Be Tested.

2. The Test Samples Will Be Provided by the Participant.

3. Each Participant Connections Provided Will Be Different.

4. The Test Samples Will Be Stubs Between 4 and 8 Feet Long.

5. The Connections will Not Be Larger Than 13 3/8” Diameter.

6. All Lab Testing Will Be Done At Stress Engineering.

7. STV will Provide Personnel, Cameras, and Computer Equipment to Perform Thread Verification Testing.
DEA 160 Phase 1 Testing

Test Will Consist of the Following:

Make Up and Break Outs with the Threads Cut as Follows:


2. A box with tolerances on the low side and a pin with tolerances on the high side.

3. A pin with tolerances on the low side and a box with tolerances on the high side.

4. A box with tolerances on the high side and a pin with tolerances on the high side.

5. A box with tolerances on the low side and a pin with tolerances on the low side.
DEA PROJECT 160  
System Development

Funds: 5 participants @ 30k each 1st Phase  
100k each 2nd Phase

Development project:

1. Develop real time database of various, good made-up connections.  
2. Develop software system to utilize 3 cameras & handle large data files.  
3. Develop data communications between drillers consol, tong operator, company man office and oil company headquarters.  
4. Develop real time plots for data warehousing and recovery  
5. Connection make-up testing & evaluation for acceptable make-up  
   a. Tubular connections to be furnished by companies  
   b. Testing and evaluation performed at Stress Engineering  
6. Purchase necessary hardware.  
7. Develop software to automate complete system for offshore rig usage.
Codex