The Project Envisioned to Consist of Two Phases

A. Phase I
   a. Will Develop a Limited STV Image Database to Determine What Constitute a Properly Made Up Connection
   b. Takes the Technology to the Field at Cost to Determine How the Technology Works
   c. Determine Commerciality and Operator Benefit

B. Phase II
   a. Develop Smart Software to Automatically Recognize a Properly Made Up Connection From One That is Improperly Made Up
   b. Test Additional Connections and Add the STV Images to the Database
Phase I Consist of 10 Task With The Following Goals:

1. Determine Connections to be Tested
2. Conduct Lab Testing of the Selected Connections
   a. Establish Proper Make Up
   b. Establish Improper Make Up
   c. Compare Both to Torque Turn Results
   d. Photograph and Store Results For Field Testing
3. Take the Technology to the Field and Use Lab Results to Determine Properly Made Up Connections
4. Determine Commerciality of the STV System and Quantify Benefit to the Operator
5. Write a Report of the Results
DEA 160
Connection Testing Determination

1. Participant Will Chose One Style Connection to Be Tested
2. The 5 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
Test Will Consist of the Following:

1. Number of Make Ups and Break Outs with the Threads Cut as Follows;
   

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

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

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

e. A box with tolerances on the low side and a pin with tolerances on the low side.
DEA 160 Phase I Lab Testing

1. Determines What Constitute a Properly Made Up Connection
2. Determines What Constitue an Improperly Made Up Connection
3. Compares STV System Imaging Results to Torque Turn Results
4. Allows STV System Image Data Base to be Recorded For Field Make Up Verification
1. Each Project Participant will Take the STV System Imaging Technology to the Field at Their Own Expense to Determine the Following:
   a. Establish the Benefit of STV Imaging to Verify Proper Connection Make Up in the Field
   b. Establish the Commerciality of the Technology
   c. Determine Participation in Phase II
DEA 160 Phase I Total Cost

1. Stress Engineering Lab Cost
   - 21 Days @ $1000/Day for project management, staff engineers, report writing, and material handling - $21,000.
   - 10 Days of Testing @ $4500/Day For Equipment Usage, Two Men, and a Project Manager- $45,000
   - $5,000 For Report Writing & Misc. Expense
   - Total Stress Engineering Cost $71,000

2. STV Systems Costs
   - 40 Days @ $1000/Day for 2 engineers, project manager, travel, hotels, meals, shipping and report writing - $40,000.
   - $24,000 for 12 Day of Expenses During Testing
   - $15,000 for Administration Fees and Contract Cost
   - Total STV Systems Cost $79,000

3. Total Cost of Phase 1 $150,000 or $30,000/Participant with 5 Participants Expected.
DEA 160 Phase I Time Line

1. Expected Length of the Project is 9 Months
2. Project Will Begin When Fully Funded
3. Participants Have Three Months to Choose and Deliver the Connections to be Tested
4. Lab Testing Will Require a Month
5. Each Participant Will Have 4 Months to Test the Technology in the Field
6. The Final Report Will Require a Month
The Applicability of Phase II Will Be Determined at the Conclusion of Phase I

1. The Goals of Phase II are:
   a. Perform Additional Lab Testing
   b. Develop Smart Software to Automatically Recognize a Properly Made Up Connection From One That is Improperly Made Up
   c. Cost for Phase II are Estimated @ $500,000
Shoulder Thread Torque Verifier System

STV System Overview (1/3)

1. The system verifies the torque being applied to the complete length of the mating threads.
2. The Verifier (new) System detects a .012 degree C change in temperature through-out the connection.
3. The system verifies the threads, shoulder seal and torque applied to the drill pipe shoulder.
4. The system verifies break-out torque and can calculate life predictions on drill pipe connections.
5. Real time make up displayed on the user monitors.
Shoulder Thread Torque Verifier System
STV Overview (2/3)

6. The system sounds alarm warning when real-time STV signature is outside of pre-set parameters.

7. The system stores all STV thread verification data for future use analyzing connections.

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

9. The system has cross-section & graph/plot print-out capabilities of the STV signature for visual comparison with archived files.

10. The system is portable and the STV System camera can be placed/mounted up to 50 -100 or more feet away from the bore hole.
11. The STV 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.