International Organization for Standardization

ISO 15551-1 Revision

SPE ESPS Breakout – May 16, 2019

Objective for Breakout

- Educate on the current ISO 15551-1 ESP Standard and provide insight on why the document is being revised and who is involved.
- Collect feedback from operators:
  - Who's using it and how
  - Who is not and why
- Collect feedback from manufacturers
- Collect feedback from all on what content needs to be corrected for better usability.

Summary of feedback

- Equinor appears to be the only company requiring compliance in their ESP tender. Other companies said they would use it the next time they go for tender but need guidance. PDO is waiting for others to apply this standard to determine the value.
- Standard was published during the downturn and manufacturers did not have the budget to conduct the required tests for compliance. Unsure of who should bear the cost of the testing: manufacturers or operators.
- Most breakout attendees had not read the standard and did not know what it covered. Much of the breakout was spent reviewing the document's contents. Request for training and "how to" guides for its implementation were made.
- Requests made by some participants to expand the scope of the document to include installation requirements, PMMs and subsea installations.
- Operators seem to realize the value of the standard but the manufacturers do not. Until operators standardize on their requirements regarding quality control and documentation (which was the intent of this standard), there will not be any value to the manufacturers to comply with it.

ESP Energy Efficiency Management as a Key to Cost Savings and Run life Improvement

Moderators: Musorina A., Gorlov A.

Currently power costs account for over 35% of total operating costs for well fluid lift in Russian oil companies. . Therefore, and taking into account continuous increase of electricity purchasing tariffs, the subject of energy efficiency enhancement is very important. Moreover the data about daily power consumption can be used as additional indicators to assess deterioration in the ESP operation.

Technical Committee of the ESP2019 symposium has made a decision to consider energy efficiency of oil production with ESP as a key to cost reduction and enhancement of the equipment run life.

More than 25 people took part in the session. The participants discussed the results of the 'ESP Efficiency Calculator', considered major activities to enhance energy efficiency and analyzed examples of the use of data about daily consumption of power during decision making regarding normalization of ESP operation.

Distribution of power losses during operation:

System Components	**kW**	**power loses**
Submersible Pump	9.87	45%
Downhole Motor	2.53	12%
Step-Up Transformer & Distribution Network	1.52	7%
Downhole Cable Line	1.34	6%
Motor Seal Section	0.4	2%
ESP Control station / VSD	0.47	2%
Useful power	5.77	26%
Total	**21.9**	**100%**

Useful power of ESP system spent for well fluid lift is ONLY 26%!

Key identified and implemented actions to reduce energy consumption

- Change C&P procedure to introduce ESP efficiency is one of the important factors for vendor selection process together with its cost . Installing more efficient pumps and motors.

- Ultra-High Speed ESPs (UHSESP)
- Changing ESPs motors from AC to PMMs
- Energy efficient design during ESP selection. Input data based on production forecast, but not today numbers.
- AC motors with higher nameplate voltage and lower current.
- Revising downhole cable size based on economical assessment. Bigger cable.
- Revising ESP setting depth to avoid unnecessarily deep installations
- Replacement of gas separator with intake in wells with high WC
- Optimization of tubing diameter for reduction of friction losses

The abovementioned activities allow to cut the inefficient power consumption by up to 35% with a positive effect on Company's OPEX.

Moreover, sudden increase in ESP power consumption can be an indicator of scaling, deterioration of pump stages and tubing lift leakage.

An additional indicator of ESP condition is instrumental in quality control and optimization of the ESP producing stock and in prevention of early equipment failures.

Misconceptions About ESP Transportation & Implementation of Best Practices

Glenn Toney, Mark Petrie, Branden Pronk, Jeff Dwiggins, Carol Grande

Summary

- Well attended (approximately 40 persons)
- Good discussions & interactions
- General concerns expressed by many operators about S&H methods currently employed in North America
- Broad discussion on methods
  - Shipping boxes
  - Shockwatch Sensors (value?)
  - What are we missing
  - Foam filled boxes

Summary

- Discussion around responsibility for delivering the ESP to the wellsite
- What process/procedure is being followed?
- Poor handling is an issue

- A procedure is needed
- Who’s responsible?
  - Ultimately the operator must take control on methods
- Should there be an industry standard?

Why and How to Make ESPs your Specialty

Summary

Moderators: Jesus Chacin, ConocoPhillips

Soumyadeep Ghosh, Chevron Energy Technology Company

Panelists: John Patterson, AccessESP

Richard Delaloye, ConocoPhillips

Leon Waldner, CNOOC International

Michael Dowling, Perenco

The 2019 SPE ESP Symposium Technical Committee thought it would be valuable to address the generalized perception that the Industry has been facing a shortage of technical experts for some years now, an undesirable trend that is believed will continue unless some actions are taken.

Thus, the goal for this breakout was to promote a conversation about why Young Professionals (YPs) should consider becoming a specialist in ESPs and in the wider area of Artificial Lift.

To help kick-off the discussion, we enlisted the help of 4 panelists that are well recognized as subject matter experts (SMEs) in ESPs and Artificial Lift. Efforts were made to market the breakout session to YPs with email blasts and focused communications via the YPs networks prior to the Symposium.

We are glad to report that more than 40 YPs were in attendance and poked the panelists with very relevant questions and comments. Engagement was very high, and the session ran 15 minutes longer than the 1hr. 20 min. originally scheduled.

As you can imagine with a panel of this caliber, there was no shortage of great comments and advice, but also different points of view coming from the personal learnings accumulated from more than 140 years of combined experience working for both Operators and Equipment Manufacturers.

There was of course significant agreement on many fronts. Here are the relevant points made.

On "Why" become a Specialist

1. Endless challenges. There are plenty of exciting technical problems to fill a professional lifetime
2. Making a real difference to the bottom line of your company

3. Empowerment to push the envelope
4. Great job security – If you are good
5. Long career, great path to financial independence as a Consultant

On "How" to become a Specialist

1. There is no single unique roadmap. Each panelist made it differently.
2. If the YP works for a Service Company, keep asking questions to Operators, work on failure investigations, get deeply involved with your clients.
3. Be innovative but understand "the problem" first; try tweaking first before trying to re-invent the wheel.
4. Most Operators do not have an "Artificial Lift" department, so you need to work closely with Production Engineering and Completions. You may in fact end up being part of one of these departments. But do not forget that you must also understand the reservoir reasonably well, so do not neglect working with Reservoir Engineering.
5. Understand the business you are in, so focus on economic impact and do not blindly pursue reliability at "all cost".
6. Seek understanding the key issues, first and foremost. Be aware that Operators do not always know what they need, and Service Companies can only deliver to match requirements.
7. Even in these lean times, there are many conferences, short courses, discussion networks to hone-in your technical and business skills. Vendors offer many learning schools, usually free. It is in always in your hands to grow, not always in your employer's hands.
8. Develop your network; takes energy and a lot of time, but it is key to becoming a specialist.
9. Embark on endless learning, that's were the fun is for an SME.
10. One of the best ways to learn is to observe others. Work with a recognize SME, asked to be mentored. Be aware, though, that it takes dedication and time. Nobody becomes an expert on anything overnight.