

Successful Pipeline Cleanouts Using Jointed Pipe



Challenge

Paraffin and asphaltene deposition, along with hydrate formation, can often lead to expensive and time-consuming efforts in attempts to cleanout pipelines and restore flow assurance. Multiple cleanout runs and remediation efforts are often needed to adequately cleanout the pipeline, costing the operator millions of dollars through the cost of equipment, rig time, and loss of production.

Coiled tubing is often the first deployment for cleaning out pipelines due to the initial associated cost, ease of rigging up the coiled tubing unit, and the less complicated setup compared to a snubbing unit/hydraulic workover unit (HWO). Though coiled tubing is slimmer, smaller, and more flexible than jointed pipe, it also has limitations that can prevent a successful cleanout run including the limited circulation ability due to the smaller ID, lack of stiffness leading to buckling, and difficulty in rotation, all of which can affect the ability of the coiled tubing in achieving a successful cleanout and reaching the total depths required.

Solution

Over the past 15 years, Workstrings International has designed and modeled numerous successful pipeline cleanout strings for operators and snubbing/HWO service companies looking to use jointed pipe to cleanout their pipelines. By using jointed pipe in conjunction with a snubbing unit, many of the limitations of coiled tubing can be avoided and the cleanout can become a more cost-efficient operation due to the speed and efficiency in reaching the desired cleanout depths which are 4-5 miles laterally with the ability to snub, push, and rotate the pipe.

Working in consultation with the operator and snubbing/HWO service workover teams to ensure operational demands are met while allowing for the greatest safety factor, Workstrings Engineering cleanout string designs have been used to cleanout pipelines with actual depths reaching as far as 28,789 ft. and with pipeline internal diameters as small as 4.0 in. For several of the pipeline cleanout designs, calibration work was done by Workstrings to improve accuracy of the modeling, allowing for a greater degree of certainty when modeling the pipeline cleanout string, and determining optimal operational parameters. This calibration modeling has supported operators during real time operations.

Common challenges when designing pipeline cleanout strings using jointed pipe include diameter limitations of the pipeline, trajectory of the pipeline, torque capacity issues if reaming through hydrate and paraffin accumulation is necessary, riser to pipeline transition, and limiting the degree of buckling as much as possible. These pipeline cleanout operations have been successfully performed from both platform facilities and intervention vessels.

“Use of HWO Units and jointed pipe have saved operators millions of dollars in service costs and getting production back online as quickly as possible.” - John Hardy, VP of Operations, International Snubbing Services

Results

Across all pipeline cleanout string designs provided by Workstrings Engineering, each design has proved successful with positive feedback being generated by the operator and snubbing/HWO service company, with the most recent pipeline cleanout string designed by Workstrings Engineering being used to set a new offshore snubbing/HWO world record for the longest subsea pipeline cleanout by reaching 28,789 ft. actual depth, using a 2-7/8” CTM26 and 2-7/8” PH6 tapered cleanout string and conducted onboard the Helix Q4000 Intervention Vessel. The

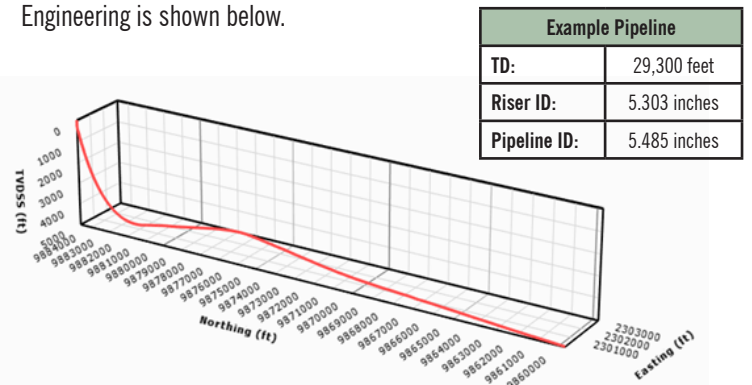
highlight of this operation was to successfully clean out the flowline from the Q4000 rather than cutting the flowline up into sections which has been performed previously on long flowlines such as this one. This significantly reduces the number of critical subsea lifts, the HES exposure and overall timeline for the flowline abandonment. The flowline was lowered subsea with the deployment rigging and drill string where it was laid back in the original trench on the sea floor. This is another benefit of being able to perform the full cleanout in a single lift and requires the least amount of onshore disposal of flowline components

Common Workstrings International pipe used for pipeline cleanout operations is shown below in **Table 1**, with tapered strings often being used to provide the optimal design.

Workstrings International Pipe Used for Pipeline Cleanout Operations						
OD (in)	Connection	Grade	Wall (in)	Nominal Weight (lb/ft)	Max MUT (ft-lbs)	Premium Tube Tensile (lbs)
2-3/8	PH-6	P-110	0.254	5.95	3,400	145,371
2-7/8	PH-6	P-110	0.276	7.90	4,400	194,099
2-7/8	CTM26	V-150	0.362	10.40	10,100	333,070
2-7/8	XT27	S-135	0.362	10.40	7,100	299,763
3-1/2	NC38	S-135	0.368	13.30	12,100	381,870
4	XT39	S-135	0.330	14.00	21,200	403,526
5	NC50	S-135	0.362	19.50	30,700	560,763

Table 1 - Workstrings International Pipe Used for Various Pipeline Cleanout Operations

An example of a pipeline cleanout string designed and modeled by Workstrings Engineering is shown below.



Date of Design	Vessel	HWO Unit	Type of Cleanout	TD (Designed or Actual)	ID of Pipeline
13 April 2020	Helix Q4000	SBS Energy	Pipeline Decommission	29,000' Planned 28,789' Actual	4.775"
14 May 2019	Spar	ISS	Spar Column/ Pipeline	29,283' Planned	5.125"
27 May 2015	Spar	ITS	Pipeline	21,000' Planned	5.410"
08 April 2014	Spar		Spar Column/ Pipeline	18,077'	4.000"
06 Sept 2011	Spar	ISS	Pipeline	20,555'	5.625"
04 June 2010	Spar		Export Pipeline	21,806'	16.000"
28 Sept 2005	Helix Q4000		Pipeline	25,000' Planned 23,800' Actual	6.893"