

Replacing Sucker Rods with Coiled Tubing in Oil and Gas wells

Main considerations

1. Safety and environmental

1.1 Well control,

When running production tubing and sucker rods the well is exposed to the ambient. The need to make or break connections every 30 ft in the case of tubing, and 25 ft in the case of sucker rods calls for killing the well before its intervention to prevent uncontrolled gas surges that can lead to blowouts.

Killing the well has two collateral effects a) fluid, mostly water can damage formations b) in a multi layer formations water can filtrate/disappear into one or more formations, thus reducing the fluid level needed to maintain the well under control.

Being CT a smooth and continuous pipe, with no connections, has the advantage that it can be run/pulled through a stripper, which provides a better well control at all times.

1.2 Spills,

Tubulars and rods pulled out of an oil well, always come embedded in oil, meaning splashing oil on location.

Most service companies use some kind of pollution control such as wipers, absorbent blankets, etc

Being CT a smooth and continuous pipe, (no connections), the advantage is a much cleaner job

1.3 Personnel, accidents,

Making and breaking connections requires manual tongs and or power tongs. Most of accidents are related to pipe handling in a well intervention.

A second hazard in a PU or WO rig is the need of a derrick man. Being CT a smooth and continuous pipe,(no connections), GIH or COOH is a smooth operation that does not require personnel intervention around the well head, neither a derrick man. Only the CTU operator is in charge, away from the well head.

2. Personnel

2.1 While a typical pulling unit requires a minimum crew of four, a CTU for CTLift interventions requires three.

3. Mechanical failures

3.1 Breakages or fishing jobs are mainly caused by pipe or rods connections. Other breakages on SR string are related to wear. Both lead to fishing jobs.

4. Logistics

4.1 CT is stored on a reel weather GIH or COOH , while PU either stack rods on the derrick or lay jointed pipe or rods on racks on the floor. That requires additional handling to load/unload, and trucking.

5. Preventive maintenance

5.1 as explain in “Three in one Solution” CTLift allows reverse circulation of fluid to clean out sand or scale and prevent premature subsurface pump failures.

6. Downtimes

6.1 CT has the ability to run faster operations, i.e pump changes reduces downtimes to one half when compared to typical rods operations.

7. Weather interferences with well intervention

7.1 Is a common practice in windy areas to stop working with a WO or PU once wind exceeds 25 Mi/hr. Motion of strings stacked on the derrick can destabilize the rig and eventually turn it over. Also, “banging” rods against rods due to wind damages the physical structure of couplings or rods.

CTU can work under harsh weather conditions

8. Economics

CTU operations are twice as fast than a typical CTU meaning that one CTU's replaces two PU's.

Rig	number of interventions/day	Crew	Cost/well	wells week
PU	one	4	1	5
CTU	two	3	1/2	10

A list of advantages of using a CTU Vs. a Pulling unit

There are two types of pulling units, A) one that stores the string of tubing and rods standing on the side of the derrick, and B) one that lays tubing and rods on racks.

Factors to consider

A) Type

- *Size of location and anchors*
- *Crew Size*
- *Derrick man*
- *Power Tongs*
- *Threads cleaning*
- *Speed going in hole (GIH) or pulling out of hole (POOH)*
- *Wind, rain.*
- *Well head exposed-open*
- *Hauling rods and pipe*

B) Type

- *Size of location and anchors*
- *Crew size*
- *Power Tongs*
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- *Wind, rain*
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- *Hauling rods and pipe*

Rods lay down on racks in dual stands are subjected to bending forces that can affect material integrity.

Coil Tubing Unit when compared to Pulling units

- *Smaller location*
- *No need for anchors or guide lines*

- *No derrick man*
- *No power tongs*
- *No threads to clean*
- *Faster in and out of hole*
- *Well head under control*
- *CT comes with the rig*
- *Same CT string can be also used to do well clean out and service work*

Advantages

- *Avoiding the use of derrick man, power tongs and connections minimizes possible personnel accidents*
- *Rain or wind does not affect the well intervention*
- *Faster speed GIH-COOH means that the job can be completed in less time, translates in better CTU utilization within the day, and sooner production.*
- *Lack of upsets and couplings (sucker rods), POOH/GIH allows total control of well head minimizing chance of blow outs*