Frequently asked Questions

What is the recommended method of calculating a stuck point?

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There are numerous ways a cable or tool may get stuck in a well during both cased hole and open hole logging operations. In cased hole work it is most commonly, but not always, the tool that is stuck. In open hole operations, there is always the problem of the cable becoming key-seated in the bore hole wall. In cased hole operations, tools can become stuck due to D.V. tools, sidetracks or casing windows, sand or debris in the wellbore, severe doglegs or horizontal sections and collapsed casing. In an open hole well it is possible for the logging tools, or wireline to become stuck many feet above the tool. This is usually referred to as being "differentially stuck". This phenomenon can occur when there is higher pressure in the well bore than the formation which can force the logging cable and/or logging tool into the thick mud cake that has built up on the bore hole wall. Continued attempts to withdraw cable from a cable that is stuck can result in frictional forces so great that cable tension exceeds allowable limits. Another circumstance that can occur in open hole operations is Key Seating of a wireline in the well bore wall. Because oil & gas wells are not drilled perfectly straight, dog legs can cause points of friction on the wireline as it is pulled out of the well. As the cable is drawn out of the well during logging operations it can wear a slot into the formation. When a logging tool reaches the slot it stops because the diameter of the slot is much too small for the logging tool to pass through. In many instances the logging tool will be free to go down hole, but it cannot be pulled up past the dog leg in the well.

When a cable becomes stuck and will not move at the recommended maximum allowable tension, then the first step in deciding what action to take is to determine where the cable is stuck. If the logging cable is stuck above the logging tool, it will be impossible to part the weak link in the cable head and the only way to free the logging truck from the stuck point will be to pull the wireline until complete failure. Before making any determination about pulling out of the weak point in either open or cased hole operations, it is critical to understand where the wireline has become stuck.

Methods for Determining "Stuck" Depth

Each wireline has a known stretch value that can be found in the manufacturer's specifications. This value denotes the amount of stretch a cable will experience when placed under tension. The amount of wireline above the stuck point can be determined by measuring how much the wireline stretches in response to a given change in tension. This determination can then be used to calculate the depth of the stuck point. There are typically two methods to measure this stretch. The quickest method is by utilizing the depth indicator in the wireline truck to measure the stretch via change in depth. The disadvantage with this method is that it is less accurate and is should only be used when a general stuck depth determination is required. The second method is to use a physical landmark as a fixed reference on the rotary table or well head and measure the stretch using a piece of tape or marking on the cable. While this method is more time consuming it is more accurate and should be used in circumstances where finding the most accurate stuck depth is required. The below procedures give step by step instructions for both of these methods.

Stuck Point Location Using Depth Indicator

The quick procedure for locating the approximate depth of the stuck point, (Ds) is as follows:

- Pull on cable to remove all slack and put the cable under strain.
- Note and record the indicated depth from the measuring device, (D1).
- Note and record the tension in the cable.
- Increase the tension exactly 1000 pounds (4.44 kN) & record the indicated depth, (D2).
- Calculate the depth of the stuck point: Ds = (D1 - D2) / K (1000 feet).
- K is the stretch coefficient of the cable, which is listed in the Camesa Catalogue as, ft/Kft/Klbs.
- To convert from meters to feet: 1 foot = 0.3048 meters

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Example
Cable type-Camesa 1N32PTZHS, 5/16" Mono-cable ; K = 1.2 ft/Kft/klbs
Cable becomes stuck at an indicate depth of, D1 = 16500 ft.
With the cable under strain the line tension is = 3,300 lbs.
The tension is then increased to 4,300lbs and the indicated depth is D2= 16480 ft.
Ds = (D1 - D2)/K = (16500-16480) / 1.2 (1000 ft) = 16,600 feet
In this example the stuck point depth is close to the indicated tool depth, so it is the tool that has become stuck.

Depth Corrections
If a more accurate stuck point is important, then the following factors can be considered:
- The stretch, (D2-D1) when measured at the truck includes the stretch in the cable from the truck to the well head. A more accurate method of measuring the stretch is to mark the cable at the well head and then measure the stretch when the tension is increased.
- If the rig-up distance is known, it can be subtracted from the calculated depth based on measurements of stretch at the truck.
- For well seasoned cables the stretch coefficient should be reduced by 5%.
- In very deep hot holes the effective value of K can increase by 10%.
- If there are reasons not to increase the tension by 1000 lbs, then just increase the tension by 500 pounds and then take the value of Ds. calculated using the above formula.

Finding Stuck Point Using a Fixed Reference Point:
Have a tailgate safety meeting and insure all safety steps have been taken prior to proceeding with the following procedure.
1. Calculate total cable tension at tool depth.
2. Calculate the amount of cable stretch from manufacturers' specifications for tool depth. (Feet of stretch per thousand feet per thousand pounds.)
   NOTE: Use 50/50 rule while determining stuck point. Do not pull over 50% of cable total breaking strength, nor 50% more than the weak link pull out point.
3. Slack off, then pull until tension indicator reads calculated total tension.
4. Stop reel and lock down reel brakes.
5. Flag cable at fixed reference point where cable movement can be measured.
6. Unlock reel brakes and pull an additional 1,000 pounds cable tension.
7. Flag cable at fixed reference point again.
8. Measure distance between flags.
9. Compare measured stretch to calculated stretch (if measured stretch is less than calculated stretch cable may be stuck above tool).
10. Repeat procedure either by slacking off 1000 pounds and pulling again, or by pulling an additional 1000 pounds (total 2000 pounds over calculated cable tension at tool depth). Always double check calculations and procedure.
    NOTE: Keep Customer and your supervisor advised of all conditions, events and the results.

Major Basic Consideration:
1. Never pull free from the tool until it is determined to be the best procedure and all have agreed on that procedure. (A needle is easier to find with a thread attached.) The same is true of a logging tool deep in a hole of unknown size.
2. Do not break the cable. The Customer may try to blame the fishing job on a faulty cable if you break it. Never exceed 50% of the new cable rating, except at Customer's orders. If the driller is determined to pull on the cable, which is key seated, remind him that it may break at the surface. He might as well cut it off at the rotary table. Point out that weeks of fishing are possible, and that the well may be lost if the cable is broken above a key seat.

RULES TO PULL BY:
When attempting to determine the stuck point, follow the rules listed below:
- The 50/50 Rule: Do not pull over 50% of cable total breaking strength, and never pull over
- 50% of weak link strength before consulting with customer.

When attempting to pull a stuck tool free, follow the rules listed below:
- Never pull over 60% of the cable total breaking strength.
- Never pull over 75% of the weak link strength.

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