Getting the most from your Camesa cable *Part 1:* Cable Seasoning

The most important step in improving cable life is seasoning your cable. Wireline cables are most susceptible to damage during their first few runs into and out of a well. This damage can affect cable performance over the life of the line, so getting the first few runs right is paramount to improving cable life overall.

What is a "seasoned" cable?

Seasoning a cable consists of three parts. The first is that the cable is run in a well following the recommended seasoning process in order to remove the constructional or mechanical stretch from the cable. Torque is introduced into all cables during the manufacturing process. This torque is directly related to the helical design of the wires and the proportional mass of each armor layer (See Technical Bulletin #20, Cable Rotation). The stretch introduced into the cable during the first run is a normalization of the cable and torque equalization between layers. All steel has a stretch factor; helically formed steel wire is no different. The permanent stretch in a cable for a true cable length is more a function of tension as opposed to truly stretching the wire itself.

The second part of the seasoning process is the seating of the separate components of the cable, specifically the inner and outer armor and the insulation. The manufacturing process is performed under relatively low tension, less than 300 lbs., at ambient temperature, whereas the installation process and field operations are performed under higher tensions with higher downhole temperatures. These higher tensions and temperatures allow for the inner armor wires to embed in the conductor insulation slightly, decreasing the overall diameter of the cable and increasing cable length. The tensions also allow the outer armor to seat with the inner armor. It is important for the different layers of the cable to seat against one another to allow for friction between the armor layers to help hold the cable together.

Third and possibly most important to the longevity of the cable is developing a thin layer of corrosion and buildup of micro-particulate matter between the armor wires and armor layers to improve friction. This thin layer of rust and wellbore particulates provides friction between armor layers helping to reduce loose outer armor wires.

Remember, a proper seasoning process consists of three parts.

1. Equalization of interlayer torque.
2. Seating of cable components.
3. Developing a layer of corrosion and particulate matter to improve interlayer friction.

Why would a seasoned cable have increased longevity?

A well-seasoned cable is just one part of a cost savings plan to increase cable life. The majority of cable issues result from loose outer armor. There are a multitude of issues that result from loose outer armor and all are reviewed in the Camesa cable school. The short answer to this question is that the seating of the components and increased friction from the seasoning process allow the cable to remain in a normalized state longer. In other words the friction holds the outer armor wires in place and slows the loosening process.

Keep in mind, there are a myriad of factors that influence cable life: well conditions, pressure control equipment, differential tensions, running speeds and cable service frequency just to name a few. All of these factors can affect the longevity of a cable's usable life. However, like most equipment and processes in the oil and gas industry there is a fly wheel effect, continuously doing the little things correctly keeps equipment working better, longer. Cutting corners or missing maintenance steps leads to equipment failure.

Camesa strongly recommends following the below seasoning recommendations to improve cable life. In order to experience the best performance from your Camesa cable, these best practices should be incorporated into your operating procedures.

To accompany the seasoning process we recommend following the best practices highlighted in our cable school. For more information on the Camesa cable school please contact your local Camesa representative.

Camesa cable seasoning recommendations.

Well Configuration:

Camesa recommends running new cables in a test well for at least the first run; additional runs, up to five, are ideal. The test well should be at least as deep as the wells you will be working on; if this isn't possible then a minimum of 8,000 ft. is recommended. Test wells are also preferred to allow the operator time to complete the seasoning process without distractions.

Well characteristics should be as follows:

- Minimal deviations
- Lighter fluids, a light brine solution or saltwater is best
- Minimal pressure as pressure control equipment can damage a new cable. Lower pressure is preferred to limit cable constriction

Tool Configuration:

- Use heavy tools or weight bars
- Use a swivel to allow for cable rotation
- NEVER use a junk basket, centralizer, calipers or any other tool that restricts cable rotation

Line wiper pressure:

- Keep the wiper pressure as minimal as possible, preferably zero.
- Use large ID flow tubes, we recommend 0.004to 0.006 of an inch over the largest cable diameter.
- Do not run the cable through any restrictions that limit or prohibit rotation.

Line Speed and Tensions:

- Speed and tension should be based on the 80/120 rule.
- The tension going into the well should not exceed 80% of the line weight plus the tool weight. The tension coming out of the well should not exceed 120% of the line weight plus tool weight including drag.**Note: equalizing tension going in and coming out will prolong cable life.* **Speed is nothing more than a tool used to control tension.**

Procedural Recommendations:

1. Stop every 1000 feet on way in and allow the cable time to rotate; on every other stop pull up 100 ft. to allow for tool and cable rotation again.
2. Stop every 2000 feet on way out to allow the cable to rotate.
3. Reduce speed both in and out of the hole to maintain equal tension and allow rotation. Follow the 80/120 rule.

These recommendations need to be followed for at least the first run on a new cable; three to five runs is preferred.

The following 10 to 20 runs should be run using the 80/120 rule. This means the cable will have to be run relatively slowly both in hole and out hole. If the cable is being used on horizontal wells, stop just above the kick off point to allow tension to equalize on the way in. After pulling through the kick off point, on the way out, stop, let the weight stabilize and allow the cable to normalize for a time. Please note that allowing the cable to normalize is not a substitute for regular cable maintenance and in no way tightens the cable.

If your company has questions regarding your internal seasoning procedures for a new cable please contact your local Camesa representative. We can review your procedure, make recommendations as necessary and help refine your process to maximize cable life.

Check with your local representative regarding cable schools, best practices and troubleshooting. Camesa is here to help you maximize the service life of your Camesa wireline.