Cementing

Bow-Spring Centralizers

The proper centralization of the casing for primary cementing has long been a critical step in quality cementing. Lack of proper centralization can lead to severe cementing problems, including lack of zonal isolation and improper casing support.

Bow-spring centralizers help center the casing in the wellbore during cementing operations, allowing the cement to be evenly distributed around the casing string. The degree to which the casing is centered (standoff) depends on the performance of the centralizer and the spacing between the centralizers installed on the casing OD. Bow-spring centralizers, both welded and nonwelded, provide the following advantages:

- They help center the casing in the wellbore, allowing even distribution of cement around the casing.
- They help reduce casing drag on the wellbore during casing running operations.
- They help prevent differential sticking of the casing.
- They increase fluid turbulence at the tool, helping remove filter cake from the wellbore.
- They can be run through hole restrictions in the wellbore or through smaller casing strings that are cemented in the well, thereby centering the casing below the restriction.

Welded Bow-Spring Centralizer

Welded bow-spring centralizers are available in two styles: slip-on and hinged. Slip-on centralizers are manufactured with solid end rings, requiring the centralizer to be slipped on the casing OD during installation. Hinged centralizers are manufactured in segments, allowing the centralizer to be installed easily around the casing OD. Hinge pins hold the segments together during installation. All welded bow-spring centralizers are manufactured to API Specification 10D.

The dual-contact (double bow) welded centralizer is designed for small-clearance casing-to-hole size applications. The centralizer will perform as a standard bow centralizer in holes up to 1/2 in. smaller than the centralizer’s nominal OD. When run in holes less than 1/2 in. smaller than the OD, the center of the centralizer contacts the casing OD, performing as a rigid centralizer. Because of its high restoring force with very little spring deflection, the dual-contact centralizer is excellent for deviated and horizontal wellbores. The dual-contact centralizer should only be installed between a collar and stop ring—never over a casing collar.

Nonwelded Bow-Spring Centralizer

Nonwelded bow-spring centralizers are available in the hinged style only. The bow springs of this centralizer are attached to the end rings without welding. The centralizer bow end is connected to the end rings with a locking tab that bears the load force on the centralizer. The centralizers are supplied in hinged segments joined by hinge pins in each segment. All nonwelded centralizers meet or exceed the requirements of API Specification 10D, which dictates the minimum restoring and maximum starting forces for centralizers for various casing/hole size combinations.

Centralizers with turbofins attached to each bow spring are designed to create localized turbulent fluid flow at the centralizer. The turbofins divert the fluid flow to more evenly distribute cement around the casing.

All welded and nonwelded bowspring centralizers are available in most common hole/casing sizes.
Case History

Challenge: The customer was challenged with running an 8 5/8-in. production liner inside a previous 11 3/4-in. liner and into open hole with average size of 12 in. to a total MD of 23,500 ft with TVD of 20,600 ft. Optimized centralizer placement was critical to get standoff and also land liner at TD.

Solution: Halliburton recommended using the OptimCem™ design program for consideration of foam design, slurry placement with ECD predictions and also centralizer placement to enhance standoff and torque and drag predictions.

Results: Liner was successfully run to TD with a centralizer program of one bow centralizer per 40-ft joint. A total of 115 centralizers were placed on the 8 5/8-in. liner. The liner was cemented with a foam design with excellent displacement efficiency as realized by pressure profile and mud returns during cementing operations.

Estimated gain = $150,000