

WELL CONSTRUCTION

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## Centralizer Sub

Delivering optimal centralization and standoff in wells with tight restrictions



“Cementing is 80% placement, and placement is 80% centralization. If you can’t centralize the pipe and place cement in more than 99% of the annular areas—you can’t expect to achieve reliable long-term isolation.”

– Mike Cowan, Senior Research Fellow, The University of Texas at Austin

# Weatherford centralizer subs keep you centered, even in tight-tolerance wells.

Wellbores today reach farther than ever, which means casing IDs must stay as large as possible. To achieve proper cementing in these conditions, centralizers have to pass through close-tolerance casing restrictions as narrow as 0.125 in. and still centralize strings in underreamed open holes of 4 in. or more.

Weatherford centralizer subs can go places that conventional centralizers simply can’t. These tools enable you to pass through ultratight restrictions and centralize casing in the larger wellbore. The rugged design and construction leave the centralizer uncompromised to properly center the casing. As a result, you achieve optimal standoff for improved cement placement and, ultimately, reliable isolation.

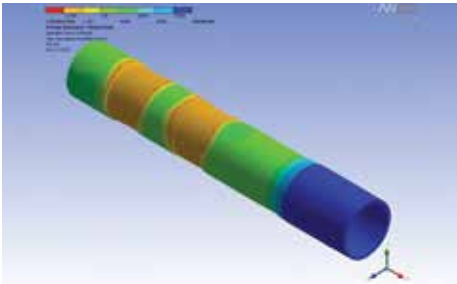
We patented the original centralizer sub design in 1995. Since then, we have run our subs and evolved our portfolio to satisfy industry demands. Our ongoing commitment to continual improvement assures you that our subs meet or exceed performance requirements.

## Solving challenges in ultratight applications

- Running centralizers through restrictions less than 0.5 in.
- Centralizing casing in underreamed holes of 4 in. or more
- Passing through a casing window and then centralizing casing for re-entry and sidetracking
- Running casing or liner to bottom in both vertical and highly deviated wells
- Rotating casing or liner to reach bottom and to improve the cementing job
- Meeting casing requirements for the sub portion of the tool in these areas:
  - burst
  - collapse
  - tension
  - drift

# Our centralizer subs are engineered for a lifetime of integrity.

Centralizers affect more than your ability to reach total depth. They also have a critical impact on cementing integrity. When you select Weatherford centralizer subs, you get the benefit of 20 years of production and field experience.



## Advanced designs for any installation

We manufacture each centralizer sub from a single piece of steel or corrosion-resistant alloy, which matches the burst, collapse, and tensile ratings of most casing sizes. For specialized performance, we also offer custom designs. By applying finite element analysis and proprietary calculations, we can machine materials to the exact dimensions and mechanical properties you need. In addition, we can determine the right bow style, size, and number.



## Thorough testing for superior performance

To ensure field performance, we simulate actual field applications and use internal testing protocols that exceed API requirements. During testing, we flex the bows multiple times, conduct a 100-percent weld inspection, pass the centralizer sub through ultratight restrictions, and measure the starting, running, and restoring forces. This process provides you accurate performance data and quality assurance.



## Expert advice on the right program

Whatever your centralization challenge, our experienced sales and applications teams can analyze your well and recommend the optimal solution. For every application, we run proven CentraPro Plus® software to select the proper centralizer and determine effective placement. This enables you to reach bottom and achieve the necessary standoff for a quality cement job. Our clients have successfully run thousands of casing strings using our subs with this approach.

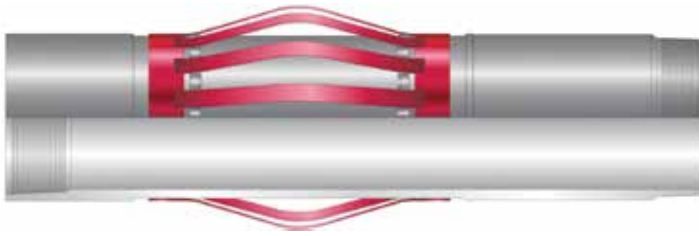
## Built-in benefits



- Most experience in the industry
- Rapid response team for expediting orders with short lead times
- Extensive selection of raw materials for unique metallurgy
- Customer-defined quality plans with third-party inspection
- Manufacturing capability in multiple global locations:
  - Houma, LA
  - Ortana, Italy
  - Abu Dhabi, UAE

# An extensive portfolio for diverse applications

Our broad centralizer sub portfolio includes three main product families: centralizer subs, rotating centralizer subs, and centralizer sub guide shoes. We have solutions for nearly every existing centralizer-sub application, and we can custom build technologies for new challenges.



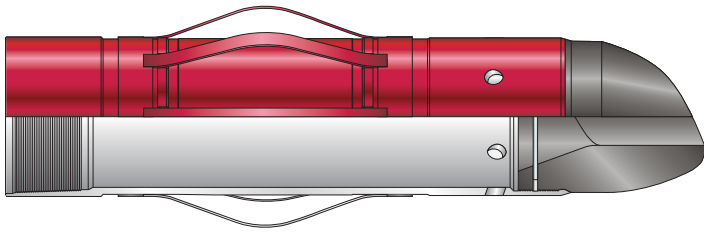
## 541 Centralizer Sub

The original centralizer sub features our smallest rigid OD. This enables it to go places that some rotating subs cannot. The sub has a low running force in restrictions and previous casing, and it has a high restoring force in the open hole.



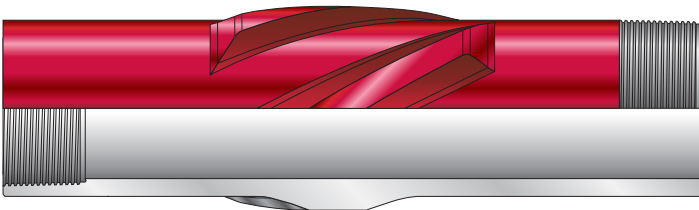
## 541R Rotating Centralizer Sub

The 541R rotating centralizer sub freely rotates inside the centralizer, which enables the casing or liner string to rotate. Like the original centralizer sub, it has a low running force and a high restoring force. The running and restoring force have been optimized to suit any application.



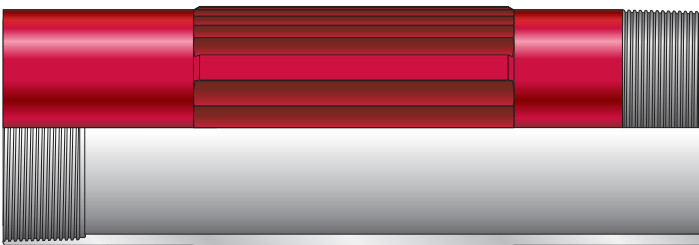
## Centralizer Sub Guide Shoe

Designed and built for specific needs, centralizer sub guide shoes are available for either rotating or standard centralizer sub designs. These guide shoes come with nose, nose material, and jet configurations as needed.



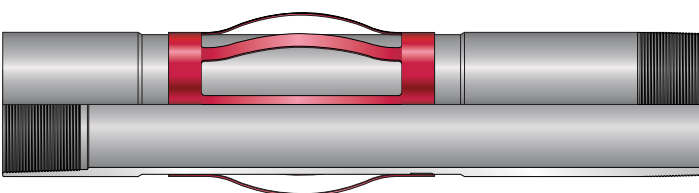
## 542 Centralizer Sub

The 542 centralizer sub features solid blades and is typically used with deviated strings to reduce drag. The sub enables casing to get to bottom, especially in deviated and extended-reach-drilling wells.



## 540 Centralizer Sub

The 540 centralizer sub is run in deepwater wells when a solid centralizer must pass through ultratight clearances. This sub allows positive standoff around the shoe, which reduces the risk of differential sticking and guides casing over ledges.



## VariForm™ Centralizer Sub

The VariForm centralizer sub is the next generation of the 541R bow-spring centralizer. This sub features a high-performance VariForm centralizer mounted by a patent-pending method onto the centralizer sub body.

# Application Guide

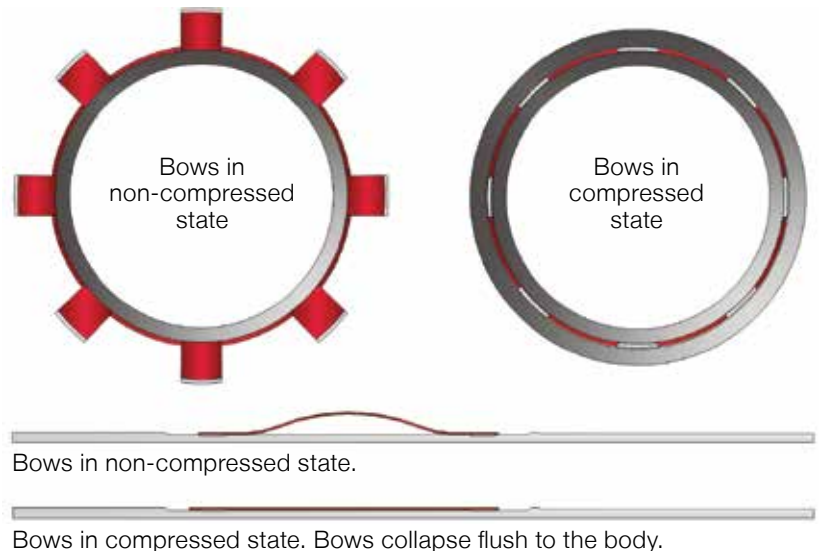
Our family of centralizer subs features high-quality, welded products for various casing sizes. Nonrotating and rotating centralizer sub versions give you options to address specific casing running and cementing challenges.

- Best choice
- Can be used without limiting operations
- Can be used with caution
- Not recommended

	Rigid		VariForm	Bow Spring	
	542	540	Sub	541	541R
Vertical Strings	●	●	●	●	●
Deviated Strings	●	●	●	●	●
Horizontal Strings	●	●	●	●	●
ERD Strings	●	●	●	●	●
Rotating Casing	●	●	●		●
Reciprocating Casing	●	●	●	●	●
Cased Hole	●	●	●	●	●
Open Hole	●	●	●	●	●
Underreamed: 0.875 in. < Restriction < 1.5 in.	●	●	●	●	●
Underreamed: Restriction ≤ 0.875 in. More Than Casing OD	●	●	●	●	●
Oversized/Washed-Out Hole	●	●	●	●	●
Uncemented Completion	●	●	●	●	●
Uncemented CRA Completion	●	●	●	●	●
Protects Tools in String	●	●			

## How the centralizer sub works

Our centralizer sub features a machined body with an integral bow spring centralizer secured to it. The springs compress near the sub body OD when going through the ultratight restriction. After the centralizer sub reaches the open hole, the bow springs expand to provide standoff in the underreamed sections. As cement slurry is pumped between the casing and the wellbore, the sub keeps the casing centered in the well for excellent centralization.



# Operational support with a global footprint

Our local teams can assist your centralizer-sub applications anywhere in the world. When you're on the job, we can revise simulations on-site or remotely from our closest city, country, or global facility. Once the job is complete, we can help you analyze performance according to cement-bond logs and hookload data.

In addition to these services, we offer 360° torque-turn technology for offline makeup of centralizers to the casing, which saves you significant rig time and enhances safety.



## Ultradeepwater, Black Sea

Ran casing up to  
**15X FASTER**  
using the WellMaster™  
system with 541R  
centralizer subs



The all-in-one WellMaster deepwater system, including rotating centralizer subs, provided a simple, fast, and effective solution to eliminate potentially costly problems in a weak formation. The operator ran a liner to a TD of 16,213 ft (4,942 m) and performed a flawless cement job at rates of up to 45 ft/min (13.7 m/min) with zero mud spills and zero recordable incidents.



# There's more to cementing a well than just cement.

The challenging wells you cement today must provide a lifetime of integrity. Our centralizer subs are just one part of a product portfolio and service suite that can help you construct wells in the toughest environments and make them last. We can help you properly install and centralize casing, place cement optimally, and achieve long-term isolation.

**Identify drilling challenges** and objectives in deep water, shale, HPHT, and conventional applications.

**Design out risk;** design in lower well construction costs and longer productive life.

**Select products and services** that meet design requirements with our reliable technology.



## Casing centralization

Increase stand-off, prevent differential sticking, and eliminate channeling

- Casing accessories
- Centralizers
- Placement software services



## Casing installation

Reach total depth safely and efficiently

- Float equipment
- Surge reduction systems
- Torque-and-drag reduction



## Wellbore isolation

Prevent fluid migration and reduce well construction costs

- Inflatable packers
- Isolation systems
- Swellable packers



## Integrity confirmation

Measure cement bond quality

- Cement-bond-logging tools



## Cement placement

Ensure effective cement slurry displacement

- Stage cementing tools
- Wiper plugs and darts

WELL  
INTEGRITY

For more than half a century, Weatherford has provided an extensive portfolio of products to meet your casing centralization needs. To learn more about how our centralizer subs can enhance the integrity of your well, contact an authorized Weatherford representative or visit [weatherford.com](http://weatherford.com).



**Weatherford**<sup>®</sup>

[weatherford.com](http://weatherford.com)

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