



# ROI of Cold Root Rolling API & Proprietary Connections

How to Reduce Corrosion, Costs and Downtime



# ROI of Cold Root Rolling API & Proprietary Connections

## How to Reduce Corrosion, Costs and Downtime

In the petroleum industry, more companies are utilizing a process known as cold root rolling to achieve the enhanced benefits of stronger drill string connections.

Cold root rolling involves burnishing the root radius of a thread that has been freshly cut, or previously cut in a rotary shouldered connection. A hardened roll is forced into contact with the thread's root radius, and then pressure is applied so that the hardened roll penetrates and plastically deforms the surface of the root radius.

Cold root rolled connections are primarily used in offshore drilling applications. However, these connections have also proven to be advantageous for onshore drilling applications—especially with the rise of extended-reach drilling, multi-lateral wells, and horizontal well applications, which can significantly increase the stress placed on threaded connections in these drill strings.

Cold root rolling can substantially boost the return on investment (ROI) of your efforts by greatly prolonging the service life of your threaded connections. Studies have shown this process can increase joint life by up to three to five times. Connection failures are also extremely costly — according to reports, the average cost of a failed connection in offshore drilling is at least \$250,000 per day.

**“According to reports, the average cost of a failed connection in offshore drilling is at least \$250,000 per day.”**

Based on an average estimate of 6 days of downtime, that puts the average cost of rig downtime at \$1.5 million.

Improved product lifespan translates into reduced equipment costs, which in turn, leads your company to a better bottom line. Cold root rolling can also increase resistance to thread root stress, reduce the rate of corrosion, and help you keep your workforce employed by moving work in-house.

Let's take an in-depth look at the various benefits of the cold root rolling process.

### Improved Strength

Cold root rolling will increase the fatigue life of each rotary-shouldered connection. Rolling the root of a connection has a work-hardening effect on the surface of the material. This essentially displaces the steel grain structure from a uniform surface to an improved surface finish resulting in a much stronger connection compared to similar un-treated connections.

During this process, the structure of the steel material changes on an atomic level: in a typical steel pattern, the crystal structure has a uniform, lattice kind of pattern. As a result of the compression in the cold root rolling process, this structure changes, causing many different dislocations in the steel. These dislocations cause the crystal structures to interlock, thus making the finished product much stronger.

These dislocations help prevent damage and failure when the drill string is in use and prevent small cracks from developing into wider structural flaws that could necessitate costly repairs or drastically reduce the lifespan of your threaded connections downhole.

## Increased Resistance to Thread Root Stress

The weakest point of a threaded connection is near its root. The cold root rolling process imparts a thin zone of residual compressive stress in the root region. This residual compressive stress offsets the tensile stresses induced in service, and lowers the overall stress in the critical stress region of the thread root.

**“Research has shown that cracks occurring in cold-rolled joints exhibit a considerably low through-thickness crack aspect ratio, typically between 30 to 50 percent longer than unrolled joints.”**



Research has shown that cracks occurring in cold-rolled joints exhibit a considerably low through-thickness crack aspect ratio, typically between 30 to 50 percent lower than unrolled joints. Dislocations of the steel material prevent cracks from growing lengthwise, and diminishing the length of cracks is critical for getting the most from your initial investment. Long and shallow cracks can lead to a joint's structural failure, potentially forcing a sudden halt in operations. In contrast, deep cracks are more easily detected and repaired. Research has also shown that cold-rolled joints have shorter surface crack lengths than unrolled joints. This ensures that a damaged drill string can be recovered prior to complete structural failure and prevent costly shutdowns and extensive maintenance.

## Reduced Corrosion

In the cold root rolling process, the root of a thread that has been previously cut in a rotary shoulder connection is burnished. Overall, this process deforms and cold-works the material and improves the thread's overall surface finish. This works the material on the thread profile into a more even, uniform surface, reducing scratches and imperfections. This not only reduces stress and improves fatigue strength, but it also reduces corrosion.

Any imperfections on the material, especially scratches, accelerate the rate of corrosion, as they are jagged and porous, and also tend to harbor the corrosive chemicals commonly used in drilling environments. When imperfections are smoothed out in the burnishing process, there are fewer nooks and crannies for these corrosive chemicals to take hold, slowing down the rate of corrosion. This improves overall performance and reduces the need for costly repairs, which saves money in the long run.

## More Work In-House

With cold root rolling, companies can expand on opportunities bringing new work in-house instead of contracting the service out, simultaneously maximizing your workforce, equipment and creating a new revenue stream. When you decide to implement this process into your company's operations, make sure to choose the world leader as so many other companies have. Visit [www.coldrootrolling.com](http://www.coldrootrolling.com) to see who some of our customers are.

The patented **CJWinter Cold Root Rolling Tools** can be easily integrated into several types of modern industrial lathes, including those supplied from companies such as Weiler, Doosan, Mazak and many others—this integration will not strain your company’s budget. The CRR Tool is simple to use and highly intuitive for machinists; and it is fitted with a 1:1 force/pressure ratio that effortlessly converts pounds per square inch (psi) to pounds of force (lbf).

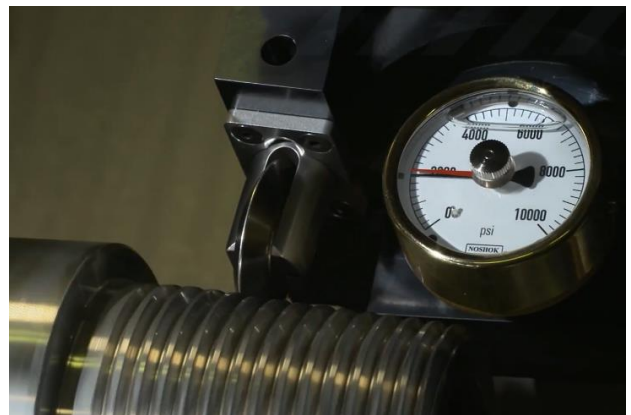
“The CRR Tool is simple to use and highly intuitive for machinists; and it is fitted with a 1:1 force/pressure ratio that effortlessly converts pounds per square inch (psi) to pounds of force (lbf).”

These features improve the overall safety of your employees, while simplifying the training process for future employees.

Through the use of cold root rolling, your company will be better equipped to manufacture superior threaded connections at much higher volumes.

## Invest in Cold Root Rolling Today

Cold root rolling provides so many notable benefits, easily making the investment worthwhile for your company. Why rotary shouldered connections perform at the highest level, it strengthens both drill string operations and your company’s investments.



Check out our [latest video](#) to hear from a few members of our team.

## About CJWinter

C. J. Winter Machine Works, Inc. (later changed to C. J. Winter Machine Technologies, Inc.) was incorporated in 1956 and acquired by Robert J. Brinkman in 1969. In continuous operation since then, CJWinter® is known worldwide for its high quality thread rolls, easy to adjust thread rolling attachments, competitive pricing and the industry’s fastest turnaround time.

Nearly 60 years later, CJWinters thread rolling products are also found in specialty applications like **cold root rolling** used by the oil and gas industry. We’ve applied our decades of experience designing tooling for rotary shouldered connections as well as many other drill string components. We offer the only commercially available, self-contained, error-proof loading, patented tools for cold root rolling threads that is in compliance with ANSI/API Specification 7.2:2008, ISO 10424-2:2007, NS-1 cold root rolling procedures, and DS-1 Third Edition, Volume 3.33.6 standards.

Renowned for its friendly customer service, expert technical assistance, fast delivery and custom engineered solutions, CJWinter should be your first choice when it comes to your cold rolling needs.

Contact [CJWinter](#) today or [Request a Quote](#) to learn how to integrate cold root rolling into your capabilities.