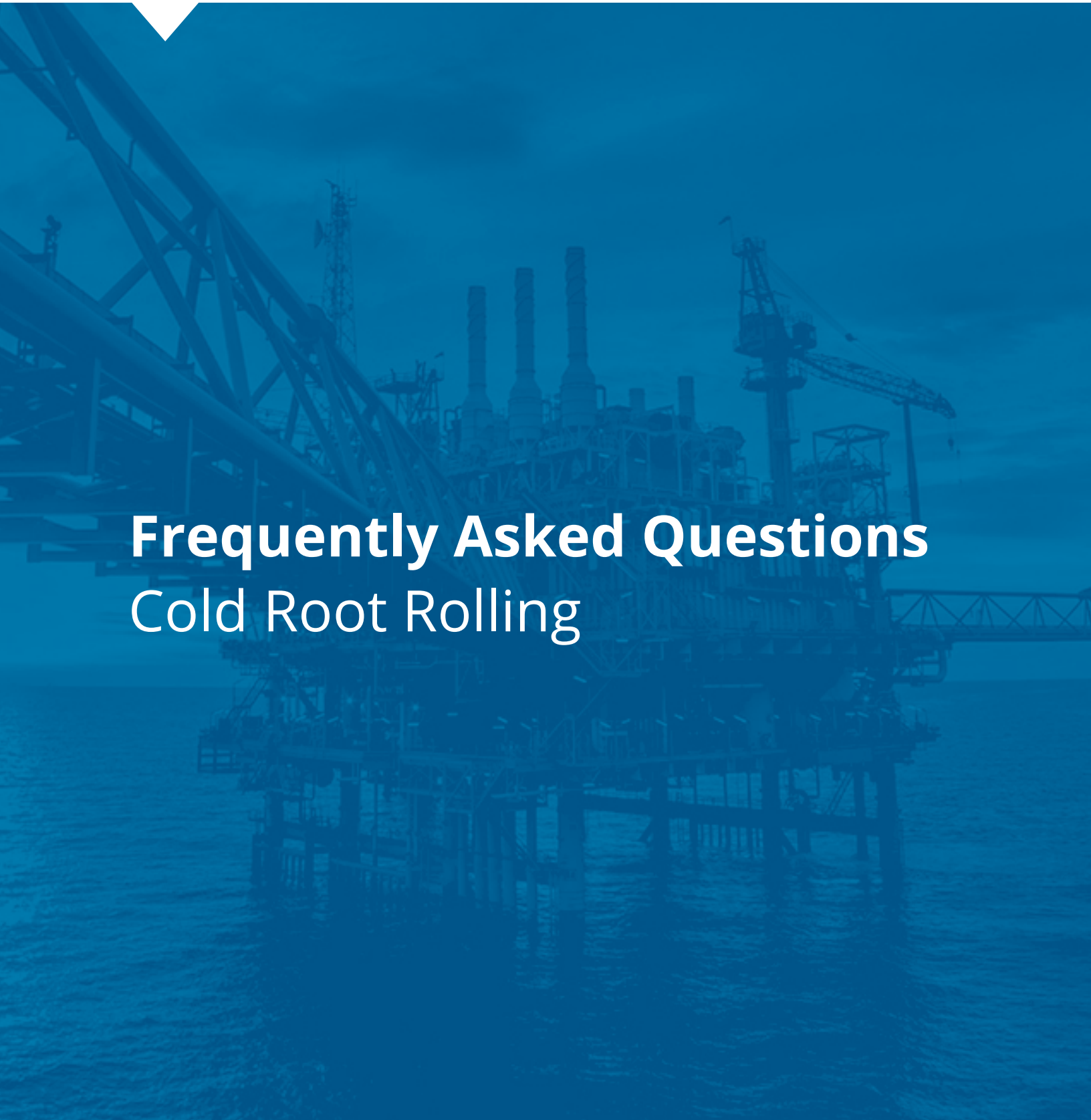
CJWINTER
A Brinkman International Group, Inc. Company



Frequently Asked Questions
Cold Root Rolling

Frequently Asked Questions
Cold Root Rolling

1. What standards cover the process of Cold Root Rolling?

A. Both NS-1 and DS-1 have standards in place that cover the process of Cold Root Rolling to one extent or the other. Many of the major Rotary Shouldered Connection OEMs also have internal standards that cover some aspect of this process. You should be familiar with your customer's expectations and requirements.

2. Why does the target pressure vary for different sized connections?

A. Each connection type has a different target force depending on the thread shape, the part diameter and material. Changes in the root radius, the part diameter affect the shape and surface area of the contact patch between the roller and the part being rolled. When Cold Root Rolling, you need to generate enough force at the roller tip such that the pressure on the contact patch can overcome your connection material's yield strength.

3. What should my target pressure be?

A. You need to generate enough force/contact pressure to overcome your connection material's yield strength, but lower than your roller's yield strength. Each connection type has a different target force. Your target forces are typically stated by either the DS-1 or NS-1 standard, or by an OEM standard. On a CJWinter tool, your target pressure (PSI) will be numerically equivalent to your target force (Lbs) because our working cylinder has an area of exactly 1.00 in^2.

4. I'm rolling standard connections in material other than 4145H. Can I use DS-1 force tables?

A. DS-1 force tables were developed decades ago around HWDP and BHA components made from 4145H. No consideration was given to other materials. Due to the higher yield strength of many of today's Rotary Shouldered Connections, you will need to elevate the forces to achieve the same cold-rolling results. As a rule of thumb, we at CJWinter suggest multiplying the DS-1 tables by the ratio of yield strengths of your material to 4145H. I.E.: if your material has a 20% higher yield than 4145H, then multiply your DS-1 target pressures by 1.2x to find your target pressure.

Frequently Asked Questions
Cold Root Rolling

5. What should my target pressure be?

A. Your pre-charge pressure should be set to approximately 95% of your target pressure. Significantly lower settings will make your tool "springy", and require a larger tool offset to reach target pressure. Higher pre-charge pressures will "stiffen" the tool, but make it difficult to discern if your tool is exerting your target pressure, without overshooting.

6. If I change process parameters like Force or RPM, can I still certify as DS-1 Cold-Rolled connections?

A. Any deviation from the standard would need to be approved by your customer. The deviations suggested by CJWinter are intended to preserve the intent of Cold Root Rolling, which is to significantly increase fatigue life of the connection. These suggestions address gaps in the standard that were not considered at the time of the standard development.

7. How can I tell if I have rolled a good part?

A. Each standard and customer may have its own pass/fail criteria for cold rolling, but generally speaking, the process has three tell-tale signs:

i. The thread tooth form has been deformed. The tooth height has been increased, usually by .002" or more. On a comparator, there is a noticeable non-tangency at the root where the burnished form blends into the cut flanks.

ii. The thread roots are burnished, and have a smooth and more mirror-like appearance compared to the more matte finish of the cut thread.

iii. During the rolling process, the pressure reading on the CJWinter tool rose above the pre-load pressure and to the target pressure all the way thru the "last scratch".

8. What is the "last scratch" thread?

A. The "last scratch" thread is the partial tooth-height thread created by the retraction of the thread cutting insert. On connections without stress relief grooves, it is the partial thread closest to the shoulder of a pin, and deepest into the box. It is particularly important to roll the entire "last scratch" thread, as this is the site for most fatigue failures on rotary shouldered connections.

Frequently Asked Questions
Cold Root Rolling

9. If I pre-charge the tool, won't my roller and roll-holder piston just fall out of the tool body?

A. No. The roll holder piston is seated on a hard shoulder inside the tool. It cannot advance past this fixed position.

10. If my gauge is displaying my pre-charge pressure, does that mean I am exerting that much force on my part?

A. No. The only way to ensure the gauge display is accurately representing the force being exerted on the part is to observe a rise in pressure during the rolling process. If the gauge is displaying the pre-charge pressure, the actual force being exerted at that time can be anywhere from 0 lbs to the pre-charge value. Only when the force at the tool tip exceeds the force from the pre-charge pressure does the piston un-seat itself, and cause a rise in the hydraulic fluid pressure displayed on the gauge.

11. Do I ever need to change my Roll?

A. Rolls need to be changed for different forms (i.e. when changing form a V-038R form to a V-050 form), and when they show signs of wear. A quick and easy way to check is to run your fingernail around the tip radius. If your nail catches, the roll should be replaced. The tip radius or form can be more closely inspected on an optical comparator with 50x using an overlay set to the root radius tolerance of your part. The surface finish should be no worse than 16RMS, with no significant pits or dings. Roll life when used on the OD of 4145H parts is typically several hundred parts. Roll life when used on ID threads will typically be shorter due to the higher forces required to roll boxes, as well as the smaller circumference of the roll. Roll life on non-magnetic and exotic materials will typically be lower as well.

12. What does the EPL system on CJWinter's tools do?

A. The EPL system is an Error Proof Loading system "patent pending". It ensures the roll cannot be inserted backwards, and as a result prevents scrapping of the connections due to a non-symmetric thread form being rolled into the part.

Frequently Asked Questions
Cold Root Rolling

13. Do I need to lubricate my Roll?

A. Yes. During assembly, lubricate the Roll ID with Synthetic oil or a EP grease. Just before EACH ROLLING PASS, spray or squirt an oil-based lubricant onto both end faces. Spin roll by hand to check for free rotation, and to distribute oil to the Roll ID and Roll Pin.

14. Do I need to lubricate my Roll?

A. Yes. While you can set-up and take trial passes without the coolant, we recommend production runs use coolant to help clean the part and control the heat generated by the process.

15. How much penetration do I want between the roll and the part during this process?

A. This varies by machine and part, but values between .080” and .180” of diametral penetration would be typical. Higher values may be required for high-yield strength materials, enlarged root radii, non-standard forms, and less rigid machines.

16. Won’t this much penetration cause my machine to “crash”?

A. No. When programmed in a manner recommended by CJWinter, this penetration is applied slowly and in a controlled fashion. The penetration is mostly absorbed as compression of the hydraulic cylinder, as well as deflection in the part and tooling. It is not a true measure of how far into the thread the tool is being pushed.

17. How much force is being exerted by my machine?

A. The full force required by Cold Root Rolling is being generated by your machine. The CJWinter tool itself only transfers the force to the correct location, and monitors the magnitude of that force. The Cold Root Rolling process typically requires forces similar in magnitude to an aggressive thread roughing cycle.

Frequently Asked Questions
Cold Root Rolling

18. Will these forces damage my machine?

A. Cold Root Rolling has been performed by Rotary Shouldered Connection manufacturers on CNC Lathes for decades. Generally speaking, no abnormal or adverse effects have been observed in terms of spindle or ball-screw life. Many machines have gone their entire life without any major repair. Cold Root Rolling has been performed on many medium and heavy frame CNC Lathes. The style and size of machine that can typically handle Oilfield Pipe manufacturing is more than capable of generating these forces safely.

19. How will I know if my particular machine can handle the forces of Cold Root Rolling?

A. We have had several customers ask their lathe OEMs if the machine can handle Cold Root Rolling forces. The answers have all been similar. OEMS will either outright say YES, or they will advise the customer that modern machines are equipped with axis load monitoring, and if the loads become excessive, they will safely alarm out before physical harm is caused to the machine. If you have any reservations about your particular machine model, your OEM is the best source for information.