

How it Works:

Cold Root Rolling with Mazak

Cold Root Rolling (CRR) burnishes the root radius of a previously cut thread in a rotary shouldered connection. A hardened wheel, formed in the profile of the existing thread, is placed in contact with the root radius of the thread. A calculated pressure is applied, forcing the wheel to penetrate into the previously cut surface of the root radius. This displaces, or cold-forms, the thread material, imparting an improved surface finish, compacting and displacing the grains of the root material. CRR is an industry proven manufacturing process, showing an increase in fatigue life of three to five times over similar untreated connections under the same working environment. This is a commonly required process for connections within the Oil and Gas industry to protect against leakages and failures due to fatigue.

The CJWinter CRR Tool is an error proof tool that meets or exceeds the specified standards for any job. It is a self-contained system requiring no external power supplies, meaning no hoses to tangle or pumps to lose. It is also equipped with an easy to read pressure gauge that can be placed in four separate locations. Its 1:1 pressure ratio removes operator error based on incorrect readings, miscalculations, or confusing lookup tables. The tooling can be ordered in a Boring Bar Style for BOX/PIN connections or as a Square Shank style for PIN connections, which has been designed for reduced clearance situations.

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The CJWinter CRR tool works seamlessly within a Mazak lathe and can be controlled through the integrated Mazatrol control system. Mazatrol is the proprietary conversational programming language used for controlling Mazak brand lathes. This language is noticeably different than what is found on standard Electronics Industry Association (EIA) programmers. However, the Mazatrol control contains process codes that are very useful when using the CJWinter CRR tool. One of the most useful of these processes is the “rethread” feature. Once the tooling is fixtured in the lathe, the user merely jogs the machine until the roll begins to engage in the pre-cut thread. The tool is then slowly positioned to one side stopping as it barely binds on the flank. This position is recorded and then the process is repeated for the other flank. From these locations, a mid-point is determined. At the mid-point, the tool is then lowered into the thread until it binds on the root. This position becomes the “wheel position” and will be used to synchronize the tool and part during the CRR process.

This process requires that the operator also feed a few thread characteristics through the software into the controller; these characteristics include some basic nominal variables. From the location of the tooling and the input variables, the Mazatrol software then computes the appropriate tool paths. CJWinter has embraced this Mazatrol process by developing a Mazatrol Calculator tool to assist machine operators when setting up the software. The user enters the necessary parameters for the process and the Calculator returns the values required for proper Mazatrol control.

The Mazatrol process is more automated and intuitive than the EIA Programming structure. The tooling is manually set and “taught” to be in place, and then a pre-determined set of variables controls its motion within the thread. This process is safer and more intuitive than the standard G-code control of other CNC systems. These programming structures require that the threaded part be in a pre-defined location and that the location of the piece is faithful to the programmed coordinates. If these two items do not match, there is a very likely chance that the tooling, the threaded part, and even the CNC machine tool will be damaged. Damage to any of these parts can be catastrophic to the manufacturing process, and combining the CJWinter Cold Root Rolling Tool within a Mazak lathe significantly reduces these risks and the costs associated with them.