

**REGO-FIX**▲



Hazards, Hidden Costs and Liabilities of Toolholding

# Hazards, Hidden Costs and Liabilities of Toolholding

## Introduction

The U.S. Occupational Safety and Health Administration (OSHA) has estimated that employers pay almost \$1 billion per week for direct workers' compensation costs alone. Direct costs include workers' compensation payments, medical expenses and costs for legal services. While indirect costs can entail training replacement employees, accident investigation, implementation of corrective measures and – most detrimental to business – lost productivity.

Given this information, most metalworking job shop owners will agree that employee safety and injury prevention should take utmost precedence over all other business decisions involving processes and procedures as well as machines and equipment. This includes toolholding systems.

While most toolholding systems provide acceptable levels of performance, not all are equally safe operational wise. In particular, those systems that use heat tend to present the most significant safety risks. And as such, they can carry with them hidden costs and liability issues.

Foremost, is the risk of serious burns when operators fail to follow the strict tool handling protocols of heat-based toolholding systems. There is also a risk of toxic fumes and even of EMF radiation resulting from the heat-generating units of those systems. Additionally, heat-based systems often mandate several serious operating restrictions, one of which involves persons with heart pacemakers keeping their distance or the results could be fatal.

However, there are toolholding systems that eliminate the safety risks, hidden costs and liability issues associated with super-heated tools. One such system is powRgrip® invented by the Swiss company REGO-FIX, and this paper not only discusses its design and functionality, how it works and why it is a better, but most importantly how it is a safer alternative and one that ensures the health and wellbeing of workers.

## Risks, restrictions and potential fatalities

According to most heat-based tooling system OEMs, there will always be a level of danger if the systems are operated incorrectly and/or by untrained personnel. When using a heat-based system, operators must remove super-heated toolholders from a heating device with asbestos gloves, load in a cutting tool and place the assembly – holder and cutting tool – in a cooling tower, cooling attachment or on a table top to cool.

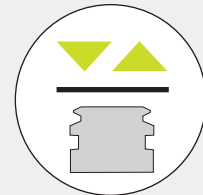
Operators that fail to follow the strict handling protocols – isolate or tag – associated with these systems run the risk of serious burns – mainly because it is near impossible to detect whether a holder is hot or cold. Operators also have the ability to change the heat cycle of the systems and inadvertently overheat holders, which further increases the severity of a burn if one should occur.

To prevent accidental burns, some systems incorporate cooling or quenching units that often use standard water-soluble metalworking fluid. Unfortunately, this fluid further adds to the list of safety risks and hidden costs.

### Key advantages



Clamp the tool safely and securely by pushing just one button. The clamping will take less than 10 seconds, without the use of heat.



Clamp tools with maximum clamping force and best runout in the powRgrip collet and toolholder.



Smart System — no setting of parameters required. Clamping pressure is controlled by the insertion of the respective clamping insert (APG). There are five clamping inserts available for the clamping of different collet sizes.

The fluid must be used properly, requires additional man hours for maintenance and is an added consumable cost. If this fluid is not kept clean, exposure could lead to eye, skin and, in some instances, respiratory irritation.

According to OSHA, some workers have contracted hypersensitivity pneumonitis (HP) from improperly managed metalworking fluids. HP is an allergic type reaction in the lungs and is marked by chills, fever, shortness of breath and a deep cough. Prior to 1985, the use of poorly refined mineral oils, according to OSHA, had been associated with an increased risk of cancers of the larynx, rectum, pancreas, skin, scrotum and bladder.

Obviously because they generate high temperatures, heat-based systems should not be used around flammable and/or combustible materials or fumes. This includes flammable liquids or aerosols that might be used to clean toolholders. In those instances, hot toolholders could burn and/or vaporize any residual oil or coolant on either the cutting tool or the holder itself, and those resulting vapors are often toxic.

To prevent such exposure to those potentially fatal fumes, safety regulations dictate the use of exhaust and filter systems in close proximity to the system. These are typically in addition to any other existing facility-wide exhaust systems and, as such, will entail an initial purchase cost and costs associated with installation and regular system maintenance.

Most heat-based systems incorporate induction coil-type heating elements to quickly heat toolholders. These units, however, pose additional safety risks, one of which is electromagnetic field (EMF) radiation – invisible lines of force that emanate from any electrical or wireless device. While EMF radiation is under scrutiny, most experts consider it harmful to human health.

Additionally, induction coil-type heating elements come with proximity restrictions. One such restriction is that operators refrain from wearing rings, bracelets or other metallic objects while using the system. Such metallic objects may heat up very quickly if kept in close proximity of the heating element.

Also along those same lines, heat-based toolholding system OEMs strongly warn that persons with heart pacemakers should not operate the systems and must always maintain minimum safe distances from them at all times. To prevent any accidental fatalities, employers should consult with a liability attorney to find out exactly what preventive measures and practices must be in place, then ensure that they are.

According to Andreas Napp, M.D. and cardiologist at RWTH Aachen University Hospital in Aachen, Germany, electromagnetic interferences with pacemakers in everyday life can occur. In occupational environments, such as the manufacturing industry, an individual risk assessment for workers with a pacemaker is required due to the presence of a strong EMF.

## powRgrip

As opposed to heat-based toolholding systems, powRgrip works without heat, and tools are safe to handle immediately after they have been loaded, which also eliminates the need for any kind of cool-down period or unit. And because there is no heat or heat-generating unit involved, the powRgrip system eliminates the risk of burns as well as the threat of toxic fumes, vaporized oil, EMF radiation or heart pacemaker damage. And equally as beneficial, powRgrip comes without any hidden costs.

The powRgrip System is a taper-to-taper collet-holding system that consists of three basic components – holders, collets and press-fit assembly mounting units. In manual or automatic configurations, the



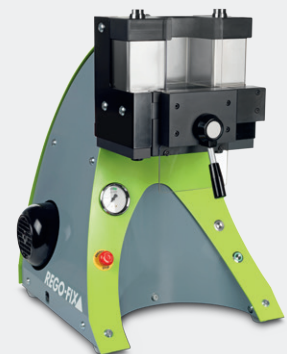
Cutting tool



powRgrip® collet



powRgrip® toolholder



Automatic clamping unit PGU

hydraulic press-fit assembly units quickly press collets into holders with up to nine tons of force. The collets have high-precision tapers that match up with equally high-precision internal tapers in the holders, all of which creates the system's extreme levels of transferable torque.

Unlike other clamping systems where heat or hydraulics are used, the powRgrip system capitalizes on the mechanical properties of the holder material to generate tremendous gripping force without heat. Interchangeable dies for both the manual and automatic powRgrip presses determine the pressure used to press the collet into the holder.

The powRgrip system enables the operator to select and load the die that fits the holder, and the press-fit assembly unit automatically applies the correct pressure. This intelligent die technology eliminates operator error, while the unit's interlocked doors enclose the press-in area to prevent operator injury during the press-in and removal processes.

A special patented metal processing method creates a unique wear-resistant surface treatment on the powRgrip collets. This extremely hard surface finish contributes significantly to the system's ultra-longevity and repeatability.

All powRgrip collets accommodate through-coolant tools and are rated for up to 2,000 psi. Collets are also available with coolant flush channels/grooves that direct a coolant jet around cutting tool shanks even when using solid, non-through-coolant tools.

The powRgrip toolholders are balanced by design. And in terms of speed, holder assemblies are balanceable for use up to 42,000 rpm.

In addition to precision, strength and safety, the powRgrip system provides incredibly fast tool changeouts. Full clamping cycles take less than 10 seconds with the automatic assembly mounting unit. Plus, tools are completely safe to handle and ready to use immediately after that short loading cycle time.

The automatic press operates on standard 110V AC power and runs on nine amps. Because it plugs in to any standard wall receptacle, the unit is portable and easily incorporates into any facility.

Likewise, Z-level tool length adjustments are equally simple with powRgrip tapered collets because each one has a Z-level adjustment screw. On any standard presetter, an operator can easily and precisely adjust this screw using an inexpensive adjustment tool, and repeatability of this Z-level adjustment is well within 10  $\mu\text{m}$ .

Properly maintained powRgrip holders and collets sustain their high performance for at least 20,000 cycles. Over time, pressing a collet into a holder slowly burnishes the holder cavity to a more polished, higher precision surface finish that further increases the system's overall accuracy.

Each holder in this system holds any collet diameter – in metric or standard units – within its specified range. This drastically reduces the number of holders that must be kept in inventory to accommodate a wide variety of tool diameters.

## Heat-based shrink-fit holders

Heat-based toolholding systems, such as those referred to as shrink-fit, fail to deliver the same clamping force as taper-to-taper collet-holding systems, especially for smaller diameter tools. In these instances, the other toolholding systems are only about 45 percent as effective as taper-to-taper ones.

In contrast to the controlled and consistent press-in parameters of a taper-to-taper toolholder, operators can alter the heating cycles of a shrink-fit holder. These alterations in temperature or length of heating cycle can damage the holder and cause it to wear out faster. Even under optimal heating conditions, the life cycle of the holder may only reach 5,000 uses – which is one quarter of the life of a taper-to-taper holder. And overall, shrink-fit holder life spans are typically much shorter.

Shrink-fit holders also lack versatility as compared with taper-to-taper holders. Separate shrink-fit holders are required for each cutting tool diameter, as well as for any long reach options. And, shrink-fit holders are incompatible with Weldon-shank tools, so if one is accidentally installed, it could potentially damage the holder or become permanently stuck and impossible to remove.

Shrink-fit system tool load/unload cycles take longer and require more power than do those of automatic assembly mounting units for taper-to-taper holder systems. Additionally, shrink-fit systems tend to require up to 480V and 30 amps of power, which necessitates special electrical installations.

When it comes to tool presetting, the task is a complex one for shrink-fit holders. This is because once the tool is inserted, a special induction and presetter machine is needed to adjust it. Balancing operations for the holders also present similar challenges as they involve the adjustment of a series of multiple screws – a process that is both time-consuming and difficult to complete with any degree of accuracy.

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## Summary

The dangers of some metalworking toolholding systems are real, so there are many factors to consider. While most toolholding systems provide comparable levels of performance, safety should always be the overriding factor and utmost in the minds of today's manufacturers.

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## powRgrip Accessories

To further enhance the performance and productivity of the powRgrip system, REGO-FIX has developed a range of specialized accessories. From automated presetting tools to special taper brushes and cleaners, these tools provide users with the means to easily optimize and maintain the powRgrip system so that it safely performs to its full potential

**Presetting tool** The powRgrip presetting tool accepts the powRgrip collets and is inserted into the toolholder. The tool has a small thumb wheel for precise tool length adjustments and allows maximum repeatability in the toolholder assembly

**PGU automatic presetter unit** The fully automated powRgrip tool presetting and measuring system virtually eliminates the need for any operator intervention and, thus, significantly increases tool presetting speed, precision and repeatability. The system provides users with safe, fast presetting and measuring of tools of all types, as well as for the clamping/unclamping, measuring and presetting of powRgrip tools.

**Toolholder taper cleaner** Special taper cleaner brush quickly and easily removes dirt and light rust from powRgrip holder bores before insertion of a tool/collet.

**Cleaning paper set** Soft, absorbent paper specifically prepared to clean the powRgrip holder bore. The paper is lint free, chemically neutral and for one-time use only. It is packaged in containers of 250 sheets.

**Ultrasonic cleaner** This cleaning system with a heavy-duty steel double wall design provides high efficiency cleaning. The multi-frequency operating system ensures optimum cleaning conditions for most tool system components.

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