

# Ergonomics.

*When form follows function.*



**COOPER** Tools



# Meeting The Challenge: Minimizing Injuries While Increasing Productivity

Today's modern, automated manufacturing climate is exacting a high price for its productivity. And we're all paying it.

In the past decade, performance of some repetitive tasks at work has been linked with certain health problems.

Cumulative Trauma Disorders (CTDs) most often affecting the hand, arm, wrist and shoulder, may result from repeated gripping, twisting, reaching and bending – over weeks, months and years.

At CooperTools, we're using advanced ergonomics to refine our drill, grinder and fastening system design. Our goal: to achieve maximum productivity while minimizing workers' health and safety risks.

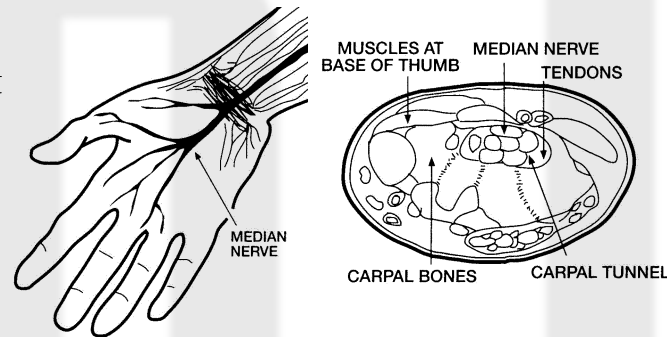
Work-related injuries cost all of us. Businesses lose good, productive employees to early retirement. Employees endure pain and loss of wages -- while consumers end up paying for medical treatment and business losses through higher prices for products.

The bottom line: Improving worker comfort, safety and satisfaction are good for everyone.

To minimize injuries suffered by power tool users, the first step was to precisely pinpoint the stresses put on workers' fingers, hands, wrists and shoulders.

Over a prolonged period, those stresses, combined with other kinds of stresses in the work environment, can lead to sore nerves, muscles, tendons and joints.

Some stress-producing conditions are easy to spot:



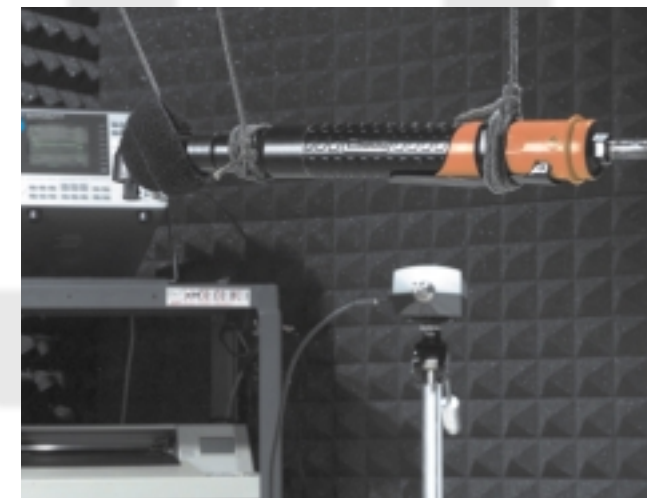
Use hearing protection as recommended by your employer or OSHA. See 29CFR Part 1910.

| TYPE OF SCREWDRIVER       | MOTOR NOISE DURING POSITIONING OF TOOL | MOTOR NOISE WHILE DRIVING FASTENER | MOTOR AND CLUTCH NOISE DURING DWELL |
|---------------------------|--|------------------------------------|-------------------------------------|
| Clecomatic                | NONE                                   |                                    | NONE                                |
| Push-to-Start Ratcheting  | NONE                                   |                                    |                                     |
| Lever-Operated Ratcheting |  |                                    |                                     |

The automatic start/stop feature means that the tool runs only while the fastener is being tightened. With virtually no clutch ratcheting tool noise is reduced.

awkward working posture and unnatural body movements. But, others are more difficult to find. So CooperTools enlisted the input of experts in the field of ergonomics to identify factors that contribute to stress for power tool users. Key factors, they said, are task repetition, heavy tools with high loads, and exposure to cold.

Based on these findings, CooperTools established the goals of reducing tool stress-factors as much as possible – and encouraging employers to minimize work-environment factors as much as possible.



Noise of power tools in manufacturing is an important issue. Our tools have been designed to operate as quietly as possible, while providing substantial power.





# Improving Job Ergonomics And Worker Safety Is Your Responsibility Too.

Bringing ergonomic advancements into power tool design can go a long way toward improving worker productivity and safety. But they won't do it alone.

In addition to the choice of tools, both the organization of the work to be done and the work habits of tool users deserve in-depth consideration.

## What's Your Role? Here's A Checklist:

- Let fellow employees know you're concerned about safety. Work with employees to study work functions and strive to properly match tool and task.
- Make sure ergonomic tools are used in the manner for which they're designed – to take full advantage of their injury-prevention features.
- Workers may initially resist using ergonomic tools in favor of old, familiar designs. Short-term comfort is nothing compared to long-term health.
- When possible, modify work practices to keep vibration exposure to a minimum.
- Encourage use of vibration-dampening gloves and other protective clothing when possible.



*An optional exhaust overhose is available for Dotco tools as shown here on a 12R91 Series Precision Turbine. This allows the exhaust to be routed away from the operator for improved comfort.*



*Dotco sanders are available with various vacuum arrangements to best meet the needs of the application – central vacuum with vacuum attachment and shroud as well as self-generated vacuum with floor bag.*



*Many of our tools, both assembly and material removal, are available with oilless blades where a clean work environment is important.*

- Devote time to training new workers, and continue training existing workers with emphasis on work-health issues.
- Expanding individuals' tasks beyond a single function – that is, job enlargement – can help relieve chronic repetition.
- Cross-training and job rotation are other ways to avoid overly repetitive tasks and provide rest for sensitive muscle groups.
- If possible, design tasks appropriate for completion by both hands.
- Reposition work to assure that workers avoid wrist flexing and wrist extension tasks – and promote the use of right-angled tools wherever appropriate.
- Use automation to eliminate frequent high-frequency hand movements for manual tasks.
- Carefully evaluate other work-environment factors such as lighting and room temperature.
- Encourage regular medical monitoring for vibration tool users, to assure early detection and treatment of possible injuries.
- Pay attention to working posture and workstation setups to avoid unnecessary reaching, bending, twisting and lifting.
- Mount heavy tools on automatic retractors or overhead balancers when possible – and insist that materials be kept within easy reach. (Workers with proper posture, positioned properly in relation to the workpiece.)
- Promote correct posture and proper positioning of the workstation, to eliminate the risks of extended-elbow and bent-back tasks.

*Soft grip provides noise, vibration and temperature insulation for operator comfort.*

*Optional overhose directs exhaust noise away from operator.*

*Single hand operation for ease of use.*

*Multiple grip lengths are provided to match the tool to various hand sizes.*





# Adding New Meaning To "User Friendly".

In efforts to improve power tool user comfort levels, some operational factors deserve special attention...

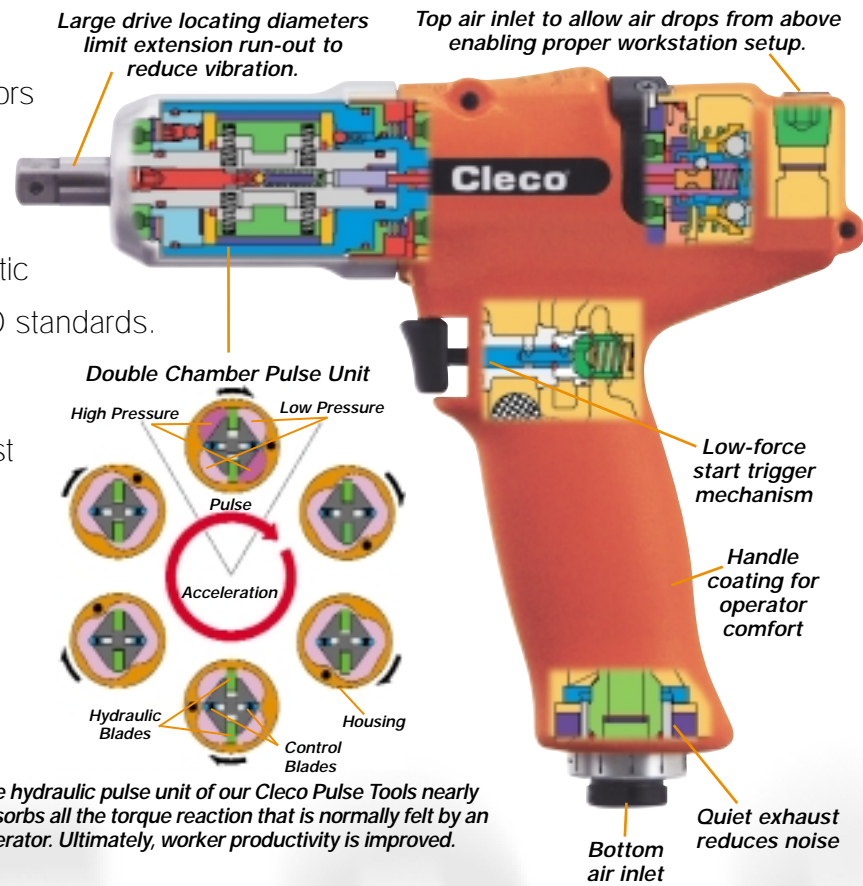
**Noise...** Process, airflow, and vibration-induced noise from pneumatic tools should be within OSHA and ISO standards.

**Dust...** An avoidable byproduct of grinding and other operations, fine dust particles should be collected and trapped by a vacuum source near the workstation before they are absorbed into workers' lungs.

**Torque Reaction...** Industry consensus is that 100 inch-pounds is the maximum torque that should be delivered. Use of "bucking bars" and torque-absorbing mounting accessories can help reduce torque buck.

**Vibration...** Dynamically balanced, true-running wheels can help reduce vibration in power tools, with the goal of avoiding the extreme amounts of vibration which can disturb the flow of blood to the hand and cause "white finger."

*Tool arms absorb the torque produced by the tool, eliminating torque reaction to the operator. Balanced by springs or air cylinders, the arm and not the operator supports the weight and reaction of the tool. By reducing the fatigue factors, the operator productivity is improved. Arms can be post mounted, wall mounted or mounted on an adjustable height post. Tool holders for all models will accommodate most major brands of air tools...straight and pistol. Tool holders allow the tool to swing, swivel and rotate, enabling the operator to work more comfortably and productively.*



*The hydraulic pulse unit of our Cleco Pulse Tools nearly absorbs all the torque reaction that is normally felt by an operator. Ultimately, worker productivity is improved.*

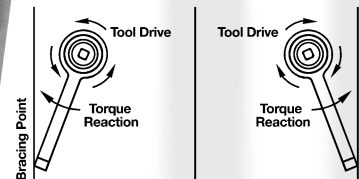


*Via tool software coded with hard algorithms, operator detection of speed shifts is avoided. The result is less fatigue to the operator, and consistent torque transmission to the assembly task.*



*This diagnostics screen of the Cleco Tightening Manager displays an oscilloscope style torque trace of the joint to help identify potential assembly process problems.*

*Some higher torque tools incorporate torque reaction bars which transmit the reaction to a solid fixture rather than the operator for improved production and safety.*



**Torque Bar Opposes Rotation of Tool**





# How To Build High-Output Tools With A High Level Of Comfort.

Vibration-reducing dampening materials should surround motor housings. Thermally-isolated composite handles reduce tool weight and the effects of cold temperatures.

Different handle sizes are provided, to accommodate physiological and gender differences among users.

Special mufflers can reduce sound levels to accepted standards without compromising tool power and performance.

Handle design should direct cold air exhaust and possible oil mist away from workers' hands.

Torque reducers help assure a captive grip ideal for comfort and control – yet resist in-hand tool movement under load.

Impact and stain-resistant plastic composite handles provide shock absorbency and thermal protection.

Lever triggers located in tool grips can simplify long-cycle operation and high-force tasks, and allow tool positioning before start-up.



*Vibration is minimized through the use of specially designed comfort grips which isolate the operators hand from the tool. In some cases composite housings are also used.*

*Design features double ball bearings for the spindle, pre-loaded for longer bearing life and more accurate spindle control. Vibration and spindle wobble are reduced.*

*Time-proven motor and gear design is well balanced to reduce vibration and extend tool life.*

*Each tool is individually checked, aligned and adjusted on our assembly line for minimum chuck runout. Vibration and spindle wobble are minimized.*

*Full feathering is accomplished with our pressurized tip-valve design for speed control while drilling.*

*Gears are machined from alloy steel and heat-treated, with fixed cages to control centers for smooth operation.*

*The trigger is practically forceless requiring only 4 ounces of pressure to engage.*

*Rubber grip acts as a thermal protector and isolates vibration for improved operator comfort.*

*Ergonomically critical finger and thumb guides fit the hand and aid in control.*

*Finger lip under the trigger keeps other fingers from interfering with the trigger action.*

*Handles are shaped to fit the human hand. They are flat where they need to be flat and round where they need to be round.*

*Minimal noise levels enhance operator comfort.*





# At CooperTools, We Think It's Time For A Second Industrial Revolution.

It's time for employers and employees to work together to create a positive job climate and increase awareness of on-the-job risks.

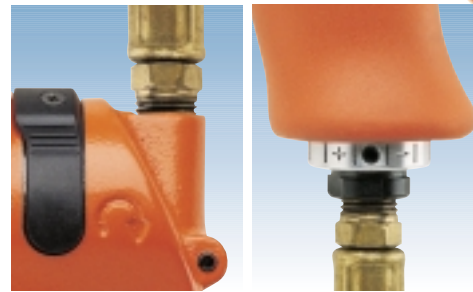
We all benefit when workers can perform tasks with the highest degree of efficiency and safety. Quality products, satisfied workers, and company profits are the result.

## The Cooper View

1. Cooper will always strive to design and build tools that provide the greatest level of user comfort and safety.
2. Cooper will continue to incorporate ergonomic principles into its tool design and manufacture criteria.
3. Cooper's design criteria will always meet or exceed the requirements set by OSHA, ISO and government and trade regulation organizations.

The highest level of worker's safety and comfort cannot be accomplished by a tool manufacturer alone.

Many of our pistol model tools, such as this Cleco pulse tool shown below, offer top and bottom air inlets which provide better customization of the operator's work area.



At a very basic level, a tool must be comfortable to hold. Because grip capacity varies, many of our tools are available with different sizes of handles to provide a more comfortable grip to a wider range of operators. Pistol model Cleco pulse tools are available in two different handle sizes and the Cleco electric screwdriver is shipped with three different nosepieces. Dotco orbital and random orbital sanders are shipped with three interchangeable grips.

It is important to keep in mind the following points:

1. Each worker must properly use the tool in the manner in which it was intended to be used.
2. The design of the work environment as a whole must consider ergonomic principles.

3. The job to be accomplished and the tool to perform the job must be properly matched. Assistance in matching the tool to the job can be obtained from your Cooper salesperson who is dedicated to helping each customer with proper application of our products.

Our full line of Gardner-Denver hoists offers load lifting capacities ranging from as low as 275 pounds all the way up to 8800 pounds. Many spark resistant options are available which makes matching one of our industrial grade hoists to your shop or clean room application easy.



OVERALL CO... RT



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