UW Physics Student Machine Shop

Standard Operating Procedures

Pedestal Grinder

Purpose

Grinders are very helpful for removing the last layers of excess material, especially ferrous and other harder metal workpieces. Also, drill bits and other lathe and milling tools can be sharpened, fashioned, and modified with the use of a grinder. The grinder itself is a relatively small but powerful 1-2 HP motor. An abrasive grinding wheel is mounted on both sides of its single shaft. The Grinder itself is mounted to a floor-mounted steel pedestal or directly to a bench-top. Grinding, and abrading in general, is a relatively slow method of material removal. This is why it is normally reserved for metals that do not pass "the file test." If you try filing an edge with standard pressure and technique but simply slide across the material without any "bite" of cutting, the material is better suited for grinding.

Limitations

- Grinding Takes Time: Grinding is seldom the quicker option and often is the last option. This has two main reasons: Heat and Hazards.
- Controlling Heat: Excess heat is a key limiting factor in all machining operations, but it is a challenge especially when grinding. Too much heat can quickly oversoften or overharden the workpiece beyond use. When grinding, keep a metal container of clean fresh water to quench the workpiece often, before it can overheat.
- Controlling Hazards: Grinding can be much more hazardous than it may seem to be to the beginner. This is partially because the dangers of grinding are often not visible.
- Catastrophic Tool Failure: When changing wheels, you must first inspect for visible cracks, fractures, or other flaws. After that, perform the "ring test" by giving the wheel a quick, sharp, medium-force tap UNIFORMLY all over the wheel. There should be a uniform clarity and volume "ringing" tone from each tap. If you encounter a different tone, especially one that is dull or dead, you

may have a fracture inside the wheel. If this wheel is mounted, its bonding will get progressively weaker as the motor winds up to speed and the wheel will probably explode.
- Always stand off to one side when turning on the pedestal grinder.
- Soft is Off Limits: Non-ferrous materials such as brass, aluminum, copper, plastics or wood should never be ground on a pedestal grinder. It is too soft and will quickly load up the porous outer surface of the grinding wheel trapping pressure and heat until the wheel violently explodes like a bomb.
- Make sure all safety equipment is in place and working before using the pedestal grinder. The Tool Rest should be set as close to wheel as possible without interference, never further than workpiece thickness, and ⅛" maximum.

As always, whenever you have any questions regarding the safe operation of Student Shop equipment, find the Shop Instructor or another Instrument Maker and ask before you act.

Hazards

There are a number of particular hazards associated with the operation and use of tool, including but not limited to:

- High speed rotating grinding wheels and shafts
- Large amounts of energy embodied in rotating wheels
- Wheel explosion hazard
- Potential for loose items to become entangled in rotating parts • Strangulation hazard
- Flying objects • Grinding wheel can catastrophically fail throwing high velocity objects into space and operator.
- Refer to the "Ring Test" Limitations section of this procedure.
- Work pieces, tooling, drill bits, or clamps can become disengaged and rotate or be flung across the room Crushing/pinch point hazards
- Workpiece can get loose and jamb between improperly adjusted work rests or guards
- Loose clothing, jewelry or body parts can be drawn into spinning wheels Hot components
- Grinding generates significant heat, burn and/or fire hazards. Grinding generates flying sparks. Keep area clear of rags, clutter, flammable liquids, and other fuels,
- Dust Exposure Dust generation produced from the abrasive surface and machining of the workpiece may present physical and health hazards. Minimization practices may include dust collection equipment and general housekeeping practices.

- Proper operation and maintenance of dust collection equipment is essential to effective dust minimization.

Required Personal Protective Equipment (PPE)

- Safety glasses and/or an OSHA-tested face shield.
- Closed-toe, sturdy footwear. Sturdy sneakers and other such footwear is the minimum level of allowable foot protection. Proper safety shoes or boots, with steel toes, electrical protections, etc. are preferred. Extremely lightweight sneakers and all sandals and flip-flops are not safe for machine shops in general.
- Hearing protection is recommended in areas which exceed 85 decibels. Higher decibel levels can cause permanent hearing loss very quickly so hearing protection is always recommended in machine shops.
- If sufficient dust is created, a particle mask or respirator is advised.
- Hair ties, hats, etc. to safely contain long hair if needed
- Sturdy, well-covering and comfortable clothing WITH NO LOOSE SLEEVES, SCARVES, etc.