

Wheel Dressing

INTRODUCTION

The importance of proper truing and dressing of grinding wheels on precision operations cannot be too strongly emphasized. This applies to the type and condition of the dresser used as well as the method employed.

A rounded, blunt diamond cannot be expected to produce the same texture of grinding surface as that produced by a sharp diamond. Likewise it is not possible to produce as free a cutting surface with a light feed and slow traverse as can be produced with a heavier feed and faster traverse.

The selection of the correct grinding wheel is of primary importance in the production of high-grade work, but a close second is the selection of the proper truing tool and its proper use. As a matter of fact, incorrect dressing will cause a satisfactory wheel to act unsatisfactorily. On the other hand, a skillful operator with a good dressing tool can correct to a certain extent the grinding action of a wheel that does not exactly fit the requirements of the work being ground. This kind of knowledge is of special importance in shops where there is such a great variety of work that it is not practical to have a special wheel for each kind of work.



Grinding is actually a cutting operation. The small cutting edges on the grains of the grinding wheel are like so many tiny teeth. They must be

kept sharp in order to give a free cut and to produce a satisfactory finish on the work.

Wheel dressing is the process of re-sharpening these tiny cutting edges. The hard diamond point in the dressing tool fractures the grains of the wheel or removes the dull grains entirely and thus produces new, sharp edges. It also cleans out the tiny spaces between the grains removing metallic dust and other particles which eventually clog up the "pores" of the wheel face and make it dull.

The following pages briefly explain this "sharpening" operation – or how a wheel should be dressed.



When the grinding wheel spindle bearings are cold, wheel position and balance may be considerably different from the position when the bearings are warm. This makes it essential to wait until the bearings are warm, as under normal grinding conditions, before starting to dress.



**TAKE LIGHT CUTS ...
 Not over .001" for finishing.
 Roughing cuts may be slightly heavier.**

In wheel dressing and truing, there is always the temptation to take too deep a cut in an effort to speed up the dressing operation. This is false economy from every viewpoint. Deep cuts invariably leave diamond marks on the wheel which are transferred to the work. They also generate an excessive amount of heat and cause rapid wear or complete destruction of the diamond. These troubles can be avoided by holding all finishing cuts to a maximum depth of .001". Roughing cuts may be slightly deeper.



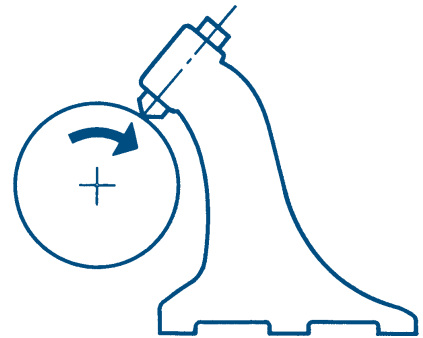
CORRECT POSITION IS IMPORTANT FOR A STRAIGHT FACE.

As nearly as possible, adjust the dressing tool so the diamond touches the "work-wheel" contact.

Most cylindrical grinders are arranged so that the work and the grinding wheel are on the same horizontal line. The point at which the circumference of the work touches the circumference of the wheel is called the "work-wheel contact."

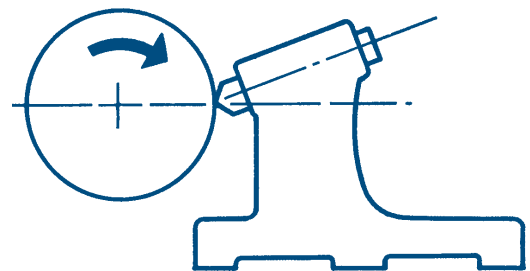
The diamond tool should dress the wheel as nearly as possible to this point. Why? Because the table-ways will wear in the grinding position, and the dressing is generally done with the table in a different position.

WRONG



If the diamond is located way up here with one end of the table on the worn portion and the other end on the unworn portion, the wheel face is bound to be tapered.

CORRECT




But if the diamond is located at or near the horizontal center of the wheel the wear in the ways will not cause trouble.

On internal grinders the relation of the diamond to the "work-wheel contact" is of considerably greater importance than on external grinders. In these cases a close study should be made of the literature furnished by the manufacturer.

SHARP TOOLS GET BETTER RESULTS.

Turn diamond frequently to insure sharp points.



The diamond dresser is a cutting tool and, like all cutting tools, its usefulness is in direct proportion to its sharpness. Dull diamonds crush and glaze the wheel face and load the pores with wheel cuttings, producing a dull wheel. To insure a sharp cutting point at all times, longer wheel life, and greater wheel efficiency, turn the diamond frequently.

The U-DEX-IT and MINI-DEX single point tools are designed for easier turning. These patented tools are indexable with an open-end wrench to keep the diamond free-cutting longer.

HANDLE DIAMOND TOOLS CAREFULLY.

Do not bump them against the wheel.



Diamond dressers are precision tools and should be treated accordingly, both in the interests of diamond economy and grinding efficiency. Care should be taken not to bump the tool against the wheel, as such shocks may result in fracture or complete destruction of the diamond. Although the diamond is extremely hard, it is also brittle and is easily damaged when subjected to a sudden shock or blow.

DRESS AS NEARLY AS POSSIBLE TO WORKING POSITION.

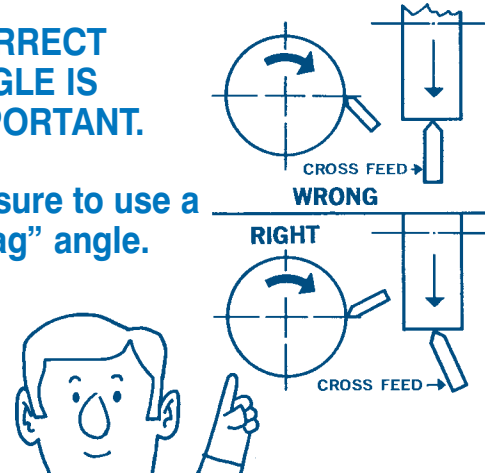


Worn ways on the wheel-head slide may cause the grinder spindle to be out of parallel to the work, if it is dressed too far back (or front) of its grinding position. Therefore, the diamond tool should be adjusted to dress the wheel as nearly as possible to the grinding position.

A lot of time will be saved and “taper trouble” avoided if this tip and the one regarding light cuts (page 59) are followed.

CORRECT ANGLE IS IMPORTANT.

Be sure to use a “drag” angle.



All diamond tools should be mounted at an angle to the wheel so that the tool may be turned to keep a sharp point.

This angle should point in the same direction as the grinding wheel travel. This is called a “drag” angle – as though the wheel had “dragged” the diamond with it for a short distance, and a tool so mounted will never “gouge” the wheel or cause chatter.

The proper “drag” angle for a single point tool on external grinding is from 10° to 15° from a line drawn through center of the wheel and the contact point. On certain types of internal grinders this is not always possible.

APPROACH FACE FROM THE CENTER...



It is not uncommon on external grinding to find the wheel face worn .015 to .020 on the edges and a high spot in the center. It is best in these cases to contact the highest point before traversing, thus preventing excessive penetration and possible damage to the diamond.

For high finish grinding, however, do not make contact without traverse, as the diamond may leave a mark on the wheel which will take a lot of dressing to remove. In such cases it is best to bring the diamond almost in contact with the high spot—start the water—then the traverse, and feed in .001 to .002 at the end of each pass until contact is made. Then proceed in the usual way.



Wheels may be dressed either wet or dry, but the operation should always be carried on under the same conditions as when grinding. If grinding wet – dress wet.

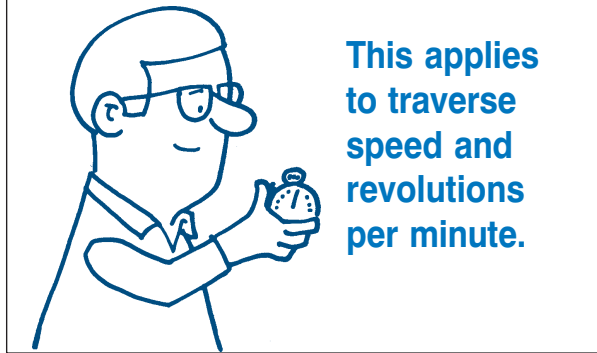
The coolant nozzle should be so arranged as to flood the entire face of the wheel – or else follow the diamond across. If the diamond is run dry over the first part of the dressing and then suddenly into cold, the resulting shock will crack any crystal.

It is best to filter the coolant, as dirt or chips carried to the work not only affects the quality of finish, but also tends to load the wheel, thus necessitating frequent redressing.

When grinding dry – dress dry. But allow frequent intervals for the diamond to cool, otherwise burning or fracture will result.

When quitting work for the day, always run the wheel idle for a few minutes after the fluid has been shut off, so that it will not be waterlogged and out of balance next morning.

CORRECT SPEED IS IMPORTANT.



The speed of traverse in passing the diamond across the wheel is very largely determined by the type of grinding being done. A steady, uniform rate should be held during any one pass.

A slow traverse gives a high finish, but too slow will glaze the wheel. A fast traverse gives a freer cutting wheel. Somewhere in between these extremes is the proper speed for your job. Only you can determine that.

When possible, always take the last dressing pass in the opposite direction from the last pass the work will take. This will tend to eliminate “diamond marks.”

Truing and dressing should be done at wheel speeds (R.P.M.) as near the operating speed as possible, never higher. Speeding up the wheel for dressing may throw it out of balance. The one exception to this is in truing the regulating wheel of a centreless grinder, which should always be done at the highest speed available.



Every time you dress your wheel, it consumes production time and frequent dressing wastes grinding wheel. A good sharp diamond, properly set, will give more pieces on a dressing than a large flat diamond or substitutes, which glaze the wheel.

Sometimes, however, it will shorten the dressing time and lengthen the wheel life, to stop just a little shy (say 10%) of the maximum number of pieces possible. Make this your standard and dress on a regular schedule, whether the wheel shows signs of dulling or not.

Apparent variation in the characteristics of a wheel is often caused by inconsistent dressing.



Be sure tool is tight in holder, and is rigidly supported with a minimum amount of overhang. If the diamond tool is not securely held, vibration will cause chatter, diamond marks, gouging and breakage.

But – the diamond is not the only source of chatter. If the tools are properly mounted and you still get chatter – then check for :-

1. Belt seams or idler pulley balance.
2. Spindle bearing adjustment.
3. Wheel-head gibs.
4. Motor balance.
5. Wheel grade, grain, balance, etc.
6. Geared drive accuracy.
7. Centers and steady rests.
8. On internal grinders use a shorter wheel quill.
9. On centerless grinders check truing device gibs, and location of work rest blade.
10. Surrounding machinery shocks.
11. Machine foundations.

IS WHEEL DRESSING NECESSARY?

The questions are often raised, “Why not use a softer wheel and thus reduce dressing?” “Why dress a wheel, as the diamond cost is high?”

Dressing is not, strictly speaking, an item of expense, but rather, one of economy. A wheel that is so soft that dressing is not needed is short in life, and gives a rather rough surface. A wheel of such a grading that requires periodic dressing will produce considerably more work per Rupee, regardless of the class of work.

As to diamonds, they are essential for dressing except in such cases where the operation is highly specialized and other types of dressing tools may be adaptable – though it is a question if any real economy is to be found in diamond substitutes.