

# A PRIMER ON GRINDING WHEEL SAFETY

## INTRODUCTION

Grinding wheels are safe and necessary cutting tools, but it must be remembered that they are not unbreakable.

The excellent safety record in their use is no mere accident. It is the result of over 80 years of research and exhaustive tests by wheel manufacturers - of an extensive and ever continuing program of education for machine operators in the proper use and care of grinding wheels.

This program, in turn, has resulted in the ANSI Standard, "Safety Requirements for the Use, Care and Protection of Abrasive Wheels" ANSI B7.1. It is the "Safety Bible" of grinding and the basis of most state codes, as well as OSHA regulations.

## INSTRUCTIONS for the SAFE USE of GRINDING WHEELS . . .



## MOUNTING THE WHEEL

1. Select correct wheel for your operation. "Ring" wheel and inspect for cracks. Never use cracked wheel.
2. Never exceed maximum safe speed established for wheel. Be sure machine speed is not excessive.
3. Never alter hole in wheel or force wheel on spindle.
4. Use clean, recessed, matching flanges at least 1/3 wheel diameter.
5. Use one clean, smooth blotter on each side of wheel under each flange.
6. Tighten nut only enough to hold wheel firmly.
7. Adjust wheel guard and put on safety glasses before starting wheel.



## USING THE WHEEL

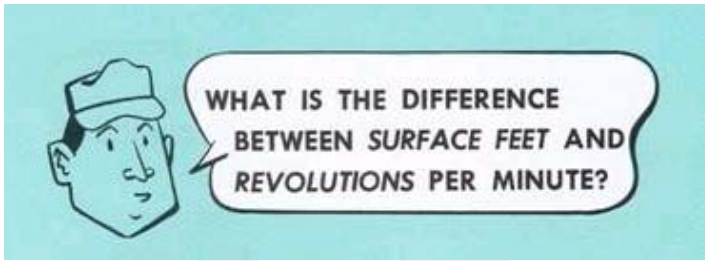
1. Adjust dust hood and coolant nozzle (for wet grinding). Keep work rest adjusted within 1/8" of wheel face (periphery).
2. Stand aside and allow wheel to run idle a full minute before starting to grind.
3. Dress wheel if out of true.
4. Make grinding contact without "bumping" or impact.
5. Grind only on face of straight wheel. Use disc wheels for side-grinding. Light side-grinding permissible on cup or saucer wheel.
6. Never force grinding so that motor slows noticeably or work gets hot.
7. Protect wheel when not in use. Store safely if removed from grinding machine.

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**PLAY IT  
SAFE  
AT THE  
WHEEL**



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**REVOLUTIONS PER MINUTE:** is the number of complete axis turns per minute.

**SURFACE FEET PER MINUTE:** is the distance any one abrasive grain on the cutting face travels in one minute.

If you ran a steel tape around the outside of a 24" diameter wheel you would find that the wheel measured a little over 6 feet around. For every revolution of a 24" wheel, any given point on the outside surface of the wheel travels about 6 feet. If the 24" wheel is mounted on a machine which runs at 1000 RPM, the surface speed is a little more than 6000 surface feet per minute.

In general, wheel speed is given in surface feet per minute. Machine speeds, however, are usually indicated in RPM, and most speed indicators and tachometers read in RPM. It is frequently necessary to translate surface speed into RPM for various sizes of wheels.

Where a wheel is used at the same speed (RPM) until worn out it is not necessary to make any translation. Simply make sure that the speed is not higher than shown on the wheel blotter or the wheel. In some places it is customary to maintain a fairly uniform surface speed in order to keep the grinding action the same. This means that the RPM must be increased as the Wheel Wears down.

**SFPM == diameter of wheel in inches X RPM X 0.262.**

**VITRIFIED AND SILICATE**  
SPEED LIMIT  
6500 S.F.P.M.

**RESINOID AND RUBBER**  
SPEED LIMIT  
9500 S.F.P.M.

**As** a rule, vitrified and silicate wheels can be safely used at 6500 surface feet per minute, and resinoid and rubber wheels at 9500\* surface feet per minute. Coarse, soft wheels are not strong enough for these speeds. Cup wheels and cylinders should also be run at slower speeds. Operating speeds recommended by the manufacturer must not be exceeded.

\* Excepting cut-off wheels.

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# PLAY IT SAFE AT THE WHEEL



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**NO** – if the wheel is properly mounted and not abused, it is not dangerous. Today, grinding is not considered a dangerous occupation.



**YES** – definitely. In actual use, the periphery of a grinding wheel usually travels at a speed faster than a mile a minute. If a wheel should be broken while traveling at that speed, serious personal injury or damage to machinery or equipment might result.



In most cases they are not accidents at all. They are due to carelessness or to lack of knowledge. The most common causes are:

1. Using the wrong wheel for the job
2. Careless handling
3. Improper mounting
4. Too high speed
5. Too much pressure

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# PLAY IT SAFE AT THE WHEEL



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WHAT CAN I DO TO PREVENT SUCH ACCIDENTS?



ARE ALL GRINDING WHEELS EQUALLY STRONG?



WHY CAN'T WE USE ONLY THE STRONG, TOUGH WHEELS WHICH CANNOT BE BROKEN EASILY?



HOW DO I KNOW WHICH WHEEL TO USE FOR MY JOB?



**First**, you must have a general understanding of the strength of various types of wheels.

**Then**, if it is your job to mount the wheels, you should learn how to mount them properly, and

**Finally**, you should learn how to grind so that there will be no danger of damaging the wheel.

**NO** – They are all breakable, but some kinds of wheels may be actually ten times stronger than others. Some are quite brittle, others tough. The bond in vitrified wheels is similar to glass and can be broken easily. Careless handling can easily damage such wheels. Rubber and resinoid bonded wheels can usually stand harder usage and can be used at higher speeds.

**The** tough, strong wheels would not be suitable for all kinds of grinding. On some classes of grinding, relatively soft wheels are necessary to prevent burning and spoiling sensitive and expensive steels. If you tried to sharpen a high-speed steel cutter with the same kind of a wheel that is used for grinding castings, the cutter would be quickly ruined. On the other hand, if you used a cutter grinding wheel on a high-speed portable grinder for grinding cast-ings, the wheel would probably break.

**Use** only the kind of wheel which has been designated for your job by your supervisor or someone in authority. As a check, the tag or blotter on the wheel shows the highest speed which the wheel manufacturer recommends. If you do not know the speed of your machine, make it a point to find out. If the machine speed is faster than the speed stamped on the wheel, tell your supervisor about it.

Never borrow a wheel from another job. It might not be the right kind of a wheel for your job.

# PLAY IT SAFE AT THE WHEEL

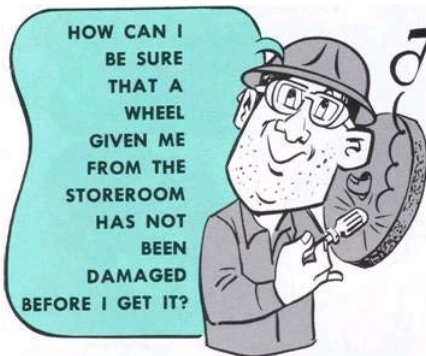


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All wheels are breakable-vitrified wheels are very similar to a piece of glass and can be broken or cracked by drop-ping, bumping or merely tipping over from an upright posi-tion. Rubber and resinoid wheels can usually stand more abuse, but they can be broken nevertheless. To be on the safe side, handle all grinding wheels as carefully as though they were made of glass.



**Inspect** it very carefully for cracks or any marks that look as though the wheel might have been damaged. If anything looks suspicious show it to your supervisor. Even if no cracks are visible, give the wheel a "ring test." Tap the side with a wooden mallet or the handle of a screw driver and notice if it gives a clear ring. If not, ask your supervisor to test it. Then, if it appears to be O.K., mount it on the machine.

When starting the machine, stand to one side of the wheel for at least a minute before starting to grind. If it is a port-able machine, hold it under a bench or inside a heavy cast-ing for a minute or so.



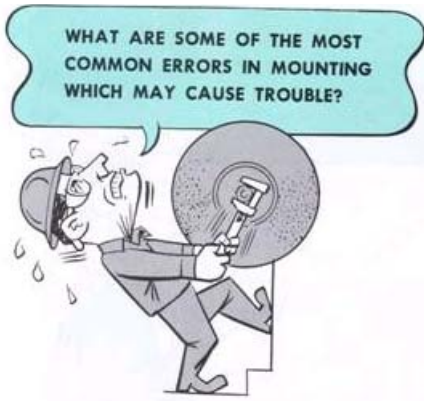
**There** are so many kinds of machines and wheels, that there can be no simple rule to cover all. The best general advice is to get proper instruction from your supervisor or someone who has authority to instruct you. Unless you have previously mounted wheels on a similar machine, do not take a chance on mounting a new wheel without proper instruction.

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# PLAY IT SAFE AT THE WHEEL



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1. Use of flanges of uneven or too small diameter.
2. Use of washers instead of flanges.
3. Flanges without proper clearance or relief.
4. Excessive tightening causing flanges to bend.
5. Failure to clean all dirt and foreign material from sides of wheels and flanges.
6. Forcing a wheel onto an arbor where fit is tight.

7. Use of just any loose washers or bushings to try to make a wheel fit a machine for which it was not intended.
8. Failure to use blotters on wheels.



**Not** if the original surface speed is not exceeded. There might be a very real danger if the RPM is increased too soon, or if, when mounting a new wheel, the RPM is not reduced to the proper speed for the full sized wheel. This is very important.



Side pressure on thin straight wheels is dangerous. Most wheels will stand quite a lot of straight radial pressure, but there is a limit to what they can take. Heavy pressure with vitrified wheels is apt to cause the wheel to get hot. If it gets too hot too quickly, it is apt to break.

Sudden bumping or pounding is more dangerous than steady, even pressure.

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# PLAY IT SAFE AT THE WHEEL



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**Guards** and other protection devices make grinding really safe. If all of the safety rules were always followed, breakages would never occur and guards would not be necessary. There is always the chance, however, that someone will some day forget one of these things and breakage might result.

Breakages do not occur often, but because of the high speed at which grinding wheels travel, the results are apt to be serious unless proper guards are in place.

It is always expected that the wheel will not break, and if it has been properly handled and mounted and is not in any way abused it will not, but the guard should always be in place just in case.



**A guard** can't possibly keep in all the small particles of grit and steel which are loosened during any off-hand dry grinding job. It doesn't take a big particle to do a lot of damage to any eye. Goggles are the best protection against this.

For additional information on this topic or if you need any other abrasive safety information, please review ANSI, OSHA and all literature provided by the abrasive wheel and machine manufacturer. You may also contact the Saint-Gobain Product Safety Department at Tel. (508) 795-2317 or Fax. (508) 795-5120 or contact your Saint-Gobain Abrasives, Inc. representative with any safety related questions.

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# PLAY IT SAFE AT THE WHEEL

