

AVOID OVER-STRESSING YOUR WHEEL

Know the normal wheel stresses and how to avoid excessive stresses.

To better understand grinding wheel safety, it is important to consider some of the possible stresses produced in a grinding wheel under normal operating conditions. Some of the possible causes for induced stress are listed below.

Flange. A wheel mounted between two flanges will have compressive stress introduced into the wheel. Use proper mounting procedures such as always use new blotters, don't over-tighten, use correct flanges, etc.

Acceleration. Stress is produced when the wheel is brought up to normal operating speed.

Rotational. The stress produced in a wheel caused by centrifugal force. This stress is increased exponentially as the rotational speed is increased. The stress created by rotation exceeds by a substantial factor the sum of all other stresses induced by most grinding operations. For this reason, it is critical that the wheel is never operated in an over-speed condition. NEVER OVER-SPEED A GRINDING WHEEL!

Dynamic Imbalance. Stress may be generated in the wheel by the dynamic imbalance of the wheel mount and spindle. Always turn off coolant before stopping wheel to avoid an out-of-balance condition.

Radial Impact. Radial stress occurs as a result of impact as the wheel is pushed into the work, or vice versa. Don't jam work into the wheel.

Tangential Stress. The stress produced by grinding is related to the tangential force which in turn can be indicated by the power consumed in grinding. Don't force grinding so that motor slows noticeably or work gets hot.

Thermal Stress. Stress resulting from heat generated by the grinding wheel in action. Heat and the resulting thermal stress are increased as the wheel becomes dull or glazed. The reduction of heat is one of the primary purposes of a coolant. Do keep wheel face open and free cutting by properly dressing the wheel as needed.

Side Load. This stress results from side pressure on the wheel during grinding. Don't grind on the side of a wheel (See ANSI B7.1 for exceptions).

Side Impact. This stress is similar to side load, but resulting from intermittent jars or jolts. Don't bump the wheel into the work.

Deceleration. Stress resulting from the slowing down of a wheel. Acts in the opposite to that of acceleration.

Braking. An accentuation of the deceleration stress resulting from the use of a brake to slow down the wheel. Never stop the wheel by jamming the wheel with the workpiece or other object.

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These stresses do not occur individually, nor are they independent of each other. Some of them, and conceivably all of them, could interact with each other to produce stress patterns of varying magnitudes. While wheels are designed to take into account these normal stresses, creating additional stresses due to misuse and abuse of grinding wheels can lead to wheel breakage. Next time you use or mount a grinding wheel, remember:

1. Don't use a cracked wheel or one that has been dropped or become damaged.
2. Don't force a wheel onto the machine or alter the size of the mounting hole.
3. Don't ever exceed maximum operating speed established for the wheel.
4. Don't use mounting flanges on which the bearing surfaces are not clean, flat and free of burrs. Never use worn/damaged mounting equipment.
5. Don't tighten the mounting nuts/screws excessively.
6. Don't grind on the side of the wheel (see ANSI B7.1 safety code for exceptions).
7. Don't jam the work into the wheel or grind material for which the wheel is not designed.
8. Don't force grinding so that the motor slows noticeably or work gets hot.
9. Don't mismatch machines and wheels. Use wheels on machines designed and guarded for those wheels.
10. Don't use machines which are not properly maintained.
11. Do always handle and store wheels in a careful manner.
12. Do visually inspect all wheels before mounting for possible damage and ring test vitrified wheels.
13. Do check machine speed against the established maximum safe operating speed marked on the wheel.
14. Do check mounting flanges for equal size and correct diameter.
15. Do use blotters that are supplied with the wheels.
16. Do always use proper safety guard.
17. Do allow newly mounted wheels to run at operating speed, with guard in place, for at least one minute before grinding.
18. Do always wear proper eye protection and additional Personal Protective Equipment as needed.
19. Do turn off coolant before stopping wheel to avoid creating an out-of-balance condition.
20. Do properly maintain all grinding equipment. Machine speed, guards, and mounting equipment must be checked at regular intervals. Never use a machine not in proper service.

Don't let excessive stress get you down and cause your wheel to break. Don't you be a fool; follow all of the safety rules! Remember, "Play it safe at the wheel!"

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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