

Selecting a Safe Lathe Speed

The proper lathe speed should allow a bowl blank to be turned with little or no vibration. The proper speed should be fast enough to allow the turning tools to produce smooth and clean cuts, while at the same time be slow enough to allow the lathe's headstock and tailstock to safely retain the wood blank against the centrifugal force of the spinning wood. As the blank is trying to fly off the lathe due to centrifugal force, the lathe holding system is trying to keep the blank in place. The larger and heavier the wood blank, the greater the forces generated at any given speed.

Vibration is usually caused by one of the following conditions.

- A bowl blank not being centered properly on a chuck or face plate.
- Square stock not being centered on the drive center and tailstock revolving center.
- Imbalance due to an area of the blank being heavier than another, often due to moisture differences in the wood.
- Blanks that are physically unbalanced such as in logs and burls used for making natural edge bowls.

Low speeds are often needed to reduce vibration until the work has been turned into balance. Speeds can then be increased for more efficient turning.

Suggested Turning Speeds

Most experienced wood turners develop an intuitive feel for safe lathe speeds under varying turning conditions. However, most novice turners can benefit from a more concrete approach to determining safe turning speeds.

Noted wood turner and author Dale Nish has developed and used an empirical formula for determining the safe lathe speed for various sizes of wood blanks. His formula is,

$$\text{RPM} = \frac{6,000}{D} \text{ to } \frac{9,000}{D}$$

Where,

RPM = Revolutions/minute of the headstock spindle

D = Diameter of the wood blank in inches

6,000 to 9,000 = Empirical numbers to determine the safe speed range

Lets look at an example where we have an 8" bowl blank. Using the Nish formula, the safe lathe speed would be,

$$\text{RPM} = \frac{6,000}{8"} \text{ to } \frac{9,000}{8"}$$

$$\text{RPM} = 750 \text{ to } 1,125$$

Therefore, the safe speed for an 8" bowl blank would be between 750 RPM and 1,125 RPM.

If your lathe is a step pulley drive system, choose a speed as close to 750 RPM as possible. After the blank has become balanced, you may want to increase the RPM, but do not exceed the maximum of 1125 RPM. If your lathe has a variable speed control system, set it initially for about 750 RPM and increase the speed as the wood becomes more balanced.

Special precautions must be observed when turning large items. For example, a 20" platter should be turned at a headstock spindle speed that does not exceed 300 – 450 RPM. This may be lower than the slowest speed possible on a step pulley drive system.

On the other hand, stock 2" diameter or smaller usually can be turned safely at speeds of 3,000 RPM or higher. This is often the top speed of most lathes.

Remember, practice safety at all times. Always check the lathe speed setting before hitting the start button!