

How to determine safe lathe speeds

By Dale Nish

The selected lathe speed should allow the blanks to be turned with little or no vibration, allowing the tools to produce a clean surface.

Vibration is usually caused by speeds high enough to cause the unbalanced blank to vibrate the lathe, as the piece is trying to fly off the lathe due to centrifugal force and the lathe holding system is keeping the piece in place. The vibration is caused by the works being unbalanced in weight. Unbalanced work can be caused by a turning blank not being centered properly on a face plate or chuck, square stock not being centered on the drive center and revolving center or stock which may be unbalanced due to an area of the blank being heavier than another, usually due to moisture differences in the wood. Another common cause of vibration is turning blanks which are physically unbalanced, such as natural edge bowl from logs or burls. Low speeds are needed to reduce the vibration until the work becomes balanced, then speeds can be increased for more efficient turning.

Suggested Turning Speeds

I have found from experience that appropriate lathe speeds can be determined using a simple formula. This method works for me, and I use it all the time to determine lathe speeds when I begin to set up to turn a piece.

D= Diameter of stock in inches

RPM= Revolutions per minute of the headstock spindle.

6,000-9,000 – just numbers used to determine lowest speed or highest speed

D" x RPM = 6,000 to 9,000

Example- A bowl blank is 8 inches in diameter.

8" X 750 = 6,000

8" X 1125 = 9,000

If the lathe is a step pulley drive system, choose a setting around 750 RPM to 1100 RPM, staying lower around 750 RPM if you can.

If the lathe has a variable speed control system, set it around 750 RPM until the work is turned round, then increase the speed, but I wouldn't recommend going above 1100-1200 RPM.

Several years ago I visited a friend who had been turning large lamps and platters which he was selling at craft shows. He had retired from the construction industry and was involved in a "useful hobby" and he was quite successful. He and his wife traveled to shows in their motor home and were enjoying retirement. He was in his shop turning 20" platters glued up from different species of colorful woods. The joinery showed a few heavy glue lines and the occasional small gap, but the quality was good enough for the customer he was selling to. I mentioned that 800 RPM was much too fast for platters that size, and turning outboard with a light floor stand was dangerous in itself. He didn't feel that either the lathe speed or the floor stand was causing any difficulty and his comment was, "I've never had any problem." A few weeks later one of the platters disintegrated while he was turning it and he suffered severe head injuries from which he

never fully recovered. When I last saw him, he was in a wheel chair, on an oxygen bottle and was watching his shop being sold at a garage sale. This was an accident that never needed to happen. In more than 45 years of teaching, mostly woodworking and turning classes, I've never seen a smart accident.

Now, let's look at the small diameter works, as there are large numbers of small capacity lathes owned by woodturners. Most will have a maximum swing of 8 inches and as noted previously, small bowls of 8" can be safely turned at around 750 RPM if held securely in a chuck or on a faceplate.

- Six inch bowls will require a speed from 1000 to 1500 RPM

- Five inch bowls or projects require a speed from 1200 to 1800 RPM.

- Three inch stock from 2,000 to 3,000 RPM

- Stock 2" or smaller in diameter usually will be turned at speeds 3,000 or higher, often at the top speed which the lathe will turn. However, caution must be practiced at all times and if the lathe speed seems too high, slow it down.

All the speeds suggested are for stock which is sound, no defects or checks, and has not been laminated.