Teaching Woodturning Basics

AAW EDUCATION

Publication of the American Association of Woodturners
woodturner.org

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FEATURES

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American Association of Woodturners

This instructional guide was written for AAW members who have intermediate or advanced experience in turning and who are interested in sharing their enthusiasm for turning, but who may not be particularly experienced in teaching. In preparing these materials it was at least as difficult to determine what ***not*** to include as is was to decide what material should be included. Our intent was to provide a teaching guide that is concise, practical, and project based.

There was consensus among the group that the best introduction to woodturning in general is through learning spindle techniques. Learning cutting theory used in turning spindle projects is broadly transferable to other types of projects. As a result, we intentionally limited ourselves to addressing spindle turning only. We have defined spindle turning as having the grain direction run parallel to the bed of the lathe. Furthermore, we have covered the use of only three tools - the 3/4" spindle roughing gouge, 3/8" spindle gouge, and 1/8" parting tool. For the sake of safety, we caution you regarding teaching outside of the scope of this guide.

There are significant responsibilities associated with teaching any manual skill involving power equipment and sharp tools. We strongly suggest you consider the implications that your instruction will have in setting good examples for safe, effective, and proper turning technique.

Although turning is great fun, THE LATHE IS NOT A TOY, and serious injury can result from improper methods. Safety should be of prime importance at every phase of instruction.

This guide includes a suggested schedule for a workshop 2-3 hours long. Participants should get an introduction to turning that teaches safe practices and attitudes, includes straight forward instruction on simple processes and projects, and provides hands-on experience that gives quick and satisfying results. Project sheets for a variety of simple spindle projects are included. In addition, there is a section dedicated specifically to teaching young turners.

This guide is not intended to be an instructional manual for woodturning, but rather a resource for experienced turners to strategize their teaching efforts. We recommend that you realistically consider your own turning abilities and awareness prior to directing students.

Our hope is that this material will help you prepare to teach an introductory woodturning workshop that will be a lot of fun and get people hooked on turning.

This guide is a resource for experienced turners to strategize their teaching efforts.

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Introduction

Woodturning is, by nature of the process, full of discoveries, challenges, great joys and sometimes wrenching frustrations, yet clearly one of the most compelling of all crafts.

Although it can be intriguing and even mesmerizing to watch, many people who attempt to learn the craft of turning without the benefit of a teacher quickly become frustrated, as the demanding nature of the subtractive process combined with the seemingly mysterious principals governing the behavior of cutting tools takes time to comprehend. Even with the help of modern instructional materials, many self-taught turners remain unaware of the potential for certain techniques and equipment, or the relative ease with which the right tool used proficiently can quickly produce the desired form with a crisp-cut surface requiring little if any additional refinement.

Fortunately, the generosity and willingness to share hard-won technical insight are still the hallmarks of the contemporary woodturning community, and remain one of its finest qualities.

". . . the demanding nature of the subtractive process combined with the seemingly mysterious principals governing the behavior of cutting tools takes time to comprehend."

Teaching Motivations

Chances are if you are reading this guide, you are at least a little curious about the possibility of sharing your enthusiasm for woodturning. Hopefully, this is due to your own interest and involvement in the craft. We are living in an era where the popularity of wood-turning and its creative possibilities has never been greater, and this enthusiasm shows no sign of waning. There are thousands of people interested in learning how to turn, and they can benefit from your help.

Maybe you have been considering teaching for some time, or have been asked to help a less experienced turner understand why a particular tool seems to be misbehaving, or perhaps you have a special technique that merits sharing . . . whatever your motivation, this guide is intended to help in the development of essential teaching skills.

Possessing turning ability does not automatically make one an effective instructor. Just as in the practice of turning, raw enthusiasm itself isn't the only requirement for success; it requires strategy and technique. The craft of teaching is a skill that can be learned, and this book is intended to be a resource for the process.

Teaching Skills

As a turner, you can come to understand and appreciate what it takes to create an object:

- Inspiration & imagination
- Technical ability
- A working knowledge of materials
- Empirical knowledge of the forces involved in the turning process
- The ability to visualize and develop the desired form within the wood through subtractive means, willingness to take risks, make subtle adjustments to details, and knowing when to stop.

"Teaching others how to turn can be very different than turning for your own purposes, and requires a different, though somewhat similar, set of skills ."

Teaching others how to turn can be very different than turning for your own purposes, and requires a different, though somewhat similar set of skills:

- The ability to organize and present information in a logical and incremental sequence
- The perception and awareness to identify the contributing factors involved in effective turning:
- The verbal skills to clearly describe the process;
- The ability to anticipate, identify, and respond to student needs;

- The willingness to be observed, questioned, and available for clarification.

Essentially, becoming an instructor requires more perception, and a willingness to share than innate talent or turning proficiency.

Keep it Simple

Present information that is relevant only to what you are teaching at the time and add complexity in small increments. Don't bog down core concepts with superfluous technical details such as differences in brand-name tools, sharpening variations, lengthy stories from your turning experiences, too many alternate methods, etc.

Visual Aids

Large Drawing Board

A chalkboard, white board, or large drawing pad set on an easel can be great for clarifying some concepts. You may even want to have some drawings prepared before the session to save time. Don't worry about your ability to draw. Make simple drawings that are large and easy to read. Using two or three colors can quickly clarify details on drawings.

Large tool models and project examples

Oversized tool models, or just a form representing the shape of the first few inches of the cutting edge can be a great way to show concepts. It may also be useful to have partially and/or completed examples of projects prepared before the demo to illustrate the steps. Cutaways that show the actual cross-section or longitudinal section of turnings can be very helpful.

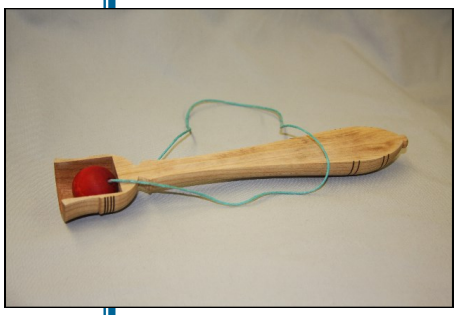
"Oversized tool models . . . can be a great way to show concepts."

Labels

Small temporary stick-on labels placed on parts of the lathe, tools, etc. are a simple way to help students remember terminology.

Using Notes

While you are initially becoming comfortable with the teaching process it may be helpful to prepare a few key words on note cards. Use small magnets to hold them on the lathe to refer to while demonstrating.



Handouts

Prepared handouts help clarify turning strategies and help students remember terminology, sequence and other important details, especially after the class session. New turners will appreciate any information you can provide regarding woodturning resources, such as information about AAW, local chapters, and local suppliers. Please respect copyright ethics and laws when preparing handouts.

"Prepared handouts help clarify turning strategies and help students remember terminology, sequence and other important details. . ."

The Learning Environment

Class size

We highly recommend your initial teaching experience be limited to teaching one or two students and then gradually increase the size of the group as you gain experience as an instructor. Smaller class sizes are more enjoyable and productive for both the instructor and the students. There should be an instructor or capable assistant available for every three or four students.

"Working with group chemistry and individual personalities can be a challenging aspect of teaching."

One-on-One
This is by far the easiest teaching situation as you won't have to divide your time and attention among students.

2 or 3 students
Teaching two or three students can be quite manageable, but pace becomes more of a concern. You will find that attending to the needs of three new turners will keep you plenty busy.

4 to 6 Students
Teaching a class of new turners with up to 6 students is not recommended without the aid of an assistant. Classes this size require more planning and preparation on the part of the instructor, and more patience on the part of the learner.

7 to 10 Students
Keeping up with a class this size requires the aid of at least one, preferably two, capable assistants. A good assistant can make or break the success of a class this large. It becomes more difficult to provide individual instruction so you may need to stop the class in order to clarify a relevant detail to the whole group rather than having to repeat the same instructions to each person.

Working with Various Personalities
Working with group chemistry and individual personalities can be a challenging aspect of teaching. Having a student who is feeling ignored and frustrated creates an irritating experience for them, and a tough teaching session for you. Some students who are really in need of help may be hesitant to ask for assistance and may need to be encouraged to be more assertive in seeking your help. Others may have a tendency to dominate your attention if you are not careful. Occasionally, you may need to deal with one or more students who are distracting the demonstration or work session. This can be tricky, and it is important to respond in a respectful manner to avoid misunderstandings and reactionary behavior. It is best not to reprimand someone in front of others, but wait for a moment when you can discretely speak privately.

A Good Assistant Need Not Be an Expert
When teaching multiple students, especially students who are raw beginners, it is helpful to have an assistant at each lathe. It is not necessary that every assistant be highly experienced at turning and teaching, as long as they are familiar with safety issues and can follow the lead of the primary instructor. Often, fellow club members with even limited turning or teaching experience can quickly become a great asset to a beginning class as they learn by assisting an experienced turner.

One-on-one Instruction

When working with students one-on-one, don't take the tool out of the student's hand to demonstrate how to make a cut. Instead, let the student hold the tool while you carefully grasp the tool handle between the student's hands and gently guide and talk through the cut. Always stand to one side rather than reaching around the student from behind which is much less effective, restricts your view, and makes most students rather uncomfortable. If done properly, slowly letting go of the tool enables the student to gradually transition to taking full control of the cut. This way they will not only see, but also feel the cut being made. In addition this lets them feel they have helped make the cut rather than simply watched someone else do it. When helping guide a cut it is always important to avoid making the student uncomfortable by getting too "up close and personal." Always take care to respect the student's personal space.

Medical and Other Considerations

Be aware that some students may have specific concerns or disabilities which should be factored in to their expected level of participation in the class. These could include:

- Limited hearing or reduced vision
- Medical conditions or injuries that restrict movement or limit their ability to perform certain tasks
- Wood allergies or other sensitivities to environmental conditions
- Limited understanding of your language

Time Management Strategies

Know the approximate time it will take you to teach the concepts or projects you are covering. Pace yourself to stay on track as much as possible. The natural inclination for most people is to try to squeeze too much instruction into a limited time period.

The Importance of Breaks

As an instructor, you will soon discover that teaching and learning demands a surprising amount of energy, so it is a good idea to take a break every couple hours. It is best to encourage everyone to get out of the workshop to clear their head, socialize with each other, or just get off their feet for a while. Breaks also offer a time for participants to talk among themselves about turning in general and to develop friendships with others who have similar interests. While there is value in all students taking a break periodically, some students may want to use break time to catch up with the remainder of the class. While this is not recommended, it may be accommodated, if appropriate. If not everyone takes a break at once, there should always be a responsible party when any student is present in the workshop and whenever any equipment is being used.

"When working with students one-on-one, don't take the tool out of the student's hand to demonstrate how to make a cut. Instead . . . gently guide and talk through the cut."

Set Up: Workshop Environment And Protocol

"A good rule of thumb is that the spindle height should be somewhere around the same distance from the floor as a person's heart."

Lathe Arrangements

Being able to freely walk around each lathe has many instructional advantages for both instructor and student.

Staggering the lathes or setting them at a slight diagonal to a wall prevents a student from standing in the 'throw line' of an adjacent lathe — this is less important with spindle work than when bowl turning where there is a greater chance of 'flying objects' suddenly appearing. There are better ways of making a turning session memorable than being clobbered by a wooden projectile. In some turning schools each turning station is divided by a screen, wall section, or tool panel. Where a tool panel is not provided it is important to have a small table or cart where students can place their individual tools. They should be encouraged to avoid placing their tools on the lathe bed.

Lathe speeds

Check each lathe for appropriate start-up speed.

Spindle Height

Try to adjust the spindle height in relation to the student who will be using that particular lathe. A good rule of thumb is that the spindle height should be somewhere around the same distance from the floor as a person's heart. It should be no lower than their elbow while standing in a relaxed position.

Floor Mats

Having a good rubber mat to stand on instead of a hard concrete floor helps reduce leg and back fatigue. A mat can also reduce damage to dropped tools.

Lighting

Adequate lighting is important not only for seeing the work but also for reducing eye fatigue and, over time, eye damage. Ideally each station should have good overhead lighting as well as a moveable work lamp to provide more direct light on the project. Lights which have protective shields are recommended.

Extension cords

Use of extension cords that cross traffic areas should be avoided.

Protection for Eyes, Ears, and Lungs
Be sure to wear eye protection whenever demonstrating. Safety glasses are often sufficient when turning relatively small spindles. Full face shields provide the most protection but make it more difficult to be heard while demonstrating. Face shields should be worn whenever the workpiece is large enough to cause injury that safety glasses alone won't prevent. Teach the students how to properly adjust the head-band and how to lift the shield for talking. Face shields should be kept clean and free of scratches.

- Hearing protection and dust protection should be recommended and should be made available to students. Mention that some people are particularly bothered by dust from woods such as cocobolo and other exotics and that precautions should be taken to avoid breathing fine dust whenever possible. Breathing dust from spalted wood should also be avoided.

Tool Sharpening

Beginning turners will have plenty to challenge them without complicating the first lesson with sharpening. This is especially true with short-format classes. As a result, added preparation may be required of the instructor to assure that the tools are ready to use. Where time allows, sharpening should be gradually introduced, starting with the easiest tools to grind such as parting tools, scrapers, and roughing gouges. The use of a good sharpening jig system will help students get much more consistent results than free-hand sharpening, and will save both the instructor and student time and frustration. It may be helpful for the instructor to have extra sharpened tools on hand.

"Beginning turners will have plenty to challenge them without complicating the first lesson with sharpening."

Wood Selection

When teaching beginning students select a domestic hardwood that has straight grain, is dry or nearly dry, and is free of knots and defects. Woods such as poplar, alder, basswood, soft maple, pine, and cherry are excellent. Woods with more even density (diffuse porous) tend to yield better surface qualities for beginners than variable density (ring porous) species such as oak, ash, and elm. Exercise blanks should be relatively small, about 2" square, and about an inch shorter than the length of the toolrest. Green wood works well for the bead and cove exercises.

Suggested Workshop Agenda

2-3 hours

- Welcome students, brief introductions, overview and purposes of the workshop (5-10 minutes)
- General safety; introduction to the lathe (5-10 minutes, safety will be taught and reinforced throughout the workshop)

- **First demonstration**: Mounting stock between centers; roughing out using the spindle roughing gouge; feedback and questions (10-15 minutes)
- *First work session*: Guided practice; roughing stock with spindle roughing gouge (10-15 minutes)
- **Second demonstration**: Laying out the exercises using a parting tool; feedback and questions (5-10 minutes)
- *Second work session*: layout using the parting tool (10-15 minutes)
- **Third demonstration**: Cutting beads with a 3/8" spindle gouge; feedback and questions (10-15 minutes)
- *Third work session*: Guided practice; cutting beads with a 3/8" spindle gouge (15-20 minutes)
- **Fourth demonstration**: Cutting coves with a 3/8" spindle gouge; feedback and questions (10-15 minutes)
- *Fourth work session*: Guided practice; cutting coves with a 3/8" spindle gouge (15-20 minutes)
- **Break** (5-10 minutes, the end of the break should be no later than the 2 hour mark)
  (See project handouts for recommended projects.)
- **Fifth demonstration**: First project; feedback and questions (15-20 minutes)
- *Fifth work session*: Guided practice making the first project (*30-45 minutes*)
- **Sixth demonstration**: Second project; feedback and questions (if the workshop is longer than three hours and time allows)
- *Sixth work session*: Guided practice making the second project (if the workshop is longer than three hours and time allows)
- Feedback and suggestions (5-10 minutes)
- Clean up, goodbyes (10-15 minutes)

NOTE: Based on the shorter time frames, this workshop would take 2 hours 45 minutes without including the optional second project. The time frames provided are estimated targets and will vary depending on a variety of conditions. The instructor should adjust the time frames as appropriate.

1 **Welcome students, brief introductions, overview and purposes of the workshop:** Take a few moments to briefly introduce yourself and have the students briefly introduce themselves. It may be helpful to find out from the students how they got interested in turning, what their skill level is, what they hope to gain from the class, what kinds of projects they are most interested in making, and what type of equipment they have available to practice on. Wearing simple name tags or posting the student's name somewhere near the lathe they will be using will help you and the other students become familiar with one another. Even if the session is only part of a day, it sets a tone of respect to call each student by their name, and makes communication easier.

2 **Safety and introduction to the lathe:** It is of utmost importance to teach through example proper respect for equipment and an attitude of safety. After discussing safety concerns with the group, be sure to reinforce safety principles as you provide individual instruction.

Safety

- As a minimum always wear safety goggles or safety glasses that include side protectors. Use a full faceshield for bowl, vessel or any turning involving chucks and faceplates.

- Tie back long hair, do not wear gloves, and avoid loose clothing, jewelry or any dangling objects that may catch on rotating parts or accessories.

- Always check the speed of the lathe before turning it on. Use slower speeds for larger diameters or rough pieces, and higher speeds for smaller diameters and pieces that are balanced. Always start a piece at a slower speed until the workpiece is balanced. If the lathe is shaking or vibrating, lower the speed. If the workpiece vibrates, always stop the machine to check the reason.

- Check that all locking devices on the tailstock and tool rest assembly (rest and base) are tight before operating the lathe.

- Position the tool rest close to work, almost touching the wood. Check tool rest position often and as wood is removed, turn off the lathe and re-position the rest.

- Rotate your workpiece by hand to make sure it clears the toolrest and bed before turning the lathe "on." Be certain that the workpiece turns freely and is firmly mounted. A handwheel on the outboard side of the headstock simplifies this process of spinning the lathe by hand before turning on the switch.

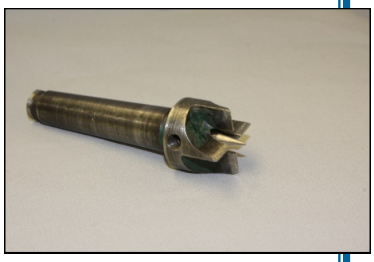
". . . it sets a tone of respect to call each student by their name, and makes communication easier."

Be aware of what turners call the "red zone" or "firing zone." This is the area directly behind and in front of the workpiece — the areas most likely for a piece to travel as it comes off the lathe. A good safety habit is to step out of this zone when switching the lathe to the "on" position. When observing others turn stay out of this area.

- Hold turning tools securely on the toolrest, holding the tool in a controlled and comfortable manner. Always contact the tool rest with the tool before contacting the wood.
- It is safest to turn the lathe "off" before adjusting the tool rest or tool rest base (banjo).
- Remove the tool rest before sanding or polishing operations.
- Never leave the lathe running unattended. Turn the power off. Don't leave the lathe until it comes to a complete stop.

Using the spindle roughing gouge

NOTE: These safety items have been selected from the 2007 revised safety guidelines of the American Association of Woodturners available from the AAW or published in their annual directory. There are another 15 safety principles on the AAW list. You may wish to copy all 26 and give special attention to the guidelines listed above.

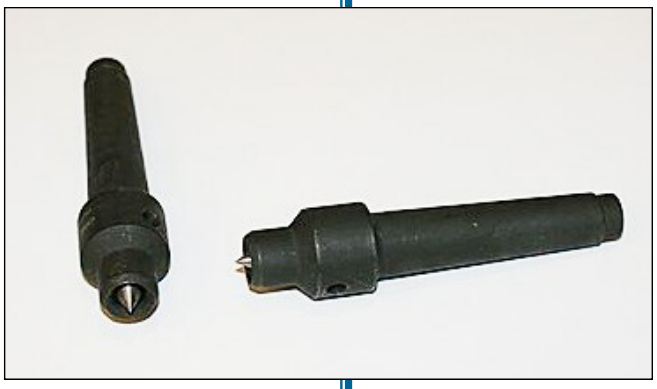


Standard Spur Drive Center

3 First demonstration: Mounting stock between centers; using the spindle roughing gouge; roughing out; feedback and questions

Drive center

The drive center is placed in the headstock and rotates with the lathe to drive the wood while turning. The most common type of drive center is the Spur Center which consists of a center point and four spurs that penetrate into the end of the spindle to provide traction. When teaching beginning turners, some instructors prefer to use a Cup Drive instead of a spur drive. The cup drive has a center point inside a supporting cup, but no spurs. When turning with cup drive, if the tool begins to catch the wood, the cup drive acts similar to a clutch and allows the wood to slip. This stops the rotation of the wood rather than forcing the tool to dig in and tear the surface.



Cup Drive Centers

Ball bearing tail center

The Ball Bearing Tail Center supports the wood on the tailstock end of the lathe. The ball bearing action allows the tail center to rotate freely with the wood.

Before turning on the lathes

A short checklist will assure that students are ready to turn on the lathe:

- Eye protection on
- Blank properly mounted between centers: drive center point engaged in the end-grain
- Tailstock base firmly locked
- Tailstock ram not extended too far out, and live center pressed into the endgrain
- Tailstock ram locked
- Tool rest base locked firmly in position
- Tool rest set at proper height and distance from the wood to avoid contact

Ball Bearing Tail Center

Exercise blank mounted on lathe

Free rotation

Instruct students to spin the outboard hand-wheel with their left hand before turning on the lathe, just to confirm that the wood won't strike the tool rest. If this is always done before they turn the lathe on, they will avoid problems after re-positioning the tool rest.

On and off

Direct the students to practice starting and stopping the lathe a few times before actually taking any cuts. They should be able to find the switch and quickly stop the lathe in a matter of seconds. Teach them to listen for inappropriate or unusual sounds.

Spindle Roughing Gouge

Spindle Roughing Gouge (3/4")

The Spindle Roughing Gouge is the most efficient tool to remove the square corners from a spindle and to do rough shaping of gentle curves. The gouge bevel is typically ground rather flat across the cutting edge with a bevel angle of about 50 degrees. The tool handle is held low enough that when the handle is raised, the edge produces a peeling or planing cut which produces a relatively clean surface.

NOTE: The Spindle Roughing Gouge should only be used where the grain of the wood is parallel to the lathe bed.

Proper Tool Grip

The simple over-hand grip is the easiest for roughing gouge use:

- Right hand: grip near the end (butt) of the handle, thumb pointing forward and on the top
- Left hand: grasp the steel within the first few inches down from the cutting edge. The left hand should be in contact with the tool rest.

Note: Left-handers: reverse positioning

Left hand grip

Right hand grip

Stance

Proper stance and body mechanics are paramount in helping students progress. Feet should be placed about shoulder width apart and the body should be positioned to allow the turner to shift their body weight from one foot to another as they lean from side to side while making the cut. Student should be shown the proper method of flexible body movement and discouraged from simply moving their arms to follow the progression of the cut.

Roughing out
Your example is critical in setting not just the sequence and movements, but the pace as well, so move at the speed you would want a beginning turner to proceed. As the roughing process nears completion, teach students to check whether the flat sections have been removed. The safest method is to turn the lathe off and inspect the wood. A more efficient method is to gently place the underneath side of the tool shaft on top of the rotating wood and then feel and listen for flat sections contacting the tool.

Left: Using the spindle roughing gouge

Right: Checking for round

4 First work session: Guided practice; roughing stock with spindle roughing gouge

Parting Tools

5 Second demonstration: Laying out the exercises using a parting tool; feedback and questions

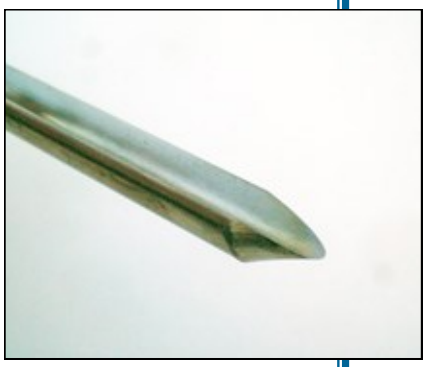
Show how to cut shoulders and set depth.

Parting Tool (1/8") The Parting Tool is a special purpose tool used primarily to produce square shoulders and to turn wood to a specified diameter. It is often used in conjunction with outside calipers when careful measuring is required. Parting tools are available in a variety of cross-section shapes. For general purposes, parting tools are relatively easy to control and usually produce a scraping cut. When making parting tool cuts deeper than 1/2”, the cut should be widened slightly to prevent the tool from binding.

6 **Second work session:**
Layout using the parting tool
Make a series of parting tool cuts about 3/4” apart and 3/8” deep.

7 **Third demonstration: Cutting beads with a 3/8" spindle gouge; feedback and questions**

Spindle Gouge



Spindle Gouge (3/8")
The 3/8" Spindle Gouge is a versatile tool used in turning most of the detail work desired on a spindle. It can also be used for turning details on bowls and other items. It is most useful for turning detail when the bevel is ground to a rather long angle of about 30 to 40 degrees and the sides are ground back forming a "fingernail" grind. However, it is easier to control if ground at about 45 degrees. The Spindle Gouge is used to turn beads, coves, tapers, shoulders, ogee curves, and various combinations of these shapes. When sharpened and used properly the spindle gouge will efficiently produce a clean cut.

“Every student should remember ‘the A B C’s’ - Anchor, Bevel, Cut.”

First Cuts: ABC’s
One recommendation is that you have every student remember “the A B C’s”: **A**nchor, **B**evel, **C**ut

- **Anchor** — set the tool firmly on the tool rest — explain that the forces of the cut must be taken by the tool rest in as direct a manner as possible.
- **Bevel** — instruct the students to always begin with the handle low, so that the bevel is the first part of the tool steel that contacts the spinning wood.
- **Cut** — slowly raise the handle until the edge engages the wood and begins to cut a shaving. Keep the handle as low as is possible while still producing a shaving.

Direction of Cut
When spindle turning, teach students to cut “downhill” from large diameter to small diameter.

Bevel Contact
Constantly bring their awareness to the importance of bevel contact. The bevel being in contact with the wood is what gives the turner control of the tool. When the bevel loses contact with the wood a catch is likely to occur.

Stance
Proper stance and body mechanics are paramount in helping students progress.

Demonstrate how to apply the above principles to cut beads.

8 **Third work session: Guided practice; cutting beads with a 3/8" spindle gouge**

9 **Fourth demonstration: Cutting coves with a 3/8" spindle gouge; feedback and questions**

Show how to use the 3/8” spindle gouge to cut coves by cutting from each side down to the center.

When starting the cove cut, be aware that the ABC rule will briefly be broken because the cutting edge will come into contact with the wood before the bevel. When this happens, there is a chance the tool will dig in and run backwards. Explain that this can be prevented by starting the cut with the gouge rolled on its side with the flute toward the center of the cove being cut. It also requires a little extra support from the hand that is holding the tool on the tool rest.

10 **Fourth work session: Guided practice; cutting coves with a 3/8" spindle gouge**

NOTE: Once the students have done all three exercises: rounding down the spindle blank with the roughing gouge, setting diameters with the parting tool, and rolling beads and coves with the spindle gouge; they will be ready to apply these cuts to the first project.

11 **Break**

12 **Fifth demonstration: First project (*select from project handouts*); feedback and questions**

13 **Fifth work session: Guided practice making the first project**

14 **Sixth demonstration: Second project (*if time allows*) (*select from project handouts*); feedback and questions**

15 **Sixth work session: Guided practice making the second project (*if time allows*)**

16 **Feedback and suggestions**

Clean up, goodbyes

Begin cleaning up by putting away wood, tools, and supplies. Then brush down the upper surfaces (lathes, tables, workbenches, etc.), and finally sweep the floor. Encourage students to wear safety glasses during clean-up.

It is not recommended that air hoses be used to blow off surfaces. However, if air hoses are used, take the following precautions:

- Safety nozzles must be attached to all air hoses
- Pressure should not exceed 30 psi
- Air must not be sprayed directly at any person
- Safety glasses must be worn

Encourage the students to take some time within the next few days to practice the basic cuts they have learned.

"Encourage the students to take some time within the next few days to practice the basic cuts they have learned."

Teaching Young Turners

Although the following suggestions are provided to help in teaching young children in particular, you will find that they apply to teaching children of all ages.

Since children have a short attention span and are interested in instant gratification, it is important that the instruction be brief so they can be on the lathe turning as soon as possible. It is also important that they experience success in a short period of time. It is more important that they have fun than produce a high quality project. However, with good instruction and appropriate project selection, young turners should be able to have success quickly making a simple useful project. Finishes should be simple and quick to apply. Paste wax, mineral oil, or friction polish work well.

Safety

Young children often have a heightened sense of invincibility, a limited sense of danger and a propensity toward horse play. Consequently, they will generally try things that more experienced adults wouldn't consider. As a result it is important to remove potential hazards and to give added emphasis to safety. It is of course essential that the instructor model all the safety behaviors you are trying to instill. It is also important to convey absolute respect for the sharpened end of tools.

"Use attached handouts to plan varied student projects:

Bead & Cove Stick,

Ball and Cup Game,

Stick Pen,

Wooden Egg,

Honey Dipper,

Ice Cream Scoop,

Combination Screwdriver,

Finger Spinning Top."

Project Selection

Projects should have child appeal. Items that are useful (such as the stick pen or ice cream scoop handle), or fun to play with (the spinning top or ball and cup game), are particularly good for young turners. Children also like to make projects they can give as gifts to friends or family. Small projects that require a minimum amount of wood to be removed are recommended. We have included procedure sheets for several projects that may be appropriate.

Simple Enhancements

It is easy to add simple decorations or a touch of color to a turning. After students have some basic experience, you may want to demonstrate how to enhance their projects with wire burn lines, colored pens and ink, or chatterwork.

Teaching Techniques

Most all children are good visual learners. Anything you can show them such as finished examples of projects, cutaways of projects showing a section view, and large wooden models of tools will help you communicate a lot of information in a short period of time.

Here is an old model that works well with individual kids:

Step 1: The instructor demonstrates the cut or process, explaining what, how and why as they do it.

Step 2: The student teaches back to the instructor what to do, how to do it, and why. If this is correct, the instructor again demonstrates the cut following the students' instructions (if wrong, go back to Step 1).

Step 3: The student tells the instructor what he/she is going to do, how, and why. If correct, the student makes the cut with the instructor watching (if wrong, go back to Step 2).

To help students connect turning to the world around them, ask them to identify items they see in everyday life that they think were probably turned on a lathe.

Sharpening and Drilling

Plan on sharpening the tools before each session and consider periodic honing to keep the tools sharp during the session. All sharpening is handled by the instructor. The instructor should also do all drilling operations until you are confident the student is ready to do this on their own. If students are using the drill press, safety instruction should be given to assure safe use.

Equipment and Accessories

Use of smaller lathes with lower horse power is highly recommended. For chucking purposes, it is preferable to use lathes with similar tapers in the headstock and tailstock and with common threads so that accessories can be interchanged between lathes if necessary. Teach the students to catch the centers when they use the knock-out bar. This prevents the points from being damaged when they hit the lathe bed or the floor. A belt drive has advantages over electronic variable speed since the instructor can fix the speed and it is less likely to be tampered or played with by the students.

The height of the lathe is a major consideration that is often overlooked when teaching children. The spindle should be at about elbow height. This may require some work to accomplish. There are two approaches to addressing this concern. The best approach is to adjust the lathe to be at the correct height of the child by using an adjustable stand (e.g. Jet mini lathe stand), cutting down the height of the stand, or adjusting the height of the table. The second method is to adjust the child to be at the correct height for the lathe. This can be done by standing the student on a wooden stage made from 2x4s and plywood, or even stacking of mats. If a platform is built up, it should be large enough to prevent the student from accidentally stepping off it during normal turning operations.

The lathe should be equipped with a headstock handwheel.

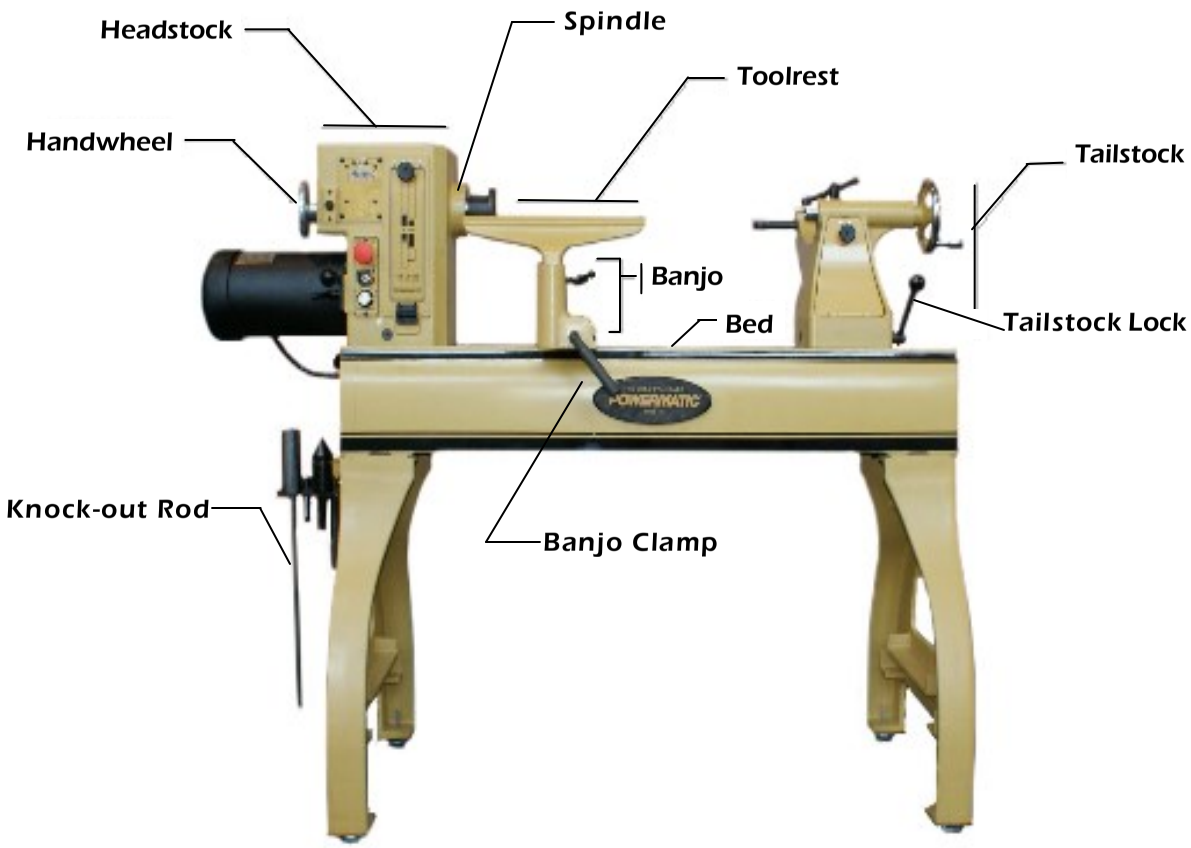
Some instructors prefer to use a dead center or cup drive in the headstock to drive center work rather than a spur drive. This allows the instructor to control the amount of drive based on the abilities and/or fear level of the young turner. If the turner is too aggressive with the tool, the wood simply stops spinning rather than cause a catch.

For small projects that need to be supported only at one end (such as a spinning top), secure the stock using a wooden Morse taper driven into the headstock rather than a scroll chuck. The Morse taper—turned from extra material on the project blank— can be as short as 1.5" in length. Use support from the tailstock as much as possible.

Although they are a little harder to find, there are full faceshields available for small heads (adjustable to small head sizes and only about 8" in length for the shielded area). These are preferred over goggles in order to offer full facial protection.

Two platforms are used to raise a young student to the proper turning height.

Underside of platform



HANDOUT

The Wood Lathe

1. As a minimum always wear safety goggles or safety glasses that include side protectors. Use a full faceshield for bowl, vessel or any turning involving chucks and faceplates.

2. Tie back long hair, do not wear gloves, and avoid loose clothing, jewelry or any dangling objects that may catch on rotating parts or accessories.

3. Always check the speed of the lathe before turning it on. Use slower speeds for larger diameters or rough pieces, and higher speeds for smaller diameters and pieces that are balanced. Always start a piece at a slower speed until the workpiece is balanced. If the lathe is shaking or vibrating, lower the speed. If the workpiece vibrates, always stop the machine to check the reason. As a starting point, consult your operator's manual for recommended speeds for a particular lathe.

4. Check that all locking devices on the tailstock and tool rest assembly (rest and base) are tight before operating the lathe.

5. Position the tool rest close to work, almost touching the wood. As wood is removed, turn off the lathe and re-position the rest.

6. Rotate your workpiece by hand to make sure it clears the toolrest and bed before turning the lathe "on." Be certain that the workpiece turns freely and is firmly mounted. A handwheel on the headstock simplifies this process of spinning the lathe by hand before turning on the switch.

7. Be aware of what turners call the "red zone" or "firing zone." This is the area directly behind and in front of the workpiece — the areas most likely for a piece to travel as it comes off the lathe. A good safety habit is to step out of this zone when turning on the lathe. When observing someone else turn stay out of this area.

8. Hold turning tools securely on the toolrest, holding the tool in a controlled and comfortable manner. The tool should always be in contact with the tool rest before contacting the wood with the tool.

9. It is safest to turn the lathe "off" before adjusting the tool rest or tool rest base (banjo).

10. Remove the toolrest before sanding or polishing operations.

11. Never leave the lathe running unattended. Turn power off. Don't leave the lathe until it comes to a complete stop.

NOTE: *These safety items have been selected from the 2007 revised safety guidelines of the American Association of Woodturners (available from the AAW or published in their annual directory). There are another 15 safety principles on the AAW list. You may wish to copy all 26 and give special attention to the above 11.*

HANDOUT

Safety

HANDOUT

How to Determine Safe Lathe Speeds

Appropriate lathe speed should allow the blanks to be turned with little or no vibration. Vibration is usually caused by the wood being unbalanced in weight, and is particularly common before the wood has been rough turned down to round. Low speeds are needed to reduce the vibration until the work becomes balanced, then speeds can be increased for more efficient turning.

Suggested lathe speeds for various diameters of spindle stock are given below. If there is a question regarding whether a lathe rpm is set too high, chances are it is. It is best to work on the side of caution. A slower lathe speed may require more time to remove the excess stock, but will allow for safer turning. Cutting principles remain constant regardless of lathe speed.

Suggested lathe speeds:

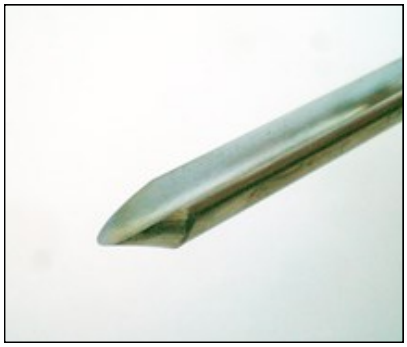
Diameter of Stock	**Lathe Speed**
1” or less	3,000 rpm
1.5”	2,500 rpm
2”	2,000 rpm
3”	1,500 rpm

Spindle Roughing Gouge (3/4")

The Spindle Roughing Gouge is the most efficient tool to remove the square corners from a spindle and to do rough shaping of gentle curves. The gouge bevel is typically ground rather flat across the cutting edge with a bevel angle of about a 50 degrees. The tool handle is held low enough to produce a peeling or planning cut when the handle is raised and the cutting edge contacts the workpiece. This produces a relatively clean surface. If the tool is held at 90 degrees to the wood the result will be a scraping cut which leaves a torn surface.

NOTE: The Spindle Roughing Gouge should not be use for turning bowls or other objects where the grain of the wood is not parallel to the lathe bed.

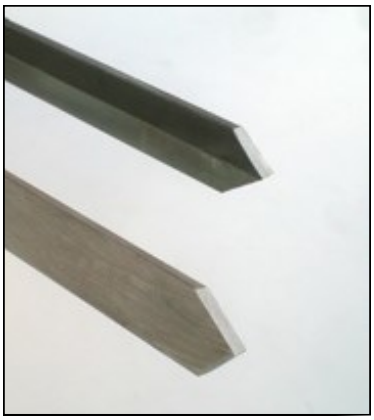
Spindle Gouge (3/8")



The 3/8" Spindle Gouge is a versatile tool used in turning most of the detail work desired on a spindle. It can also be used for turning details on bowls and other items. It is most useful when the bevel is ground to a rather long angle of about 40 degrees and the sides are ground back forming a "fingernail" grind. With this grind it can be used to turn fine details and work into tight corners. The Spindle Gouge is used to turn beads, coves, tapers, shoulders, ogee curves, and various combinations of these shapes. When sharpened and used properly the spindle gouge will efficiently produce a clean cut.

Parting Tool (1/8")

The Parting Tool is a special purpose tool used primarily to turn wood to a specified diameter. It is often used in conjunction with outside calipers when careful measuring is required. Parting tools are available in a variety of cross-section shapes. For general purposes, parting tools are relatively easy to control and usually produce a scraping cut. Each bevel on a parting tool is typically ground at about 30 degrees making the angle between the two bevels about 60 degrees.



HANDOUT

Tools & Accessories

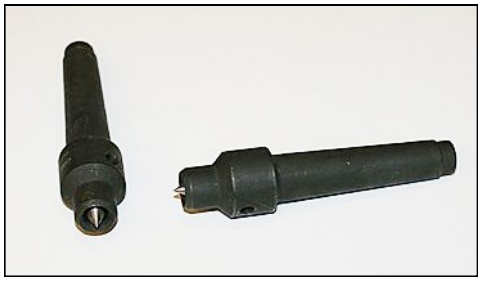
OVER

Tools & Accessories

Drive Center

The drive center is placed in the headstock and rotates with the lathe to drive the wood while turning. The most common type of drive center is the Spur Center which consists of a center point and four spurs that penetrate into the end of the spindle to provide traction. Some turners prefer a Cup Drive. The cup drive has a centerpoint inside a supporting cup, but no spurs. When turning with a cup drive, if the tool begins to catch the wood, the cup drive acts similar to a clutch and allows the wood to slip. This stops the rotation of the wood rather than force the tool to dig in and tear the surface.

Spur Drive Center



Cup Drive Center

Ball Bearing Tail Center

The Ball Bearing Tail Center supports the wood on the tailstock end of the lathe. The ball bearing action allows the tail center to rotate freely with the wood.

Ball Bearing Tail Center

Morse Taper

The drive center, tail center, and several other accessories are secured in the lathe using a morse taper. The taper on the end of the accessory (drive, center, tail center, etc.) matches the taper on the inside of the headstock and tailstock. The fit between the accessory and lathe is a friction fit. These accessories are usually removed simply by tapping on them with a knock-out rod that is fed through the end of the headstock or tailstock. When removing an accessory that is secured in a morse taper, hold onto the accessory while tapping with the knockout rod so the accessory does not drop and hit the lathe bed or the floor.

Brief Description of the Project and/or Project Strengths:

- This is an exercise intended to help develop tool-handling skills with the spindle gouge prior to using the techniques on the projects.
- Turn the largest cylinder possible from the blank to start, next cut the beads, then turn the beads into coves. Rough the blank down to a smaller cylinder and repeat the exercise.

Estimated Time for Instruction:

- 10 to 15 minutes

Estimated Time for Participants to Complete:

- 15 to 30 minutes — can be repeated if time allows

Project Materials Needed for Each Participant:

- 1.75" x 1.75" x 9" straight grained wood

Tools and Accessories Needed for Each Participant:

- Drive center
- Ball-bearing tail center
- 3/4" spindle roughing gouge
- 3/8" spindle gouge
- Parting tool

Procedure for Making the Project:

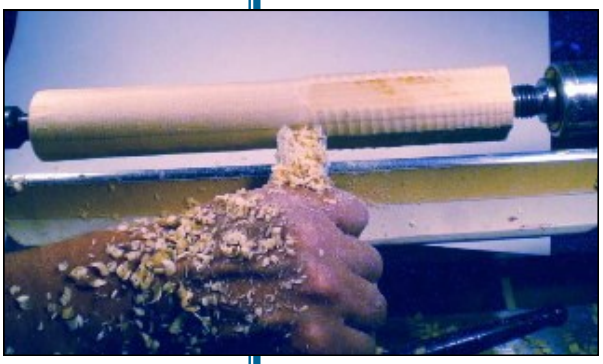
1. **Mount the turning blank on the lathe**
   Use a drive center in the headstock and a ball bearing tail center in the tailstock.

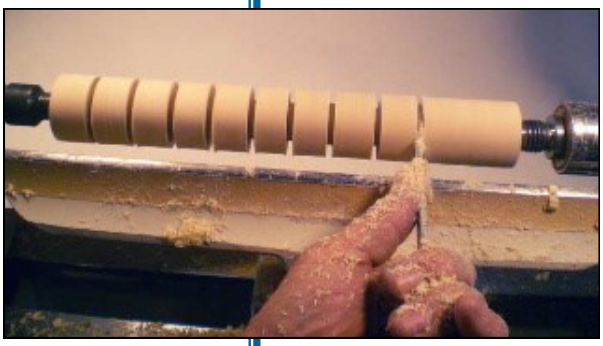
2. **Remove the square corners using a 3/4" spindle roughing gouge.**

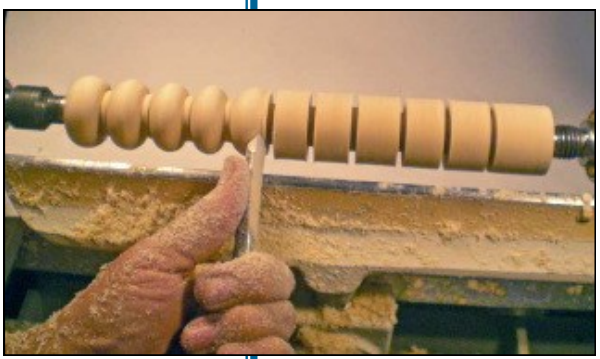
3. **Layout the beads using a parting tool.**
   Lay out the width of several beads down the length of the round turning blank. First use the parting tool to set the small diameters at the ends of the beads. This makes it easier to round over the corner from large diameter to smaller with the spindle gouge. It also reduces the tendency for the wing of the gouge to be scraping into the end-grain of the wood.

HANDOUT

Bead & Cove Stick







OVER

Bead & Cove Stick

4. Cut the beads using a 3/8” spindle gouge

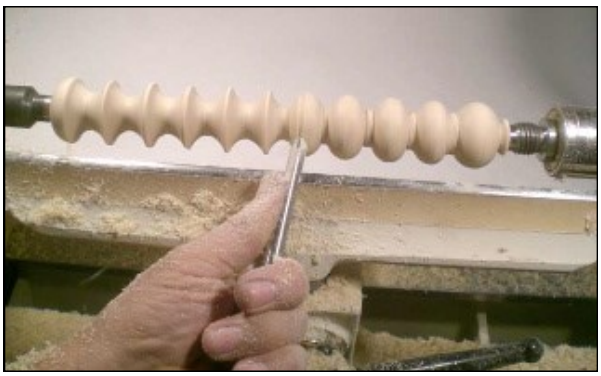
Pay attention to the position of the tool at the start of the cut (large diameter of the bead, gouge bevel rubbing, wing engaged in the cut), and then at the outside of the bead (small diameter, gouge flute rolled over to the side, tool nearly perpendicular to the lathe axis and parallel to the floor).

5. Cut the coves using a 3/8” spindle gouge

Pay particular attention to the starting and ending position. These are similar to the positions used on the beads but reversed: the tool entry position for the cove is at the large diameter with the flute rotated to the side, and it finishes the cut with flute up at the lowest diameter.

If using the overhand grip, have the heel of the upper hand in contact with the tool rest so that the base of the little finger can help prevent the gouge from running back. If using the index-finger-under-the-tool-rest grip the thumb provides the same sort of backing for the gouge.

Overhand Grip



Underhand Grip

Brief Description of the Project and/or Project Strengths:
- Fun to make and fun to use
- Inexpensive
- Good introduction for use of spindle roughing gouge and 3/8" spindle gouge
- A particularly good project for children

Suggestions for Simple Decoration:
- Coloring with markers or dyes
- Decorating with wire burners

Estimated Time for Instruction:
- 20 to 30 minutes

Estimated Time for Participants to Complete:
- 40 to 60 minutes

Project Materials Needed for Each Participant:
- 1.75" x 1.75" x 9" straight grained wood
- String approximately 18" long
- 1" wood ball (available at most craft stores)

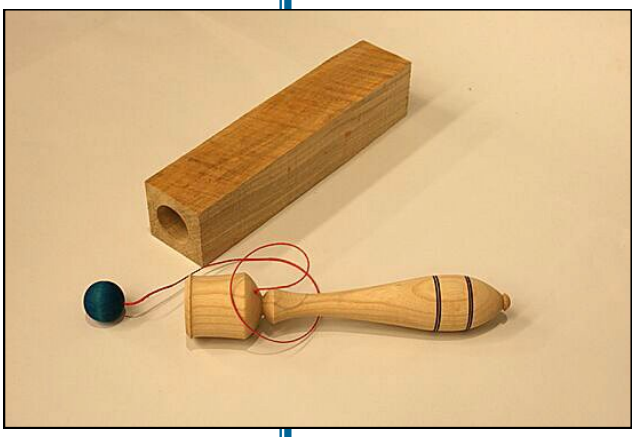
Tools and Accessories Needed for Each Participant:
- Drive center
- Ball-bearing tail center
- 3/4" spindle roughing gouge
- 3/8" spindle gouge

Materials and Accessories Needed for Use by the Group:
- 3/32" drill bit
- Thick CA glue
- Cordless or electric drill
- Toothpick or stiff paper clip
- Abrasive paper in various grits
- Finish, such as friction polish or oil
- Finish rag

Advanced Preparation Needed by the Instructor:
- Prepare the turning blanks by cutting straight grained wood 1.75" x 1.75" x approximately 9" long. Using a 1.25" Forstner bit drill a hole in one end that is 1.25" deep. (The easiest and safest way to do this is on a drill press, but it can also be done on the a lathe. If done on the lathe, mount the blank in a scroll chuck and the drill bit in a drill chuck in the tailstock. Advance the rotating wood into the drill bit.)

HANDOUT

Ball & Cup Game



OVER

Ball & Cup Game

Procedure for Making the Project:

1. Mount the turning blank on the lathe. Use a drive center in the headstock centered in the bottom of the drilled hole. Use a ball bearing tail center in the tailstock.

2. Remove the square corners. Use a 3/4" spindle roughing gouge. A peeling or planing cut works well for this.

3. Shape the spindle as desired. Rough shaping can be done with the spindle roughing gouge. Finish shaping and detailing should be done with the 3/8' spindle gouge. Take care to not cut into the drilled hole.

4. Sand and apply finish to the spindle as desired. The first coat of finish should be applied while the lathe is stopped.

5. Drill the holes for the strings. Lock the spindle in place and drill a 3/32" diameter hole about 1/4" deep near the base of the cup. Also drill a 3/32" diameter hole about 1/4" deep in the 1" wood ball.

6. Remove the spindle from the lathe. Hand sand each end of the spindle as needed.

7. Glue the ends of the string into the spindle and the ball. Using a toothpick or the end of a stiff paper clip, apply a small amount of thick CA glue into the 3/32" diameter hole in the spindle. Then fold over about 1/4" of the end of the string and use the toothpick to press the string firmly into the bottom of the hole. Allow the glue to cure for 3-5 minutes. Repeat this process to secure the string into the ball.

8. Have some fun. Your custom turned Ball and Cup Game is ready to be enjoyed.

Brief Description of the Project and/or Project Strengths:
- Useful project
- Very inexpensive

Suggestions for Simple Decoration:
- Coloring with markers or dyes
- Decorating with wire burners

Estimated Time for Instruction:
- 10-15 minutes

Estimated Time for Participants to Complete:
- 20 to 30 minutes

Project Materials Needed for Each Participant:
- 5/8" x 5/8" x 7" straight grained wood
- Bic ballpoint pen

Materials and Accessories Needed for Each Participant:
- 5/32" drill bit
- Cordless or electric drill
- Drive center
- Ball-bearing tail center with cone point
- 3/8" spindle gouge
- Abrasive paper in various grits
- Finish, such as, friction polish or oil
- Finish rag

Advanced Preparation Needed by the Instructor:
- Prepare the turning blanks by cutting straight grained wood 5/8" x 5/8" x 7" long. Using a 5/32" bit drill a hole in one end that is at least 2" deep. (The easiest way to do this is on a drill press, but it can also be done on the a lathe. If done on the lathe, mount the drill bit in a drill chuck in the headstock, then center the blank on the tailstock and advance the blank into the rotating bit. Also, using a bandsaw or handsaw, make saw cuts for the spurs of the drive center to seat into.)

HANDOUT

Stick Pen

OVER

Stick Pen

Procedure

1. **Mount the turning blank on the lathe.** Use a drive center in the headstock centered on the blank with the spurs seated in the saw cuts. With the cone point tail center in the drilled hole, apply light pressure with the tailstock.

NOTE: Another method of mounting the blank is to put a drill chuck in the headstock with a 5/32" metal rod secured in the drill chuck. The metal rod should be long enough to bottom out in the drilled hole and allow about 1/4" of clearance between the end of the pen blank and the drill chuck. A ball-bearing tail center is used in the tailstock. This chucking method reduces the possibility of splitting the pen blank due to excess pressure between the centers.

2. Remove the square corners. Use a 3/8" spindle gouge. A peeling or planing cut works well for this.

3. Shape the spindle as desired. Shape the pen as desired. Shaping and detailing can also be done with the 3/8" spindle gouge. Light cuts work best.

4. Sand the apply finish to the spindle.

5. Remove the spindle from the lathe. Hand sand each end of the spindle as needed.

6. Insert the Bic cartridge into the pen. If the drilled hole is not as deep as the length of the cartridge, simply cut off the cartridge to fit inside the hole.

7. Enjoy your simple but beautifully turned pen.

Brief Description of the Project and/or Project Strengths:

- Inexpensive
- Good introduction for use of basic spindle turning tools
- Good for training the eye to see the classic egg shape
- A challenging project to do well, better for adults than children

Suggestions for Simple Decoration:

- Coloring with markers or dyes

Estimated Time for Instruction:

- 10 to 15 minutes

Estimated Time for Participants to Complete:

- 20 to 30 minutes

Project Materials Needed for Each Participant:

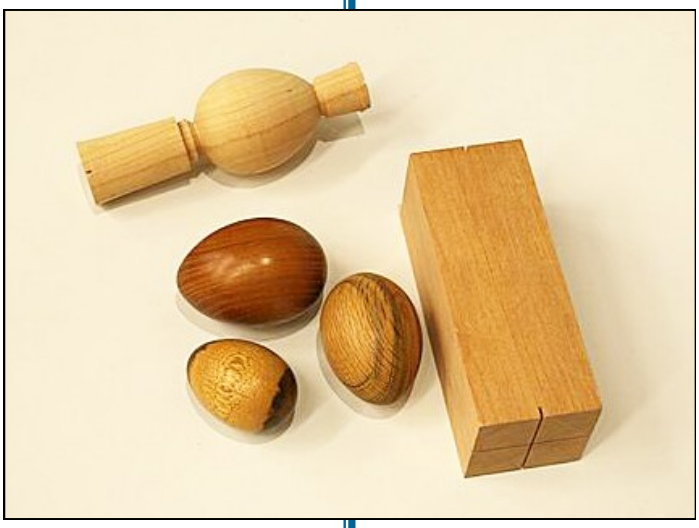
- 2" x 2" x 3.5" straight grained wood

Materials and Accessories Needed for Each Participant:

- Drive center
- Ball-bearing tail center
- 3/4" spindle roughing gouge
- 3/8" spindle gouge
- Abrasive paper in various grits
- Finish such as friction polish or oil
- Finish rag

Advanced Preparation Needed by the Instructor:

- Prepare the turning blanks by cutting straight grained wood approximately 2" x 2" x 3.5" long.



HANDOUT

Wooden Egg

OVER

Wooden Egg

Procedure

1. Mount the turning blank on the lathe. Use a drive center in the headstock and a ball-bearing tail center in the tailstock.

2. Remove the square corners. Use a 3/4" spindle roughing gouge. A peeling or planing cut works well for this.

3. Shape the spindle as desired. Rough shaping can be done with the 3/4" spindle roughing gouge. Finish shaping should be done with the 3/8' spindle gouge. Work close to each end of the egg but leave about 1/4" diameter of wood for support during sanding and finishing.

4. Sand the apply finish to the egg.

6. Remove the spindle from the lathe. Turn the wood at each end of the egg to about 1/8" diameter and about 1/4" long, then remove the egg from the lathe. Break off the waste wood on each end or cut it off with a small hand saw.

7. Sand and finish the ends of the egg. Hand sand each end of the egg and apply finish as needed.

8. Admire your turned wooden egg. It can be the beginning of the a great collection of turned eggs.

HANDOUT

Honey Dipper

Brief Description and/or Project Strengths:
- Very inexpensive
- Good practice for controlled use of the parting tool

Suggestions for Simple Decoration:
- Decorating with wire burners
- Coloring with dyes and markers

Estimated Time for Instruction:
- 15-20 minutes

Estimated Time for Participants to Complete:
- 20-30 minutes

Project Materials Needed for Each Participant:
- 1"x1"x7" straight grained wood (cherry, maple)

Tools and Accessories Needed for Each Participant:
- Drive center
- Ball-bearing tail center
- 3/4" spindle roughing gouge
- 3/8" spindle gouge
- 1/2" parting tool

Materials and Accessories Needed for Use by the Group:
- Abrasive paper in various grits
- Mineral oil
- Finish rag

Advanced Preparation Needed by the Instructor:
- Prepare the turning blanks by cutting straight grained wood 1" x 1" x approximately 7" long.

OVER

Honey Dipper

Procedure for Making the Project:

1. Mount the turning blank on the lathe. Use a drive center in the headstock and a ball-bearing tail center in the tailstock.

2. Remove the square corners. Use a 3/4" spindle roughing gouge. A peeling or planing cut works well for this.

3. Shape the spindle as desired. Use the 3/8' spindle gouge. Pay particular attention to the shape at the handle end and dipper end.

4. Cut evenly spaced slots in the dipper end. Use a narrow parting tool. Leave a center core of about 5/6" diameter.

5. Add wire burn lines or other decoration if desired.

6. Reduce the diameter at both ends to about 1/8". A parting tool works well for this.

7. Sand the apply finish to the spindle as desired. The mineral oil finish should be applied while the lathe is stopped. Additional coats should be added after the project has been removed from the lathe.

8. Remove the spindle from the lathe. Finish parting off and hand sand each end.

Brief Description of the Project and/or Project Strengths:

- Fun to make and fun to use
- Inexpensive
- This is a simple handle into which is inserted the metal part of the scoop

Suggestions for Simple Decoration:

- Decorating with wire burners

Estimated Time for Instruction:

- 15 to 20 minutes

Estimated Time for Participants to Complete:

- 20 to 30 minutes

Project Materials Needed for Each Participant:

- An inexpensive plastic handled ice cream scoop. These are usually available at Target, Wal-Mart or similar stores and are usually under $3.
- 2"x2"x5" dry straight grain wood like cherry or walnut

Tools and Accessories Needed for Each Participant:

- Jacobs chuck with 3/8” bit (this size may vary depending on the tang size of the scoop)
- Drive center
- 3/4” spindle roughing gouge
- Parting tool
- 3/8” spindle gouge
- Ruler (6” or 12”)
- Pencil or awl
- Small handsaw (such as a coping or Japanese pull saw)
- Ice cream and ice cream cones

Materials and Accessories Needed for Use by the Group:

- Epoxy
- Sandpaper in assorted grits
- Walnut oil or mineral oil finish
- Finish rag

Advanced Preparation Needed by the Instructor:

- Take the purchased ice cream scoop and break the plastic handle off. This is best done with a hammer, laying the scoop on a firm surface and giving it a sharp rap with the hammer.

HANDOUT

Ice Cream Scoop Handle

OVER

Ice Cream Scoop Handle

Procedure for Making the Project:

1. Have the student **mark the centers** of the block of wood using a ruler and pencil or awl.

2. Mount the turning blank on the lathe. Use a drive center in the headstock and use a ball-bearing tail center in the tailstock.

3. Remove the square corners. Use a 3/4" spindle roughing gouge. A peeling or planing cut works well for this.

4. Shape the handle as desired. Rough shaping can be done with the 3/4" spindle roughing gouge. Finish shaping and detailing should be done with the 3/8' spindle gouge.

5. Sand the apply finish to the spindle as desired. The first coat of finish should be applied while the lathe is stopped.

5. Drill the hole for the ice cream scoop. Place the Jacobs style chuck in the headstock with the appropriate bit. Position the wood with one end against the bit, the other held with the tailstock. Run the lathe at a moderate to slow speed (under 700 rpm). Drilling commences when you grip the spinning handle and rotate the tail-stock handwheel. If working with kids, the instructor should do the drilling. If working with a more experienced student, the instructor may do the drilling with the student (one grips the piece while the other cranks the handwheel).

6. Remove the spindle from the lathe and with a small handsaw cut off the waste area. Hand sand as needed.

7. Glue the ice cream scoop into the turned handle. Mix about a tablespoon of epoxy and place it down into the opening of the handle. Insert the tang into the hole, being sure to bring the shoulder of the scoop flush against the wood. Set the handle aside in an upright position for the epoxy to dry.

8. After the epoxy has set, **apply an oil finish**.

9. After the epoxy has had sufficient time to cure, **dip yourself a refreshing scoop if ice cream**.

Brief Description of the Project and/or Project Strengths:

- A very useful project
- A bit more challenging as it requires fitting a metal ferrule

Suggestions for Simple Decoration:

- Decorating with wire burners

Estimated Time for Instruction:

- 20 to 30 minutes

Estimated Time for Participants to Complete:

- 30 to 50 minutes

Project Materials Needed for Each Participant:

- Purchase a 6-in-1 combination screwdriver with plastic handle OR one of the available commercial kits (such as the Rockler kit, available at 1-800-279-4441 or www.rockler.com)
- If using the plastic handled screwdriver as the source, you will need a metal ferrule. A 1" copper coupling, cut in half to create two ferrules works well.
- 2" x 2" x 5" dry, straight grained hardwood (cherry, maple, ash, walnut)

Tools and Accessories Needed for Each Participant:

- Drive center
- Ball-bearing tail center
- 3/4" spindle roughing gouge
- 3/8" spindle gouge
- Parting tool
- Jacobs style chuck
- 5/8" and 7/16" drill bits (these sizes will vary if you cut apart a purchased screwdriver)
- 6" or 12" ruler
- Pencil or awl

Materials and Accessories Needed for Use by the Group:

- Epoxy
- Small handsaw (coping or Japanese pull saw)
- Abrasive paper in various grits
- Finish such as tung oil, walnut oil, or mineral oil
- Finish rag

Advanced Preparation Needed by the Instructor:

- If you are using a purchased screwdriver, place the handle in a vise and saw out the metal insert. This can be done easily done with a hacksaw. Cut on all four sides, then pull out the insert with pliers.
- To ensure that the metal inserts are well centered you will need to drill a pilot hole. Measure the diameter of the insert (it is 5/8" for the Rockler kit) and either drill, freehand with an electric power drill or on a drill press, to a depth of approximately 1". Some turners prefer to do the entire drilling first—either at the drill press or on the lathe. In teaching, you will probably want to bring pre-drilled blanks to the class.

HANDOUT

Combination Screwdriver

OVER

Combination Screwdriver

- Use a live center with a cone center to go inside of the drilled hole, or simply turn a wood "cork" to fit the hole. (This is a tapered plug about 1" in length, smaller than the hole at one end and larger at the other.)

Procedure for Making the Project:

1. Mount the turning blank on the lathe. The end with the drilled hole should be toward the tailstock. Use a drive center in the headstock centered in the bottom of the drilled hole. Use a ball bearing cone center in the tailstock.

2. Remove the square corners. Use a 3/4" spindle roughing gouge. A peeling or planing cut works well for this.

3. Fit the ferrule. The first critical turning step is to fit the ferrule. Use a parting tool to establish the diameter and length needed for the ferrule. Use a second ferrule to drive the piece onto the wood. (Ideally it should be a friction fit, but if a student slightly undersizes the wood, you can glue the ferrule on with epoxy.)

4. Establish the critical dimensions. First, if using the kit, leave plenty of wood in the metal insert region that holds the shaft and bits (about 1.5" in length). Measure the length of the shaft with attached bit that will go into the handle. This will determine a minimum length of the overall handle (for the kit, it is 4").

5. Shape the spindle as desired. With the critical dimensions in mind, shape the handle. Encourage a discussion and even a drawing of a proposed shape with the students. Rough shaping can be done with the 3/4" spindle roughing gouge. Finish shaping and detailing should be done with the 3/8' spindle gouge.

6. Sand the spindle as needed.

7. Additional drilling. If further drilling is required, mount the Jacobs style chuck in the headstock and complete the drilling. Either drill the 5/8" the entire depth (about 4") or only for the length of the metal insert (1 9/16") and the remaining depth with a 7/16" bit. Be especially mindful of drilling accurately, especially for the area that will hold the metal insert.

6. Remove the spindle from the lathe and cut off the waste material on the end of the handle. Hand sand the end of the spindle as needed.

7. Epoxy the metal insert into the opening. Place a light coating of epoxy evenly inside the hole to a depth of about 1". If using the kit be sure the two grooves (that accept the shaft with bits) are pointing outwards of the hole. You might find it necessary to run the 7/16" bit through the inside of the insert to remove any glue and to be sure the shaft and bit with go easily into the handle.

8. Apply the finish of your choice. Tung oil or walnut oil work well.

9. Once the epoxy has set your screwdriver is ready to use.

Brief Description of the Project and/or Project Strengths:
- An easy, quick project
- Requires minimal tooling
- Fun to use
- Inexpensive, requiring very little wood

Suggestions for Simple Decoration:
- Decorating with wire burners
- Coloring with dyes and markers

Estimated Time for Instruction:
- 10 to 15 minutes

Estimated Time for Participants to Complete:
- 15 to 25 minutes

Project Materials Needed for Each Participant:
- 1.5" x 1.5" x 5" dry hardwood cut with parallel ends

Tools and Accessories Needed for Each Participant:
- Drive center
- Ball-bearing tail center
- 3/4" spindle roughing gouge
- 3/8" spindle gouge
- Parting tool

Materials and Accessories Needed for Use by the Group:
- Center punch
- Mallet
- Abrasive paper in various grits
- Friction polish
- Finish rag

Advanced Preparation Needed by the Instructor:
- Prepare the turning blanks by cutting straight grained wood 1.5" x 1.5" x approximately 5" long.

Procedure

1. Mount the turning blank on the lathe. Draw diagonal lines across the ends of block to find the center, then mark the center with a punch. Mount the wood between the drive center in the headstock and a ball bearing tail center in the tailstock.

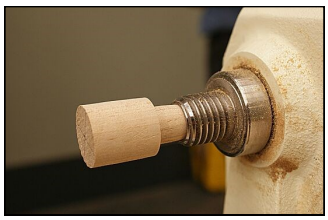
2. Remove the square corners. Set the lathe speed at about 1500 RPM. Starting approximately 2" from tailstock, and using a spindle roughing gouge, rough turn the blank into a cylinder shape. Move the spindle roughing gouge towards the tailstock. Make sure you explain the reason for the direction of cut and placement of tool rest. The tool rest should allow roughing gouge to cut slightly above center.

HANDOUT

Finger Spinning Top

OVER

Finger Spinning Top



Spinning top blank with turned Morse taper secured in headstock

Alternative chucking method — turning block glued to waste wood which is attached to the faceplate

3. Layout the sections of the top. While the lathe is running, mark a pencil line on the cylinder approximately ¾ inch from tailstock end.

4. Turn a Morse taper to fit in the headstock. Using a Morse taper drive center as a guide, shape a taper from the line on the tail-stock end of the blank to the headstock end. This taper should match the Morse taper used in headstock. This can be done easily by trial and error, or use calipers for measurements and a parting tool. When the taper is formed check the fit into headstock spindle. It should fit snug with at least ½ inch of contact into spindle.

5. Mount the top blank for final turning. Bring the tailstock forward and align the live center with the center point of the blank. Knock out the drive center from headstock spindle and snug the taper of the cylinder into the spindle. Back off the tailstock and give a few quick raps with a mallet to better secure the block. Turn on lathe and check for trueness of cylinder, re-cut true cylinder if needed. Next, mark a line on cylinder ½" up from tailstock end.

NOTE: An alternative method for holding small projects is to use a faceplate with a glue block attached. Workpieces can be fastened to the glue block with CA glue or regular wood glue. This can be safer than a chuck and sometimes more secure. The tailstock may be brought up for extra support.

6. Form the base of the top. Using the spindle roughing gouge make downhill cuts to rough form base of the top.

7. Turn the handle. Mark a pencil line ⅜" above the tapered base. Using a ⅜"spindle gouge cut downhill toward the headstock and form a vee groove to ¼" diameter. Mark a pencil line 1” above the groove and using a spindle roughing gouge tilted slightly toward tailstock, cut a tapered handle to intersect the v groove. Continue to taper this handle until you have a pleasing proportion to the tapered base of the spinning top.

8. Make the finish cuts and forming the tip. Cut a slight crown on top of the handle. Back off the tailstock and using light cuts with 3/8 spindle gouge form a sharp point on the end of the base. The angle to this cut may be 45 degrees or greater. This is the tip which the top spins on.

9. Sanding the top as needed. Sand any sharp edges or round over any desired surfaces except the very tip of the base.

10. Apply the finish. Friction polish applied while the lathe is rotating works well.

11. Remove the top from the lathe. Separate the top from block using a pull saw and sand off any nub, or separate it using a 3/8 inch spindle gouge.

12. Give it a spin. The top should be ready to use.