

# ***TURNstyles***

## ***The History and Art of Wood Turning***



A R T M O B I L E

Traveling throughout Bucks County  
September 1997 - June 1998

**Artmobile** is the outreach museum of the Division of the Arts at Bucks County Community College. A portion of Artmobile's general operating funds for this fiscal year has been provided through a grant from the **Institute of Museum Services**, a Federal agency that offers general operating support to the nation's museums. *TURNstyles: The History and Art of Wood Turning* is supported in part by a grant from the **Pennsylvania Council on the Arts**.

**This manual** was devised to help teachers incorporate the Artmobile experience into their curricula by providing background information and classroom activities related to the exhibition. It is intended to serve as a resource both in conjunction with and apart from the exhibition.

**Artmobile** is celebrating its twenty-first year of bringing the arts to the school children and adults of Bucks County through its visits to schools and public sites. For more information about Artmobile and its programs, please call 215/968-8432.

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Kathleen Carriere and Dana Weinberg, our Artmobile Guides for this tour. These two will delight all who visit *TURNstyles* with their impassioned joy of art and their warmth. Artmobile relies on our guides to interpret each exhibition in a developmentally appropriate manner. They must connect with each child for them to apperceive our exhibit.

Planning and developing *TURNstyles* has been a joy for me. I have the warmest regard for all the wood turners I have been privileged to meet. In my experience, turners are a unique group of artists who enthusiastically give and then give some more!

**Carol Partlow-Fyock**  
**Interim Director of Artmobile/Artmobile Guide**

It is my pleasure to thank Albert LeCoff and The Wood Turning Center for their participation in this exciting collaboration with Artmobile. His knowledge and love of the medium is matched only by his enthusiasm for sharing both with adults and young people and his generosity toward this exhibition.

I would also like to thank Dave Hardy for generously giving of his time and expertise to train our Guides and myself how to “make chips” at the lathe. I hope that he found some reward in our faces as we began to taste the joy of wood turning.

Finally, I owe a great debt of gratitude to Carol Partlow-Fyock, who served as Interim Artmobile Director during my maternity leave this year. She did a remarkable job curating *TURNstyles* and writing this teacher’s manual. Her hard work kept Artmobile running smoothly and allowed me the luxury of time with my family. For that, I will be forever grateful.

**Fran Orlando**  
**Director of Exhibitions/Artmobile**  
**Bucks County Community College**  
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## WOOD TURNING: AN OVERVIEW

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This overview is for those not familiar with wood turning. It answers some questions that children might ask in a classroom discussion. Questions like: What is wood turning? When did it begin? Is wood turning a craft or an art? What is the history of wood turning in Pennsylvania and Bucks County? Can children turn wood or is turning only for adults? Is wood turning compatible with conserving trees and forests?

### **What is wood turning? When did it begin? Is wood turning a craft or an art?**

Originally, all wood was shaped by hand. Wood turning began as a craft as early as the 8th century B.C., and is a process used to shape wood while it rotates on a lathe. The bow lathe is believed to have been invented in Egypt around 740 B.C. The bow lathe supported the wood being worked between two pointed pieces of wood. The bow string made one loop around this wood. While the turner moved the bow forward and backward with one hand, the work rotated in opposite directions. It is believed that the cutting tool was applied only when the piece rotated toward the turner.

The spring-pole lathe is another type of lathe that was used by the ancient Egyptians. It was used by turners around the world until the 18th century and is still used by some turners today. A rope was fastened to the end of a tree branch. The rope extended downward, made one turn around the work-piece and the lower end was tied to a loop to serve as a foot treadle. When the turner pressed down on the rope around his foot, the wood rotated. When the turner released his foot pressure, the tree branch pulled the rope up again and reversed the rotation. The cutting tool was used only when the wood rotated toward the turner. The spring-pole was an improvement over the bow lathe as the turner had both hands free to use during turning. Lathes were operated by hand or foot power or by water wheel until the Industrial Revolution when motors were used to power lathes and machines could be made to shape as well as turn the wood. Lathes can be used to turn materials other than wood such as metal, ivory, bone, plastic, coal, soapstone, marble, jade, rubber and ice.

A modern wood lathe is operated much like a horizontal potter's wheel. The raw wood is attached either to the left end of the lathe, usually the source of power, or to both the left and right ends. As the lathe is turning, the raw wood spins, and material is gradually carved away with the sharp tool. Common tools are gouges, scrapers, parting tools, and skewers.

Since the lathe was invented, craftspeople and artists have used it to create a variety of things. Early objects were often functional kitchen ware like bowls, vessels, goblets and plates. Turning expanded to create decorative elements for furniture and buildings, i.e. spindles for chairs, balusters for railings and staircases, and columns for porches.

At the end of the 20th century, lathe-turned art became part of the Craft Art Movement. Craft artists used the lathe to create non-functional, sculptural

pieces with varied shapes and ornamented surfaces. These works allow the artist to express their feelings about life and their expertise in turning wood. Michelle Holzapfel, turner, has said of turning: “It is made with my hands and for my hands. It is my continuing effort to integrate the unique sensibilities of the body and the mind.” Turning, once a utilitarian endeavor, has become a forum to explore diverse woods and their beautiful grains as a basis for art.

Lively classroom discussions and/or essays could be created from exploring the questions: What is art? How does a craft become art? Dave Hardy, a Bucks County woodturner, has joked: “If it can’t hold soup, it’s art!”

Master craftsman Robert Whitley reflects on turning: “Turning the spindles is a rhythmic discipline. As the pieces turn, they hum. I listen to the sound of the wood as it spins. When my tools are sharpened just right, it’s much like playing a song. One after another, playing exactly the same tune, they all come out the same. It is only in hearing the music of the lathes that uniformity is achieved. Many approach the tool as a machine, attempting to achieve machine-like tolerances. I follow the rhythm, the melody and the mood of the tools, the woods, and the great machine itself. Bringing all these elements together creates a harmony in rapport with the materials.”

Turning requires a knowledge of woods, design, lathe operation, and mathematics. George Radeschi explains the mathematics of his turning in this way, “Each turning is made with hundreds of pieces of various woods, each precisely measured and carefully cut to form a pattern . . . To make each one-of-a-kind vessel, I apply skills in design, mathematics, woodworking, joinery, and finishing.”

### **What is the history of wood turning in Pennsylvania and Bucks County?**

European traditions of wood turning traveled to the New World as the colonies were settled. In Europe, wood turning was an apprenticeship characterized by formal training with a master wood turner. Wood turners from Germany and the British Isles settled in Pennsylvania.

In Pennsylvania, early wood turners made spinning wheels, slat chairs, Windsor chairs, toys, and various household items by hand. These turners lost much of their trade as the machines and automated lathes of the Industrial Revolution claimed much turning business.

Still operating in Philadelphia, is the John Grass Wood Turning Company founded in 1863 located on North Second Street. The shop makes flag poles, balusters for stairways, rolling pins, night sticks, crash sticks and household items. Look for the photographs and an architectural drawing of the John Grass Wood Turning Company in Artmobile.

Bucks County is the birth place of the Wood Turning Center of Philadelphia. During discussions at turning symposiums hosted by the George School, Palmer Sharpless, who taught at the George School, along

with Albert LeCoff and others, conceived of the Wood Turning Center as a non-profit arts institution dedicated to developing the art and craft of the lathe-turned object.

Bucks County Community College has integrated lathe turning into its fine woodworking program and hosts the Bucks Woodturners. Many Bucks Woodturners have generously donated items and provided expertise to our exhibition. The Bucks Woodturners meet at the Wood Shop in the Hicks Art Center at Bucks County Community College on the third Monday of even months. If you are interested in attending a meeting, please call Matt Haist at 215-357-8017 for more information.

### **Can children turn wood or is turning only for adults?**

Children love to turn wood! The Wood Turning Center's residency programs have taught children as young as eight to turn. Children have turned honey dippers, keychain fobs, and ornaments after learning the basics of turning and the safe operation of a lathe. The Wood Turning Center provides lathes and instructors when they bring their residency program to schools. For more information about the Wood Turning Center's residency programs, call Albert LeCoff at 215-844-2188.

### **Is wood turning compatible with conserving trees and forests?**

Children might question the ecological implications of cutting trees for turning. Such concerns can be laid to rest when they learn how turners obtain their wood. Turners often use wood from local trees that have been cut down by tree services. Homeowners often need to have overgrown or diseased trees removed. This wood is often referred to as "found wood." For example, this summer a beautiful old beech tree became diseased in Newtown, PA and was cut down so that it would not fall down on surrounding houses during a storm. The wood was harvested and some was given to local turners. Turners often like to use wood that is diseased. The bugs create wonderful patterns in the wood!

One of the most interesting pieces we have in *TURNstyles* is made of "found wood" from a peat bog in Ireland. It lay buried in the bog for almost 5,000 years. It was turned wet from the bog into a plate. As it dried, it shrunk from its original round shape to an irregular oval shape.

Most turners use very little wood from tropical rain forests. As children will discover, the majority of the woods presented in *TURNstyles* come from trees commonly grown in Pennsylvania. Varieties of maple, birch, oak, beech, walnut, cherry, yellow wood, osage orange, dogwood, apple, plum, pear, hemlock, pine are often used in wood turning. The woody branches of shrubs can also be turned. Lilac, box wood, grape vine, and even poison ivy can be used in turning!

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## ABOUT THE EXHIBITION

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In designing *TURNstyles* we have kept in mind that our primary audience is children. To make the exhibit meaningful to them, we present wood turning as part of their life. Once that connection is made, children are better able to explore wood turning as craft and art. We begin our exhibit with exploring every day turned objects. We continue with what a lathe is and how it works, how turning has evolved through the ages, historical wood turning in Pennsylvania, turning of toys, turning of musical instruments, what woods are used and where they come from, and finally explore turning as art.

So what do children know about wood turning? A lot actually! A tour of the kitchen might produce a rolling pin, wood spoons and bowls and a honey dipper. In the kitchen and throughout the house there may be turned legs on tables and chairs. Perhaps the chandelier over the kitchen or dining room table is made of turned wood. The balustrades of stairs are turned. The wood decoration of many house exteriors has turned elements, especially on Victorian homes. Columns are turned. These turned items are present in children's lives and are often taken for granted.

It's not enough to know that wood is turned, children need to experience turning. The sights, the smells, and the whir of the lathe will be part of *TURNstyles* when Guides demonstrate turning on a lathe. A rectangular prism becomes a turned cylinder. Minds are challenged to see the three dimensional excitement of turned objects. Geometry emerges along with discoveries of symmetry and measurement.

Then its off to consider how wood turning is part of Pennsylvania's history. Wood turners from Germany and Great Britain settled in Pennsylvania. As Pennsylvania grew, so did the demand for turned items like Windsor chairs, tables, balustrades, bowls, goblets, spinning wheels, wagon wheel spokes, and toys. *TURNstyles* connects with Philadelphia in 1776 by presenting a reproduction of the Windsor Chair Thomas Jefferson designed and had built. The chair was uniquely designed to swivel allowing Jefferson access to his book shelves from his desk as he wrote the Declaration of Independence in the Graf House he rented in Philadelphia. Bucks County master craftsman, Robert Whitley, has generously donated a copy of this chair to *TURNstyles*. Palmer Sharpless, Bucks County resident, retired teacher from the George School, and bowl maker and spindle turner, has donated a balustrade like the ones he turned for the restoration of the railings in Independence Hall in Philadelphia. More Pennsylvania History is presented in architectural drawings and photographs of the John Grass Wood Turning Company founded in 1863 and still operating today.

Toys are turned! Nutcrackers, tops, chess sets, nesting toys, wooden dolls and doll furniture are turned. Musical instruments are turned. Flutes, clarinets, oboes, bassoons, drums, and sounding bowls are turned. During their visit to *TURNstyles*, children will be able to examine and play with

turned toys and musical instruments. A child-sized toy wooden lathe, crafted by Bucks County turner Norris S. White, will enchant all of our visitors.

Wood is the medium of wood turning. It may be from the next door neighbor's maple tree or the Philippines with its textures, grain and color waiting to be revealed on the lathe. Children will see a world map illustrating where different woods come from around the world. They will handle and examine examples of woods commonly found in Pennsylvania. They will learn about what happens to turned wet or green wood.

*TURNstyles* presents wood turning from craft to art. Joanne Shima's chair features delectable turned Oreos and fabricated Tinkertoy components. Is her chair craft, toy or art? James Prestini, an internationally known wood turner, sculptor, and philosopher has defined the dichotomy of craft and art by saying, "Craft is the body of structure. Art is the soul of structure. Optimum creativity integrates both."

The numerous beautiful art objects will delight children and adults with their beauty, and often, their sense of whimsy. It would appear that many turners have a finely developed sense of humor! Turners from Bucks County, Pennsylvania, and around the world have their works displayed in *TURNstyles*.

The first stop on Artmobile's 1997-98 tour of *TURNstyles: The History and Art of Wood Turning* is The Henry Francis DuPont Winterthur Museum in Delaware on Saturday, September 27 as part of the World Turning Conference planned by the Wood Turning Center of Philadelphia. During our nine-month tour, Artmobile will visit about 35 schools throughout Bucks County bringing the art of wood turning to more than 18,000 school children and adults this year!

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## ABOUT THE EDUCATIONAL ACTIVITIES

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The following pages offer pre-visit and post-visit educational activities for elementary through high school students.

- **Pre-visit activities** familiarize students with the materials and concepts they will encounter in their visit to *TURNstyles*.
- **Post-visit activities** reinforce what students have learned during their Artmobile visit. These exercises allow students to reflect on and interpret their experience creatively.
- **Activity levels** are suggested but certainly can be modified for other grade levels.

Both pre-visit and post-visit activities integrate other curriculum areas with the fine arts. Wood turning invites students to explore mathematical concepts along with history, science and art.

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## PRE-VISIT ACTIVITY - GRADES K AND UP

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### Scavenger Hunt for Turned Wooden Objects

**Subject Areas:** Fine Arts, Language Arts

**Materials:** List of Turned Objects (Appendix A)

**Objective:** Students will find wood objects that may have been turned.

**Description:**

Students will go on a Scavenger Hunt to identify possible turned wood objects. The Hunt can begin in school and continue as a homework assignment. Students will bring in their objects, or if too large, sketch and present their objects to the class. A show and tell can be held. The class can discuss whether they believe an object may be turned or not (this of course depends on prior knowledge of turned objects.)

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## PRE-VISIT ACTIVITY - GRADES 3 THROUGH 9

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### Two Dimensional Spiral to Three Dimensional Object

**Subject Areas:** Fine Arts, Math, Language Arts, Science

**Materials:** Archimedian Spiral (Appendix B), scissors, hole punch, string, lamp

**Objective:** Students will transform a two-dimensional spiral into a three-dimensional object by cutting.

**Description:**

This activity will help children grasp the difference between a two- and three-dimensional object. It will help them grasp the three-dimensional nature of wood turning. In addition, this activity can be used to prove that hot air rises by hanging the three-dimensional spiral over a lamp. **Caution: Paper can burn so demonstrate this for children.**

1. Have children study spirals. Discuss spirals in nature, such as shells, waves, spiraling horns on mountain sheep, elephant tusks, a growing fern, spiraled tail of sea horse, a hurricane, a galaxy of stars spiraling out, etc.
2. Pass out spirals to children. Lead a discussion about why its two-dimensional.
3. Demonstrate cutting spiral. Have each child cut their spiral, stopping when line ends.
4. Punch hole in center of spiral. Attach string through it and secure with a double knot. Pull on string and see what happens to spiral. (It becomes three dimensional.) Discuss findings.
5. Suspend the spiral over a lamp and turn the light on. The spiral will start to move because of the hot air rising.

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## PRE-VISIT ACTIVITY - GRADES 5TH AND UP

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### Draw a Turned Object from Different Angles

**Subject Areas:** Fine Arts, Math

**Materials:** Turned Object, Paper, and Pencil

**Objective:** Students draw a three dimensional turned object from different angles to discover different views of the object.

**Example:** A small table with turned supports.

Top

Long Side

Short Side

Bottom

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## POST-VISIT ACTIVITY - GRADES K AND UP

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### Measuring Turned Objects

**Subject Areas:** Fine Arts, Math, Language Arts

**Materials:** Turned objects children and teacher brought from home, measurement devices (rulers, tape measures, calipers).

**Objective:** Children will measure turned objects.

**Description:**

Use the turned objects the children brought in from the Scavenger Hunt for Turned Objects. (The teacher may wish to bring additional turned wooden objects.) Set up stations around the class. At each station have measuring tools available. Divide children into cooperative groups to measure and record their findings at each station. Depending on their level, children can measure in inches, centimeters, or by arbitrary units like paper clips, small blocks, etc. Concepts of length, height, distance around can be measured. Children will be reinforcing their knowledge of three-dimensional objects and measurement. Very young children can have stations set up so they can compare concepts like “small and large” or “shorter and taller”.

A classroom discussion could follow based on the groups’ findings. Results might be graphed. Further discussion could be held on the importance of measurement to wood turning. What pieces in *TURNstyles* required careful measurement and planning when they were made? What pieces required little measurement? Why?

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## POST-VISIT ACTIVITY - GRADES K AND UP

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### Acting Out Wood Turnings

**Subject Areas:** Fine Arts, Language Arts, Physical Education

**Materials:** List of Turned Wooden Objects (Appendix A), Chant

Chant:           “Wood, would you be,  
                      A turned object just for me?  
                      I must think and guess you see,  
                      to figure out what you must be!”

**Objective:** Students act out or pantomime a wood turned object.

**Description:**

Teacher writes chant on board and distributes the list of turned wooden objects (Appendix A). Teacher leads class in learning chant. Teacher has class recite chant and then teacher acts out a turned object. Class guesses what object must be. Child with correct guess then leads the next pantomime.

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## POST-VISIT ACTIVITY - GRADES 6 AND UP

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### Creating Symmetrical Patterns for Wood Turnings

**Subject Areas:** Fine Arts, Math

**Materials:** Three Handouts (Appendix C )

How is Turned Work Designed?

What are the Types of Turned Work?

How is a Design for Turning Used?

Paper, pencil, scissors, ruler. The knowledge that on each step of a staircase there are typically two balusters; one approximately 29 inches and the other 33 inches in height.

**Objective:** Students design a symmetrical pattern for a wood turning.

**Description:**

After reading and discussing the three handouts, students design two balusters for a staircase. The patterns can be drawn on a piece of folded paper and then cut as shown on the handout, “How is a Design for Turning Used?”

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## DIAGRAM OF ELECTRIC LATHE

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## DIAGRAM OF FOOT TREADLE LATHE

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## GLOSSARY

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**baluster** - any of the small posts that support the upper rail of a railing, as on a staircase.

**bead** - a convex surface carved into the wood while it turns on the lathe.

**box** - a turned wooden container that has a fitted lid.

**chuck** - a clamp-like device on a lathe by which the wood to be turned is held.

**cove** - a concave surface carved into the wood while it turns on the lathe.

**Craft Art Movement** - Some lathe turned works were recognized as art, not only as craft, during this 20th Century Movement.

**faceplate** - a disk fastened to the spindle of the lathe that holds in place work to be turned.

**finial** - a wooden, decorative, terminal part at the tip of a spire, gable, lampshade, bedpost, newel post, etc.

**finish** - the treatment applied to a turned wooden object such as polish, oil (often salad or cooking oil), wax (often beeswax or paraffin) to bring out the luster and grain of the wood.

**foot treadle** - a lever or pedal moved by the foot as to turn an early lathe.

**goblet** - a turned, shaped, wooden bowl without handles used as a drinking container.

**gouge** - a tool used for cutting large blanks of wood into rounds and for cutting shallow coves, having a curved cutting edge with a bevel ground on the outside of the tool.

**grinding** - sharpening wood working tools so that they cut efficiently.

**headstock** - a bearing or support for a revolving or moving part of a machine; specifically, the part of the lathe supporting the spindle.

**lathe** - a machine operated earliest by hand or foot, commonly now operated by electrical motor, that rotates a piece of wood so it may be shaped by a cutting or abrading tool. Operates much like a horizontal potter's wheel.

**live center** - the center in the revolving spindle of a lathe on which work is turned.

**lubricant** - a substance that reduces the friction of moving parts of the lathe.

**motor speed** - speed at which the lathe motor operates. Usually there are four or five motor speeds on a lathe within the 400 rpm to 2500 rpm range.

**newel post** - the post at the top or bottom of a flight of stairs supporting the handrail or the central upright pillar around which the steps of a winding staircase turn.

**parting tools** - narrow, chisel like tools used primarily on centerwork to get into odd corners and to cut, or part, turned pieces from the lathe while its running.

**pattern** - a model or plan used as a guide in making things; set of forms to the shape of which material is cut for assembly into the finished article.

**scraper** - flat tool of a square section with a cutting edge of various shapes.

**skew** - a chisel used in cutting wood on a lathe.

**spindle** - in a lathe the shaft-like part (live spindle) that rotates while holding the thing to be turned, or a similar part (dead spindle) that does not rotate.

**spindles** - short, lathe turned pieces of decorative wood often used in the back of chairs.

**spiral** - see Volute.

**symmetry** - similarity of form or arrangement on either side of a dividing line or plane.

**tailstock** - the adjustable part of a lathe, containing the dead center which holds the work.

**turner** - a person that turns wooden objects on a lathe.

**vessel** - a utensil for holding something, as a vase, bowl, pot, etc.

**volute (spiral)** - a spiral or twisting form; turn or whorl.

**wood turning** - a craft initiated as early as the 8th century B.C.. The art or process used to shape wood while it rotates on a lathe.

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## BIBLIOGRAPHY AND RESOURCES

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### **Bibliography**

A search provided only one book on wood turning for elementary children. However, there are many books on trees readily available. The following are some newer books.

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Gamlin, Linda. *Trees*, Dorling Kindersley, Inc., New York, 1993, ISBN 1-56458-230-2.

#### **Grades 2 - 6**

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Ruiz, Andres Llamas. *Cycle of Life - Trees*, Sterling Publishing Co., Inc., 1996, ISBN 0-8069-9327-8.

Russo, Monica. *The Tree Almanac: A Year Round Activity Guide*, Sterling Publishing Co., Inc., 1993, ISBN 0-8069-1252-7.

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Starr, Richard. *Woodworking with Kids*, The Taunton Press, Newtown CT, 1982, ISBN 0-918804-14-0.

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#### **Grades 7 and up**

Jones, Phil. *Woodturner's Project Book*, Sterling Publishing Co., Inc., New York, 1987, ISBN 0-8069-6478-2.

Nish, Dale. *Creative Woodturning*, Brigham Young University Press, Salt Lake City, 1975, ISBN 0-8425-1557-7.

Raffin, Richard. *Turning Wood*, The Taunton Press, Newtown, CT, 1985, ISBN 0-919904-24-8.

*A Sampling of Papers from the 1993 World Turning Conference*, Wood Turning Center, Inc., Philadelphia, PA, 1997, ISBN-0-9624385-5-3.

Spielman, Patrick. *The Art of the Lathe*, Sterling Publishing Co., Inc., New York, 1996, ISBN 0-8069-4272-X.

*Woodwork: A Magazine for all Woodworkers*, published bi-monthly by Ross Periodicals, Inc., 42 Digital Drive #5, Novato, CA 94949.

## **Resources**

### **The Wood Turning Center**

P.O. Box 25706, Philadelphia, PA 19144  
E-mail address 76143.137@compuserve.com  
<http://www.libertynet.org:90/-woodturn>  
Telephone: 215-844-2188

*Turning Points* - a publication of the Wood Turning Center.

The Wood Turning Center offers wood turning Residency Programs to schools. Contact at address and phone above.

### **Bucks Woodturners**

Meetings on the third Monday of even months at Hicks Arts Center, Bucks County Community College. Contact Matt Haist at 215-357-8017 for more information.

### **Bucks County Community College**

Division of the Arts/ Fine Woodworking Program  
Swamp Road  
Newtown, PA 18940  
Telephone: 215-968-8425

*Knock on Wood* - student publication of the Fine Woodworking Program.

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## APPENDIX A

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### List of Turned Wood Objects

## Turned Wooden Objects

The following is a list of wooden objects that are commonly turned on a lathe. How many of these objects can you find? Circle found objects. On the back of this sheet, draw your favorite object. Bring a wooden object to class that you think may have been turned.

Bowls	Recorders	Tops
Butter Molds	Newel Posts	Mortar and Pestles
Candle Sticks	Columns	Mallets
Gavels	Balustrades	Ball and Cup Game
Mustard Pots	Rosettes	Clarinet
Hat Pegs	Boxes	Oboe
Egg Cups	Whistles	
Knife Rests	Rattles	
Buttons	Drumsticks	
Earrings	Cribbage Board/Pegs	
Knobs	Thimbles	
Table Lamps	Honey Dippers	
Chandeliers	Crochet Hooks	
Nut Crackers	Jump Rope Handles	
Door Knockers	Toothpicks	
Cup/Saucer	Spoons	
Salt and Pepper Shakers	Spools	
Coasters for Glasses	Pool Cues	
Clothespins	Pencils	
Chess Sets	Nesting Dolls	
Ornaments	Doll Furniture	
Paper Weights	Darning Eggs	
Banks	Toy Rockets	
Chairs	Door Knobs/Handles	
Jewelry Boxes	Pasta Servers	
Spinning Wheels	Tinker Toys	
Tables	Croquet Mallets	
Baseball Bats	Paint Brush Handles	
Canes	Finials	
Walking Sticks	Architectural Elements	
Police Night Sticks	Wool Spinner	
Rolling Pins	Wooden Eggs	
Rulers	Pens	
Beds	Key Chain Fobs	
Drawer Pulls	Flag Poles	
Goblets	Cutting Boards	
Plates	Trays	

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## APPENDIX B

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### Archimedian Spiral



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## APPENDIX C

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### Three Handouts