

**LatheCity**

**Safely Working with Benchtop Lathes II**

*Featuring the Sherline System*

## **Volume 2 – Working with Lathe Accessories**

**by Uwe Burghaus**





LatheCity  
Safely Working with Benchtop Lathes II  
Volume 2 – Working with Lathe Accessories

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**The author is not a professional machinist or engineer. He is a hobby machinist as you probably are. In fact, the author holds a PhD in physics and teaches physical chemistry at a college. Therefore, no information provided herein represents professional advice or best practices in machining. All information is provided to help hobbyists and other non-professionals gain a better understanding of using a miniature benchtop (tabletop) lathe for hobby type work.**

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**Obtain a fair but critical and independent opinion about the numerous and often pricy accessories for the Sherline benchtop lathe before purchasing those. The author is a hobby machinist as you probably are. Compare the price of this book which details numerous accessories with a typical price for just one of the lathe upgrades.**

**A few accessories from other vendors besides Sherline are also included in the discussion.**

**Besides typical starter pack accessories, the following accessories are described:**

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Fast tool change systems .....	ch. 4.4
Grooving cutter .....	ch. 11.5
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**Working with the following materials is described**

- Alloy steel
- Aluminum Bronze
- Brass
- Cast Iron
- Ceramics – Macor
- Cold pressed Steel C1018
- Copper
- Cork
- (Exotic) Wood
- Leadloy (leadloy)
- Machinable Wax
- Magnets (Nickel super alloys)
- Pure Manganese
- Rocks
- Sandwich structures – hardened steel
- Stainless steel
- Sterling Silver
- Styrofoam
- Titanium (alloys)
- Tool Steel
- Various plastics



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## Book 2

# Part A: Introduction



### 1. Required safety notes

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Working with Alloy Steel, Aluminum, Bronze, Brass, Cast Iron, Cold Pressed Steel C1018, Ceramics – Macor, Cork, Copper, Pure Manganese, Magnets, Plastics, Rocks, Sandwich Structures – Hardened Steel, Stainless Steel, Styrofoam, Sterling Silver, Tool Steel, Ledloy, Titanium, Wax, Wood



## Book 2

### ⇒ 1. Required safety notes



**Fig. 1.1:** Safety glasses. Use versions with ANSI Z87 label. ANSI is short for American National Standards Institute. Chemistry goggles, as also shown here, are not recommended for metal work, since they may block the vision too much.

Please note that **initially you may be at a higher risk** than folks doing this for living since you will be on your own. Typically hobbyists do not attend safety classes or safety briefings. Therefore, at least read the following.

When it comes to safety the “buddy system” is essential. Actually, nobody should work alone with power tools. This is obviously difficult to organize for a hobbyist. Therefore, you are at a higher risk and have to manage the risk yourself.

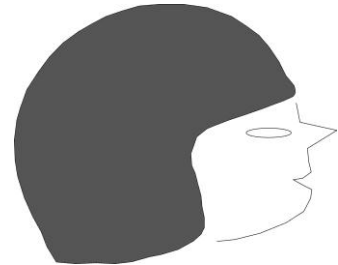
However, everyone can learn how to work safely with power tools. Otherwise I would not offer this type of textbook. In one of the safety briefings I attended, the instructor, a professional machinist, outlined almost proudly how many accidents he had throughout his career ... well ... I still have all my fingers and would like to keep it that way. What about you? Therefore, **READ** the following general safety notes and hints about how to prepare yourself before switching on your lathe. **PLEASE, take this seriously it only takes 20 minutes.**

Specific safety notes for every procedure are part of every subchapter. Naturally the notes in the beginning are more extensive and become shorter towards the end of the book since I assume that you learn safe working practice along with the operation of your power tools. (In addition, safety concerns are often similar for different procedures.) This is one of the main goals and part of the title of this hobby machinist primer: “Safely working ...”

Working at a public university myself, I have to participate regularly in safety classes and I am at present (2011) in fact the safety liaison for our

chemistry department. However, again I am a hobbyist myself when it comes to metal work. I still have all 10 fingers and two eyes, but there is no legal guarantee that the following notes are complete or even correct. **Read the disclaimer note above.**

- **Use goggles / safety glasses** (see Fig. 1.1). Chemistry goggles, which are also shown here, have the disadvantage that they may block your vision too much which again can generate a safety hazard. You need comfortable glasses and perfect vision. You need to look around. Glasses approved for metal would need to be closed all around the face (at the top, sides, and bottom) and in the U.S. they have the label **ANSI Z87** on them. Some versions additionally block UV light which was interesting to me, since I also work with glass pieces, using glue hardened by a UV lamp. In any case, a UV filter is better for our eyes, I believe.
- At most safety briefings you may come across the term “**situation awareness**”, as a general strategy to reduce risks. Knocking over a leg of a storage rack when walking through a metal shop, which carries 500 pounds of steel, would not be it. Heavy footwear is unfortunately very uncommon except in an industrial setting. (We also don’t want to overdo it in a hobby shop.)
- Let someone know that you are working in your garage and/or basement. Why? First, you are setting up “a buddy system” in doing so. Second, you are making sure that nobody disturbs you at a critical moment, startling you from behind.
- Have a working phone in reach. Check if your cell phone is working properly in your basement. Where is the closest hospital/emergency room? Emergency number in the U.S. is? Right, 911. At some locations the number may be different.
- Make your shop kid safe. Talk to your kids about the risks. Make sure that they do not sneak around a corner and surprise you when the lathe is running, etc. They often don’t see the difference between “playing” and “safe working practices.”



- Read the application notes and manuals that came with the tools and/or accessories before starting to use them. Learn the applications and limitations as well as the specific potential hazards of every tool.
- Don't use a tool for a purpose it was not designed for.
- Don't modify a tool yourself.
- Don't push a tool beyond the limits it was designed for. A mini metal lathe is designed to work on small metal stock.
- Don't modify the electrical connections of your tools. Electrically ground all tools. If a tool is equipped with a three-prong plug, then it should be plugged into a three-hole receptacle. If an adapter is used to accommodate a two-prong receptacle, the adapter wire must be attached to a ground connection.
- Don't remove safety guards. Keep guards in working order. (I could tell you stories where a student did exactly that to "save time" and lost several fingers in the process. This is not a joke, but I will spare you the details. Fortunately, I was not involved in this accident, in this case, at a chemistry lab abroad ... ) **Don't remove safety guards.** However, the little safety shields that sometimes come with a lathe provide only very limited protection. Use always goggles, in any case.
- Make it a habit of checking to see that keys and adjusting wrenches are removed from the chuck before turning on any machine/lathe. In the case of a lathe, turn the spindle by hand before turning on the lathe making sure that it runs freely. Don't underestimate the power and torque generated even by a benchtop/tabletop lathe. A key left behind in a chuck can easily fly off traveling at a significant speed for 10 ft (3 meters) or more. Full size lathes used to train students professionally are often equipped with **spring lock chuck keys (self-ejecting keys)**. These pop out of the chuck when not pushed down, i.e., it's impossible to leave them in the chuck unintentionally. Typically the chuck key would hit the instructor rather than the student running the lathe which may explain why this feature is eagerly installed in training metal shops. (Don't put your nose over the spindle anyhow.) In any case, just kidding I do like all instructors, safety first. Unfortunately, this type of system is typically not available for benchtop lathes, as far as I know.



- Cluttered work areas and benches are a safety hazard. This is indeed true.
- Do not use power tools in damp or wet locations. This can be an issue for garage or basement shops. Solve the problem if it exists at your location.
- Keep work area well illuminated. This is extremely important for safety issues and any proper work. Do you need new glasses?
- All visitors should be kept at a safe distance from the work area.
- Again make your workshop kid proof. Use padlocks, master switches, remove starter keys. This is of particular concern for hobby work, correct (?) I would in principle encourage you to awaken the interests of young adults for practical and creative work. Fortunately, perhaps in this case, many of them prefer to play dull computer games instead. However, teaching young adults to work with metal tools is particularly difficult and a major safety hazard for everyone involved in this process. At least don't do this in the very beginning. You must be very confident yourself, first. Make sure that they are old enough and have no access to the tools alone.
- Again, do not force tools or attachments to do a job for which they were not designed. Use the proper tool for the job.
- Avoid loose clothing, necklaces, gloves, or jewelry that could become caught in moving parts. We all know this, but taking care of it every day is another thing.
- By the same token, fluffy cloth appears to attract small cut off metal pieces like a magnet. They stick deep in the fabric and can scratch/cut you fingers and skin.
- Wear protective head gear to keep long hair styles away from moving parts! If you would like to see a sad story in this regard, go to:  
<http://blog.makezine.com/archive/2011/04/yale-student-killed-in-lathe-accident.html>  
It takes milliseconds to pull you into the running chuck if something gets caught in the chuck. A benchtop system is safer in this regard than a full size system, I guess, but ... (A lathe running at 1600 RPM makes 26 RPsec or ~40 milliseconds = 0.040 sec for one revolution.)
- Use safety glasses i.e. goggles designed for metal work. Yes, this is on the list more than once.
- Use a face or dust mask if cutting operation is dusty.





**Fig. 1.2:** Full face shield with plastic foil that need to be peeled off.

- When using a metal grinder you will generate sparks. Use a full face shield and goggles for these operations. Make sure not to have lots of cardboard boxes, gas containers for you snow blower / lawnmower, paint, solvents, etc. in your basement or garage hobby shop. The sparks generated by grinders or metal saws can ignite a fire. It may start to burn long after you left the shop ... Full face shields often have a plastic foil on the shield which needs to be peeled off. Otherwise the shield may not be transparent (Fig. 1.2) – just a note in case you didn't realize. (I have seen students running around ...)
- Use clamps or a vise to hold work. It is much safer than using your hand and frees both hands to operate the tool. This is more of an issue for the use of a drill press, milling machine, or saws than for a lathe, but it must be included here.
- Keep your proper footing and balance at all times. Wet floor? Cable? This is dangerous.
- Keep tools sharp and clean for best and safest performance. Follow instructions for lubrication and changing accessories. A sharp knife is dangerous, indeed. However, a dull lathe cutting tool may be even more dangerous. (Why? It does not cut properly. It will over-heat, etc.)
- Use only recommended accessories. Read the manual carefully and completely. Use of improper accessories may be hazardous.
- Unplug tool before servicing and when changing accessories such as blades, bits or cutters. Definitely.
- Make sure switch is "OFF" before plugging in a power cord. Double check.

- Again turn spindle by hand before switching the motor of the lathe on. This ensures that the work piece or chuck jaws will not hit the lathe bed, saddle or cross-slide, and also ensures that they clear the cutting tool.
- It is not recommended that the lathe be used for grinding. The fine dust that results from the grinding operation is hard on bearings and other moving parts of your tool. For the same reason, if the lathe or any other precision tool is kept near an operating grinder, it should be kept covered when not in use. I do occasionally use a polishing sponge (safer than sandpaper) to polish pieces, but I don't overdo it.
- Make sure that all locking and driving attachments are tightened. However, also be careful not to over tighten these adjustments. They should be just tight enough. Over tightening may damage threads or warp parts, thereby reducing accuracy and effectiveness.
- Don't allow long stock pieces to stick out far in back of the spindle of the lathe. Long, thin stock that is unsupported and turned at high RPM can suddenly bend and loop around. This WILL indeed happen. You may be amazed that an aluminum or steel rod bents like nothing.
- Wear proper safety glasses. All folks working for living in metal shops can unfortunately tell you stories such as this one: a piece of metal hit the backside of glasses (somehow) and the reflected piece hit the eye of the machinist. They had to pull the piece out of his eye in a hospital. This is not a joke. You need safety glasses specified for metal work, even if you wear optical glasses. You need glasses fully closed at the sides, the top, and bottom. Goggles that fit over optical glasses are often not very comfortable and restrict the vision. These are better than nothing, but you can purchase goggles with optical lenses. If you work every day in your shop, then invest the money to purchase really comfortable and safe glasses. Your eyes are worth the investment.
- This may sound as a talk to a teenage girl/boy, but ... you need proper eye protection before you switch on the lathe for the first time. Safety

**I did read the safety notes.**

**I did understand them.**

**I did read and accept the disclaimer statement.**

glasses are perhaps the most important safety feature in a metal shop. Don't start without them with any work on a lathe. Any home improvement store carries them. (These glasses should come together with any lathe package. Unfortunately, they don't.)

- Don't work when you are tired. Rushing home, having a heavy dinner and a few beers, then going down to the basement shop in your house ... obviously not a good idea. Don't do it. Metal work requires your full attention, even if it is a hobby.
- You may realize that the fingers of the machinist are really close to the spindle when cutting certain shapes, in particular when you eventually polish pieces. The edges of the chuck are sharp and turn at perhaps 1800 RPM. It would cause very serious injuries when hitting the rotating chuck with your fingertips. Sherline also offers a tool post for polishing (P/N 8976) which I did not, however, use myself. Polishing operations on the Sherline lathe are, by the way, not recommended by Sherline, mostly due to issues of metal dust which may end up in the motor controller box causing shorts. In addition, a dust mask is generally required for all sanding/polishing operations. Using a sanding sponge is somewhat safer than using sand paper for polishing since you can even touch the chuck with the sponge and the fingertips are still at an o.k. distance. Sanding sponges are available in any home improvement store.
- One last thing. Please be aware of that you will carry chips (small cut off metal pieces) with you all over your house. Don't ask how – chips stick to everything, somehow. Aluminum chips are “rather” soft and probably often (but not always) “harmless”, but steel chips are sharp as razor blades. Never clean up chips with your bare fingers, never.
- This kind of list can never be complete. Read the disclaimer statement.

This is a long list, but don't blame me if you did not read it and end up in a hospital.

Safety notes can also be found on various web sites, a few links are given here:

[http://www.mini-lathe.com/Mini\\_lathe/lathe\\_safety.htm](http://www.mini-lathe.com/Mini_lathe/lathe_safety.htm)

<http://www.zeraware.com/>

[http://www.americanmachinetools.com/how\\_to\\_use\\_a\\_lathe.htm](http://www.americanmachinetools.com/how_to_use_a_lathe.htm)

[http://www.fricknet.com/lp/safety\\_posters.php?gclid=CPTW6ZfFhaYCFQTNKgodFQolpA](http://www.fricknet.com/lp/safety_posters.php?gclid=CPTW6ZfFhaYCFQTNKgodFQolpA)

Safety products can also be purchased on-line, for example, perhaps look at e.g.:

[http://www.envirosafetyproducts.com/product/magnifying\\_safety\\_glasses\\_magnifying\\_safety\\_glass](http://www.envirosafetyproducts.com/product/magnifying_safety_glasses_magnifying_safety_glass)



## Book 2

### 2. Introduction

**Object:** is this the right book for you?

**Obtain a fair but critical and independent opinion about the numerous and often pricy accessories for the Sherline benchtop lathe before purchasing those. The author is a hobby machinist as you probably are. Compare the price of this book with a typical price for just one of the lathe upgrades.**

#### 2.1 What topics are included?

A number of sections in this introduction were already included (in more detail) in the first book of this series. However, not all of you may actually start with the first volume. Therefore, the most important introductory notes are summarized here. Chapter 3 briefly describes standard lathe operations such as turning, facing, boring, etc. and may be considered as a **short course for lathe work**. This may be sufficient, if you have some prior experience in machining otherwise start with volume one. The 2<sup>nd</sup> volume focusses on accessories and includes, in contrast to the first volume, a large number of **engineering notes (in plain English)** which are hopefully interesting for the more advanced hobby machinist. This 2<sup>nd</sup> volume is devoted to advanced hobby machinists.

In addition, how to **grind HSS lathe tools** is detailed. A quite detailed chapter describes how to work safely with difficult to cut and **exotic materials** as well as where to purchase those materials. How to **cut threads** on a lathe is described in detail including curiosities such as cutting **double lead screws** or left hand screws. I focus here on practical procedures and troubleshooting (tips & tricks). I indeed show how all this can be done on a benchtop lathe. I have not seen this type of information as concise as it is here anywhere else in a hobby type machining book. I focus on practical and doable procedures, but include also the engineering background. Standard topics such as using a **compound slide** and **radius cutter** or how to cut a Morse taper properly are certainly detailed, too.

Again, the **Sherline lathe** is featured in volume two since it may be the most complete and smartest benchtop lathe currently available, in my opinion.

#### 2.2 Why should you purchase this book?

You should purchase this book since it includes **detailed** descriptions of lathe accessories and related projects. I go way beyond what one may find in application notes (manuals), at least in my opinion. **The object** is getting “you to work” with the numerous accessories efficiently, quickly, but safely. I do emphasize very much safety issues without the intention of boring the reader to death. The descriptions are accompanied by an endless number of figures which are also useful for later reference.

This is still more or less an introductory text for advanced hobby machinists. However, I do not stop already at the simplest possible operations. **Included are nearly all operations you can accomplish on a benchtop metal lathe taking advantage of typical accessories.** The first book describes work that can be done with a typical Sherline starter lathe package. This second volume is devoted to working with the numerous accessories available for the Sherline system. Similar accessories (compound slide, radius cutter, etc.) are also available for other systems, or are even included in the basic versions of some lathes. **Therefore, the outline here should be useful also for other benchtop lathes even if the exact procedures will differ from those described here.**

I struggled quite a while about what writing style would be the best. As you can already read here, I do use a more or less informal and personal style which appears to me the best in a respectful “learning environment” with adults. I hope that I have not over done it in this regard. Some notes about what I do myself besides hobby metal work, can be found at the end of the book if this is of any interest.

I hope that this was convincing and that you purchase this textbook. The later would allow me to acquire a few more cool tools for my own hobby garage machine shop ... just kidding (?).

### **2.3 Does it make sense to learn practical procedures with a textbook?**

I have been told that guys working in metal shops don't like to read much. Similarly, an English professor may enjoy reading, but typically not about metal work. Well, I personally know exceptions to these “rules”, identifying these statements as unfair misconceptions – in both cases. In addition, I have seen in the meanwhile that females, not just guys work naturally in metal machine shops: a good trend. However, in any case, it is plausible that explaining rather complex manual operations can generate texts of significant length. Movies can be found at the internet or DVDs purchased, but often they are designed to sell a product rather than to explain how a given motor tool, such as a metal lathe, is really working. Metal work is something students learn best from a foreman in a metal shop. True – perhaps, but this is not how a hobby machinist typically develops his/her skills. In addition, the Machinist and English college teacher are anyhow two extreme examples. Therefore, ***I believe that a textbook, together with other media such as movies and good images, can provide help for a good start with operations on a metal lathe.*** Many books titled such as “Hobby Machinist”, “Benchtop Tools”, “Complete Course about Metal Work on the Lathe” do already exist. True again and I did read a number of these books. But, I was not perfectly satisfied with most of them. Statements such as, “metal work is not like drawing-by-the-numbers” and “some common sense and thinking is required”, can often be found in technical notes and manuals. True certainly, thinking always helps but, this may also be an excuse not to write down procedures clearly enough. I hope that I did a better job here.

## 2.4 How is the book structured?

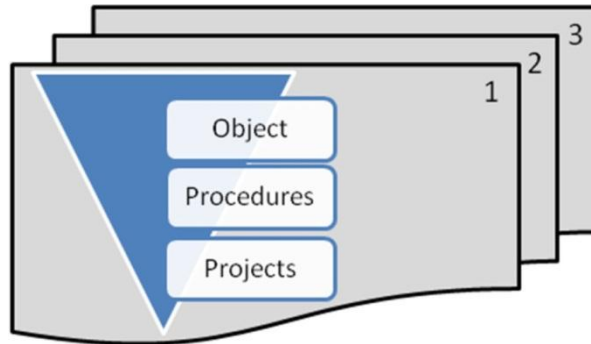


Fig. 2.1: Structure of the chapters.

Typically I explain first the **object**, i.e., what is the purpose of a given tool or operation. Then the **procedures** are described in detail. I always start here with the most simple and basic operation which can be accomplished with a given lathe tool/accessory. In-between, **further notes** are given including troubleshooting, more safety notes if required, and more advanced operations. You should at least browse over an entire subchapter before starting to work with a new tool. Reading one subchapter typically takes less than 20 minutes.

Finally, each subchapter concludes with more or less small **projects** taking advantage of the new skills and/or tools. Working on a single project can take 5-90 minutes. I describe mostly how to use the tools safely, so that you can make whatever piece you like, rather than going only through extensive project descriptions (of stuff you probably don't need). The projects are, at least initially, setup to make practicing parts. The interests of hobbyists are simply too diverse for coming up with meaningful general purpose projects. Learn how the tools work and you can make anything you want, right. That's the strategy, but a number of small projects are included. **A project list is given in the appendix.**

A few **pictograms** are used throughout the book to label particular text sections such as

- |   |  |
|---|--|
| ⇒ | ⇒ safety notes   |
| Σ | Σ summaries  |
| ♣ | ♣ troubleshooting / important note                         |
| > | > <i>notes not too important in the beginning projects</i> |
| E | E <i>engineering type notes</i>                            |

which makes it easier to browse through the text later on.

## 2.5 Are other volumes available?

**Yes.** The first book already includes descriptions of the most basic lathe accessories such as the rear parting (cut-off) tool and the 4-jaw independent chuck. Most of the other accessories are, however, detailed in this second volume. A separate volume describes how to emulate a CNC lathe without actually spending a lot of money on purchasing one – part of this volume is included in the first book. Other volumes about milling operations and CNC programming will follow shortly.

The books are presently produced using desktop publishing, i.e., they are printed on regular paper, as ordered, using LASER printers. We do not stock-up on anything which drops the costs. However, the books will be shipped within two business days after receiving the orders. Grayscale printouts are used which are just fine, in our opinion. However, we plan to offer (at some point) the books printed in full color for an additional cost. So far we use spiral binding (binding spines) which again drops the costs and is just fine, in our opinion. The book series will continuously be updated and enlarged, i.e., check out our Web site frequently. We do also offer CDs with software tools and movies. A list of all web addresses given in our books as well as a number of computer codes can be downloaded free of charge in the customer corner (requires a password which came with this book). In addition, we started to develop a product series of lathe and mill accessories for benchtop systems.

## 2.6 Are accessories from other vendors besides Sherline available?

**Yes.** As even mentioned on Sherline's web site ("Accessories Made by Other Manufacturers for Sherline Tools..."), accessories are also available from other vendors. I have to write, that we should really commend to find this information directly on Sherline's web site. Anyway, perhaps, have a look at

<http://www.sherline.com/resource.html>

for a short list of vendors provided by Sherline. In addition, you may check out:

[www.omwmetal.com](http://www.omwmetal.com) (Radius cutter)

[clockguru@gmail.com](mailto:clockguru@gmail.com) (Morse taper cutter. They have no website, but offer the product through e-bay.)

Indeed, LatheCity also offers accessories for the Sherline system. However, as our rule, we do not offer anything which is already available from other manufacturers. Now, of course, in some cases different solutions and designs can be developed for similar applications.

## ⇒ 2.7 Should I make my own accessories?

**Perhaps.** After working your way through our book series you would also be able making your own accessories. A few project examples are directly included such as a Morse taper adapter and other useful small pieces. Since labor costs are not an issue for a hobby machinist, your own designs will be less expensive than commercial offers. After a while the quality of your work may match professionally made pieces. However, in most cases this requires at least a combination of lathe and mill work (vol. 4), i.e., the overhead costs to acquire all of these tools are quite significant. Also be aware that flawed designs can be very dangerous and/or may result in sloppy results obtained with imprecisely made accessories. In this regard, some accessories are more critical than others. For



obvious reasons, [this textbook does not include any design details of Sherline's systems, parts, or accessories](#). We do not provide "trade secrets". No exact dimensions or blueprints are given. All projects described are for private and non-commercial use. However, some designs developed and offered by LatheCity are described in more detail. Perhaps make these by yourself or visit our online shop.

- ⇒ safety notes
- Σ [summaries](#)
- ♣ trouble shooting
- > notes not too important  
in the beginning  
[projects](#)



## Book 2

# Appendices

- mm to inch conversion table
- English tap and drill sizes
- Metric tap and drill sizes
- English set screw sizes
- Letter size drill bits
- Center drills
- UNC thread standard
- Morse taper
- English/metric thread conversion
- Abbreviations
- Project list
- Very brief glossary
- Index

**Other books are / will be available forming a complete series featuring a benchtop metal shop.**

**Available:**

## **VOLUME 1:**

### **Part A: Introduction**

1. Why should you purchase this book?
2. Does it make sense to learn practical procedures with a textbook?
3. How is the book structured?
4. What is the maximum size of materials that can be worked on with the (Sherline) lathe?
5. What about other benchtop systems or what lathe should I purchase?
6. What attachments/accessories may be useful in the beginning?
7. What spare parts would be useful?
8. Where is metal stock purchased?
9. What is needed for the projects described later on?
10. A few brief notes about materials

### **Part B: Basic terms**

11. Very first steps – safety first
12. Basic components of a lathe
13. Maintenance / troubleshooting
14. Cutting tools
15. Cut and feed – peeling an onion

### **Part C: Right hand (RH) turning tools**

16. Turning down round stock with a right hand (RH) tool (reducing the diameter)
17. How to do this more precisely – using the digital readout
18. Tool chatter (troubleshooting)
19. Over-heating of tools
20. Turning a short outside chamfer with a RH tool
21. Facing-off work with a RH tool
22. Turning taper shapes with a RH tool
23. Diverse projects including taper shapes
24. Using a 4-jaw (independent) chuck
25. Cutting-off the work – parting tools
26. Cutting small grooves
27. Mounting tools on the backside of the cross-slide
28. Turning down / facing-off square stock with a right hand tool

### **Part D: Boring and drilling**

29. Drill bits / center drills / taps / dies
30. Specialty drill bits
31. Boring tools
32. Mounting the drill chuck in the headstock
33. Practice projects utilizing the boring tool

### **Part E: Working with longer stock**

34. Using a live center
35. Dead center / tailstock center
36. Taper shapes and the drive dog
37. Where are the limits?
38. Using the steady rest

### **Part F: Left hand (LH) turning tools**

39. Facing-off work with a LH tool
40. Turning operation with a LH tool
41. Section cuts – combining LH and RH cutters (turning operation with LH cutters)

### **Part G: Poor man's CNC system, or, how to cut fancier shapes (e.g. parabolas, circles, ellipses) with a manual lathe?**

42. The project idea is ...
43. Cutting a parabolic shape

- 44. Cutting a spherical shape
- 45. Cutting an elliptical shape
- 46. Slicing difficult to cut taper shapes (Morse taper)
- 47. Slicing other shapes

#### **Part H: Full size systems**

- 48. Metal working classes
- 49. What does a full size lathe look like?

#### **Part I: Next steps**

- 50. What are the next steps?
- 51. Basic terms of milling operations

#### **Appendices**

- Web links and software
- Software codes included in the first volume
- Project lists
- Conversion factors
- Abbreviations
- Accessories described in this book
- Very brief glossary
- Computer codes (listings) – parabolas, spherical (ball) shapes
- Further drawings and photos of projects
- Index
- About the author
- Acknowledgement

#### **Available soon:**

### **VOLUME 3: POOR MAN'S CNC LATHE (CD included)**

Similar to chapter G of the first volume of LatheCity. Additionally more slicing tables and programs are included here as well as a CD with windows programs.

1. How to simulate a CNC lathe with a manual lathe
2. Cutting a parabolic shape
3. Cutting spherical (ball) shapes
4. Cutting an elliptical shape
5. Slicing a Morse taper shape
6. Slicing other shapes
7. If you don't like PCs – black-and-white: various slicing tables
8. Program codes

#### **Available:**

Selected chapters are available as booklets.

**Booklet 1:** Brief summary of standard late operations (chapter 3, vol. 2)

**Booklet 2:** Thread cutting with the Sherline lathe (chapter 10, vol. 2)

**Booklet 3:** Working with exotic materials in a lathe (chapter 6, vol. 2)

#### **The following volumes are in preparation:**

**VOL 4:** MILLING ATTACHMENT TO THE SHERLINE LATHE

**VOL 5:** CNC OPERATIONS

**VOL 6:** LATHE AND MILL OPERATIONS – SHORT COURSE

**LatheCity Accessories**

**LatheCity offers currently (will offer) the following accessories for benchtop lathes and mills. For current prices go to our on-line shop.**

**Lathe**

- Mechanical stop for the lathe (can also be used to lock the cross-slide table for milling operations)
- Mechanical stop for the compound slide
- Morse tailstock adapters (for center drills, impact tools, etc.)
- Morse #0 tailstock extensions
- Various lathe chuck adapters including indexable adapters

**Mill**

- Endmill holder (screw-on), various sizes available including those for impact socket tools
- Various lathe chuck adapter for lathe/mill operations
- Lock system for lathe cross-slide when used as a mill

**LatheCity also offers software, affordable jewelry, and more.**

**Check out our on-line store.**

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Uwe Burghaus, born in West Berlin, Germany, obtained his education in Physics and Physical Chemistry at the Free University of Berlin. He obtained a PhD in 1995, after conducting his graduate studies in surface science at the Fritz-Haber Institute of the Max Planck Society in Berlin. After postdoctoral positions in Genoa (Italy) and Santa Barbara (USA), he went back to Germany to complete a habilitation/tenure in Physical Chemistry. Now at North Dakota State University, he started to establish a surface chemistry group in 2003 and obtained tenure in 2009. His group is currently focusing on studies about nanostructured catalysts.

His hobbies include machining furniture from metal and glass as well as occasionally manufacturing pieces for his research group by himself. He is not a professional machinist by training. However, his hobby developed into a small part-time business in 2012. LatheCity currently sells books about metal working and software tools and accessories as well as affordable jewelry: everything that's fun to make and may find customers. The strength of the business is custom-designed pieces including accessories for scientific instruments.



**Acknowledgements**

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I will continue to update and improve on the texts over time. These updates will be made available to our customers as a free newsletter – assuming that one of the textbooks was purchased from LatheCity. Go to the customer's corner and use the password provided with your purchase. We will not bother you with e-mails, but the updates can be downloaded from our website.

Writing a book about metal working typically does not improve the reputation of a scientist (some prefer not to get dirty fingers...) and chemistry college teacher. Therefore, many thanks in advance to open-minded colleagues. However, in the UK, there is apparently a "tradition" to write your own book about "gardening" – the LatheCity books would be my version of this, I guess.





**Synopsis.** Detailed are lathe accessories for the popular Sherline metal shop, but the outlines will be useful for projects with nearly any tabletop metal lathe. Obtain a fair but critical and independent opinion about the numerous and often pricy accessories for the Sherline benchtop lathe perhaps before purchasing those. The author is a hobby machinist as you probably are. Compare the price of this book which details numerous accessories with a typical price for just one of the lathe upgrades. Accessories from other vendors besides Sherline are also included in the discussion.

This second volume of the LatheCity book series is written for more advanced hobby machinists and includes engineering type information. However, a brief short course of standard lathe operations is also included.

A quite detailed chapter describes how to work safely with difficult to machine and exotic materials as well as where to purchase those materials. How to cut threads on a lathe is described in detail, including curiosities such as cutting double lead screws or left hand screws. The author focusses here on practical procedures and troubleshooting (tips & tricks). Indeed it is shown how all of this can be done on a benchtop lathe. We have not seen this type of information as concise as it is here anywhere else in a hobby type machining book. The descriptions focus on practical and doable procedures, but include also the engineering background. Standard topics such as using (and fixing) a compound slide and radius cutter or how to cut a Morse taper properly are certainly also detailed.

LatheCity  
Safely Working with Benchtop Lathes II  
Volume 2 – Working with Lathe Accessories  
Uwe Burghaus

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