

2nd Edition

LatheCity

Working Safely with Benchtop Systems IV

Tabletop Milling

Featuring Sherline & Grizzly Mills

by Uwe Burghaus

www.LatheCity.com

LatheCity

Safely Working with Benchtop Systems IV

Volume 4 – Tabletop Milling

1st Ed.: ISBN-10: 0985136057 ISBN-13: 978-0-9851360-5-5

US Registered copyright: TXu 1-838-063

2nd Ed.: ISBN-10: 0991153022 ISBN-13: 978-0-9911530-2-2

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Publisher and author: Uwe Burghaus, Fargo, ND, USA

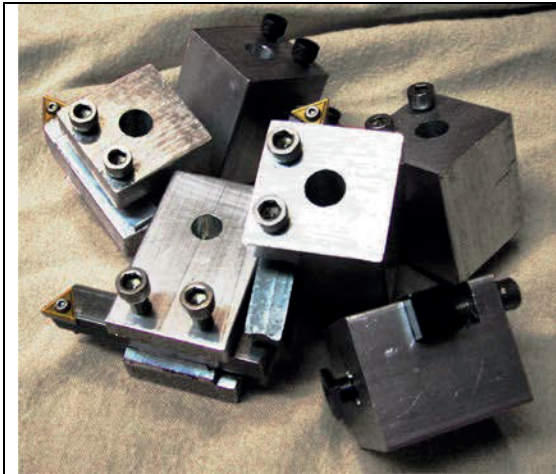
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A few project images



Tool posts



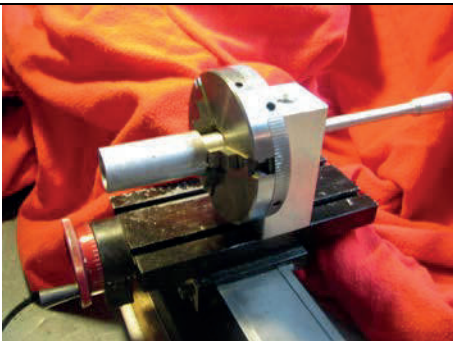
Lathe cutting tools



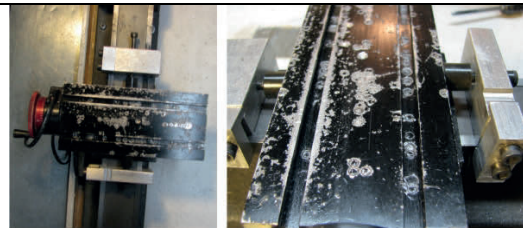
Artwork projects – earrings



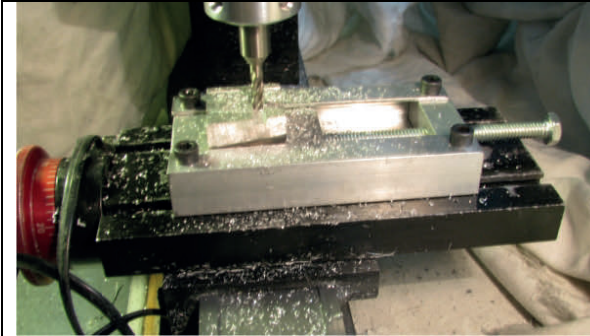
Drill stops



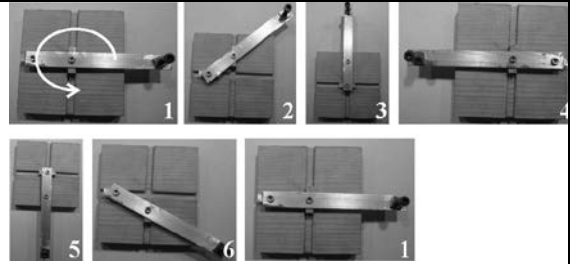
Indexing tools



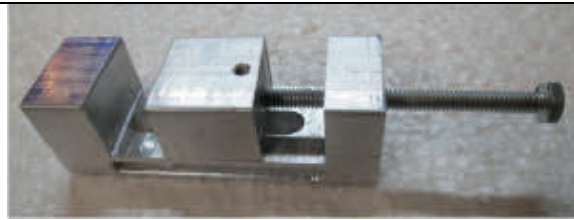
Dovetail lathe stop / mill lock



Zero budget, zero effort mill vise



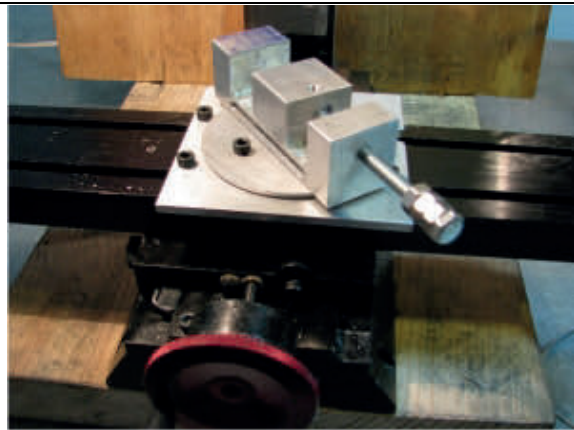
Dovetail toy



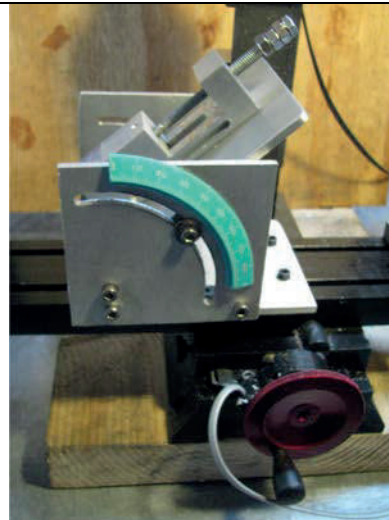
Miniature plane mill vise



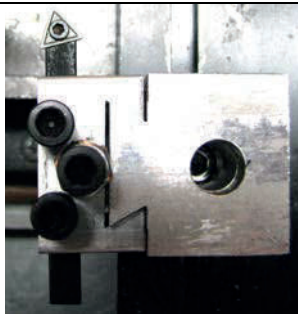
Playing with a rotary table



Swiveled base for the self-made vise – working with a rotary table



Machining a tilt table



Fast tool change system



Keyways with rounded corners – flanges

Project list

	page	level, time (min)	required tools						
			swiveled vise	end mill	fly cutter	dovetail / T-slot cutter	boring drilling	rotary table	tilt table
turning tools	121	++, 30	X	X					
chuck storage rack	118	+, 30		X					
low budget mill vise	132	+, 30					X		
hole punch	170	++, 60					X		
lathe lock	55	+, 60					X		
drill stops	119	+, 15		X			X		
adjustable gibs plate	138	+, 10				X			
machinist jack	82	+, 10		X			X		
lathe tool posts	115	++, 20		X			X		
kids (?) toy	149	+, 60		X		/x	X		
angle plate	199			X			X		
dovetail lathe stop / mill lock	157	+++ , 90		X	X	(X)	X		(X)
indexing chuck holder	167,130	++, 60					X		
plane mill vise	134,161	+++ , 120		X	X		X		
tilt table	182	++, 120		X			X	X	
fast tool change system	143	++, 120		X		X	X		(x)
swiveled base	178	++, 60		X			X	X	
handwheel (lathe work)	207	+, 10					X		
monster mill vise	134	+++ , 60			X		X		
flange	186	++, 20		X				X	

The “++” indicate the difficulty level (from + simple to +++ difficult) which is certainly a matter of taste and depends also on the tooling at hand. The time estimates may be somewhat optimistic and assume advanced machining skills. (x) indicates that options exist in regard of the required tooling.

Disclaimer

This book has been written carefully, and all projects and procedures have been tested thoroughly. However, as always, the author cannot guarantee that the procedures are perfect and without any mistakes. In addition, it is impossible to predict and prevent all of the possible problems someone may possibly run into when working with power tools. **Using a motor tool can be dangerous, and the proper use is the responsibility of the person using the tool.** If you are not perfectly comfortable with working with motor tools, then don't do it! In this case, take a metal working class rather than following a do-it-yourself outline, or find a different hobby. No one else can jump in if you may make a mistake that results in harming yourself or damaging the tools you use. Do not use half broken or banged up tools, possibly purchased on the cheap at a secondhand store or who-knows-where. These will be overwhelming to handle in the beginning. Also note that metal work is a rather expensive hobby. Thoughtful work will be your responsibility.

The author makes no representations or warranties with respect to the accuracy or completeness of the content.

The author is not a professional machinist or engineer. In fact, the author has 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 tabletop milling machine for hobby type work.

The statements and procedures may not coincide with Sherline's Inc. or Grizzly's Inc. opinion or interests.

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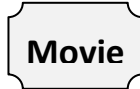
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Pictograms used in this book



Object of a given Chapter/brief introduction. Start of a project. The Chapter numbers are given in the content list.



Internet addresses of potentially useful sites. However, web sites may be infected by computer viruses. Use them at your own risk.



Safety notes. It is not my intention to bother you, and this book is meant for adults with advanced machining skills, not for children. Therefore, whether you read the safety notes or not is your decision. However, don't blame me if you do not take the few minutes to do this and end up in the hospital. All procedures are performed at your own risk.



Engineering terms or topics are described here. You may skip these if you are only interested in the operation of the tool. Remember, though, that knowledge also always provides protection (safety). If you know what you're doing... right.



Projects: engineering/artwork projects



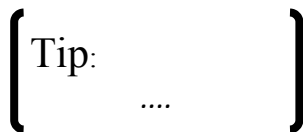
Comparison of lathe and mill operations. Most of us started with lathe work, that is, these comparisons can help gaining a deeper understanding (even of lathe work).



Summary of the Chapters. See content list for Chapter numbers.



Note specifically related to the Grizzly mill. This book focuses on the Sherline mill, but does include some comments related to larger milling machines such as Grizzly and Bridgeport systems.



Tips and tricks

The idea of using pictograms is to allow for fast browsing as well as making the book more appealing to read. Straight text is hard to digest and boring after a while.

Contents at a Glance

Part A – First steps

1. How is this book structured? – introduction..... 23
2. What is a milling machine? 27
3. What hardware do I need to get started with milling? 34
4. First things first – required safety notes – how to work safely? 39
5. The very first project on the mill – how can I get started?..... 49
6. Simple cross-slide lock - how to reduce vibrations? 55

Part B – A bit “theory”

7. Peeling an onion – cut and feed on a mill 63
8. Up and down milling 66
9. Work holding – clamping work safely for milling operations..... 74
10. Tool holding..... 90
11. Tooling 96
12. Working precisely on a mill..... 103
13. Summary of basic milling operations using an end mill 110

Part C – Working with accessories on projects

14. End mills – finishing the tool post 115
15. End mills – chuck storage rack and working with wood 118
16. End mills – drill stops 119
17. Swiveled base mill vise - milling a turning set / machining brass earrings 121
18. The mill as a drill press – machining indexing equipment..... 127
19. Dovetail cutter – adjustable gib / lathe stop 135
20. T-slot cutter – machining a toy 146
21. Fly cutter – cutting flat surfaces / lathe stop / mill lock 151
22. Boring on a mill – machine indexing equipment 167
23. Rotary table – machining a tilt table / swiveled base 173
24. Tilt table and sine vise – machining precision dovetails..... 191
25. Working with materials besides aluminum 195
26. Getting started with a larger tabletop mill (Grizzly G0720R) 201
27. Tapping attachment 212
28. Specialty form mill cutters 217
29. Selecting and mounting a DRO – digital read-out..... 220
- Appendix 231

Featured Milling Machines:

P/N 3050/3053 – Sherline’s mill column attached to their lathes, Fig. 2.1

P/N 5000/5100 – typical mill table from Sherline, Fig. 2.3

G0720R – Grizzly heavy-duty bench top mill, Fig. 2.4

Bridgeport mill – a few notes and images of full size mills, Fig. 2.2

Contents

- A few project images
- Copyrights
- Disclaimer
- Pictograms used in this book
- Contents at a glance
- Contents

Part A – First steps

- 1. How is this book structured? – introduction23**
 Sections; Chapters; Other volumes; Color vs. Grayscale prints;
 Customer corner; Customer feedback
- 2. What is a milling machine? – how to decide which one to purchase ?27**
 Cheapest Sherline mill; Milling operations; Type of milling
 machines; What is not included; Internet resources
- 3. What hardware do I need to get started with milling?34**
 Mill; Minimum tooling; Metric vs. English, DRO; Internet; Summary
- 4. First things first – required safety notes – how to work safely?.....39**
 Lathe, Mill, LASER tools
- 5. The very first project on the mill – how can I get started?49**
 Object; Steps 1 to 6; Start to machine a tool post
- 6. Simple cross-slide lock - how to reduce vibrations?.....55**
 Object; Machining a cross-slide lock; Strategies (tips and tricks);
 Backlash lock

Part B – A bit “theory”

- 7. Peeling an onion – cut and feed on a mill.....63**
 7.1 Cut and feed on a lathe

7.2	Cut and feed on a mill	
7.3	Coordinates	
8.	Up and down milling	66
8.1	Definition	
8.2	Properties	
8.3	Often found recommendations (“rules of thumb”)	
8.4	Mill vs. lathe	
8.5	Cutting conditions	
8.6	Effect on surface finish	
9.	Work holding – clamping work safely for milling operations	74
9.1	Screw-less vise	
9.2	Plane mill vise	
9.3	Drill press vise	
9.4	Shims	
9.5	Parallels	
9.6	Rotatable mill vise	
9.7	Sine vise	
9.8	Machinist jack	
9.9	Hole blocks	
9.10	Angle plates	
9.11	Step blocks	
9.12	V-blocks	
9.13	Lathe chuck adapters for mill table	
9.14	Clamp sets	
9.15	T-nuts and clamping blocks	
9.16	Collet blocks	
9.17	Internet resources	
10.	Tool holding	90
10.1	Screw-on type holders vs. Morse type holders	
10.2	Collets	
10.3	How good are end mill holders?	
10.4	Trouble shooting	
10.5	Safety concerns	
10.6	Details about small size standard taper / collets	
11.	Tooling	96
11.1	Basic tooling	
11.2	Specialty cutting tools	
	Miniature end mills; Bull nose cutter; End style of end mills;	
	Boring; Fly cutting; Keyway cutters; T-slot cutters;	
	Form milling vs. profile milling	
11.3	Internet resources	

12. Working precisely on a mill103

- 12.1 Locating the edge of a work piece – simple & cheap method
- 12.2 Datum points
- 12.3 Locating the edge of a work piece II – edge finder
- 12.4 Zero budget edge finder made in your home shop
- 12.5 Squaring parts on the mill
- 12.6 Using layout dye
- 12.7 Further internet resources

13. Summary of basic milling operations using an end mill110

Part C – Working with accessories on projects

14. End mills – finishing the tool post115

15. End mills – chuck storage rack and working with wood118

16. End mills – drill stops119

17. Swiveled base mill vise - milling a turning set / machining brass earrings.....121

- 17.1 Engineering project – cutting lathe turning sets
- 17.2 Artwork project – milling earrings and working with brass

18. The mill as a drill press – machining indexing equipment127

- Safety, Why?; Standard tool holding; Alternatives; Work holding;
- Indexing equipment; Angle scales; Project - machining a low budget mill vise

19. Dovetail cutter – adjustable gib / lathe stop135

- Form tools; Parameters; Machining options; Why dovetails;
- Measuring dovetails; Project – adjustable gib; Project – milling a dovetail slot

20. T-slot cutter – machining a toy146

- Dimensions; Procedure; T-slots in steel; Project – toy;
- Internet resources

21. Fly cutter – cutting flat surfaces; lathe stop / mill lock.....151

- Safety concerns; Fly what; How to use it?; RPM; Project – fixture made from plastic; Project – lathe stop mill lock; Operation plan; Project – plane mill vise; Trouble shooting

22. Boring on a mill – machine indexing equipment.....167

- Design; Safety; How to use it; Advantages; Alternative operations; Project – indexing tool post; Project – hole punch; Radius cutter; Internet resources

23. Rotary table – machining a tilt table and swiveled base173

- 23.1 Options to “rotate something” or how to select the right accessory?
- 23.2 What can you do with a rotary table?

- 23.3 How are rotary tables designed?
- 23.4 Using a rotary table – first project
- 23.5 Project example – machining a swiveled base
- 23.6 Project example – machining a tilt table
- 23.7 Project example – machining a flange (round corners)
- 23.8 Machining a wheel with spokes
- 23.9 Note: cutting gears with a rotary table – mounting rotary table vertically
- 23.9 Internet resources
- 24. Tilt table and sine vise – machining precision dovetails191**
 - 24.1 Options to “tilt something” or how to select the right accessory?
 - 24.2 Using a tilt table or sine vise – “theory”
 - 24.3 Project example – machining dovetails with a sine vise
 - 24.4 Project example – machining dovetails with a tilt table
- 25. Working with materials besides aluminum195**
 - 25.1 Plastics
 - 25.2 Leadloy or 12L14 (steel), cold drawn
 - 25.3 Working with steel – plain steel (hot rolled)
 - 25.4 Brass
 - 25.5 Wood
 - 25.6 Milling gray cast iron
 - 25.7 Carbide end mills
- 26..Getting started with a larger “tabletop” mill (Grizzly G0720R)201**
 - Home delivery of heavy equipment; ...part II; Work bench;
 - Cleaning the mill; Loose handle on mill?; Running spindle in;
 - Basic features and controls of the “heavy duty benchtop mill”;
 - Trouble shooting (!), Lifting a heavy mill, Warrantee
- 27. Tapping attachment.....212**
 - Requirements; Why do taps break?; How does a tapping attachment work?; How to use the attachment on a Grizzly mill?
- 28. Specialty form mill cutters.....217**
 - 28.1 Bevel cutters
 - 28.2 Tapered end mills
 - 28.3 Indexable form tools – dovetail cutters
 - 28.4 Radius cutting endmills
- 29. Selecting and mounting a DRO – digital read-out.....220**
 - 29. 1 DRO – Digital read out for a lathe
 - 29.2 Mounting a DRO on a mill - example / case study
- Appendix231**

Web links and software; Interesting web sites about milling;
Specs of the mills; Adding a DRO to Sherline's mill table; Larger
hand wheels; Better DRO mounting hardware; Where is metal
stock purchased?, Sources for Sherline accessories; Index;
Acknowledgements; About Lathe City

Back cover

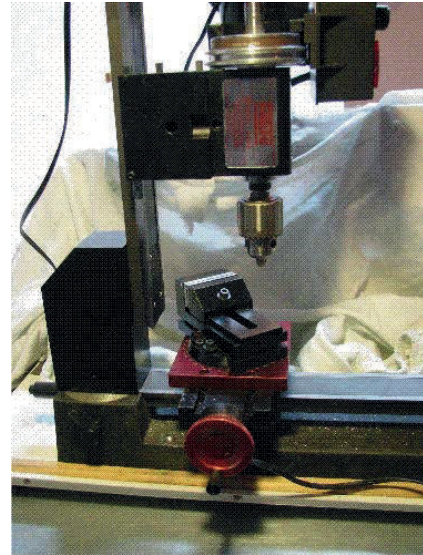
Synopsis

Book 4

Part A:

First

steps



Sherline's mill attachment to their lathe and accessories are shown

1. **How is this book structured - introduction**
2. **What is a milling machine? - how to decide which one to purchase ?**
3. **What hardware will I need to get started with milling?**
4. **First things first - required safety notes – how to work safely?**
5. **The very first project on the mill - how can I get started?**
6. **Simple cross-slide lock - how to reduce vibrations?**

Index

A

Adjustable gib 56, 132, **140**
Angle scales **237**
ANSI 39, 40, 95, 125
ANSI code for inserts 125
Angle plate 84, **199**
Automatic tapping 212

B

B18 128
Brass 195
Bed-type milling machines 30
Belt mill systems 30
Backlash correction 57, 59
Boring 99, 167
Boring head 167
Boring bar 167
Brinell 195
Bridgeport mill **29**
Bull nose end mill 98
Buddy system 39

C

Chuck storage rack 118
Cut 63
Chamfer angle 135
Compound slide 138
Column-and-knee milling machines 30
Cross-slide lock 55
Coordinates 65
Conventional milling 66
Climb milling 67
Clamping sets 86
Collets 91
Collet blocks 89
Composite part 161

Convex-radius mills 99
Cellular manufacturing 162
Corner radius 186
Carbide end mills 197
Center cutting end mill 97
Clutch 205, 213

D

Datum points 103
Drill stops 119
Drill press 64, 77, 127
Drill press vise 77
Drill mill 30
DRO 220
Digital Readout, DRO 220
Down milling 66
Dovetail slot 141
Dovetail joints 137
Dovetail cutter 135
Degree of freedom 168
Down milling 67
Dial indicator 106
Dykem 109

E

External key way 115
Earrings 126
Edge finder 104
End mill holder 92

F

Fast change tool post 115
Face milling 151
Form tools 100
Female dovetail 138
Face width 135

Firearms 32
Face milling 29, 98, **146**
Flutes 92, **95**
Feed 63
Fly cutter 151
Face mill 151
Form milling 29
Flange 186
Friction clutch 213

G

Grizzly Mill 201
Grizzly mill specs 212
Gib 56, 140
Gear head mills 30
Group technology 162
Grey cast iron 198

H

Hammer it 79
Handwheels 104
Horizontal mill 31
Headstock drilling 128
Hole blocks 82
Hogging 96
Hardness **188**, 191

I

Indicating 82, 105
Internal key way 115
Indexing equipment 125
Interrupted cuts 51, 70, **148**

J

K

Keyway 52, 167

Keyway cutter 96, **98**

L

Lathe stop 132
LASER protractor 128
Low budget mill vise 129
Locating 102
Layout Dye 106
Leadloy 188

M

Machinist jacks 81
Mill vise 74
Measuring dovetails 134
Male dovetail 134
Miniature holes 125
Mill column 27
Minimum tooling 34
Morse type holders 93
Morse taper 93
Mill drills 199

N

Nylock 193, 96

O

Opitz code 155
Operation plan 151

P

Parallels 77
Profile milling 99
Plane mill vise 157
Process plan 155
Propagation of error 102
Parts family 155
Plastics 188

Power tapping 201
Pivot pin 105

Q

R

Radius cutter **165**, 214
Rotary table 167
R8 collet 90, 94
Roll-in milling 70
Rotatable mill vise 79e
Routing sheet 155
Ripping 96
R8 to MT 202

S

Step blocks 84
Scales templates 217
Strap clamp 82, 84
Sine bar 80, 81
Swiveled base 79
Shank 95
Sherline mill 27
Sherline mill specs 212
Side milling 108
Slotting 29
Slip clutch 202
Slab milling 29
Spiral fluted taps 201
Safety 39
Spindle rotation 63, 197
Shims 76
Sine vise 80, 184
Screw-on type holders 99, 126
Squaring parts 104, 106
Shell end mill arbor 94

T

Tapping 201
Taylor tool life equation 188
Tool post 113
T-slot cutter 142
Turning set 119
Telescopes 138
Tilt table 184
T-slot adapters 85
T-nuts 86, 87
T-slot cutter 142
Toy 144
Twist drills 93

U

UNIMAT lathe/mill 92, 96, 127
Up milling 66

V

Vise 73
Vertical mill 27, 94
Vibrations 55
V-block 84

W

Weldon shank 96
Wiggler 102
Working with wood 116, 181, 190
Ways 133
Worm drive 169
Worm gear 169
Worm 169
Woodruff cutter 98

X

X-coordinate 65

Y

Y-coordinate 65

Z

Z-coordinate 65

55.5° 136

12L14 195

C1018 196

Acknowledgement

Some Chapters of this book were proofread by Scribendi (Canada), a commercial proof reading service, which did cost me a fortune, but hopefully reduced the number of typos.

Commercial proof readers are typically located at English departments rather than engineering departments. Therefore, I am glad that William D. Gardner (CA) was so kind to run a 2nd proof reading loop. I met Bill as a customer and got to know him somewhat via e-mail. He is also a hobby machinist and owns a small part-time business. His suggestions are highly appreciated, and the number of typos was further reduced thanks to him.

2nd edition

I did fix up some smaller issues that in the meanwhile came up and smoothed out some sections. When working longer with a larger mill the perspective of some operations changes, perhaps to the better end. A few more figures and subchapters were added.

The biggest change perhaps, in the meantime, I do offer the book with a professional paperback binding.

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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 Inst. 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 (German 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 the adsorption dynamics and kinetics of small molecules on nanostructured catalysts. He is not a professional machinist by training. However, in 2012 his hobby developed into a small part-time business. LatheCity sells currently books about metal working including software tools as well as accessories for mills and lathes: everything that's fun to make and may find customers. The strength of the business is custom designed/customized pieces.

Other LatheCity books are available:

Vol. 1: Basic Lathe Operations (2nd edition)^{S,U}

Vol. 2: Working with Lathe Accessories^S

Vol. 3: Poor Man's CNC Lathe^{*}

Vol. 4: Tabletop Milling (2nd edition)^{S,G}

Booklet 1: Thread Cutting on a Lathe (3rd edition)^{S,U,*}

Booklet 2: Working with Exotic Materials on a Lathe and Mill (3rd edition)^{*}

Booklet 3: Summary of Basic Metal Lathe Operations^{*}

Booklet 4: Artwork Projects on Benchtop Lathes and Mills^{*}

Volumes in preparation:

Vol. 5: Tabletop lathes^{}*

Vol. 6: The CNC Benchtop Lathe^S

^S: Featuring Sherline systems

^U: UNIMAT

^G: Featuring Grizzly systems

^{*}: Model independent

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Tabletop Milling

Most of us started our hobby with work on a lathe. However, the shapes than can be cut are limited. For example, basic accessories are simple to machine if a mill is at hand. Even a hobby machine shop is incomplete without a milling machine. Fortunately, quite sturdy tabletop mills are available at acceptable costs. However, none of these come with an extended manual. Mill work, on the other hand, is trickier to learn than turning. Thus, a book that describes not only the simplest operations would be useful.

Safely Working with Tabletop Systems IV
Volume 4 – Tabletop Milling (2nd edition)
ISBN-10: 0991153022
ISBN-13: 978-0-9911530-2-2

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