METALWORKING BOOK ONE

Techniques
Engine Turning Made Easy
Improve Your Mill/Drill Machine
Greater Precision for Scroll Chucks
Lathe Tips to Speed Setups
Squaring the Circle
Lathe Shear Pin Modification
Tapers on Oblong Pieces
Basic Metal Finishes
An Untapped Source for Cast Iron

Lathe Accessories
Old Lathe Collet Adapters
A Small Quick-change Tool Post
Automatic Carriage Stop
A Pipe Center for Your Lathe
Adjustable Pop-stop for a Myford Lathe
A Reverse for a Small Lathe
A Quick-change Gearbox for the Atlas 6” Lathe
Make Your Own Collet Chuck
A Shop-made Expanding Mandrel
Steady Improvement
A Ram Tailstock with a Long Lapped Hale
A Lathe Four-way Tool Turret
Lathe Threading Stop
A Change-Gear Bracket
Cross-feed Lever
Can You Handle It?
Reversible Lathe Die Holder

Milling Accessories
Making a Fly Cutter
Surface Grinding on a Vertical Mill
A Vernier Dividing Head
A Simple Rotary Table
Button V-Block
Making a Milling Saw Arbor
Add an Improved Downfeed Scale
Saddle V-Block
Modifications to Mill/Drill Attachments
A Milling Column
Two Handy Jigs
A Supplementary Tilting Milling Table

Shop Improvement Projects
GripsAll Indicator Base
A Rocking, Swinging Grinder Table
A Band Saw Speed Reducer
A Double-ended Dial Indicator Adapter
Making a Cylindrical Square
A Parallel Arm Scroll Saw
Machine Tools for Woodworking
Belt Sander
A Four-Station Grinder
Model Builder's Hand Vise
A Broad Range Wing Divider
The Presentation Swarf Collector
Make a Quickie Hardness Tester
A Depth Gage for an Imported Drill Press
Drill Grinder
Rapid Production of Dividing Head Index Plates
Better File Handles
Adjustable Try Squares
A One-Evening Project Brass Hammer
Two designs for Welding Tables
Unorthodox Mill/Lathe Grinder

**Hobby Projects**

Curved Spoke Flywheel
A Scale Model 32-Pounder Seacoast Cannon
A Huff 'n Puff Engine

**METALWORKING BOOK TWO**

**Techniques**

Taper Shank Turning Made Easy
A Mill-drill Repair
Making Up Band Saw Blades
The Mathematics of a Dividing Head
Milling Pockets
Single Thread Worm Drives
In the Home Machine Shop
Simple Tooling for Model Size Shoulder Bolts
Shower Power

**Lathe Accessories**

A 5C Collet Closer for your Shen-Wai Lathe
Risers for a 6" Atlas or Craftsman Lathe
A Rolling Tailstock Arbor
Spindle Driving Handle for Emco Super II Lathe
A 5C Collet Fixture Tailstock
Improving the Quick-change on a Small Lathe
Making a Spring-loaded Center
Square Collets
A Tailstock Tap and Die Holder
Bed Extension for Atlas and Craftsman Lathes
Single Wheel Knurling Tool
Stay-put Lathe Carriage Lock Wrench
Lathe Carriage Way Covers
A Lathe Rack Repair Using a Single Point Tool
Power Feed Ball Turning Fixture from Scrap Box Materials
Adjustable Pop-stop for the Myford Lathe
Zero Set Micrometer Dial

**Milling Accessories**
- A Small Boring Head
- Z-axis Downfeed for a Mill-drill Machine
- An Economical X-axis Readout
- Coaxial Indicator
- Spindle Lock for a Mill
- Milling Cutter Arbor
- Variations on a Button V-block
- Tips and Tricks

**Shop Improvement Projects**
- A Coolant Tank and Pump
- On the Cutting Edge
- Soft Faced Hammer
- A High Efficiency Screw Press
- A Die Stock Plus
- A One-handed Depth Gage
- A Small Sheet Metal Brake
- Indicator Clamps for Lathe Beds
- Adjustable Angle Plate
- Conservative Coolant Applicator
- Quick and Easy Electric Furnace
- A Shop Hot-tank
- Slot Anvil Depth Gage "Mike"
- Height Gage Conversion and Attachments
- A Universal Belt Tensioner
- Wire Clamps – A Unique Third Hand
- Load Cell (Hydraulic Scale)
- Tapping Block
- A Single Beam Trammel
- A Small Tool and Cutter Grinder
- Fastener Gauge
- A Glass Cutting Helper for your Drill Press

**Hobby Projects**
- Elliptical Rotary Engine
- Give Metal Spinning a Whirl!
- Spinning Your Own Oil Can
- A Knife Blade from Scrap
- Conversation Piece Two-headed Bolt with Nut
Two-cylinder Oscillating Steam Engine
Eight-tube Wind Chimes
Finger Treadle
A "Skypod" for the Traveling Photographer

METALWORKING BOOK THREE

Techniques
Conversion to Three-phase Power
Expanding Your Arbor Press Capability
Holding Thin Material for Machining
Machining an Angle Plate
The Asian Connection
Drilling Accurately Centered Cross-holes In Round Stock
Chatter and the Cutoff Blade
Machining Internal Threads - A Different Approach
On The Subject of Stiffness and Overhang
The Rise and Fall of the Taiwanese Band Saw
Truing the Column of a Mill-Drill Machine
Recycling a Mirror
Turning Square Stock Round
A Welding Tip

Lathe Accessories
A Home-built Gearbox for Your Atlas 6" Lathe
Lever Operated Tailstock
A Low Cost Adjustable Counterbore
A Quick-Acting Tailstock Lock
Drip Oiler
Tailstock Die Holder
An Easy Way to Make a Multi-Position Tool Post
Faceplates for Gap Bed Lathes
A Lever Tailstock Feed for the Center Lame
A Lever-operates Tailstock Clamp For Atlas Type 12” Lathes
Making a Set of Boring Bars
Reversible Lathe Carriage Stop
Spindle-mounted Collet Attachment for 12” Atlas Type Lathes
A Chip Breaker

Milling/Drilling Accessories
Two DROs Under $125 Per Axis
Mill Vise: Rework for Precision
Instant Soft Jaws for the Vise
Economy Substitute for a Bridgeport
Mill/Drill Speed Reduction
Reamers for Odd Sized Holes
X and Y Scales for the Mill
Getting Rid Of Chips on Your Band Saw

Shop Improvement Projects
Drill Sharpening Fixture and Point Splitter
Making an Index Plate For a 4-3/4” Center Height Dividing Head
End Mill Sharpening Holding Fixture
Hot Dip Tool Protection
Mini Square Hole Punch
A Ring Furnace
Rules - Differential and Difference
Tool Tower
A Diamond Dresser
Flare Nut Adapter Tool
Building a Band Saw
The Dedicated Topper
A Great Little Clamp
Internal-external Center Finder
A Heavy Duty Belt Grinder
An Automatic Punch
A Rugged Tap Wrench
A Very Handy One-inch Height Gage
A Precision Metal Stamper
Drop-by-drop Cutting Fluid
Boring Thin-wall Tubing

**Hobby Projects**
From Shears to Brake: A Boxing Story
A Novel Tripod Ball Head

**METALWORKING BOOK FOUR**

**Techniques**
Sphere Machining
Aligning a Lathe
Duplicating Radii
Adapting a Palmgren Drill Press Vise for Use on Sherline Machines
Methods for Success: Indicating and “Picking Up”
Machinable Angles
Plus or Minus? Tolerancing
Modifications to the Sherline Mill
A Motor Drive Modification for the Sherline Mill and Lathe
Winding a Coil for a Magnetic Chuck
V-blocks in a Vise
Shoptask Modifications

**Lathe Accessories**
A Lathe Milling Attachment
A Mini Mill Attachment
A Two-Jaw Lathe Chuck
A Lathe Boring Bar Set
A Shop Built Taper Attachment for Your Atlas 6” Lathe
An Opensided Toolholder
Last Pass Indicator
P-Style Upside Down Partoff Blade Holder
Lathe Adapters
Modifications to the Atlas 6” Lathe
Make a Thread Dial for your Lathe

**Milling/Drilling Accessories**
- Turn-O-Mill
- A Carriage Stop for the Mill
- Milling Machine Power Feed
- A Milling Machine Vertical Power Feed
- An Inexpensive Power Feed for the RF-30 Mill/Drill
- Make Your Own Edge Finder
- Spindle Clamps for a Mill/Drill
- Corner Locator
- A Poor Man’s Electronic Edge Finder
- Universal Drill Press Hold Down
- Timesaver Clampset
- A Milling Table

**Shop Improvement Projects**
- A Pantograph Label Maker
- Home Sandblasting Cabinet
- Farrier’s Forge
- A Compact Carousel Tool Rack
- Two Small Presses
- Build a Metal Slicer
- An Abrasive Belt Slitter
- An Elegant Long Reach Thickness Caliper
- A 6” Capacity Precision Height Gage
- An Inexpensive Air Compressor
- A Versatile Bubble Protractor
- Band Saw Blade Grinder
- A Hole Punch for Thin Material
- A Pencil Attachment for the Universal Surface Gage
- A Machinery Oil Gun for Under $10
- New Uses for Old Tools
- Ho-hum- Another End Mill Sharpening Jig
- Three Ideas for a More Efficient Shop
- Tap Wrench Guide with Depth Gage

**Hobby Projects**
- The Tripod Eliminator: Making a Stand for Better Pictures

**Techniques**
- Hole Locating
- Using the Four-Jaw Chuck
- Anaerobic Adhesives for Machinery

**METALWORKING BOOK FIVE**
Metric Thread cutting with an Eight tpi Lead Screw
Turning Tapers in the Lathe
Measuring Angles
An Unorthodox Spur Gear
A Second Lease on Life
Multi-Patters – Economy in Numbers
A Simple Way to Measure Inside Diameters
One Thing Leads to Another

**Lathe Accessories**
- A Simple Lathe Mill
- Keyway Shaping – A Lathe Attachment
- Tool Height Indicator for the Lathe
- A Clutch for your Lathe
- A Keyseat Cutter for the Lathe
- A Multi-boring Block for a 9” Enco Lathe
- An R8 Lathe Collet Holder
- A Low-cost Quick-change Tool Post

**Milling/Drilling Accessories**
- A Fine Downfeed for the Jet Mill/Drill
- Life with a Mill-Drill
- Another Power Feed Drive for a Mill
- For Unobstructed Milling, Keep a Low Profile
- Power Table Drive for a Mill-Drill Machine
- Workholding for an Asian Mill-Drill
- Spindle Clamps for Imported Mill-Drills

**Shop Improvement Projects**
- Electrical Phase Converter for Shop Motors
- Locking Pliers Jerk Puller
- Hand Mill Restoration
- A Tool and Cutter Grinder
- A $50 Power Table Feed from Odds and Ends
- A Set of Precision Balancing Ways
- Making Ball Handles – A New Approach
- A Shadowgraph
- An X, Y Stage for the Home Constructor
- A Lamp Base for the Shadowgraph
- A Three-Jaw Chuck Center
- A Tap
- Spindle Oscillator for Sanding and Honing
- A Tool Block Carousel
- A Simple Stepper Motor Drive
- Zap an Import: Build it Yourself
- Lathe Bit Grinding Jig
- A Mathematical Approach to Knurling
- Turn Scrap into Workstands
- An Edge Finder
Hobby Projects
Atkinson Cycle Engine
A Homemade Wheel Balancer
A Freedom Tripod Head
Construction of Pottery Kilns (Heat-Treat Furnaces)

METALWORKING BOOK SIX

Techniques
Forming Scale Bolts and Nuts on the Lathe
A Word for Loctite
Inertia Welding
Improved Tooling for Threading and Boring with the Unimat DB200 Lathe
Turning Corners with a Lathe – Setting up a Machine Shop in a Walkdown Basement
Making Gears Using a Hob
Using the Milling Machine as a Copy Stand
Variable Frequency Drive Applications
Indicating a Bridgeport Head
Reversing Rotation on a Single Split-phase Motor
Drilling Holes in Hard Material

Lathe Accessories
A Milling Attachment for a Small Lathe
A Quick-change Tool Post
A Dividing Head for the Taig (Taig/Petrol) Lathe
Lathe Index and Crank
Update and Improvements for the Craftsman 109 Series Lathe
Building Your Own Collet Chuck
Automatic Carriage Stop for a 6" Atlas Lathe
A Tool Post Grinder
Adding Muscle to your 9" x 20" Bench Lathe
A Metal Lathe Mount for a Laminate Trimmer
Taiwan Lathe Problems
Carbide Cutting Tools for the Lathe
Improving the Lathe Steady Rest
A Simple Indexing Attachment for your Lathe
A Quick-release Tailstock Lock for Small Lathes
From Pain to Pleasure
An Adjustable Cross-slide Nut
Power Drive for Lathe Chucks
Follower Rest

Milling/Drilling Accessories
Sawfeed
Rear Tool Post (Reversible) for Atlas or Craftsman 6" Swing Lathe
Rong Fu Headlock
Making a Small Split Collar
Mill-drill Power Feed
Quick Quill Stop
Addign Some Stops to Your Sherline Mill
Milling Head Alignment Wheel

**Shop Improvement Projects**
A Magnetic Base
Arbor Press
Tapping Station
How Healthy is Your Shop?
Die Maker Buttons
Fixture to Hold Small Pieces
Make a Tap Center
An Edge Finder
A Riveting Press
Handy Shop Odds and Ends
A Chuck Lifter
Getting a New Vise in Shape
Expanding Mandrels
Build Your Own Geared Rotary Table
A Direct Reading SFPM Adapter for the Common Speed Indicator
The Universal Lamp
An Index with R8 Collets
A Magnetic Back for a Dial Indicator
Two Tools for Shop Angle Measurements
Quick-change Indicator Holder
Single-phase to Three-phase plus Speed Control
Equipment Lights
The $20 Drip Coolant System

**Hobby Projects**
A Micro Drill Press
Lemon Squeezer
Random Orbital Sander
Build a Circle-cutting Attachment

**PROJECTS ONE**

**Techniques**
Milling on a Drill Press
Conserving Cutting Oil
Modifications to the Machinex 5 Lathe
Finishing Contoured Metal Castings
Sharpening Milling Cutters
A V-block Drill Guide
Handling Large Bore Tubing
Simple Chucks to Protect Finished
Versatile Fastener
Improving Your Lathe with a Dial Indicator
A Built-in Drill Guide
Balls and Bull Noses
Practical Design hints-Machining
Practical Design hints-Assembly
How to Get Things in Line Again
Drill Chuck Adapter
A Simple Hold-down Device
Chuck Key Retainer
Machining Your Own Spur Gears
Faceplates and Such
Boring, Fly cutting & Spot Facing with Rotating Cutters

**Lathe Accessories**
- Lathe Milling Attachment
- Micrometer Dial for the Tailstock
- Radius Turning Attachment
- A Simple Die Filer
- Improvements for the Atlas 6" Lathe
- Four-Jaw Independent Lathe Chuck
- Milling Attachment for the Lathe
- Swarf Trays for the Myford Series 7 Lathes
- A Tool post Grinder for Your Machinex 5 or Unimat Lathe
- Step Collets
- A Lathe Carriage Stop With Dial Indicator
- A Compound and Ram Tailstock
- A Simple Lathe Dog
- A Taper Attachment for Your Machinex 5 Lathe
- An Accessory Table for Your Lathe

**Drill Press Accessories**
- Sensitive Drilling Attachment
- Quick-Adjust Depth Stop
- Drill Press Table
- A Drill Press Improvement
- Build a Precise Topper
- Tool-less Hold-down Bolt

**Shop Tools and Improvements**
- Building Your Own Dividing Attachment
- No Bounce Soft Hammers
- Two Machine Tool Stands
- Micrometer Stand
- A 20-Ton Hydraulic Press You Can Build
- A Drafting Table You Can Build for Less Than $20
- Boring Head
- Test Indicator
- Molded Tool Storage Units
- Inexpensive Fitted Instrument Case

**Hobby Projects**
- A Modified “Wedge” Oscillating Engine
- A Pocket Size Camera Tripod
THE GUNSMITH MACHINIST
By Steve Acker

Aligning Scope Mounts
A Travel Measurement Plate
A Barrel Bushing Jig
Installing Sight Beads
Cutting a Rifle Crown
Enlarging the Ejection Port
A Fixture for Milling the Recoil Lug
Hammer Work
Making a Dovetail Front Sight
Sight Holding Fixtures
A Gunsmith’s Lathe Helper
Installing a Front Sight
Making Rifle Bedding Pillars
Milling Grasping Grooves
Moving a Firing Pin Hole
Trigger Job Pins
A Barrel Vise
Centering a Barrel Bore
Chambering a Rifle Barrel
Cutting Rifle Barrel Threads
Drilling and Tapping for Scope Mounts
Finding and Making Gun Parts
Installing a Locking Base Pin
Optimizing Revolver Throats
A Rear Sight Shifter
Replacing an Integral Front Sight
Stronger Scope Installation
An Unusual Scope Mount
Installing a Screw-in Choke Adapter
Removing a Broken Screw
Installing a Pre-threaded Short Chambered Rifle Barrel
A Post-ban AR-15 Muzzle Brake

Other Gunsmith Topics
Hot Bluing Steel
Building a Target Rifle

General Machining Topics
Checkering in the Mill
Steve Makes a Mistake
Handy File Cleaner
Making Pin Punches
Cutting Steel with a Circular Saw Blade
A Simple Phase Converter
Upgrading to Variable Speed DC
Making and Using a Bench Block
Tap Wrenches from Scrap
The Mirror-faced Hammer
A Mill-drill Repair
A 5C Collet Fixture Tailstock
Machining an Angle Plate
A Welding Tip
Making a Hardened Steel Washer
Personal Safety and Machine Grounding
A Low-cost Bead Blaster
A Wooden Work Support in the Mill
Building a Hydraulic Press Twice
A Knife Blade from Scrap
Welding up a Meat Smoker

Projects One

Techniques
Milling on a Drill Press
Conserving Cutting Oil
Modifications to the Machinex 5 Lathe
Finishing Contoured Metal Castings
Sharpening Milling Cutters
A V-block Drill Guide
Handling Large Bore Tubing
Simple Chucks to Protect Finished
Versatile Fastener
Improving Your Lathe with a Dial Indicator
A Built-in Drill Guide
Balls and Bull Noses
Practical Design hints-Machining
Practical Design hints-Assembly
How to Get Things in Line Again
Drill Chuck Adapter
A Simple Holddown Device
Chuck Key Retainer
Machining Your Own Spur Gears
Faceplates and Such
Boring, Flycutting & Spot Facing
with Rotating Cutters

Lathe Accessories
Lathe Milling Attachment
Micrometer Dial for the Tailstock
Radius Turning Attachment
A Simple Die Filer
Improvements for the Atlas 6” Lathe
Four-Jaw Independent Lathe Chuck
Milling Attachment for the Lathe
Swarf Trays for the Myford Series 7 Lathes
A Toolpost Grinder for Your Machinex 5 or Unimat Lathe
Step Collets
A Lathe Carriage Stop With Dial Indicator
A Compound and Ram Tailstock
A Simple Lathe Dog
A Taper Attachment for Your Machinex 5 Lathe
An Accessory Table for Your Lathe

**Drill Press Accessories**
Sensitive Drilling Attachment
Quick-Adjust Depth Stop
Drill Press Table
A Drill Press Improvement
Build a Precise Topper
Tool-less Holddown Bolt

**Shop Tools & Improvements**
Building Your Own Dividing Attachment
No Bounce Soft Hammers
Two Machine Tool Stands
Micrometer Stand
A 20-Ton Hydraulic Press You Can Build
A Drafting Table You Can Build for Less Than $20
Boring Head
Test Indicator
Molded Tool Storage Units
Inexpensive Fitted Instrument Case

**Hobby Projects**
A Modified “Wedge” Oscillating Engine
A Pocket Size Camera Tripod
The Stirling Hot Air Engine

**PROJECTS TWO**

**Techniques**
Reconditioning a Lathe
Rapid Machine Tapping Drill Press
Machining Thin Disks and Rings
Swaging Down a Copper Pipe Elbow
Some Pointers on Rotary Table Work
Making the Home Shop Pay
Keeping the Universal Chuck Accurate
Fear Neither Sphere Nor Hemisphere
Turning Ornamental Shapes
Measuring Pitch Diameter
Square References, Their Design, Construction and Inspiration
Solving a Weighty Problem
Getting the Most from Your Center Gage
and Other Threading Gages
A Cutting Tool for Machining Aluminum

*Lathe Accessories*
Temporary Self-locking Stub Mandrel
A Toolpost Grinder
Tailstock Die Holder
Lathe Chip Shield
A Large Steady Rest from the Scrap Pile
A Milling Machine for Your Lathe
Center Test Indicator
A Drill Holder for Your Lathe
Modifications to a Maximal V-8 Lathe
Construction & Use of the Lathe Carriage Stop
A Toolpost Problem Solver
Micrometer Attachment for Lathe Lead Screws
Double the Capacity of Your Lathe
Lathe Carriage Oiler
Build Your Own Faceplate
Spindle Stop for a 10-K

*Drill Press Accessories*
A Drill Press Tapping Tool
Column Storage Box for a Drill Press
Five-layer "Lazy Susan" Drill Index
Spacing Drill Guide Makes It Easy
V-Blocks Quickly Made

*Milling Accessories*
Rotary Milling Table
Milling Machine Chip Shield
Making an Automatic Feed for a Milling Machine
Clamping Work to the Mill Table

*Shop Tools & Improvements*
Conversion of a Gear-driven Shaper to Hydraulic Drive
An Automatic Parallel
Grinding Wheel Arbor
Oxy-fuel Cutting Guide Jig
A Temporary Aluminum Fence
A Steel Beam Trammel
End Mill Sharpening Fixture
Setting Up a Home Foundry
Metal Forming Brake Attachment
“Slow Poke” Small Keyway Broach
Toolholder Retainer
Toolmaker’s Clamp
Adjustable Parallels
Some Light on the Subject
Drawing up a Bargain
Sliding Band Saw Vise
Building a Portable Vise Bench
Screwdriver Blade Grinding Jig

**Hobby Projects**
- A Firing Model Napoleon Field Gun
- Build an Electric Gun
- Build a Gimbaled Ship's Lamp

**PROJECTS THREE**

**Techniques**
- How to Deal With Cranks and Eccentrics
- Of Auctions and Industrial Sales
- Helical Springs
- Some Electric Motor Troubles
- Watch Repair in the Home Machine Shop
- Freehand Twist Drill Sharpening
- The Extremes of Space
- Measurements for Taper Turning
- Sharpening Small Drills
- The Selection, Connection, Reversing and Repair of Electric Motors
- Cellulose Tape - Silent Magic
- Quick Threading & Tapping in the Lathe
- Indexing on Small Lathes
- More Reconditioning a Lathe
- Some Facts on Dial Indicators
- Shrink and Expansion Fits
- Facing Thin Pieces
- Jaws
- Broaching with your Lathe
- Updating Flat Belt Driven Equipment
- Cutting Bastard Threads on a Quick-change Lathe
- Cutting a Thin Gear
- Screw cutting Threads
- The Art of Soldering

**Lathe Accessories**
- Improved Atlas 6" Lathe Gear Cover
- Make your own Centering Guide
- Eliminate Headache Potential
Collets for Your Lathe
A Spindle Work Stop
Machining Aids for a Machine Lathe
Lathe Chuck Backstop
Wiggler Bar and Test Bar
Using Unimat SL Chucks and Collets
Multi-Purpose Block
Making an Angle Plate in the Lathe
Spindle Nose Collet Chuck for the 6" Atlas Lathe
Radius Turning Tool
From My Shop to Yours
An Accurate Taper Attachment for Under $500
Threading Dial Indicator for the Lathe
A Multiple Tool Post for 6" Lathes
A Lathe Thread Cutting Stop
Adjustable Traveling Dial Indicator Rod
A Lathe Tool Setup Gage
A Chuckboard

Milling Accessories
The Installation of a ShopTronis
Milling Machine DRO
Tooling for Unimat-type Drilling Milling Machines
A Power Quill Feed Attachment for Milling Machines 10” “Super Colossal” Fly Cutter
Extend the Capacity of Your Milling Machine

Drill Press Accessories
A Slow Speed Drill Press Attachment
Drilling Accurate Holes

Shop Tools and Improvements
A Twin-beam Trammel
A Vise for Small Parts
A Small Demagnetizer/Magnetizer
Table Covers and Tool Trays
Simple Centering Gage
Scroll Saw
A Cutter Bit Grinding Block
A Make-do Vernier Height Gage
A Rotary Welding Table
Parts Cleaner
Drop Cord Caddy
Build a Cutter Bit Grinding Block
Brass is Beautiful
40-Ton Hydraulic Arbor Press

Hobby Projects
A Machinist's Desk Lamp

PROJECTS FOUR
Techniques
Renewing Half Nuts
Lathe Cutting Internal Keyways
Otis Makes an Accurate Final Cut
The Color of Steel
Osborne's Four Steps to Center
Two Steps to Center
Machine Cutting Speeds
Single Point Cutting of Coarse Internal Threads
Two-Sphere Gage for Measuring Root and Pitch Diameters
Drilling Steam Passages and Tangents
Gear Driven Shapers
Using Carbide Turning Tools
Grinding and Lapping with Diamond
Economical Large Hole Drilling
Gear Repair
Buying Used Machine Tools
A Special Breed
Diamond Tool Efficiency
Reducing Tap Breakage
The Surface Grinder
Using a Vertical Band Saw

Lathe Accessories
Carriage Multi-Spot
A Lathe Cabinet/Stand
Boring Bar and Toolholder for Compact 5
Tooling for the Micro Machinist
$100 Digital Readout
Converting a Lathe to Cut Metric Threads
A Center-mounted Drill
Lathe Carriage Dial Indicator
An Assist from the Forge
Compound Rest Lock
Making the Lathe Safer
A Feed Lever for a 10-K
Two Accessories for the Atlas 12" Lathe
A New Cutoff Tool

Drill Press Accessories
Small Hole Saws
One-evening Projects

Milling Machine Accessories
Tool Plate
Mufti-Stand
Accurate Quill Depth Control for Mill/Drills
A Mill-Drill Stand

Shop Improvement Projects
A Sensitive Level
A Plastic Dip Pot
Cutting Torch Contour Guide
Handy Deburring Tool

**Foundry**
- Investment Casting
- Patterns and Molding Procedure
- A Small Melt Furnace
- Making Identical Patterns for Multiple Lost Wax Castings
- Home Shop Metal Melter

**Hobby Projects**
- A Brass Kaleidoscope
- Sentinel
- Auxiliary Outboard Motor Bracket

**PROJECTS FIVE**

**Techniques**
- Lathe Operations on a Vertical Mill
- Poshin' Up a Taiwanese Lathe
- Remounting a Four-jaw Chuck
- Electric Discharge Machining (EDM)
- Stainless Steel Fundamentals
- Heat Treating Basics
- On Preventing Bloodshed
- Otis Stops the Chatter
- Cast Iron Repair
- Confessions of a Junkyard Motor Junkie
- Otis Measures Across Backlash
- Low Range Ohmmeters for Electric Motors
- A Blacksmith Extraordinaire
- Drilling Multiple Holes in Line
- Teeth for Rotary Cutting Tools
- Dial Indicators - Dial Test Indicators
- Density, Volume, Dimensions = Weight

**Lathe Accessories**
- A Larger Steady Rest
- Out-of-the-Way Storage Where You Need It
- Lathe Carriage Stop
- A Useful Follower Rest
- A Fixture Plate for Lathe or Mill
- Topics in Micromachining
- Rule Guide for Easier Layout

**Milling Machine Accessories**
- Accessories for a Rotary Table
- Soft Vise Jaws
An Indexing Device
The Rotary, Dual Cross-slide Drill Press and Milling Machine Table
Table Square
A Mill/Drill Stand
A Tapping Guide for a Unimat
Small T-slot Nuts
Surface Grinding on the Drill Press
Keeper of the Key

Shop Improvement Accessories
Making and Using a Bench Block
Band Saw Transmission
Flame Cutter
A Pulley Puller
A Simple Phase Converter
Building the Universal Pillartool
A Hand-operated Plastic Injection Molding Machine
A Mirror-faced Hammer

Hobby Projects
An Easily Built Free Pendulum Clock
Toggle-link Operated Can Crusher

PROJECTS SIX

Techniques
Turning Short Tapers on a Mill
Checkering in the Mill
Cutting Irregularly Shaped Holes
Basement Rust
Ball Turning on the Mill
Steven Makes a Mistake
Starting Turning
Cerro Alloys Aid in Machining Irregular Parts
On the Use of Threading Dials for Cutting Metric Threads
Knurls and Knurling
Removing Broken Screws and Studs
Cutting V-notches
Skipping
Aluminum Fundamentals
Thoughts on Selecting Vertical Mills
Vacuum Up Those Chips!
Taper Turning

Drill Press Accessories
Drill Press Vise restraints
Drill Press Quill Lock

Lathe Accessories
A Thread Tooling System and Wiggler for the Lathe
A Deluxe Radius Turning Attachment
A Quick-change Tool Post System
A Saw Blade Cutoff Tool
An Improved Lathe Drive
Lead Shot Filled Boring Bar
Knockout Bar
A Thread-cutting Aid
Threaded Bushing

**Milling Machine Accessories**
A Simple Indexing Rotary Table
Alternate Clamping Devices
An Inexpensive Power Feed
A Spindle Lock for Your Mill/drill
A Milling Machine Conversion
Another Fly Cutter
Adapter for a Boring Head
Toolmaker's Button

**Shop Improvement Projects**
Building a Hydraulic Press Twice
Mobilize Your Heavy Shop Tools
The Grizzly 8 x 18" Lathe
Making Pin Punches
A Wood Carving Machine
Indexing Template for Easier Layout
A Homemade Electric Motor Mount
A Simple Grinder Water Pot

**Hobby Projects**
On Improving the Image

**PROJECTS SEVEN**

**Techniques**
Balancing a Grinding Wheel
Clamping Tapered Material in a Vise-No Problem!
Large Radius Cylindrical Cuts on a Shaper
Scroll Sawing
Facing to Accurate Length
Turning Short Tapers on a Mill/Drill
Reviving a Lunch Break Shaper
Dividing on the Lathe
Heat-treatment Processes for Engine Components
Starting Turning
Hot Bluing Steel
Stuck Chucks One-more-time, Didactic #17
The Proper Use of Diamond Dressers
Cutting Steel with a Circular Saw Blade
Building Phil Duclos’ Model Maker’s Dividing Head
Lathe Tips
Using the Diamond Toolholder
The How and Why of Tangential Cutting
Engineering Plastics
Sharpening Tungsten Carbide Drills
The Rebirth of a Model C South Bend Lathe

**Lathe Accessories**
- A Unimat Headstock Adapter
- A Quick Tumbler Gear Reversal Mechanism
- Internal Spindle Stop
- Get a Handle on Your Lathe
- Tap Dogs
- Atlas Tailstock Modification
- A Pseudo Drawbar for the Tailstock

**Milling and Drilling Machine Accessories**
- Table Stop
- Remote Switch for the Mill
- A Mill/drill Support
- Chatterless Countersinks
- Mill Spindle Indicator Holder

**Shop Improvement Projects**
- Variable Speed DC Motor for the Home Shop
- Supplement to the Home Shop Motor Controller
- A Modified Arbor Press Ram
- Low-cost Reversing Switch for Electric Motors
- A Machinists Clock
- More on EDM
- A Simple Timer
- A Sliding Bevel Gage with Protractor
- A Small Shop Butt Welder
- A Homemade Die Filer
- An Indicator Stand
- More on Three-phase Converters

**Hobby Projects**
- Building the Titan 60
- The Walking Staff
- A Steam/Air Engine for Fun
- Cylinders and Pistons

**Computers in the Shop**
- Computers in the Shop
- Convert Your Mill-drill to CNC
- Convert a Milling Machine to CNC
- Build Your Own CNC

**PROJECTS EIGHT**

**Techniques**
- On Pumps and Pumping
Indexing Parts in a Set
Another Mill-Drill Adventure
You Can Do It
Modify Your Bead Blast Gun
Screw Heads and Screwdrivers
Using a Computer to Draw Scales
The Old Compound Indexing Table Reworked
Basic Industrial Electrical Control
Troubleshooting Primary Reasons for Scrap
Grinding Tool Bits for a Smooth Cut
Pulley Arrangement vs. Spindle Speed
You Can Find It
Improve Your Lathe Drawbar
Metric Threads
A Tale of a Jet GHB Gap Bed Lathe
Cutting a Non-standard Radius on a Milling Machine
Laser Alignment for the Home Shop
Metric Threads from Your English Lathe

**Lathe Accessories**
A Multiple Project
Lathe Alignment
Drawbar Knocker
Adjustable Lathe Stop for Under $15
Two-speed Belt Transmission
Woodworking in the Machine Shop
E-Z Bore
Headstock Angle Adjuster for the Sherline 4000 lathe
A Faceplate Toolholder
A Grease Adapter for the South Bend

**Milling and Drilling Machine Accessories**
A Fine Feed Attachment for a Vertical Mill
Mill-Drill Spindle Lock
The Universal Plain Dividing Head
A Mill-drill Modification
A Mechanical Lift for a Drill Press Table

**Shop Improvement Projects**
Build Your Own Shaper
Additions to the Quorn Tool and Cutter Grinder
The Brass Pad
A "Very Much Improved" Quorn Tool and Cutter Grinder
Piloted Tap Guide Wrench
PC Board Vise
Vertical Discharge: Everybody Needs VD
A Useful, High-quality Magnifying Glass
Quick Graduated Collars
Grizzly 8" Table Indexing Plates Summary
Thin Sheet Filing Fixture
Zinc Aluminum Alloy Sleeve Bearings for a Dividing Head Upgrade
Magnetic Mandrel
Improving a Chinese-born Lathe
Band Saw Fixture

**Hobby Projects**

Telegraph Key
A Test-tube Stirling Engine

**PROJECTS NINE**

**Techniques**

The lathe Thread-chasing Dial – Lathes with Inch-thread Screws
Atlas/Craftsman Slide Stop
Sharpen those Drill Bits
Projects without Drawings
Small Precision Balls
Ball Turning
Parting Toolholder
How Many Turns? How Many Holes?

**Lathe Accessories**

5C Collet Closer
Morse Taper Work Arbors for an Oversized Project
Additions and Modifications to the Sakai ML-360 Lathe

**Milling and Drilling Machine Accessories**

Applying a Quill DRO to a Small Vertical Mill
Mill Restoration
Upgrading an Old Bridgeport
A Fixture for Thin Stuff
The Real Spindle Lock
Toolmakers' Buttons Generate Precision Holes

**Shop Improvement Projects**

Tapping Machine
The Phoenix Horizontal Milling and Boring Machine
Tilt Body Indexer
Build an Air Compressor
Another Edge Finder
The Poor Man's T-slot Rotary Table
A Dremel Drill Attachment
A Homemade Magnetizer-Demagnetizer
Band Saw Modifications
Turning a Thin Wall in Teflon
Improving a Chinese-born Lathe
The Art of Recycling

**Hobby Projects**

Free Pendulum Clock
A Poor Man's Level
Driving the Stirling-powered Tractor

PROJECTS TEN

Techniques
- Casting Iron in the Home Foundry
- Making Small Pistons and Rings
- Getting Started in Metal Spinning
- Metric Equivalent Drills
- Larger Spherical Radii
- Linux in the Home Workshop
- Like a Bridge over Troublesome Shapes
- A Collet Reference
- Precision Boring
- Welding Electrodes for the Home Shop Machinist
- Gear Repair by Bronze Surfacing
- Removing Backlash with a Left-hand Tap
- Solving the Three-phase Problem with a VFD
- Moving a Rong-Fu Mill-Drill

Lathe Accessories
- Scroll Chucks – Their Care and Repair
- Overhauling a Jacobs Chuck
- Modified Chuck Key
- Americanizing a Falcon Lathe
- Chuck Mounting Plate
- Upgrading a Cintilathe Dial
- Way Too Fast!
- Make Your Own 3C and 6K Collets
- The Ten-cent Solution
- Overhauling the “Old Lady”
- Buffers Etcetera
- Toolholder Extension

Milling and Drilling Machine Accessories
- A Locating Stop for the Milling Vise
- Setting Up Fly-cutter Bits
- Replacing Quill Bearings
- Make Your Own Small Toolholder
- Dual-action Fly Cutter
- Building a Spider Handle

Shop Improvement Projects
- A Modified Base for a Band Saw
- Angle Makes All the Difference
- Angle Measurement with an Adjustable Square
- Induction Motors and Rotary Phase Converters
- Vane Pump
- Hand-held Dial Indicator Tester
- Make Your Own Socket Head Fasteners with the Brinkerhoff Rotary Broach
A Miniature Collet Driver – Learning Experiences in Concentricity
Building an MLA Filing Machine
Inexpensive Sand-blasting Cabinet

**Hobby Projects**
- Electric Engine
- Potter’s Wheel
- Building a Miniature Church

**Research for Mastery**
- The Continental A-40 Aircraft Engine
- Notes on Building a Nine-cylinder Radial Aircraft Engine

**PROJECTS ELEVEN**

**Techniques**
- "Spring Fever" – Winding Your Own
- Rebuild a Cylinder Head
- Functional Metal Enclosures
- A Different Approach to Small Flywheel Machining
- Thread Substitutions
- Heat-Treating Steel
- Easy Threading Tool Sharpener
- Repair Blacklash With Moglice
- Getting Started In Welding Plastics
- Moving an Enco RF-30 Mill-Drill...Twice
- Model Ignition Systems - How Much Voltage is Required?
- Score in Your Shop with a Hockey Puck
- Make Mild Steel Behave Like High-carbon Steel
- All Wound Up About Springs

**Lathe Accessories**
- A Radius Cutting Tool for the Grizzly G4015Z Mill-Lathe
- Disk-Cutting Fixtures for the Lathe
- Sharpening HSS Lathe Tool Bits
- Transplant a Compound Gear Assembly
- A Simple Turret for the Atlas/Craftsman 12" Lathe
- Telescopic Taper Attachment for South Bend 9" or 10" Lathes
- Make a Saddle/Carriage Clamp Lock
- A Thread Cutting Stop for South Bend Lathes
- A Rotating Lathe Tailstock Chuck
- Machining the M.L.A. Collet Chuck Kit

**Milling and Drilling Machine Accessories**
- An Excellent, Affordable Drill Bit Sharpener
- Indexable Carbide Insert End Mill
- Experimenting with Fly Cutters
- Milling Vise Alignment
- A Universal Motor Controller

**Shop Improvement Projects**
- Repairing "Old Iron"
Swivel Blocks
Finish That Micrometer Box
A Handy Material Storage Rack
Make a Hub Wrench
Hang That File
Converting a Woodcutting Band Saw to Cut Metal
Small Parts Holder for Silver Soldering
Build a 50/30 Ton H-Frame Hydraulic Floor Press
Granite Surface Plates
Building a Model Engine Camshaft Grinder

**Hobby Projects**
My Delta-T Stirling Engine
The Vandy Electric Scooter
Radial Electric Motor

**Quest for Mastery**
Titanium - a Metal for the Space Age

**THE SHOP WISDOM OF FRANK MCLEAN**

**Techniques**
Planning a Small Shop
Drilling and Tapping Hints
To Find the Tap Drill Size
Drilling Center Holes Accurately
How to Drill the Center Holes in a Shaft Accurately
A Few Tips on Drilling on a Drill Press or a Vertical Milling Machine
Chain Drilling Locomotive Frames
Using Your Drill Grinding Attachment
A Few Thoughts on Drill Presses and Tool Grinders
A Fireside Chat about Lathes
Centering Small Square Stock
A Fire Side Chat about Lathe Chucks
A Fire Side Chat about Lathe Tools
Leveling the Bench Lathe
Tips on Turning Between Centers
Turning Tapers
How to Align the Tailstock Easily
Repairing an Old Lathe
How to Replace to Damaged Thread on a Drawbar
Boring Internal Threads
External Threads
Simple Pulley Calculations
Pulley Ratio and Cutting Speed Problems
Compound Pulley Ratios
Choosing the Correct Speed
Simple Gear Ratios
Compound Gear Ratios
Tapping Large Pulleys
Replacing Broken Gear Teeth
A Few Tips on Knurling
Milling on the Lathe
A New Vertical Milling Machine
Improving Your Vertical Mill
Tips for Silver Soldering
Installing a Power Feed Unit on a Vertical Mill
Milling Keyways
Cutting Left-hand Threads
Protecting Your Mill from Shavings
Machining Thin Plates on a Vertical Mill
Finishing Plate Ends
Bronze Bushings and Oilite Bearings
How to Make a Layout with a Vernier Height Gage
Sharpening Two-lip End Mills
Sharpening Taps and Dies
How to Install and Remove Ball Bearings
Improving a Milling Machine Vise
Broaching Square Holes

**Drill Press Tools and Accessories**
- Homemade Drills
- Reamers & D-bits
- Sheet Metal Drills

**Lathe Accessories**
- Lathe Stands
- Lathe Accessories
- Lathe End Mill Adapters
- Tailstock Die Holders
- Roller Tool for the Lame
- A Wiggler

**Milling Machine Accessories**
- A Baseplate for a Dividing Head
- A Finger Stop for the Vertical Milling Machine Vise
- Lighting Your Vertical Mill
- A Micrometer Stop Nut
- The Humble Angle Plate
- A New Rotary Table
- Homemade Milling Cutters
- A Hollow Mill
- A Carbide End Mill
- Fly Cutters and Arbors
- Expansion Link Milling Fixture
- Machinist's Screw Jacks
- A Shell End Mill Arbor
Shop Tools and Improvements
A Sturdy Workbench
How to Make a Special Tap
Transfer Screws
A Power Hacksaw
Power Hacksaw Table
A Simple Rail Bender
A Grinding Bench
Rivet and Screw Cutters
An Improved Parallel Clamp
A Plain Surface Gage
An Easy-to-Make Vernier Height Gage
A Marking Gage
A Universal Surface Gage
A Chip Catcher for the Shaper
A Depth Gage Attachment
A Toolmaker's Flat Vise
A Small Machine Vise
A Band Saw Slow Speed Attachment
A New Centering Gage

THE SHOP WISDOM OF PHILIP DUCLOS

Shop Projects and Techniques
Model Makers Dividing Head
"Floating" End Mill Sharpener
Unorthodox Mill/Lathe Grinder
Old Lathe Collet Adapters
Slow Poke Small Keyway Broach
Temporary Self-locking Stub Mandrel
Adjustable Parallels
A Temporary Aluminum Furnace
Degassing Molten Aluminum
10" Super Colossal Fly Cutter
A Showpiece Challenge
Give Metal Spinning a Whirl

Hobby Projects
Odds 'n' Ends Hit ‘n’ Miss Engine
Smallest "Hit & Miss" Gas Engine?
Model Piston Rings
Curved Spoke Flywheel
"Whatzit" Engine
Six-cycle Oddball Engine
A Huff ‘n’ Puff Engine
Fire Engine

THE SHOP WISDOM OF D.E. JOHNSON
General Machining
Build a Cutter Bit Grinding Block
Reducing Tap Breakage
Multi-Purpose Block
Machining Thin Disks and Rings
Construction and Use of the Lathe Carriage Stop
A Thread Tooling System and Wiggler for the Lathe
Serious Milling with the Lathe
Rapid Production of Dividing Head Index Plates
A Rolling Tailstock Arbor
Taper Shank Turning Made Easy
A High Efficiency Screw Press
A Universal Belt Tensioner
A Classic Boring Bar Holder
Micro Aids for a Full-Size Machinist
A Drill Press Speed Reducer
A Universal Cross Drilling Fixture
Anti-Rotation Drill Holder for the Lathe Tailstock
Making Chatterless Countersinks
Instant Soft Jaws for the Vise
A Quick-Acting Universal Lathe Mandrel
A Lathe Tool Post Grinder for Serious Grinding
A 5C Collet Adapter for the Lathe

Mill-Drill Adventures
Picking it Out
Fixing up the Downfeed
Spindle Lock and Tap Starter
Tooling Plates
A Power Feed for the Main Table and a Rotary Table
Powering the MK-4
Keeping Track of the Cutting Tool and Table Positions
New Handwheels and Lead screw Bearings Fix Backlash and Rattles
Indexing and Drilling

Live Steam Projects
Roll Forming Copper Boiler Heads and Similar Parts
An Automatic Electric Model Boiler
A Simplified Utility Hand Pump

Home Improvement Project
Building the Edge Master Lawn Machine

THE SHOP WISDOM OF JESSE LIVINGSTON

Model Engine Projects
Slide Valve Oscillating Engine
Rocking Valve Mill Engine
Bernays Engine

Scale Locomotive Projects
Filer and Stowell Logging Locomotive
The Newbie Project

Shop Talk
Increasing Boiler Efficiency
Feedwater Heater
Beautify that Pressure Gauge
Nipple Chucks
Metal Casting and Foundry Work
Scaling Plans from Photos
An Introduction to Metal Casting and Foundry Work
Flue Roller
Equipment Lettering
Mose Clears the Boiler Room

THE SHOP WISDOM OF JAMES MCKNIGHT

Metalworking Machines
Portable Power Band Saw
Horizontal Band Saw
Filing Machine
36” Brake
Easy Lathe Collet Adapter
Belt Sander
Homebuilt Surface Gage
Precision Grinding Vise

Woodworking Machines
Circular Saw Sharpener
Router Machine
Fretwork Saw
Oscillating Edge Belt/Spindle Sander
Three-Axis Wood Mill
Router Base Plate

Shop Improvement Projects
Small Index Fixture
Toolmaker’s Vise
Automatic Vent Door
Index Angle Plate
Small Compound Angle Vise
Precision Grinding Fixture for Tool Bits
Sine Plate
V-Block/Center Drilling Fixture
Filing Parallel
Self-centering Drill Jig
Miniature Height Gage
Quick-adjusting Boring Head

THE SHOP WISDOM OF RUDY KOUHOUPT
The Micro Machinist
Machine Shop in a Cabinet
Test Indicator
Compressed Air Motor
Boring Bars
Milling Accessories
Stocking Stuffers
Use of Dimensions
Slitting Saws
Fixed Steady Rest
Small Keyways and Keyseats
Building a Rotary Table
Fly Cutter and Angle Plate
Micrometer Faceplate Attachment
Time for an Overhaul
Lever Operated Tailstock

Other Features
Machining Your Own Spur Gears
Building Your Own Dividing Attachment
Milling on a Drill Press
An Automatic Parallel

Engine Projects
Steam Engine
A Horizontal Stationary Engine Project
An Overcrank Engine
Baker Fan
Build a Reversing Upright Engine
A Fore and Aft Compound

THE SHOP WISDOM OF RUDY KOUHOUPT Vol. 2

The Micro Machinist
Tooling for a Vertical Mill
Making Tap and Reamer Handles
Tool Post Boring Bars, Cutters, and Turning Tools
Making a Pair of Milling Clamps
Making a Catch Plate
A Grinding Rest for Precise Tools
Sharpen Your End Mills,
Building a Multi Cutter Face Mill
Making a Cutoff Toolholder
Using a Cutoff Tool
Drill Press Chuck Handles
Turning a Morse Taper
A Lame Table
Elevating a Vertical Mill
Two Useful Milling Accessories
Two Useful Lathe Dogs
Checking Lathe Alignment
Build and Use a Tool Post Grinder
A Fixture for Milling End Curves
Base for a Band Saw
Make a Center Finder,
Make an Open-sided Tool Post
X and Y Stops for the Mill
A Compact Boring Head
Old Iron

Other Features
An Accurate Vise for the Milling Machine
Building Your Own Engraving Pantograph
Thread Cutting on the Lathe

Hobby Projects
A Not-so-simple Oscillating Cylinder Engine
An Air-cooled Hot Air Engine
Building a 1" Scale Bobber
Running on Air

THE SHOP WISDOM OF RUDY KOUHOUPT Vol. 3

The Micro Machinist
A Lathe Milling Adaptation
A Grinding Rest for Precise Tools
A Holder for 13/16" Dies
Setting Up Shop
Tiny Engines
Make Your Own Lathe Collets
Mounting Small Chucks and Faceplates
Reconditioning an Atlas Milling Machine
Making Accurate Squares
Making an Angle Plate
Build and Use an Adjustable Angle Plate
Making a Clapper
Indexing Centers
A Mechanical Revolutions Counter
Carriage Stops
Cross-Slide Stops
Make a Magnetic Lathe Chuck
A Mechanical Stroboscope
A Balanced Knurling Tool

Other Features
Using the Diamond Toolholder
A Mobile Lathe Stand

Hobby Projects
Build a Little Workhorse Engine
Something Old, Something New
Build a Flywheel Pump
A Stirling Powered Tractor
Little Job Cement Mixer

THE SHOP WISDOM OF RUDY KOUHOUPT Vol. 4
The Micro Machinist's Legacy

A Compact, Double-action Indicator
An Atlas Mill Update
Build a Quick-change Toolholder
It Never Fails! – Raising the Lathe Axis
Build the Radial Five
Make a Holiday Nutcracker
The Micro Machinist's Legacy

TWO SHOP MASTERS: FRANK MCLEAN AND PHILIP DUCLOS

The Tool Legacy of Frank McLean
A Time for Reflection
A Few Tips for Beginners
A Miniature Four-tool Turret
Tapered Reamers
Threading to a Shoulder
Cutting Left-hand Threads
A Shell End Mill Arbor
Improving a Milling Machine Vise
A New Centering Gage
A Tool post Grinder
A Bell Chuck for Your Lathe
Improving the Collet Draw Tube
A Cylinder or Master Square
Fitting Small Drill Chucks
An Unusual Lathe Dog
Making a Knurled Head Thumbscrew
Drill Press Router Adapter
Correcting a Milling Machine vise
Hinge Centering Punch
Rounding the Ends
Tailstock Attachments for the Lathe
Brazing Band Saw Blades
Improving the Horizontal/Vertical Band Saw
An Unusual Turning Operation
Cloche Hops
Hand Turning on the Lathe
Homemade Counterbores
Small Drill Sharpening Guides
Horizontal Milling Attachment
Keyway Broach Bushings
Using a Router on the Vertical Milling Machine
How to Make a Chuck Backplate
A Spur Center for Turning Wood
Cleaning a Universal Chuck
How to Set Up and Use a Drill Grinding Attachment
Milling a Keyseat in a Shaft
A Few Thoughts on Shapers
A Taig Lathe Tool Rest
How to Make a Tapered End Mill
Tool Rests for Turning Wood
An Elevated or Auxiliary Lathe Spindle

The Engine Legacy of Philip Duclos
Little “Blazer” Engine
“Hula-Hula” Engine
Topsy-Turvy Engine
Gearless Hit ‘n Miss Engine
Maverick Engine
A “Victorian” Engine

THE GUNSMITH MACHINIST – STEVE ACKER

The Gunsmith Machinist
Aligning Scope Mounts
A Travel Measurement Plate
A Barrel Bushing Jig
Installing Sight Beads
Cutting a Rifle Crown
Enlarging the Ejection Port
A Fixture for Milling the Recoil Lug
Hammer Work
Making a Dovetail Front Sight
Sight Holding Fixtures
A Gunsmith’s Lathe Helper
Installing a Front Sight
Making Rifle Bedding Pillars
Milling Grasping Grooves
Moving a Firing Pin Hole
Trigger Job Pins
A Barrel Vise
Centering a Barrel Bore
Chambering a Rifle Barrel
Cutting Rifle Barrel Threads
Drilling and Tapping for Scope Mounts
Finding and Making Gun Parts
Installing a Locking Base Pin
Optimizing Revolver Throats
A Rear Sight Shifter
Replacing an Integral Front Sight
Stronger Scope Installation
An Unusual Scope Mount
Installing a Screw-in Choke Adapter
Removing a Broken Screw
Installing a Pre-threaded Short Chambered Rifle Barrel
A Post-ban AR-15 Muzzle Brake

Other Gunsmith Topics
Hot Bluing Steel
Building a Target Rifle

General Machining Topics
Checkering in the Mill
Steve Makes a Mistake
Handy File Cleaner
Making Pin Punches
Cutting Steel with a Circular Saw Blade
A Simple Phase Converter
Upgrading to Variable Speed DC
Making and Using a Bench Block
Tap Wrenches from Scrap
The Mirror-faced Hammer
A Mill-drill Repair
A 5C Collet Fixture Tailstock
Machining an Angle Plate
A Welding Tip
Making a Hardened Steel Washer
Personal Safety and Machine Grounding
A Low-cost Bead Blaster
A Wooden Work Support in the Mill
Building a Hydraulic Press Twice
A Knife Blade from Scrap
Welding up a Meat Smoker

THE GUNSMITH MACHINIST – BOOK TWO

Rifle Projects
Making an AR-15 Front Sight
An M-14 Front Site for the Mauser
Using a Receiver Contouring Fixture
Making a Ruger Scope Ring Base
Repairing a Scope Base Mounting Hole
Rebarreling an M-1 Garand
Installing a Muzzle Break
Adjusting Firing Pin Protusion
A Side Safety for the Mauser Rifle
Lengthening a Winchester 97 Chamber
Jewelling a Rifle Bolt
Centering an AR-15 Front Site
Surface Grinding a Remington Recoil Lug
A Varmint Hunting Scope Mount for the AR-15

**Pistol Projects**
- Line Boring a Ruger to .45 Colt
- Using a Grip Safety Fixture
- Machining a Frame for a Ramped Barrel
- Repairing a Feed Ramp
- Improving a Pistol Grip
- Installing a Low Mount BO-MAR Sight
- A Lanyard Loop for the 1911 Pistol
- Welding Up a Barrel Hood
- Repairing a Torkarev Safety
- Relining a Ruger Pistol
- Tightening a Ruger Mark I Frame
- Widening a Read Sight Notch
- Installing Colored Sight Inserts

**Techniques**
- Making a Chamber Casting
- More Uses for Cerrosafe
- Headspace and headspace Gages
- Tapping a Shallow Hole
- Making a Cleaning Rod Muzzle Guide
- Repairing a Stripped Grip Screw Hole
- A Protective Center for a Rifle Barrel

**Machine Shop Aids**
- Reworking the New Multi-Vise
- A Gunsmith’s Grinder Bit Handles
- Cutting a Gun Screw to Length
- Lathe Cutting Threads on Blank Screws
- A Cartridge-Specific Powder Funnel Adapter
- Making a Small Screwdriver Bit
- The Micrometer Adjustable Reamer Shop
- Repairing a Dunmore No. 5 Motor
- Shop Knifes from Files
- Machining a Cast Iron Faceplate

**STEAM & STIRLING BOOK ONE**

Stationary Steam Plant
An Unusual Steam Engine
Half-Horse Marine Engine
A Brief Prelude-Moriya
A Steam Turbine
Hand-Tool Steam Engine
A Word About Metrics
Variations on a Theme
Bijou
Thimble Power Plant
Minikin
Opposed Piston Steam Engine
Hot Air Pumping Engine
V-4 Oscillating Cylinder Engine
Appendix

STEAM & STIRLING BOOK TWO

Steam Engines
- A Steam Engine for the Novice
- Root's Engine
- "Hula-hula" Engine
- A Simple Steam Engine
- Simplex & Duplex
- A Reversing Duplex
- A Toy for Richard
- An Original Mill Engine "Scrapbox"
- A Three-cylinder Oscillating Steam Engine
- Brasso-A Small Beam Engine
- An Easy-to-build Speeder
- A Speeder Update -An Alternative Engine
- The Tesla Turbine
- NDC-1
- The Mystery Machine "Woody"
- Duplex Pump
- A Junkbox Steamroller

Sterling Hot Air Engines
- Fire Eater Engine
- Stirling Hot Air Engine
- A Simple, Low-Cost Stirling Cycle Engine

Boiler Works
- An Automatic Electric Model Boiler
- Roll Forming Copper Boiler Heads

Related Topics
- The use and Storage of Propane
- Stirling Engine Work
- Make a See-through Displacement Lubricator
- Flywheel Tapered Bushing
- Wood Flywheels
- A Simple Alcohol Burner

STEAM & STIRLING BOOK THREE

Steam Engines
- The First Steam Engine
A Simple Steam Turbine
A Three-stroke Steam Engine
A No-casting 1.5 x 1.5V Steam Engine
An 1871 Frisbie Toy Steam Engine
The Epicyclic Steam Engine
A Micro Steam Car
A Revolving Cylinder Engine
A Steam Engine with No Moving Parts
A Rotary Valve Beam Engine
The “Little Kathy” Engine
A Sternwheeler Engine
A Small Oscillator for Marine or Other Uses
Weeden Vertical Remembered
Square Cylinder Steam Engines
A Slide Valve Engine

**Sterling Hot Air Engines**
A Walking-beam Stirling-cycle Mill Engine
A Hot Air Stirling-cycle Engine
The Sidewinder Stirling-cycle Engine from Scrap
A Low Temperature Stirling Engine
Stirling
A Stirling Model Aircraft Engine
A Simple Hot Air Engine Burner

**Boiler Works**
Modifications to the Johnson Electric Boiler
Managing Corrosion in Steel Boilers
Tubing Boilers
A High Tech Flash Boiler
A Spider
Boiler Feedwater Treatment
Heat Flow in Live Steam Boilers

**Related Topics**
A Steam Pump Project But Not for Amateurs!
When Steam Does Not Come From Water
A Cylinder Lubricator
The Oakes Steam Valve Gear
A Steam Launch Operator’s Manual

**RUDY KOUHOUP Plan Sets From The Past: Model Stirling Engines**
Stirling-cycle Hot Air Engine
Water-cooled Horizontal Stirling Engine
Water-cooled Vertical Hot Air Engine

**RUDY KOUHOUP Plan Sets From The Past: Working Steam Engines**
Walking Beam Engine
Model Marine Engine
Open Column Steam Engine
Model Mill Engine
Enclosed Crank Steam Engine
Model Horizontal Steam Engine

RUDY KOUHOUPT PLAN SETS FROM THE PAST: FUN WITH ENGINES AND OTHER THINGS

Three-cylinder Radial Engine
Piston Valve Steam Engine
Model Vertical Steam Engine
Building a Small Steam Engine
Compressed-Air V-4 Engine
Revolutionary War Cannon

RUDY’S MODEL STEAM TRACTOR

Rudy’s Model Steam Tractor
  Rear Wheel Assembly
  Front Wheel Assembly
  Flywheel
  Shafts and Axles
  Frame and Boiler Casing
  Front Axle Fork and Perch Bracket
  Rear Components
  Power Transmission Through the Gear Train
  Steering
  Boiler Casing Details
  Machining the Cylinder and Associated Components
  Imparting Motion to the Valve
  Cylinder Attachments
  Throttle
  Inside the Firebox and Boiler
  The Final Touches

Index of Drawings
Assembly Drawings
List of Materials and Gears
Detail Drawings

TESLA TURBINE AND OTHER ENGINES FROM JEFF MAIER

Tesla Turbine
Two-cylinder Uniflow Engine
Terry Turbine
Horizontal Uniflow Engine

SO YOU WANT TO BUILD A LIVE STEAM LOCOMOTIVE

Questions Commonly Asked the Live Steam Locomotive Builder
Overall Design
Tools Required to build a Live Steam Locomotive
Engineering Data
Shop Safety Precautions
Frames
Running Gear
Wheels, Tread, and Gauge
Journals and Journal Boxes
Cylinders and Their Moving Parts
Machining Steam Engine Piston Rings
Valve Gear
Brakes
A Simple Train Brake System
Smokebox
The Boiler: Safety First, Last, and Always
The Boiler: Features and Design
Miniature Boilers of Stainless Steel
Fabricating the Copper Boiler
The Smokebox Throttle
Feed Water System
Plumbing
Fuel and Combustion
The Case for Propane
Oil Firing Your Locomotive
The Tender
Tools, Methods, and Accessories
The Whistle
Metal Etchings
Operation

BUILDING THE SHAY

Building the Shay
Trucks
Square Shafts
Engine
Reversing Gear
Axle Pump
Lubricator
Main Frame
Boiler
Hand Pump
Boiler Fittings
Steam Dome
Safety Valve and Whistle
Boiler Jacket, Bell, and Sandbox
Fire Door, Grate, and Ashpan
Smoke Box
BUILDING THE NEW SHAY

Building the New Shay – A 1920s Shay in 3/4” Scale

Frame
Trucks
Brakes
Lubricator
Axle Pump
Hand Pump
Boiler
Smokebox
Boiler Jackets
Fire Grate and Ashpan
Water Gauge, Pressure Gauge, and Fire Door
Cab
Throttle
Safety Valves
Steam Dome, Sandbox, and Handrail
Cylinders and Brackets
Crankshaft and Sleeve Couplings
Pistons and Connecting Rods
Valve Gear
Reverse Gear
Cylinder Cocks
Steam Piping
Oil Tubing
Whistle
Tank
Water Piping
Headlights
Dummy Parts
Carrying Case
Operation and Maintenance
Bill of Materials

A New Shay in 1-1/2” Scale

Safety of Copper Boilers
Safety Valves for Live Steam Boilers
Tube Joints
O-rings for Live Steam Service
Small Hexagonal Head Screws

BUILDING THE HEISLER

General Arrangement
Engine Assembly
   A 3/4” Scale Heisler by Sylvio Boudreau

Trucks
   A 3/4” Scale Heisler by Yukio Ishibashi
   A 3/4” Scale Heisler by Gunnar Ohrstrom
   A 3/4” Scale Heisler by Ken Evasew
   A 3/4” Scale Heisler by C.F. “Fred” Palmer
   A 3/4” Scale Heisler by Henry E. Washburn
   A 3/4” Scale Heisler by Roy A. Carruthers

Axle Pump
   A 3/4” Scale Heisler by John Tate

Lubricator
   A 3/4” Scale Heisler by Carl Ware
   A 3/4” Scale Heisler by James W. Field

Mainframes
   A 3/4” Scale Heisler by Don McCormac

Center Shafts
Cylinder cocks
Reverse Gear
Brake Gear
Hand Pump
   A 1-1/2” Scale Heisler by Ken Lloyd

Boiler
Boiler Fittings
Boiler Jacket
Steam Dome and Sandbox
Fire Door, Grate, and Ashpan
Smokebox
   A 1-1/2” Scale Heisler by Richard D. Lane

Steam and Oil Piping
Running Boards, Handrails, and Bell
Cab and Tank
Feedwater Piping
Painting and Carrying Case
Operation and Maintenance
Appendix
   Larger Scale Heisler
      You Can Build a Pressure Gauge
      A 1-1/2” Scale Heisler by Paul C. Haar
      An Introduction to Heisler Geared
      Locomotives by James C. Mangels
BUILDING THE CLIMAX

Introduction
Main Frame
   A 3/4” Scale Heisler by Denis K. Laflamme
Wheels
Trucks
Line Shaft
Machining Gear Cutters
   A 3/4” Scale Heisler by W.M. Shellshear
Machining Gear Teeth
Crankshaft Frame Fabrication
   A 3/4” Scale Heisler by Phil Sims
Water Pump
Lubricator
Engine
Reverse Gear
   A 1-1/2” Scale Heisler by Sumner Barber
Cylinder Cocks
   A 1-1/2” Scale Heisler by Walter Bush
Hand Pump
Boiler
Fire Door, Ashpan, and Grate
   A 3/4” Scale Heisler by Joseph Eastman
Smokebox
Steam Piping
Boiler Jackets, Handrails, and Bell
Steam Dome and Sandbox
Boiler Fittings
Running Boards
Cab
Water Tank
Water Piping
Painting & Carrying Case
Operation & Maintenance, First Steaming
Appendix
   You Can Skew Bevel Gears
   Climax With Stock Gears
   You Can fabricate a Pressure Gauge
   Larger Scale Climax
   Conversion Chart – MM to Inch
   Thread Conversion Table

THE PENNSYLVANIA A3 SWITCHER (THE FIRST PROJECT FOR THE BEGINNER)
The Pennsylvania A3 Switcher
The Pennsylvania 0-4-0 Switcher in 1-1/2” Scale
A Penny Switcher Builder – Yoshiaki Watanabe
A Penny Switcher Builder – Tsutomu Ohto
The Art of Silver Soldering
A Complete Workshop You Can Afford
Tools for a 3/4” Scale Live Steamer

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For the Lathe
For the Mill
Hand Tools
Organizing Things
Workholding
The Rest of the Shop

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For the Lathe
For the Mill
Hand Tools
Organizing Things
Workholding
The Rest of the Shop

THE HOME SHOP READERS’ TIP BOOK
Lathe Tips
Mills, Drills, and Other Tool Tips
Shop Organization
Potpourri Tips

THE HOME SHOP READERS’ TIP BOOK 2
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Mill Tips
Shop Organization
Potpourri Tips
From the Past: Chips & Sparks 1991 – 1999

BUILD AN EDM
The Introduction and Box Construction
The Spark Power Supply
The Stepper Motor Logic and Power Board
Installing the Stepper Motor Board and Stepper Motor
The Head and EDM Operation
Other Odds and Ends
Spark Eroding a Broken Stud
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Heat Treating  
Rotary Devices  
Spiders and Steady Rests and Such  
Tool Posts  
To Cool or not to Cool  
After I’m Gone  
The Boring and Facing Head  
A Day in the Shop  
My Favorite Customer  
Shop Safety  
Indexing Basics  
Collets  
A Little Something Extra

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Building an Ornamental Fireplace Screen  
Building a Better Powder Measure  
Some thoughts on Housekeeping and Space Management  
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Ornamental Iron – Again!
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Building a Gun Safe
The Care and Feeding of the Twist Drill
Some Things You Need in Your Shop – and You May Not Even Know It
The Engraver’s Vise
A Welding Quandary
Turning Between Centers
Machining with Soft Jaws
Sweeping the Head of the Turret Mill
Not Just a Lathe – A Contouring Lathe
A Horizontal Milling Machine – On End
The Wonderful World of Watts
From the Chip Pan

WELDING KNOW-HOW

Welding Overview
Safety
Terms, Joints, and Edge Preparation
Tools and Equipment
Shielded Metal Arc Welding
Wire Feed Welding
Gas Tungsten Arc Welding
Oxyacetylene
Controlling Distortion
Cutting Processes
Brazing and Soldering
Common Problems and Solutions
Design Tips
Fabrication and Repair Tips
Tools and Tooling
Pipe and Tubing
Metallurgy
Power Supplies and Electrical Safety
Bending and Straightening

MACHINE SHOP ESSENTIALS: QUESTIONS & ANSWERS

Measurement Tools, Layout & Job Planning
Basic Hand Tools
Filing & Sawing
Grinding, Reaming, Broaching & Lapping
Drills & Drilling Operations
Threads & Threading
Turning Operations
Milling Operations
Fastening Methods
Machine Shop Steel Metallurgy
Safety & Good Shop Practices
Other Shop Know-How
Sharpening Steel Lathe Tools
Sources of Tools, Materials & Supplies

Other Books by Village Press:

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THE STEAM DONKEY ENGINE
BUILDING THE CLISHAY
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BUILDING A SINGLE-SHOT, FALLING BLOCK RIFLE ACTION