Sharpening Woodworking Tools

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& Mort Cartridge
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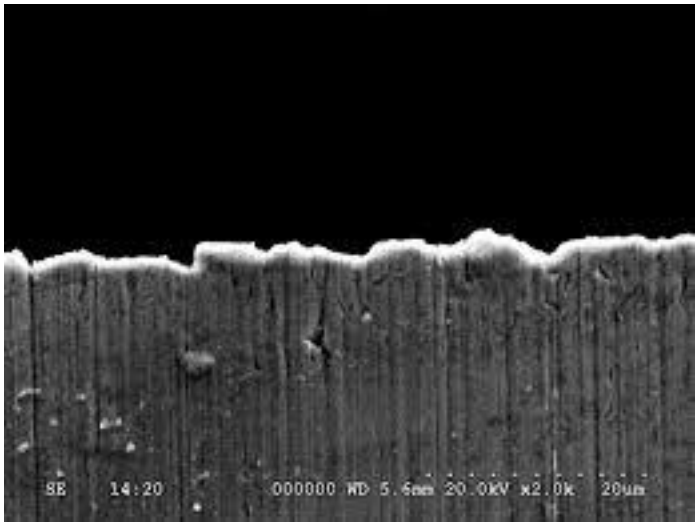
Oversharpening?

- In my view, whereas hand-tools cannot be too sharp, the relatively coarse ground edge achieved by grinding is sufficient for woodturning.



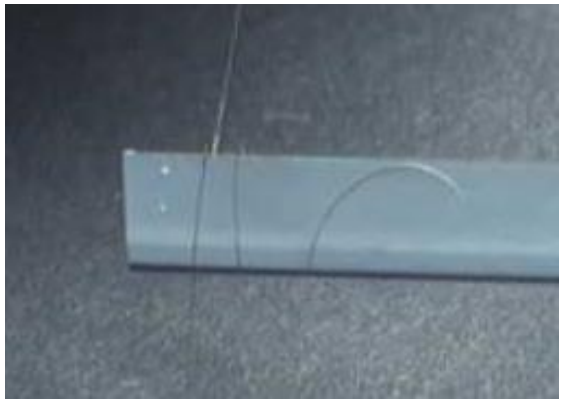
A finely-honed edge is quickly destroyed by the turning operation

TIP 1: Testing for sharpness
Traditional testing methods:

Shave arm hairs

Slice paper

Shave back of nail



Shave hairs

All these ok for knife and longer edges, but no good for short edges

TIP 1: Testing for sharpness

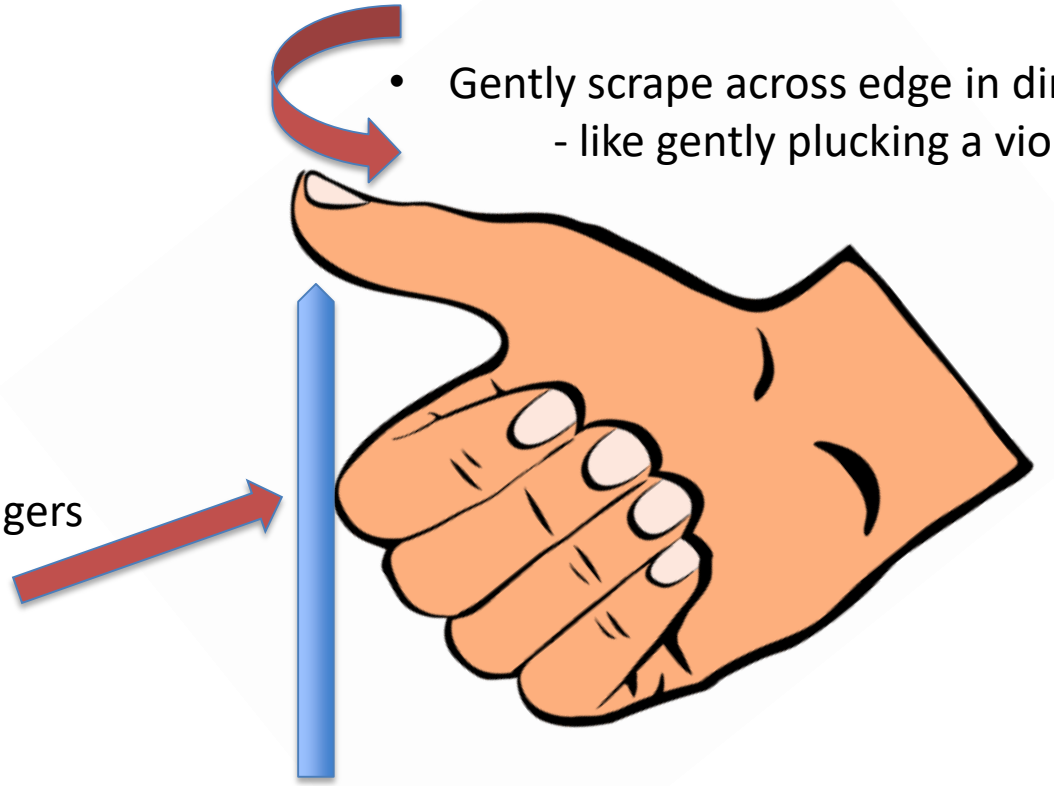
- First, look closely at edge. If shiny, then edge is dull as light reflected from edge.

Then test edge by contact:

- Highly sensitive thumb tip capable of assessing edge sharpness
- Instant assessment, requires no other materials
- Any accessible edge can be assessed, e.g. drills, router bits, gouges

TIP 1: Testing for sharpness

- Gently scrape across edge in direction of arrow
  - like gently plucking a violin string



- Use curled fingers as rest

TIP 2: Guide to sharpening the edge, not the bevel.

- Use permanent marker pen to coat bevel

- During sharpening check only edge is shiny.
  (or whatever part of bevel is to be ground)

Hand Sharpening of Woodworking Tools

Over to Mort

Grinding Wheels
Types, Setup, and Safety

Grinding Wheels: Types and Safe Use

Many different types

Many different shapes

And all woodturners have one

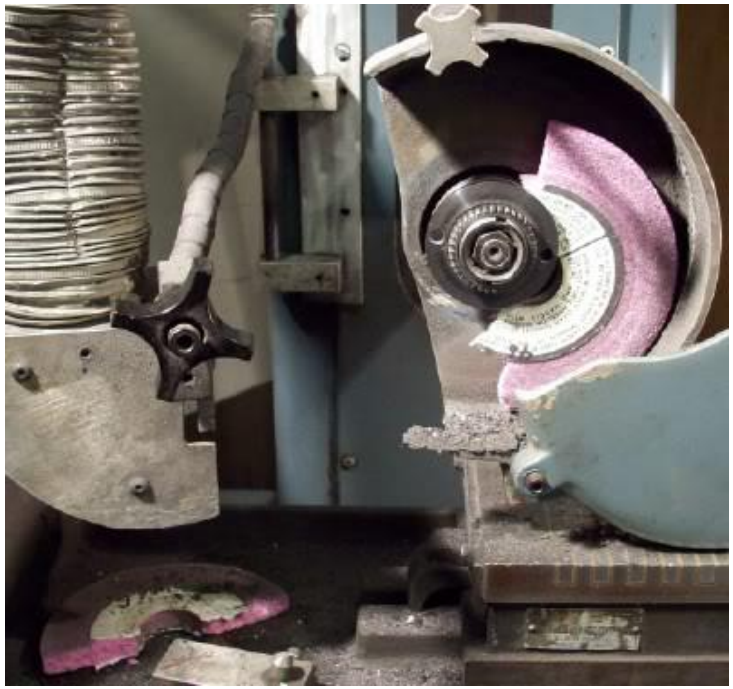
BUT: POTENTIALLY VERY DANGEROUS

Grinding Wheels: Types and Safe Use

- Wheels can violently explode without warning

-can cause serious injury
or worse

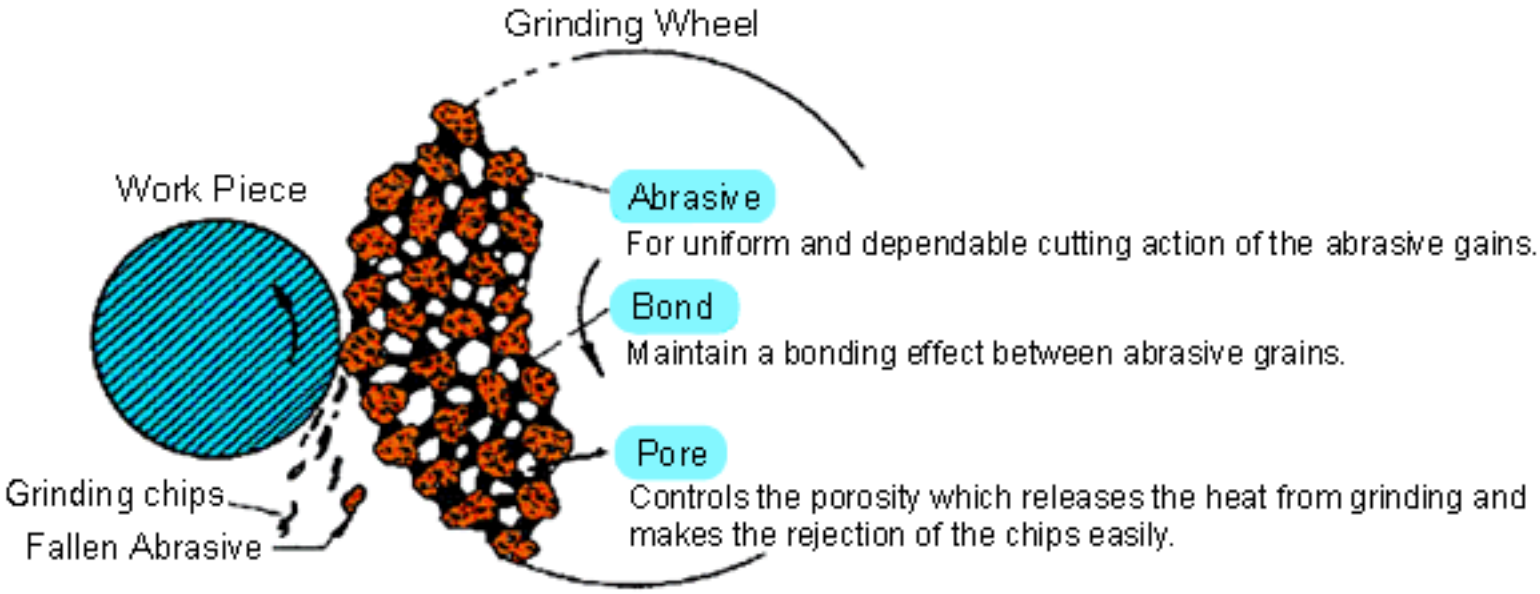
- 8” wheel at 2800rpm, Periphery moves at 97 ft/second



So, we need to know how to

- Select
- Check
- Mount
- and Use

What is Grinding ?

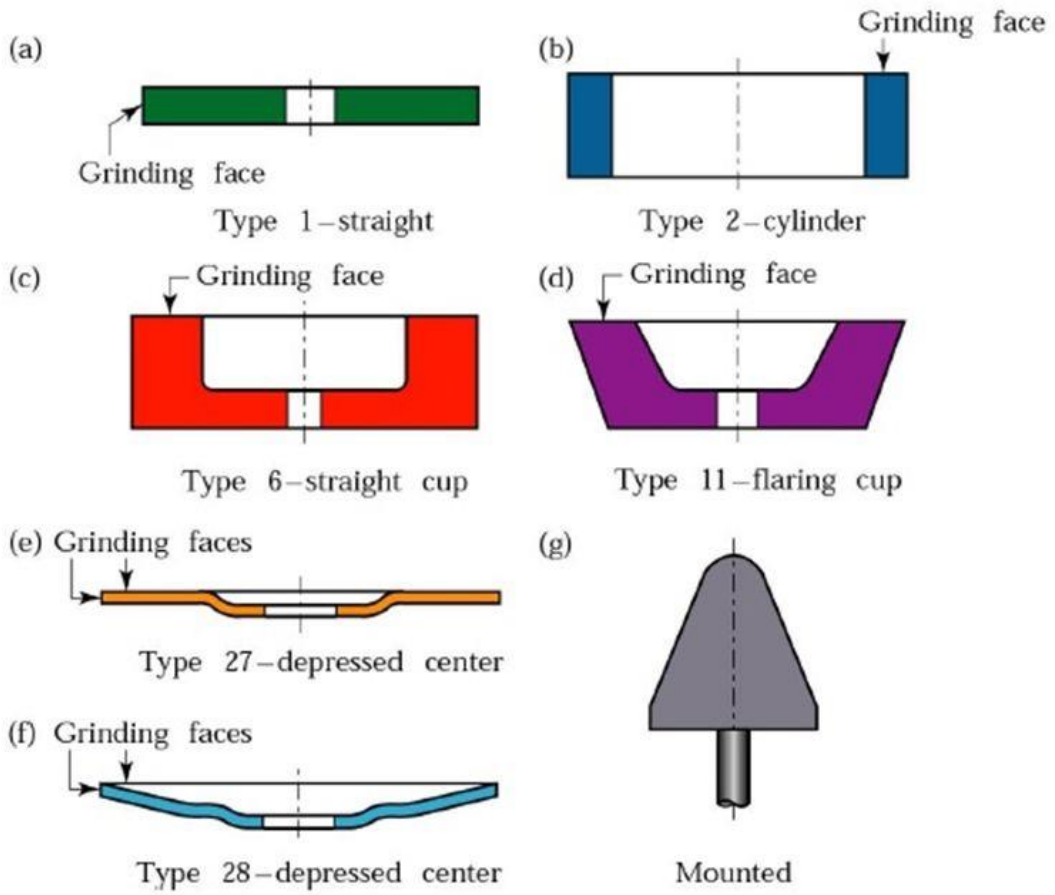


- Efficient grinding is the correct balance of **abrasive**, **bond**, and **porosity** of the wheel for the material being ground.
- Abrasive particles perform hundreds of cuts per second, and can rapidly dull. Therefore bond and porosity of wheel needs to allow blunt particles to be abraded from wheel periphery and new particles to be exposed.

Otherwise a blunt wheel will rub rather than cut, producing heat, causing the tool to be de-tempered, and the wheel to clog.

AND POSSIBLY, IN EXTREME CIRCUMSTANCES, TO EXPLODE!

Grinding Wheels: Types



Note: each shape has designated grinding face, which is only one to be used

“Blotter” on the wheel wheel has two functions:

1) Contains the specification of the wheel

2) Acts as a padding to help grip the wheel and spread clamping load

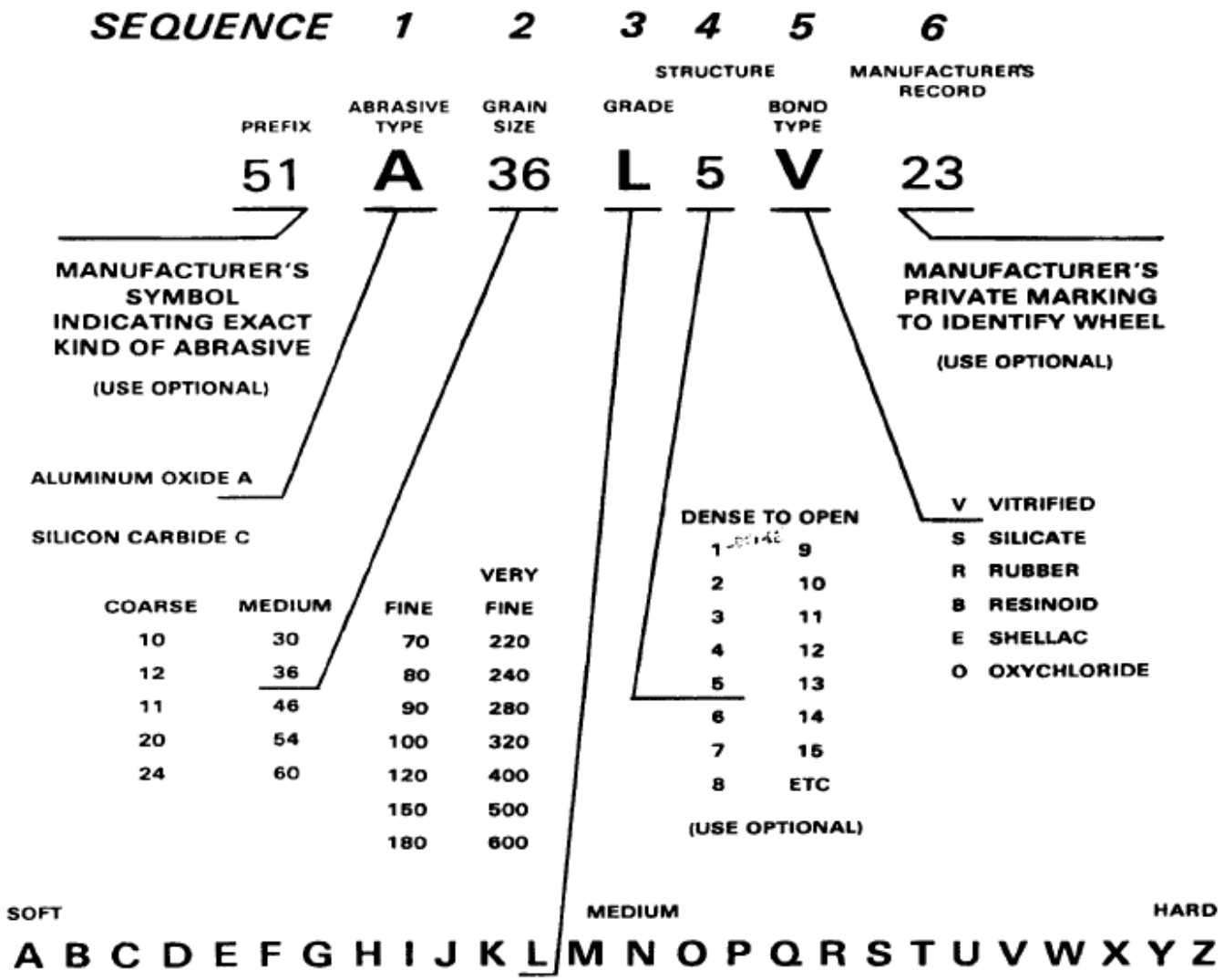
A BLOTTER OR SUBSTITUTE MUST BE FITTED

ALSO, CHECK:

WHEEL MAXIMUM SPEED IS HIGHER THAN GRINDER OPERATING SPEED

Grinding wheel marking codes.

Many variations, but typically:



RING TEST must be performed before fitting.

Tap 1/3 way in, in at least 6 positions, with wooden or plastic handle.
Listen for dull, or any variation, in ring.

Any doubt: DUMP IT!

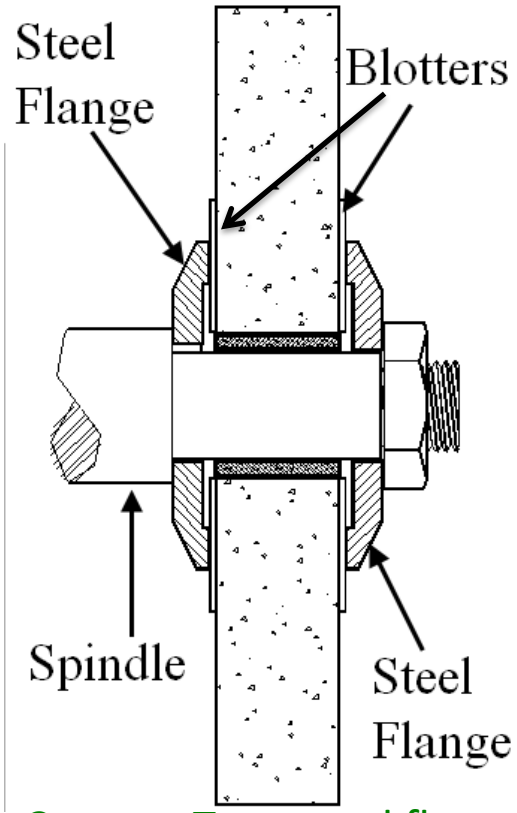
N.B. A dropped stone should be dumped as well!

Basic mounting of Straight Wheel

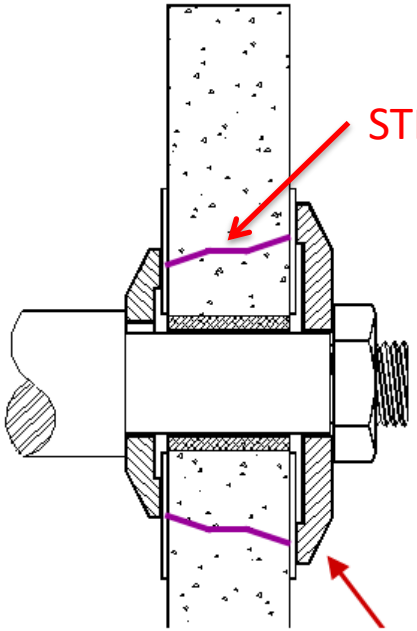
Snug-fitting adaptors must be fitted, to ensure concentricity of wheel with machine spindle.

N.B. can be metal, plastic, not wood.

Basic mounting of Straight Wheel



Correct: Two equal flanges



Note danger when different diameter flanges are used!

Incorrect: Unequal or no flanges

FLANGES AND BLOTTERS MUST BE FITTED

If blotters missing, then must be replaced by soft card or thick paper

Mounting of wheel

Only tighten sufficiently to prevent wheel slipping,
DO NOT OVERTIGHTEN

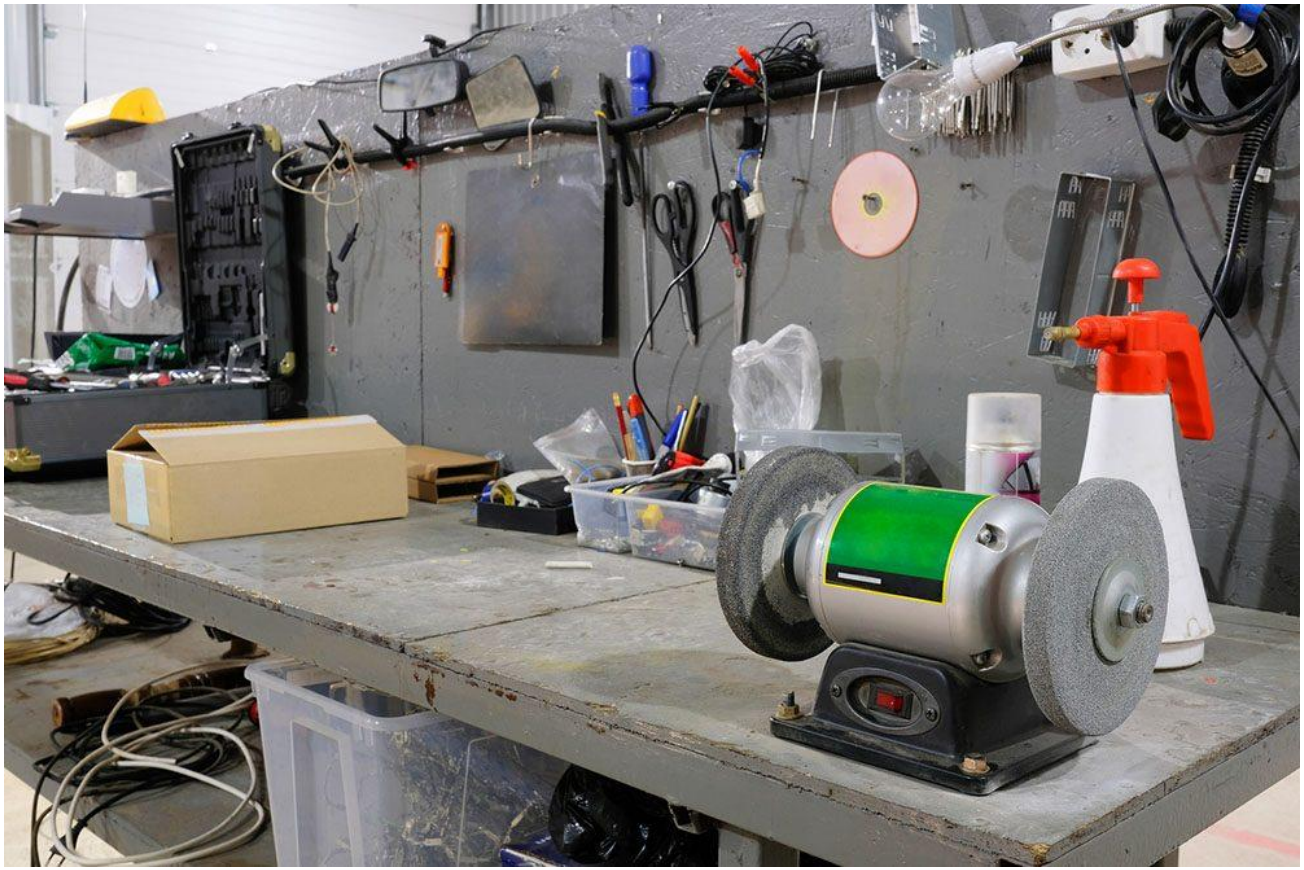
n.b. **Left side of spindle will have left-hand thread,**
Right will have right hand thread.

Spin by hand to check clearance, and trueness.
IF UNTRUE, INVESTIGATE AND CORRECT

Refit guard, adjust rest to 2mm clearance.

STAND TO SIDE and turn on, run for several minutes.

DO NOT USE UNGUARDED!



ALWAYS USE FACE VISOR

TO AVOID THIS

Wheel Dressers

-used to true and resurface wheel face

Star type

Diamond, single-point

Diamond, edge type, (Recommended)

Wheel Dressing

DUSTY: Wear face mask!

Common Wheel Types

Grey Aluminium Oxide

Aluminium Oxide 'Grey' Grindstones for general grinding.
Easy to overheat HSS tools.

Common Wheel Types

White Aluminium Oxide

Recommended for general tool sharpening, these wheels have a soft ceramic bond that enables the tool to be cut freely avoiding excessive overheating when grinding.

Common Wheel Types

Pink Aluminium Oxide, contains chromium oxide.

Semi-friable (self-sharpening) grindstone suited to the grinding of fine edged hand tools where the risk of overheating needs to be avoided. They are more resistant to grooving when reshaping or heavy sharpening is required than the white aluminium oxide stones.

Common Wheel Types

Silicon Carbide "Green Grit”

Replacement Silicon Carbide "Green Grit" (120 grit) Grinding wheels, suitable for TCT (TUNGSTEN CARBIDE) grinding

Do not use on softer materials

Common Wheel Types

Blue Ceramic Grinding Wheel

30% Ceramic grain wheels. Ideally suited for grinding hardened materials.

Cuts even faster than the white wheels and yet produces less heat thanks to its grit bonding characteristics.

Cubic Boron Nitride-coated Wheel

Safe, steel wheel, but expensive, circa £100 - £125

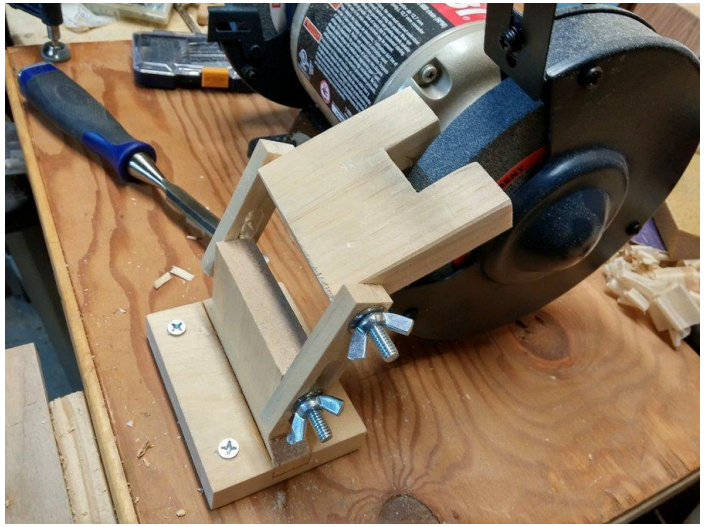
Cubic Boron Nitride: a ceramic grain almost equaling diamond in hardness but which can be used for sharpening High Speed Steel

Diamond is not a suitable abrasive grain to use when grinding tools on a high speed dry wheel as it affects the steel at relatively low temperatures - well within the range of temperature achieved when grinding, even briefly.

-Can be used dry, without coolant
-Very little pressure required
-very few sparks and little heat produced
-almost impossible to overheat tools

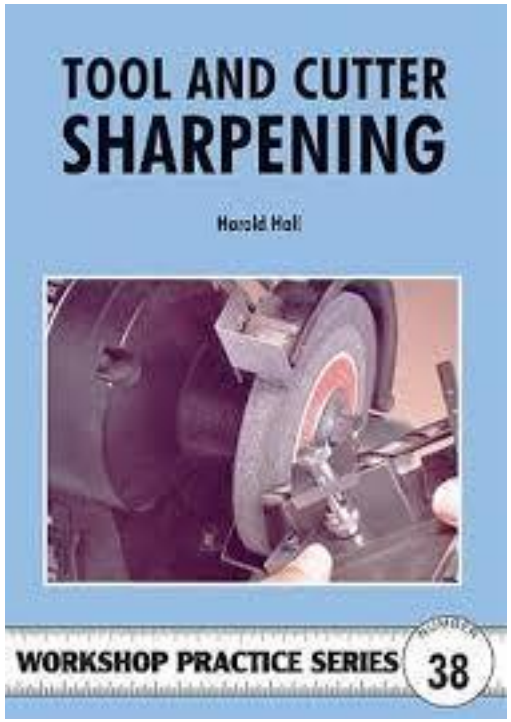
Grinding Rests

Commercial…….



Or shop-made…..

Recommended book; describes manufacture of versatile rest



BELT LINISHERS

Sharpening with Belt Linishers

PRO's:
Safe
Versatile
Quick change
Straight edge

CON's:
Can't do small internal curves
?

Linishing belts

Note: fit belt in correct direction, to avoid lifting joint

Using Small Linisher, with guide, to sharpen:

Parting Tool

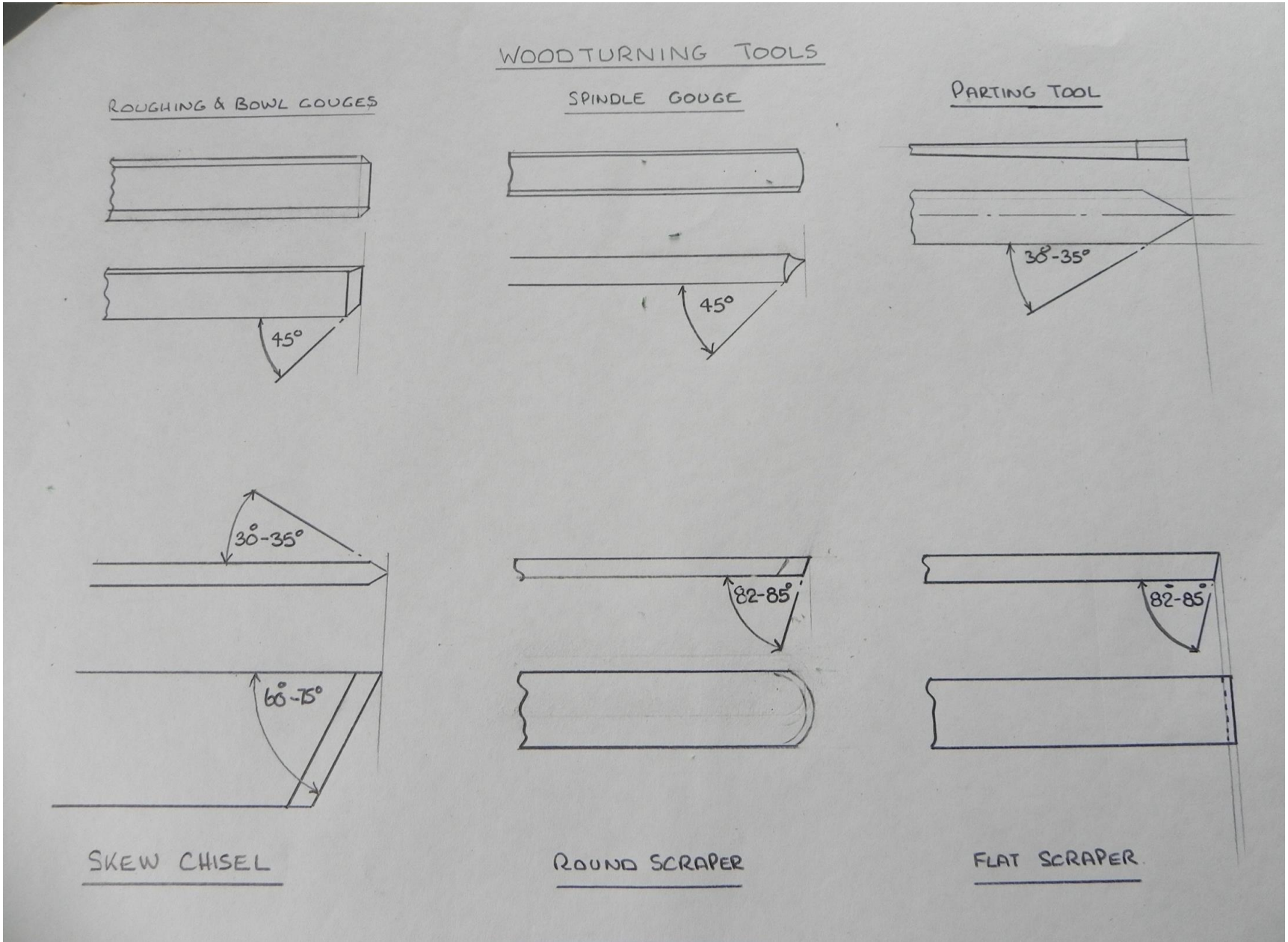
Gouge

Drill sharpening

Sharpening with Large Linisher

Using homemade fingernail grinding jig

Typical Woodturning tool angles



Commercial Sharpening Jigs and shop-made

Diamond Abrasives

- To me, these have more or less made traditional sharpening abrasives redundant

- Will cut any material: Glass, Steel, Carbide, Stone,….. etc

Diamond Abrasives

- In many forms

Files

Belts

‘Stones’

Compound

Diamond Abrasives, (continued)

Rotary discs and wheels:

Resin bonded

Diamond disc on the woodlathe

Twist-Drill Sharpening

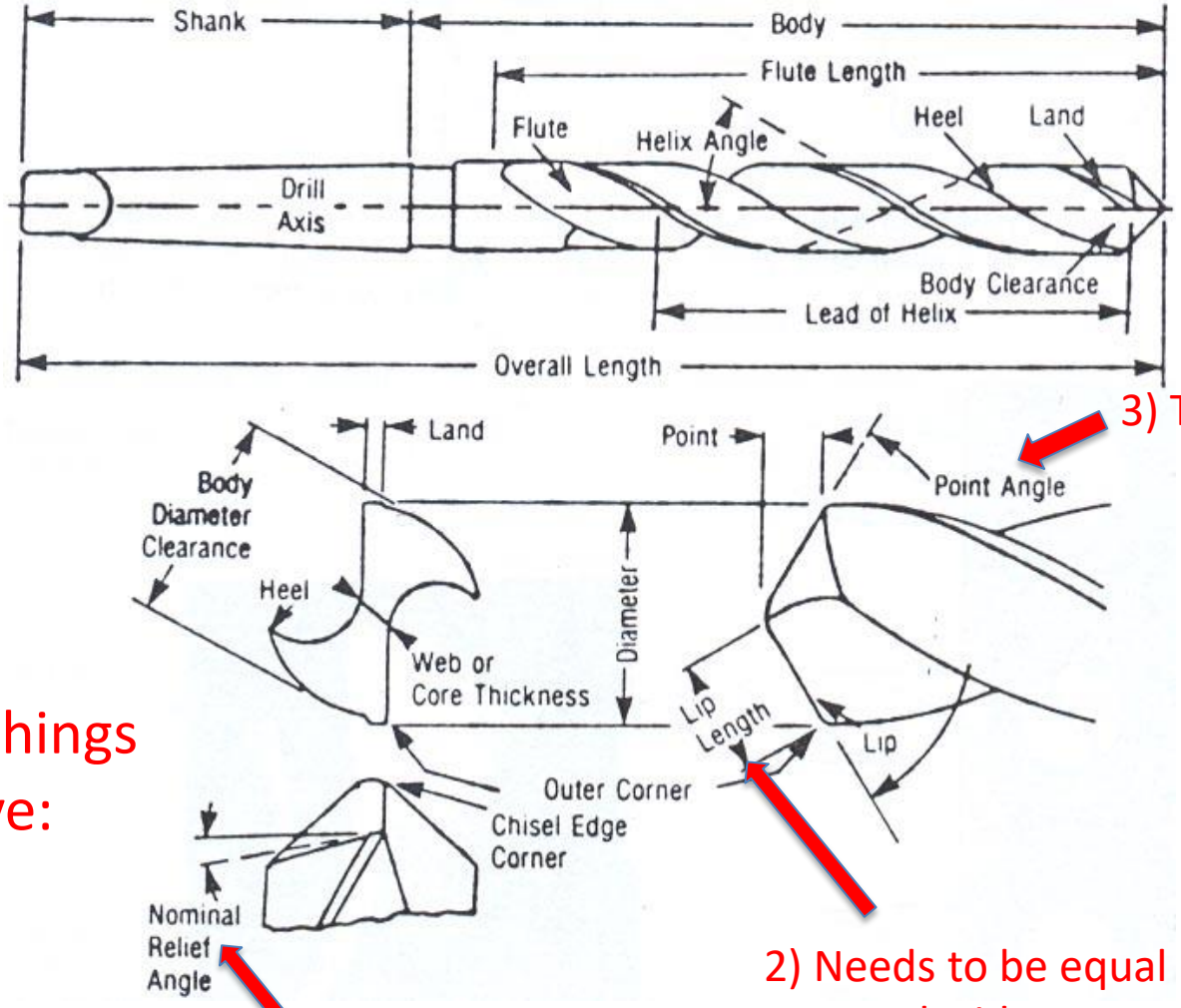
- Many different types, e.g.:

Wood, Brad point

Metal, General purpose

Carbide-Tipped, masonry

Drill Nomenclature



Three main things to achieve:

3) Typically 118 deg

2) Needs to be equal each side

1) Typically 7-12 degrees

- Drill Sharpening Jigs; many types:

Semi-pro, low cost £15

Home-made, precision

“Dremel”

“Multisharp” DIY Jig, £12

Will do normal, Brad-point, spade and Masonry drills

TORMEK

MADE IN SWEDEN

DBS-22 Drill Bit
Sharpening Attachment Jig

- ✓ Grinds 3mm to 22mm metal working drill bits
- ✓ Every degree of grinding angle from 90° to 150°
- ✓ Gives optimal bit performance in most materials
- ✓ Clearance angle choice of 7°, 9°, 11° or 14° degrees
- ✓ No burning, sparks or micro cracks from heat
- ✓ Compatible with all Tormek models

4-Facet Point

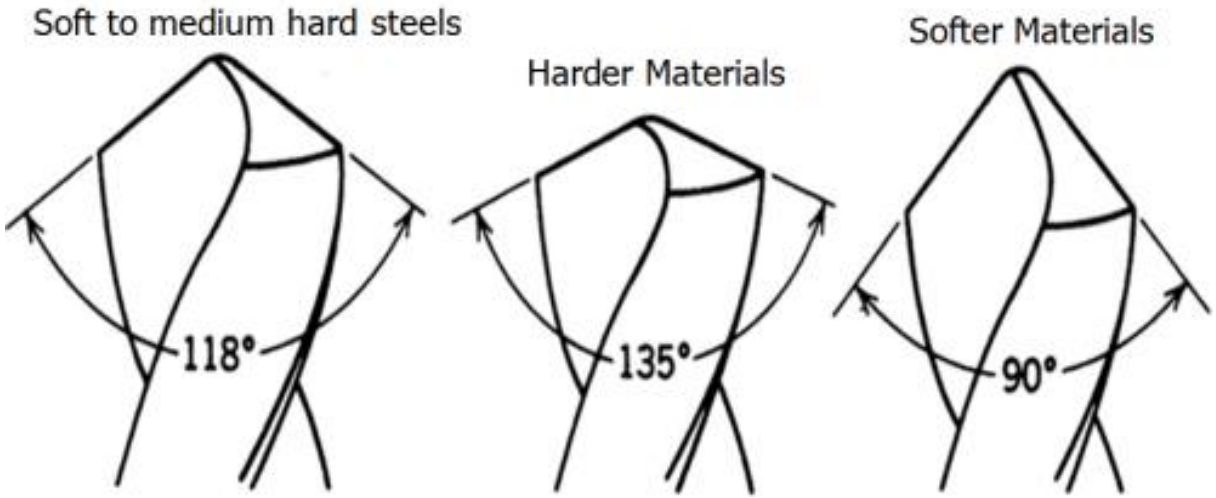
For the highest precision and accuracy. The chisel edge comes to a point and will not walk. Bores a round, straight hole with close tolerances.

Semi-pro, expensive, c £190

‘Yorkshire’, cost: nowt.

Professional

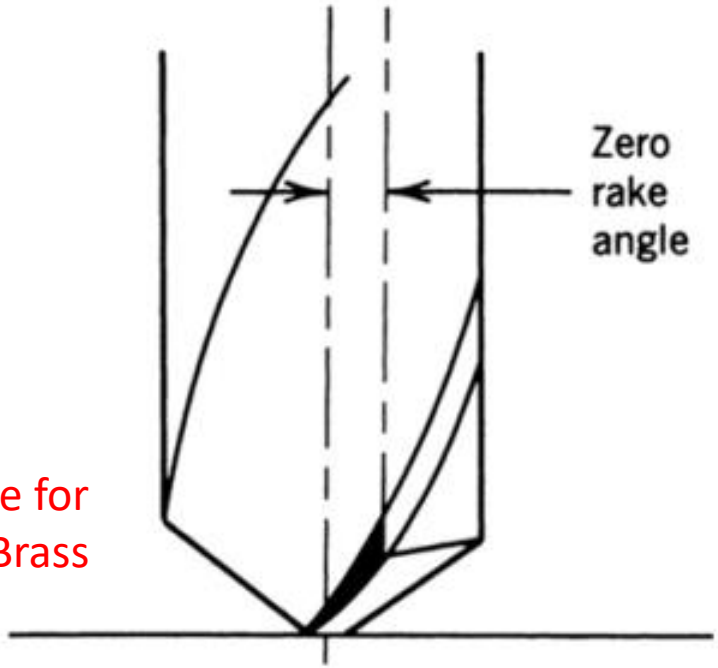
Drill angles



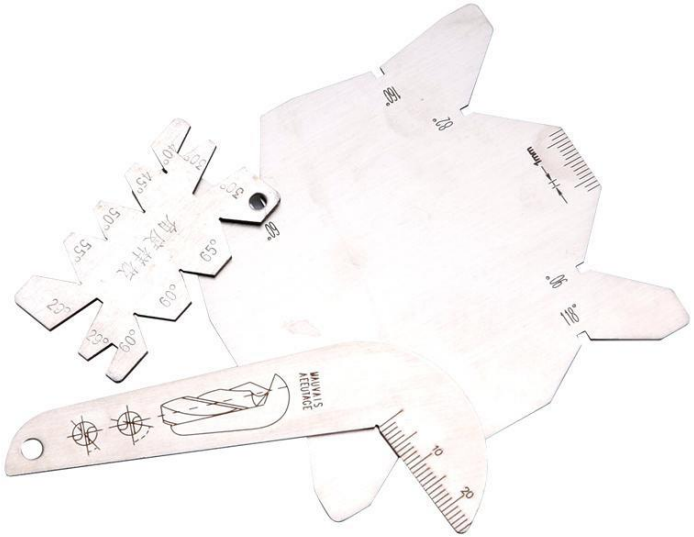
The drill point angle may be modified to cut a variety of materials.

n.b. changing angle will alter cutting edge 'straightness'.

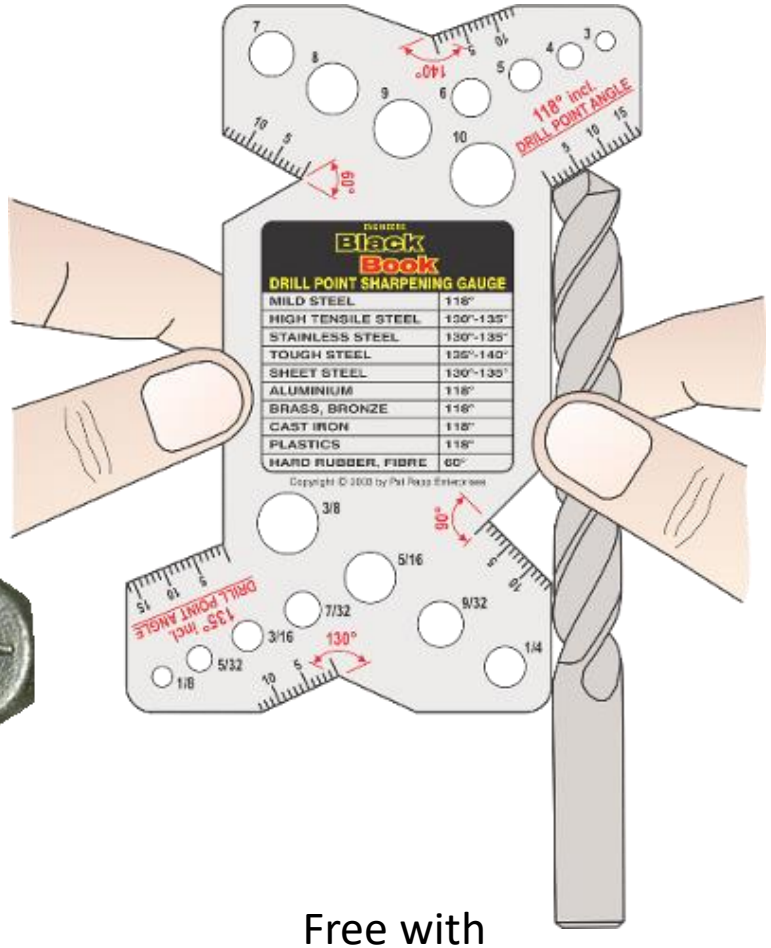
Zero rake for drilling Brass



Drill angle gauges



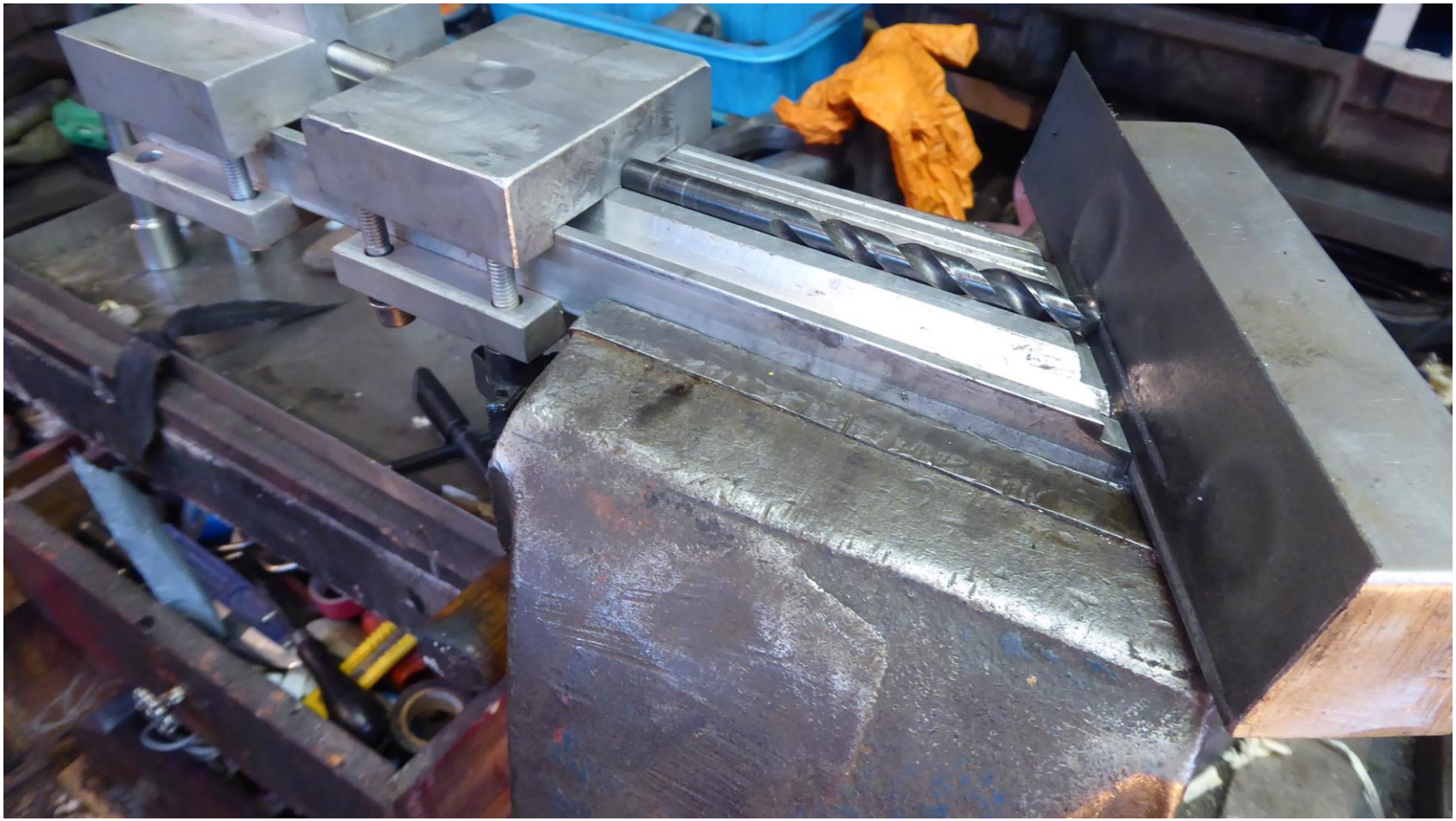
"Yorkshire Gauge"
(zero cost)



Free with
"Engineers Black Book"

Sharpening on the linisher, using Picador jig.

Mike’s home-made jig/gauge



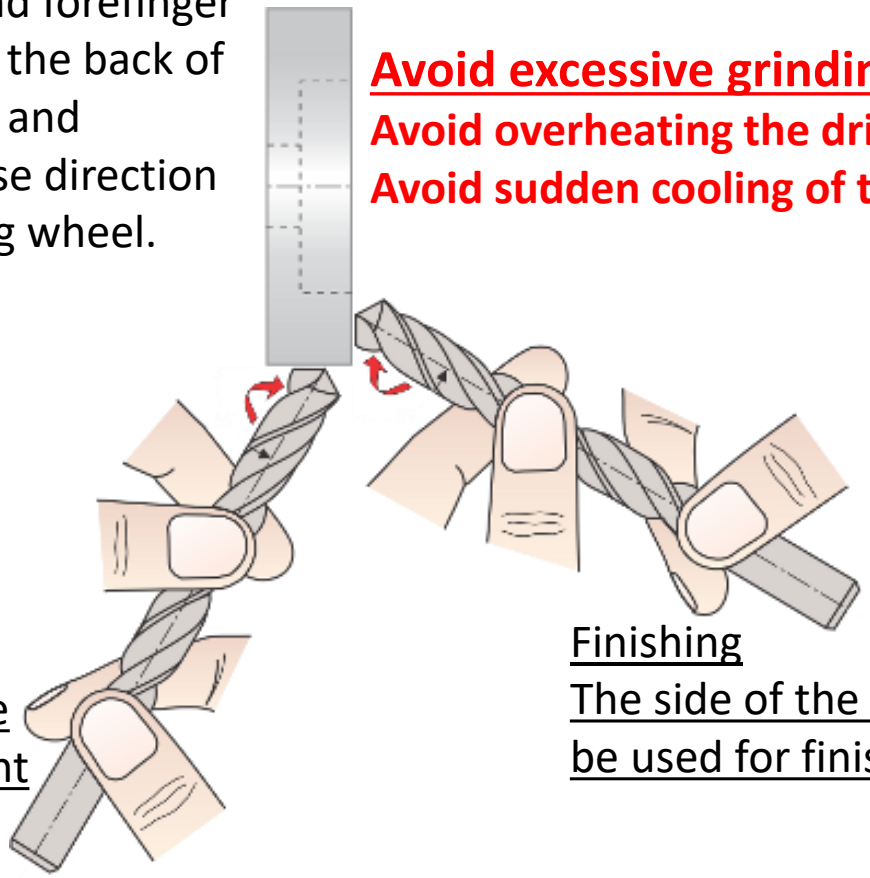
Hand-sharpening

Over to Stu

Hand-sharpening

Procedure: The left hand thumb and forefinger is used as a pivot as illustrated and the back of the drill is held with the right hand and forefinger and rotated in a clockwise direction advancing the drill into the grinding wheel.

Avoid excessive grinding pressures
Avoid overheating the drill point
Avoid sudden cooling of the drill point

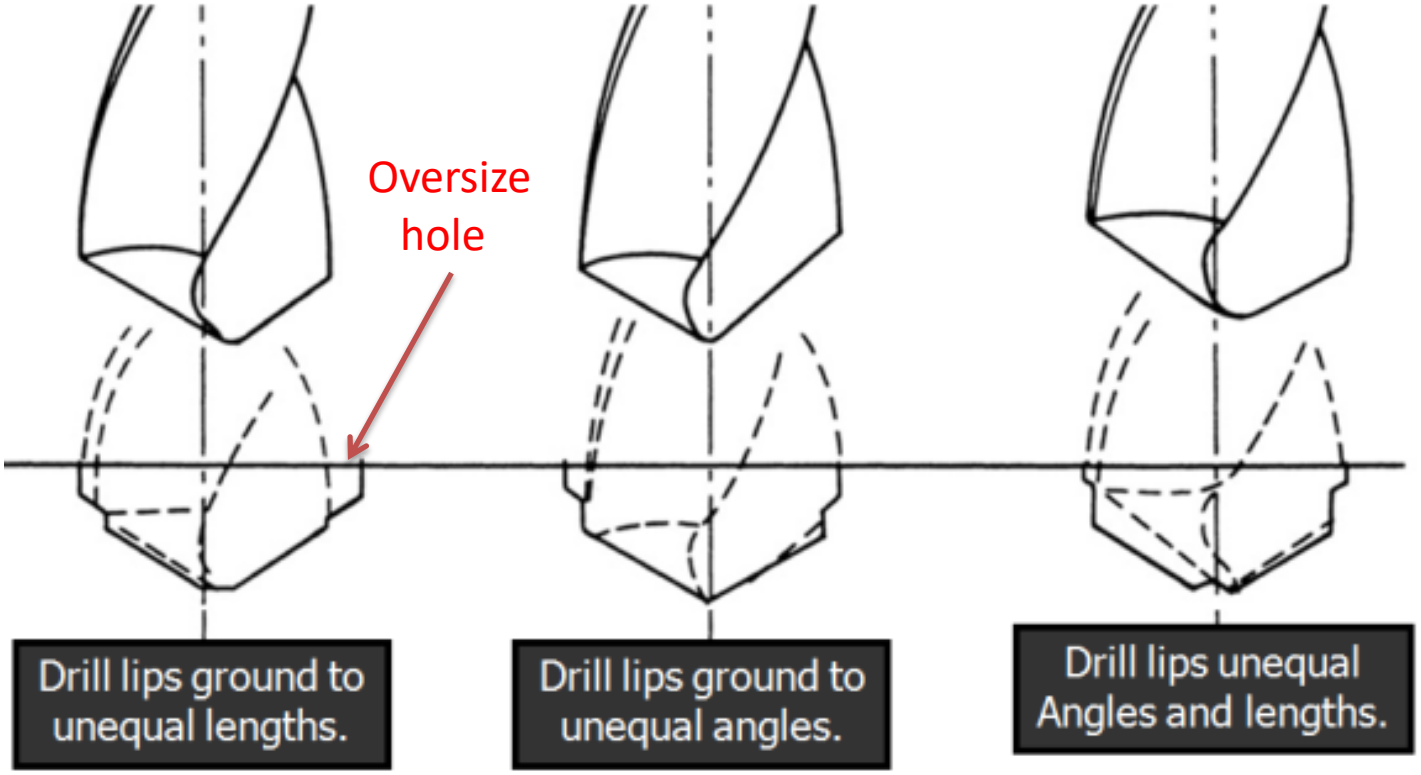


Roughing
The periphery of the wheel should be used for roughing-out of the drill point if much metal must be ground away

Finishing
The side of the wheel should be used for finishing

Hand-sharpening

- Angles not critical, but must be equal
- Lip length critical, unequal will drill oversize



Check regrind by test-drilling

- By drilling scrap soft material, eg. Aluminium or plastic, stop drill during drilling.
- Observe swarf, if unequal,

  grind lip which is cutting

  heavier, retry until equal.

and finally

Sharpening Carving Tools

Tool Sharpening Systems.

- Many different types:

Wet ……

Or Dry

Wheel ……. Or Belt

Tool Sharpening Systems.

- Some of these will be demonstrated around the room by our members.

Please have a wander and discuss with them.

That’s all from Stu, and Mort and myself,

Hope you learnt something…….

Goodnight.