Use of KS-123 with adjustable knife jigs SVM-45 and SVM-140

1. KS-123 adds 4 mm to the protrusion

I prefer using the SVM-45 or SVM-140 knife jigs for the simple reason that I can then set the correct sharpening angle by setting the protrusion to the calculated or selected length.
Moreover, I prefer to use the KS-123 to set the grinding angle for the simple reason that it is easy and accurate. However, the combination with the SVM-jigs is unfortunately not possible without further ado.
The KS-123 is clamped onto the Universal Support Bar (USB) while setting the sharpening angle. When using the adjustable knife jigs, the adjustable stop will rest against that clamp and is therefore at a distance Ko from the USB. See Fig. 1.1.

Fig. 1.1: Angle setter KS-123

The material thickness of the clamp is 4 mm at that position. This means that the set protrusion is 4 mm too large for a correct grinding angle.

The problem is easy to remedy by shortening the set protrusion for grinding by 4 mm.

Unfortunately, this is not easy to do by giving the adjustable stop the correct number of turns, as the rubber stop slips over the thread with a pitch of 2.5 mm. The amount of movement of the knob turns out not to be 2.5 mm per turn and is not reproducible. Perhaps other manufacturers have a different construction that makes this reliable. For the Tormek version, the reduction of the protrusion must therefore simply be measured.
Another possibility is to give the angle to be set a pre-correction that provides the correct grinding angle.

2. Pre-correction of the setting angle

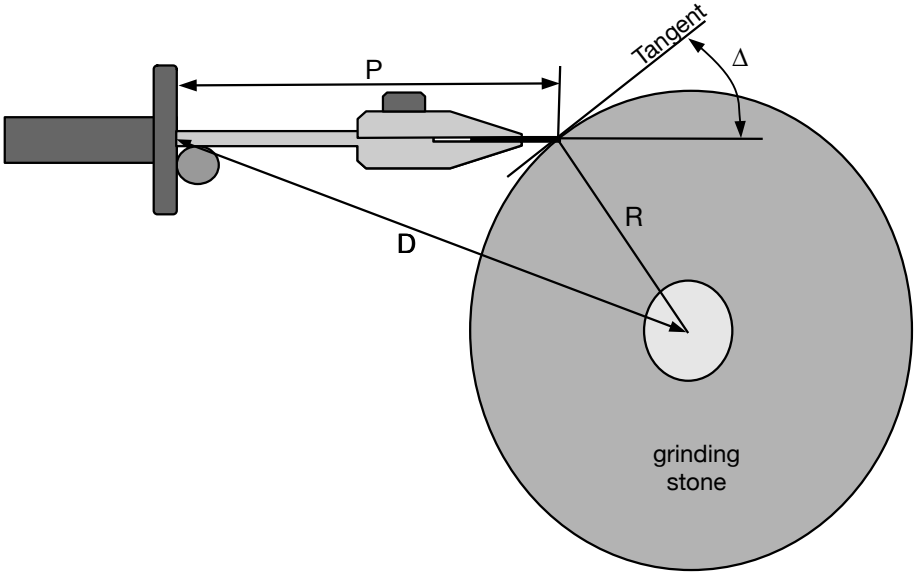

Fig. 2.1: Adjustment parameters

To calculate the grinding angle, we again use the cosine rule as described in Reference [1]

Consider the triangle determined by the knife jig protrusion P, via R to the centre of the stone and via the long side D back to the jig on the universal support. The angle opposite side D is equal to 90°+Δ because the grinding angle Δ is equal to the angle between the knife blade and the tangent to the stone while the radius R is perpendicular to the tangent.

With the cosine-law we get $D^2=P^2+R^2-2*P*R*\cos(90+\Delta)$

which can be simplified to:

$$D=\sqrt{P^2+R^2+2*P*R*\sin(\Delta)} \qquad [F0]$$

which is in parametric form: $D=F0(P,R,\Delta)$

So the grinding angle Δ is determined by:

$$\Delta=\arcsin\left(\frac{D^2-P^2-R^2}{2*P*R}\right) \qquad [F1]$$

and in parametric form: Δ=F1(D,P,R)

The problem we want to solve now is the angle we need to set with the angle setter when the knife jig is placed at a distance Ko from the USB. This can be solved in two steps.

2.1. Distance D changes

In Fig.2.2, two states of the knife jig are schematically shown: when setting the angle and during sharpening.

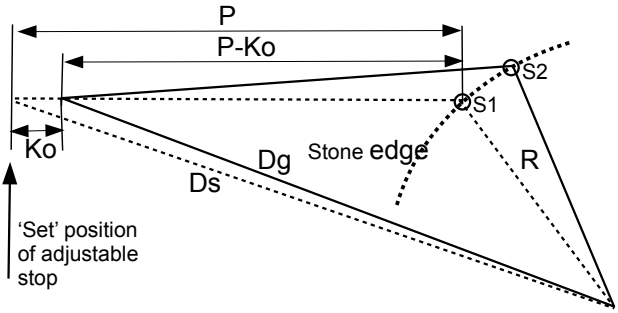

Fig. 2.2: Change in distance Dg to Ds due to offset Ko

During adjusting the angle, the angle is determined by the dotted triangle, bounded by the distance Ds, the protrusion P and the radius R of the stone. When the KS-123 is removed for the grinding phase, then the knife jig is moved over a distance Ko on the USB and the knife edge is moved from point S1 on the stone to point S2., where the grinding angle should be the desired value ∆g. The distance to the center of the stone changes from Ds to Dg.

Dg can be calculated as F0(P,R,∆g)

2.2. The 'setting angle'

If, without KS-123, the protrusion is reduced with Ko, then the knife edge will again touch the stone on point S1 where the setting angle ∆s has been set.

∆s can be calculated as F1(Dg,P-Ko,R)

2.3. Example

A small computer program in Smart Basic (Ref.[2]) gave the following results for my Tormek T7 with grinding angles of 10° and 20°:

```
P= 137
R= 119        Diameter= 238
Dg=196.4      Ds=199.7
Ag= 10.0      As= 12.3
```

and

```
P= 137
R= 119        Diameter= 238
Dg=210.       Ds=213.4
Ag= 20.0      As= 22.7
```

This method is therefore suitable for grinding angles from 10° to 20° with setting angles of 12.3° to 22.7° on the available 0°-25° scale of the KS-123.

2.4. Program code in 'Smart Basic'

```
'KS-123 usage with SVM-jigs
' by 'Dutchman' Ton Nillesen, July 2026
'See  https://nitisara.ru/forum/viewtopic.php?f=20&t=2832

'---  variables
Ko=4   'knife-jig offset to USB (mm)
Ag=15  'grinding angle
P=137  'protrusion (mm)
S=238  'diameter of stone or honing wheel (mm)

'--- Presets
OPTION ANGLE DEGREES
F$="###.#" ' format string for numeric output

'--- do the math
R=S/2  ' radius of stone
Dg=Distance(P,R,Ag)
As=Edge(Dg,P-Ko,R)
Ds=Distance(P,R,As)

'--- output
GOSUB Output
END

'=== FUNCTIONS and SUBROUTINES ===
DEF Distance(P,R,A) ' Formula [F0]
  D=SQRT(P^2+R^2+2*P*R*SIN(A))
  RETURN D
END DEF

DEF Edge(D,P,R) ' Formula [F1}
  A=ASIN((D^2-P^2-R^2)/(2*P*R))
  RETURN A
END DEF

Output:
  PRINT "P=";P
  PRINT "R=";R, "Diameter=";S
  PRINT "Dg=";F$:Dg,"Ds=";F$:Ds
  PRINT "Ag=";F$:Ag,"As=";F$:As
RETURN
```

The Smart Basic support forum can be found at Ref.[3]

2.5. Test with KJ-jig

The KJ jigs have two fixed stops where the USB can be placed in position ① or ②**.**. See Fig.2.3

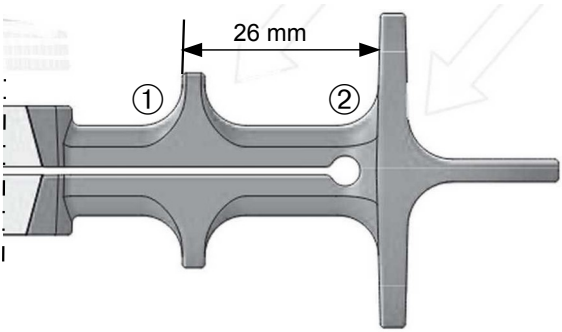

Fig. 2.3: KJ-jigs have two stops: ① and ②

The distance between the two stops is 26 mm. This allows testing whether the method is correct for an extreme value of Ko=26 mm.

The protrusion for this test cannot be chosen arbitrarily because it must fit within the angle setter at both positions of USB on tne jig.

The retractable part of the KS-123, see Fig.1.1, can be moved over a distance of 36 mm. The minimum protrusion is 126 mm, so that the protrusion in position ① can vary between 126 and 162 mm.

In position ② is that 26 mm larger. The overlap between these intervals is therefore 152 to 162 mm, and consequently, the protrusion must lie within 152-162 mm to perform this test.

From a 1mm thick hard plastic sheet, I made a strip 53 mm wide, with which a protrusion of 157 mm was set in the jig.

A part of the sheet had to be cut away in order to fit in the angle setter. See Fig. 2.4.

The calculation gave the following result:

```
P= 157
R= 117.5      Diameter= 235
Dg=208.8      Ds=231.5
Ag=  8.0      As= 24.2
```

Fig. 2.4: Shaped sheet in jig

It is remarkable that the difference between set and grinding angle is only slightly smaller than the full scale of the KS-123. However, that difference does exist, and therefore this test can be performed.

With the knife jig in position ① the angle was set to about 24.2° with the angle setter, as shown in Fig. 2.5. Then the jig was positioned on position ② on the USB and the angle was measured with the angle setter as shown in Fig. 2.6. It was spot on 8°. Actually, I had expected some deviation, but this clearly shows that the method is accurate, especially for the much smaller

Fig. 2.5: Angle set in position ①

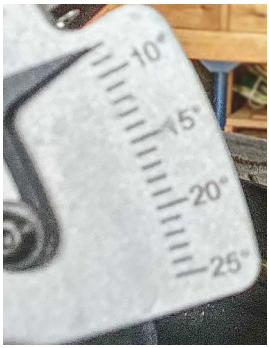

Fig. 2.6: Resulting angle in position ②

distance in position that actually exists between 'set' and 'grind': 4mm instead of 26mm.

2.6. Conclusion

Both methods are usable, but I prefer the first method because setting the KS-123 to exactly the right angle marking is simpler than setting it to a calculated value between two markings. However, it does require shortening the protrusion by 4 mm afterwards, before grinding.

3. References

[1] Grinding angle adjustment A5 serial.pdf

https://forum.tormek.com/index.php?action=dlattach;attach=6842

[2] "Smart Basic" programming language for iOS

https://apps.apple.com/us/app/basic-programming-language/id1540244170

[3] "Smart Basic" support forum

https://nitisara.ru/forum/viewforum.php?f=2