

Hardness and Ease of Deburring

This simple study is to compare how the blades differing only by hardness respond to deburring.

A2 is a high carbon, high molybdenum tool steel.

The A2 blade #7 has been hardened to HRC 54, while the A2 blade #11 to HRC 62 - they represent extremes of the knife hardness range.

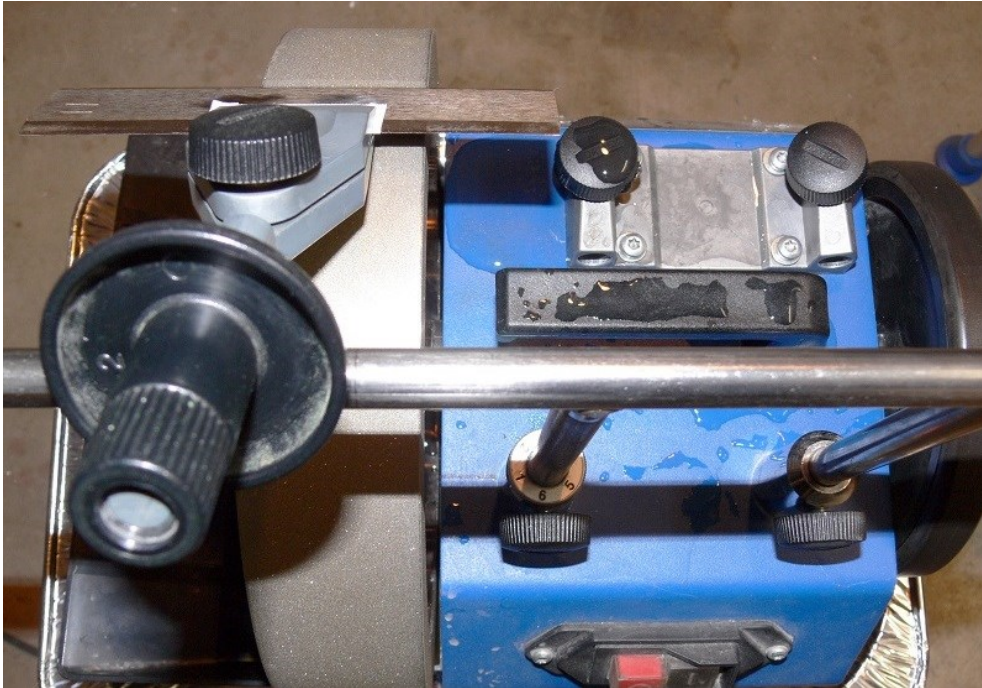


These two blades have been sharpened exactly the same way, and edge sharpness scores recorded through the process.

The results have come with no surprises: **the harder steel is easier to deburr and get sharper.**

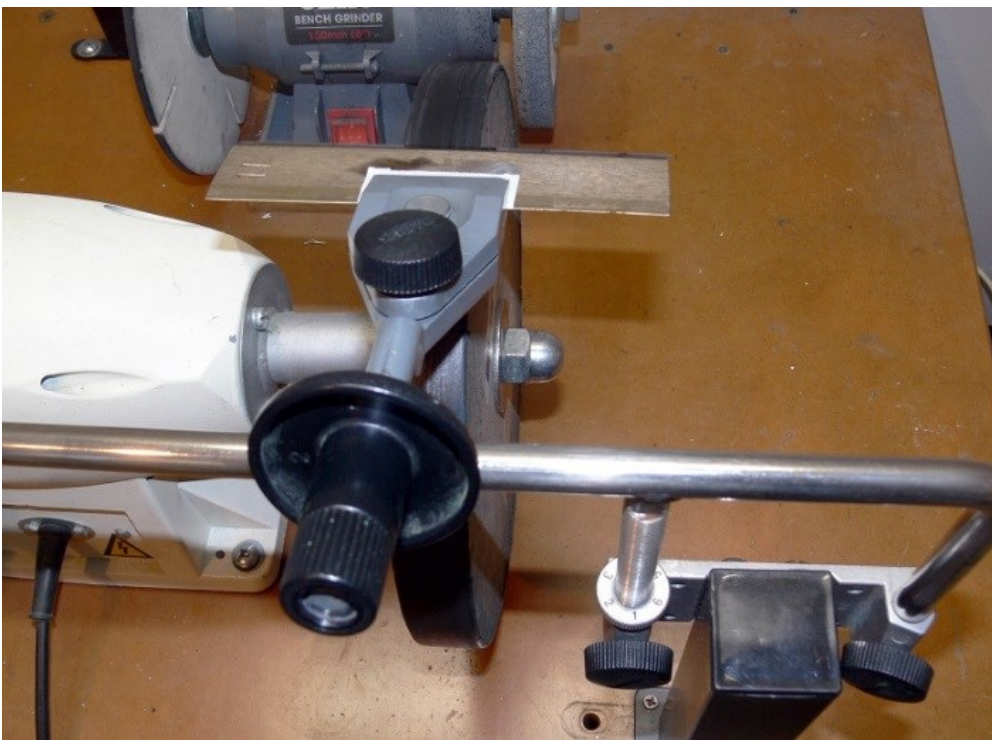
The blades were bevelled at 15 degrees per side (dps) on Tormek using CBN wheels, the edge set on CBN #1000 edge-leading.

Off the #1000 CBN wheel a tiny burr was visible.



Deburring was done edge-trailing on a paper wheel with 5 micron diamonds at the exact edge angle, i.e. 15 dps, with the help of our [support for controlled-angle honing](#) and computer software. Finished on a paper wheel with 0.5 micron diamonds to see effect of burnishing.

5 microns correspond to JIS #3000, and 0.5 micron to # 30,000



In the context of this study, higher BESS numbers indicate a larger burr.

SHARPENING STEP	HRC 54 BESS sharpness score	HRC 62 BESS sharpness score	Comments
Off #1000 CBN	197	159	
Paper Wheel with 5 micron diamonds at 15 dps			
2 passes alternating sides	193	138	
4 passes alternating sides	187	127	
6 passes alternating sides	127	72	
Paper Wheel with 0.5 micron diamonds at 15 dps			
1 pass alternating sides	321	114	Burnishing effect - in the softer plate more metal gets displaced over the edge apex, forming a wire edge
Paper Wheel with 0.5 micron diamonds at 15.4 dps i.e. higher-angle honing at 0.4° higher			
1 pass alternating sides	109	95	Final sharpness

Post-sharpening spontaneous loss of sharpness

In 17 hours after sharpening the sharpness scores are:

HRC54 = 152 BESS, worsening by 43;

HRC62 = 111 BESS, worsening by 16.

HRC62 is near 3 times better off.

The phenomenon of the post-sharpening dulling reaches its maximum between 12-17 hours after sharpening, and is explained by three factors:

- oxidation;
- the edge apex stressed by sharpening may bend to the side of the original burr; and
- the weak wire/foil edge we create by burnishing when deburring edge-trailing.