



Cold Fire - SBT investigation

Introduction:

Five Saw Blade Tips (SBT) were sent to Barry Collier for evaluation of the "Cold fire" process. It was the intention of this investigation to establish whether any differences could be seen in the microstructure. The second part of this investigation was to determine whether brazing destroys the effects of the "Cold fire" process.

Results:

Three sets of results were taken. The first set were taken directly after electro-plating. The second set were taken after the "Cold fire" (CF) process and the third were taken after the SBT's were placed in a furnace at 8000C for 2 hours.

The results have been tabulated below:

Table 1. Comparison of metallurgical properties:

	Before "CF"	After "CF"	After annealing
Coercivity (Oe)	164 - 168	199 - 216	206 - 220
Magnetic Saturation (%)	5.64 - 5.84	5.61 - 5.84	5.57 - 5.80
Hardness (HRA)	91.1 - 91.2	91.1 - 91.2	91.1 - 91.2
Grain size	1 - 3	1-3	1-3

As can be seen from the results, only the coercivity appears to have been affected by the "Cold Fire" process. Coercivity, generally, is a measure of grain size as well as cobalt content. It can also be seen that annealing did not effect the tungsten carbide properties at all. This is to be expected since cobalt melts at 14000C and there are no phase changes as in steel.

Micrographs were taken of the 3 sets of data, namely Fig 1, Fig 2 and Fig 3. Under 1000X magnification, no differences could be seen in the microstructure with the equipment available to us.

Conclusion:

The "Cold fire" process does alter the metallurgical properties in terms of the coercivity. As stated above, coercivity generally is a measure of grain size. The higher the coercivity, the smaller the grain size. However, in this case, no difference can be seen in the grain size therefore it must be concluded that the process effects the ability to align all magnetic dipoles within the carbide and probably imparts some compressive strength to the carbide. Annealing or brazing should not remove the effects of the "Cold Fire" process or affect the carbide in any way.

Fig 1. Before "Cold Fire"

1000X



Fig 2. After "Cold Fire"

process 1000X

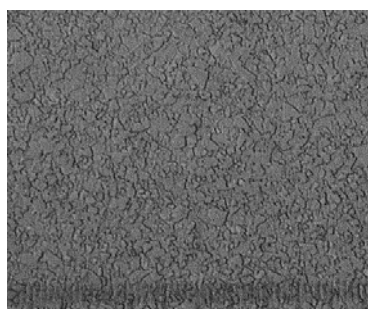


Fig 3. After annealing

