

# Bismuth-Tin Lapping Plates

Bismuth-tin alloys are uniquely used for lapping thin film magnetic heads. The primary advantage of these alloys is that they produce less smearing across the magnetic sensor which results in a cleaner magnetic and electrical signal.

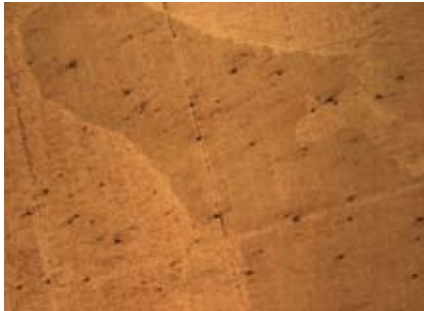
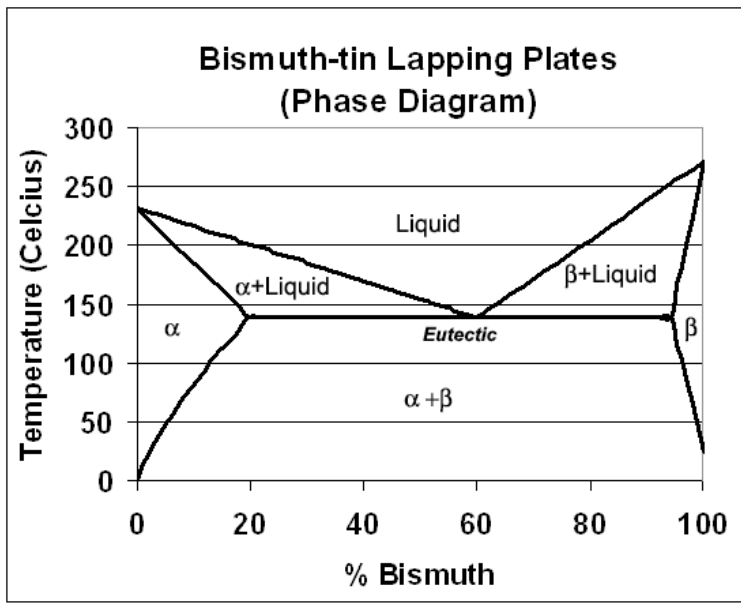
In general, tin and its alloys are a class of materials which have recrystallization temperatures below room temperature. This means that they do not work harden at room temperature. This is very important for embedding diamond into a lapping plate because the lapping material will not work harden during the charging process, thus allowing the diamond to embed into the

lapping plate. The problem with most of these low recrystallization metals and alloys is that they do not effectively hold the diamond. For the bismuth-tin alloys the very fine grain boundaries are ideal for diamond embedding.

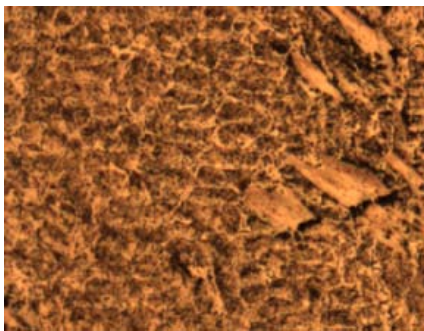
The eutectic composition for these alloys is at a composition of 58% bismuth and 42% tin. At this composition a completely



## Bismuth-Tin Lapping Plate Alloys



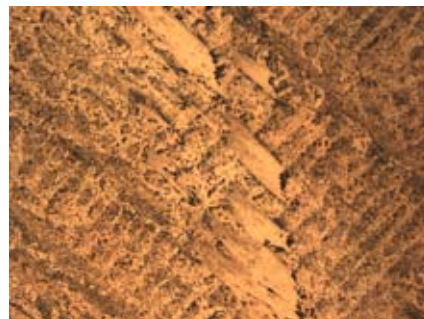
100% Sn - 100X



20% Bi-80% Sn - 200X



60% Bi-40% Sn - 200X



40% Bi-60% Sn - 200X



100% Bi - 50X



homogenous solid exists. For compositions varying from the eutectic composition, secondary phases of either bismuth or tin occur.

The bismuth-tin lapping plates are custom cast, although typical data storage lapping machines use lapping plates ranging from 15-inch to 18-inch diameters.

The reason for the wide acceptance of bismuth-tin alloys for lapping magnetic read-write heads is because of their ability to produce the following benefits:

- Lower Pole-tip recession (PTR)
- Lower Alumina recession (ALR)
- Less Alumina Roll-off
- Less Smearing across the MR/GMR gaps
- Improved Surface Finish

### Properties of Eutectic Bismuth-tin alloy

Properties	Eutectic Bismuth-tin alloy
Melting Temperature (F)	281
Tensile Strength lbs/in <sup>2</sup>	8000
% Elongation in slow loading	200
Brinell Hardness No.	22
*Specific Heat - Liquid	0.045
*Specific Heat - Solid	0.045
*Latent Heat - Fusion Btu/lb	20
Conductivity (electrical) compared with pure copper	4.5%
*Maximum load - 30 seconds lbs/in <sup>2</sup>	15000
*Maximum load - 5 minutes lbs/in <sup>2</sup>	9000

\*Approximate values

### Lapping Plates

Description	Part Number
16-inch diameter 60% Bi - 40% tin lapping plate	40Sn-60Bi-16
16-inch diameter 20% Bi - 80% tin lapping plate	80Sn-20Bi-16
16-inch diameter zinc lapping plate	ZincA10-16

### Lapping Lubricants

Description	Part Number
Ethylene glycol lube, viscosity 20 cps (replaces Engis L6037 lube)	DIALUBE L7000
Higher viscosity lube, viscosity 25 cps	DIALUBE L7500
Anti-corrosion, non-ethylene glycol lube, viscosity 17.5 cps	DIALUBE 9G-A
Non-ethylene glycol lube for diamond lapping film swarf removal	DIALUBE 3000

### Corrosion Inhibitors

Description	Part Number
IPA based corrosion inhibitor concentrate for addition into cleaning/D.I. rinse solutions	PCC-7500
Propylene glycol concentrate for addition into lapping lubricant and diamond slurries	PCC-5000



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