



## Zinc-A10 Lapping Plates

Lapping and finishing of thin film magnetic heads is a critical process step for achieving reliability and performance in data storage hard drives. This is especially true as hard drives are now being used in a variety of consumer electronics, including digital TV, portable electronic devices and advanced PDA's.

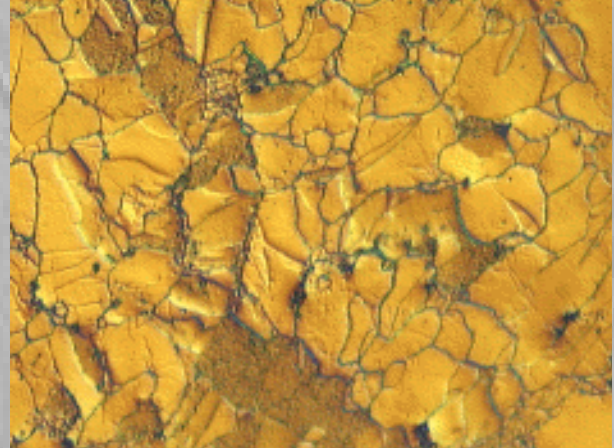
As the size of the hard drives continues to decrease, while the performance or areal density continues to increase, the requirement for more sensitive magnetic TMR heads and improved processing continues to challenge the industry.

This is especially true for the magnetic slider lapping and machining operation. With the development of thinner and more sensitive thin film layers, lapping artifacts such as smearing and preferential film layer corrosion become much more significant.

### **Zinc-A10 Fixed Diamond Lapping**

An alternative lapping plate material to the tin and tin-bismuth alloys is rolled and tempered pure zinc (Zinc-A10). Pure zinc is a malleable metal, similar to tin and lead, however it is harder and has a recrystallization temperature closer to room temperature. Both these properties allow for the diamond abrasive to become more solidly fixed into the lapping plate, thus acting as a fixed abrasive with a more controlled cutting action. The other primary advantage of zinc is that it has a higher electrochemical activity as compared to the other metals in the thin film stack. Thus the large area of the lapping plate vs. the very small thin film layers provides a desirable anodic corrosion protection scenario for the stack metals during the lapping process.

Material	Recrystallization Temperature
Lead	-25°C
Tin	-25°C
ZINC-A10	Room Temperature
Copper	200°C
Aluminum	194°C



99.99% Zinc-A10 - 200X

### **Zinc-A10 Advantages**

The result is that the ZINC-A10 lapping plate offers the following advantages:

- Improved Pole Surface Finish
- More Consistent PTR
- Reduced Alumina Roll-off and Recession
- Less Pole/ Top Shield/ Base Shield Recession Differences (MR recession)
- Less Gap Smearing
- Corrosion Protection of GMR/TMR stack

ZINC-A10 is the only lapping plate with a recrystallization temperature close to room temperature. The diamond embedding process for the ZINC-A10 lapping plate is as follows:

1. As a force is applied to the diamond, the pressure and temperature at the ZINC-A10 interface increases
2. Once this temperature increases above the ZINC-A10's recrystallization temperature, the diamond embeds into the plate
3. After the diamond is embedded the zinc metal flows around the diamond particle. This minimizes the point contact and at this point any additional lateral force on the diamond results in work hardening the zinc, thereby rigidly fixing the diamond into the lapping plate.

## Zinc-A10 Corrosion Protection

Corrosion and corrosion control of the GMR/TMR elements is an extremely important concern. As the composition and number of layers increases with GMR and TMR head designs, so does its susceptibility to galvanic corrosion. ZINC-A10 is anodic to the other elements used in the manufacturing of today's heads, thus a degree of galvanic protection is built

into the lapping process.

Conversely, tin and copper lapping can result in the galvanic corrosion of the iron, cobalt, and nickel. As these layers become thinner and increase in numbers, corrosion issues will certainly be more difficult to control and monitor with these traditional lapping plates.

In addition, the use of a lapping lubricant containing organic corrosion inhibitor with the ZINC-A10 provides added insurance that the GMR/TMR layers are protected during lapping.

Element	Corrosion Potential (mV)
Zinc	-763
Iron	-409
Cobalt	-280
Nickel	-230
Tin	-136
Copper	340

## Properties of Zinc A-10 Rolled Zinc

Properties	Zinc-A10
Composition	99.9% Zn
Melting Temperature (C)	419.5
Tensile Strength lbs/in <sup>2</sup>	18000
% Elongation in slow loading	65
Brinell Hardness No.	30
Density	7.1

## Lapping Plates

Description	Part Number
15-inch diameter Zinc-A10	ZincA10-15
16-inch diameter Zinc-A10	ZincA10-16
18-inch diameter Zinc-A10	ZincA10-18

## 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

