

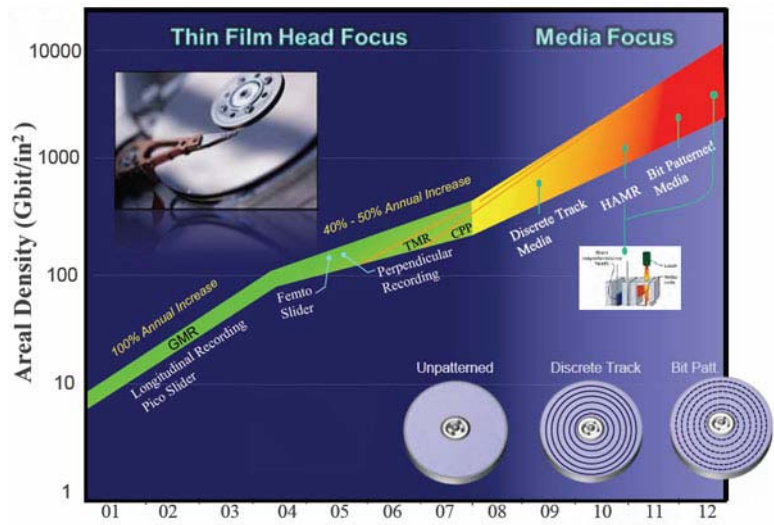


HARD DISK MEDIA

ADAPTING SEMI TOOLS FOR THE PATTERNED MEDIA MARKET

The Opportunity

Patterned media is an emerging technology that addresses the superparamagnetic limit facing conventional magnetic recording technology. It is seen by leading hard disk manufacturers as a possible route to terabit per square inch densities. The approach encompasses both discrete track recording (DTR) and bit patterned media (BPM). Given the tremendous manufacturing volumes for hard disk media and the hard disk drive (HDD) industry's rapid adoption rate, patterned media represents a significant business opportunity for those companies that can adapt their tools to meet the unique requirements of the HDD industry.



Graphic by Hitachi

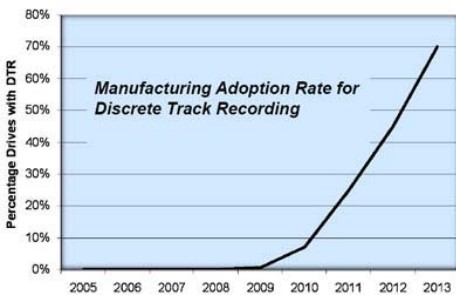
The Challenge

The fabrication of patterned media requires the hard disk industry to adopt manufacturing technologies that were originally developed for the semiconductor industry. Yet the requirements for manufacturing HDD media are quite different from manufacturing semiconductors. For instance, throughput requirements are more than 10 times greater; form factors are non-standard; and factory automation is custom. The question arises - how can a

semiconductor tool be cost effectively adapted to the unique requirements of the HDD industry?

The Answer

Owens Design has developed deep expertise in both the semiconductor and HDD markets. We have designed and manufactured custom solutions for the market leaders in both industries. Our business model is ideal to enable semiconductor OEMs to address the emerging patterned media market.



Coughlin Associates



ADAPTING SEMI TOOLS FOR THE PATTERNED MEDIA MARKET (CONT'D)

Capabilities

- Disk Sizes: 48 - 95 mm OD
- Cassettes: Process and shipping, all sizes, color, materials
- Substrate / Media Types: Aluminum, Bare + Coated Glass
- Environment: Dry, wet, high temperature, vacuum

Disk Handling

- ID mandrels, grippers and suction cups
- OD saddles, grippers, and vacuum paddles
- Load to custom pallets

Throughput

- > 1000 pph typical
- > 90% utilization

Cleanliness

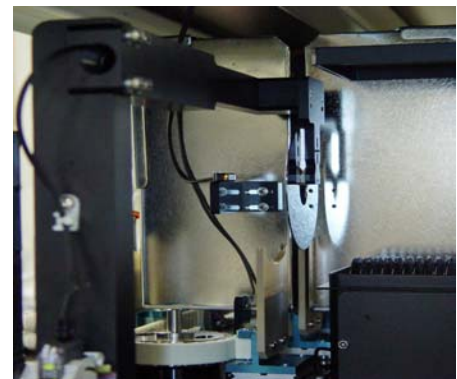
- Class 1 capability
- ESD compliant

Regulatory Compliance

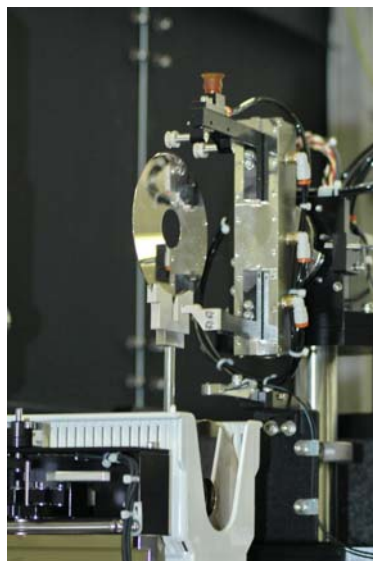
- All EHS and compliance standards
- CAL-OSHA, SEMI, NFPA, NEC, UL and CE



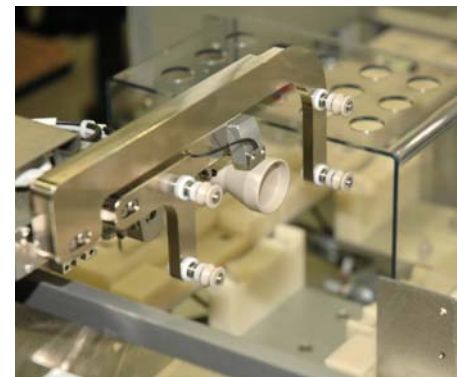
Six Axis Robot Loading Spindles



Custom ID Gripper Loading OD Saddle



Disk Lifter Mechanism



Custom OD Gripper with Push Arm