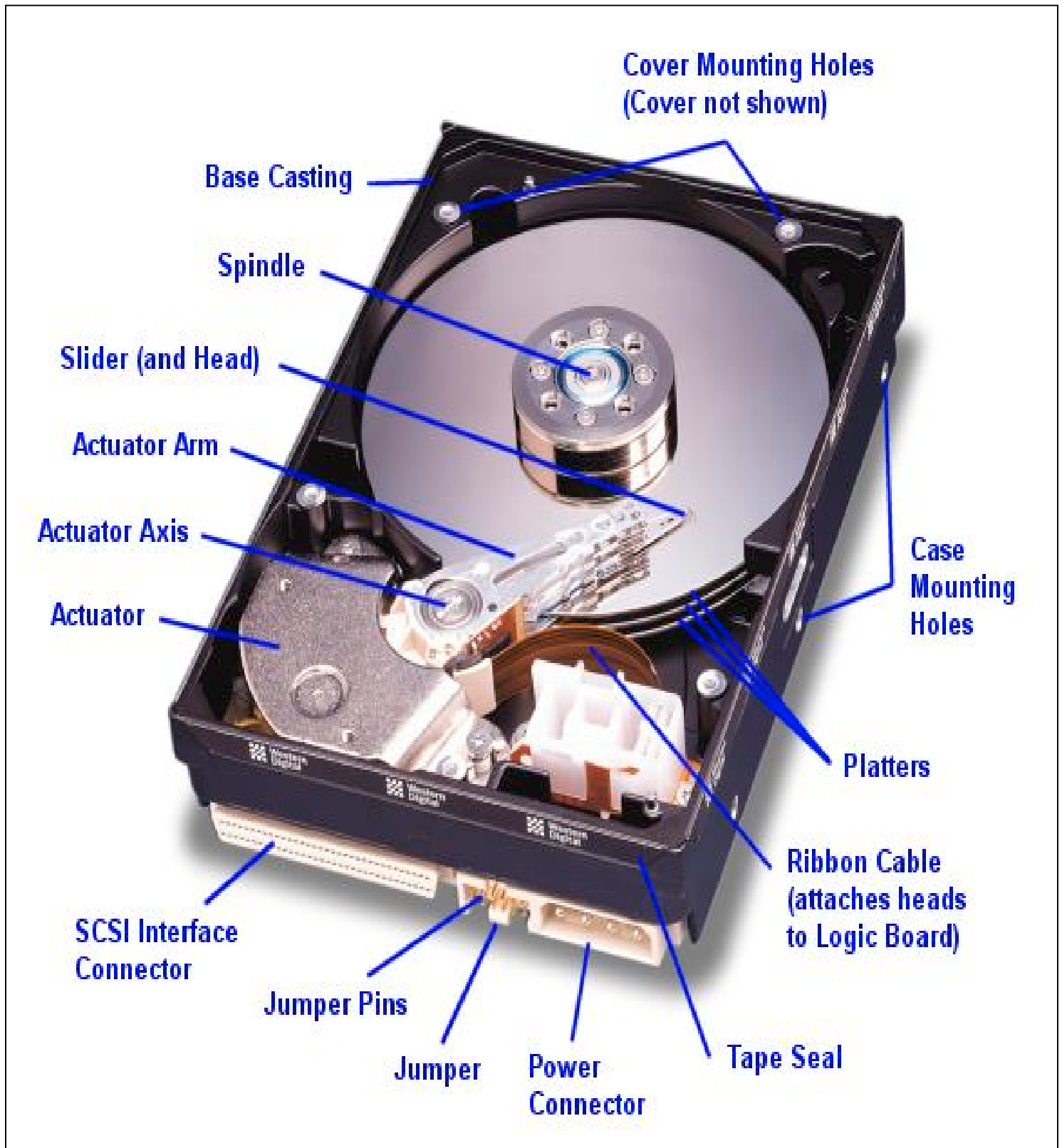




Microcontamination Testing Services

Cleanliness Test For Disk Drive Parts

MATERIALS OF THE PARTS THAT ARE FOUND IN HARD DISK DRIVE



BASE CASTINGS:

Made from pure aluminum or aluminum alloys and it is used to provide the platform for direct or indirect attachment of all of the other drive components

Contamination Control (CC) Exposures :

1. Bare aluminum castings have quite a rough surface and can be difficult to clean as well as being a particle source.
2. Usually a surface treatment such as E-coat or Alodine is required to control contamination. Both can be problematic if not properly applied.
3. Typically have relatively complex shapes with machined areas and blind and/or through holes which compound cleaning and drying problems.
4. Outgassing from improperly cured E-coat and organotin content in these have been problem in the past.

CRASH STOPS:

Made from Injection molded plastic piece with an elastomeric bumper and sometimes a permanent magnet latch and it is used to restrain the HSA from moving beyond the I.D. and O.D. boundaries of the prescribed travel zone, and also to latch the HAS into the landing zone or unloaded position for drive shut-down.

Contamination Control (CC) Exposures :

1. Magnetic contamination of crash stops can occur during manufacturing and shipping or handling.
2. The elastomeric bumper can be difficult to clean, but due to the small size they are typically not a major contamination source.

FILTERS:

Made from woven or matted synthetic fibers; glass fibers; carbon fibers or granules, and expanded PTFE and it typically used to filter out particles which become airborne during the operation of the drive, to allow for pressure equalization within the drive and for organic vapor adsorption.

Contamination Control (CC) Exposures :

1. Fibers on the filters as well as fibers shedding from the edges can be a manufacturing problem with HDD filters, but these are uncommon.

GASKETS:

Made from synthetic rubber; synthetic foam elastomer; TeflonTM, PTFE and gaskets can be used standard O-rings, custom elastomeric rings or other shapes, as well as custom foam die cuttings. They are typically used to seal around and between components such as motors to base castings or covers to base castings and around connectors.

Contamination Control (CC) Exposures :

1. Material and manufacturing process selection are critical to getting clean gaskets. Under cured elastomers, especially silicones, can outgas and cause product killing contamination.
2. Die-cut foam gaskets can be loaded with particles along the cut edges and are nearly impossible to clean.
3. Adhesives used to hold foam gaskets or custom designed elastomeric rings in place are another potential source of harmful outgassing materials.

HGA:

Made from a combination of materials which may include: ceramic or ferrite sliders; stainless steel epoxy; copper or gold wires; plastic or Teflon wire insulation and is used to provides the attachment point and suspension for the sliders.

Contamination Control (CC) Exposures :

1. Suspension components may be loaded with small particles which are difficult to remove.
2. Sliders may be contaminated with assembly debris including: abrasive particles from the lapping process and uncured adhesives.

HSA:

All of the materials in an HGA plus: flex cables; cable connectors; amplifier modules; pivot bearings; actuator coils and the complete assembly for mounting the sliders to the actuator and moving them across the media during operation of the drive.

Contamination Control (CC) Exposures :

1. Cleaning processes must be gentle to avoid damaging the fragile slider wire attachments.
2. Many of the components are received in a ready to use condition, but they may not be clean enough for use as received, depending on the cleaning handling, storage and shipping which has previously occurred.
3. Magnesium comb castings may be saturated with quenching oil which is extremely difficult to remove with an aqueous cleaning process.
4. Pivot or bearing pressing generates particles which cannot be removed with aqueous cleaning due to potential bearing damage and grease cross contamination.

MEDIA:

Made from aluminum, glass or ceramic disks which are coated to provide the magnetic recording layer and a lubricated surface. The magnetic recording layer provides the usage for the small magnetic domains which store the zeros and ones which make up the binary data records.

Contamination Control (CC) Exposures :

1. The media cannot be cleaned and is used as received from the disk manufacturing process. Some processes result in disks which are highly contaminated with particles.
2. Lube components can collect on the sliders and form a "glue" which can collect more and more particles until a head crash occurs.
3. Inadequate isolation layers and porous carbon overcoats can result in nickel layer and/or magnetic layer corrosion.
4. Pre-sputter contamination on the media can result in poor Glide yields, high thermal asperities or sputter layer delamination.
5. Contaminated lube baths can result in disk surface contamination.

MOTOR:

Made from machined aluminum hub, bearings, internal armature assembly and it provides the hub for attachment of the media, spacers and top clamp as well as the armature and bearings to spin the media under the sliders at high rotational speeds.

Contamination Control (CC) Exposures :

1. Motors are normally received ready to use and cannot be aqueously cleaned after assembly. Therefore the cleanliness of the motor is dependent on the cleanliness of the motor manufacturer's process.
2. Magnetic particles from within the motor are a known contamination problem.
3. Outgassing of bearing grease from the motor into the drive is another known problem.

SPACERS:

Made from aluminum, stainless steel or ceramic and it is used to control the disk to disk spacing of the media stack.

Contamination Control (CC) Exposures :

1. Stamped stainless steel generally contains a large number of particles and is very difficult to clean. Machined SS is generally much cleaner and more cleanable.
2. Ceramic spacers are also difficult to clean and can break during handling and under the stress of being torqued down in a disk stack.

TAPE SEALS:

Made from plastic or paper tape coated with adhesive and is used to wrapped around the perimeter of the HDD to seal the gap between the top cover and the base casting.

Contamination Control (CC) Exposures :

1. Paper die cut tapes may have high levels of surface particles.
2. The adhesive layer is exposed to the inside of the HDD and outgassing can cause drive failures.
3. Plastic tapes can generate high voltages when stripped from their backing.

TOP CLAMPS:

Made from aluminum or stainless steel and is used to hold the media and disk spacer rings in place on the motor hub.

Contamination Control (CC) Exposures :

1. Stamped stainless steel generally contains a large number of particles and is very difficult to clean. Machined SS is generally much cleaner and more cleanable.
2. Machined aluminum is generally cleaner than stamped stainless, but galls during screw installation and creates a lot of particles during disassembly, should the drive have to be reworked.

TOP COVER :

Made aluminum, stainless steel, plastic or a combination of these materials and is used to cover the drive to exclude external particles and atmospheric contamination.

Contamination Control (CC) Exposures :

1. Sub-assembled covers cannot be cleaned in an aqueous cleaner if the parts are assembled with adhesive.
2. Due to the large surface area, even reasonably clean cover assemblies still contain many millions of particles which are exposed to the inside of the drive.

VCM :

Made from stainless steel or nickel plated stainless steel, rare earth permanent magnets epoxy or nickel coated and is used to provide the field through which the actuator coil is moved to control the slider positioning on the media.

Contamination Control (CC) Exposures :

1. Should not be cleaned if they are received with the magnets attached.
2. Have the exposure of being received with magnetic contamination.
3. Epoxy coated magnets are much more likely than nickel coated magnets to chip or break and cause magnetic contamination.

Kindly call us if you have further enquiry (Biological & Chemical Technology Division)

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