

# Example of how to use wood in computer hard disk drives case study

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## Introduction

The computer hard disk drive, also known as hard drive, hard disk or simply HDD is a storage device which is non-volatile (HDD Scan, 2010). According to Mamun, Guo & Bi, (2007), it is used for the storage of digitally encoded data on platters which have magnetic surfaces. The platters are secured on an axle which holds them centrally to allow them to rotate. The motorized and mechanical aspect associated with the computer hard disk gives it the name “drive” (Bhargava, 2008). This is a distinction from other storage media like tapes or floppy disks in that it has an internal motor which is powered to rotate the platters. Early versions of hard disk drives comprised of removable media. Today, however, hard drives are completely sealed units save for a tiny filtered vent hole which allows pressure to be equalized. Over the years, material scientists have experimented with different materials for use in manufacturing hard disk drives. This paper explores wood as a material which can be used in this computer component as well as the parts in which it can be used (HDD Tool, 2010).

According to Brain 2010), the hard disk drive comprises of many parts which enable its function. According to Mamun, Guo & Bi, (2007), these parts are made up of different materials depending on their function, strength, space and weight considerations. The platters may be considered as the most important section of the computer hard disk. This is because they store data. Several platters are mounted in layers on a spindle motor which is fixed. According to Gupta (2007), the formation in layers facilitates the creation of more data storage in the limited space available. The core of the platter is made up of glass substrate or aluminium which is covered with a thin cobalt

or ferric oxide layer on both of its surfaces. This thin coat is deposited through a special manufacturing technique which ensures that the surfaces are precisely evened out. This is where data is stored.

According to Gookin (2007), the substrate material makes up the biggest part of the platters. The substrate forms the base onto which the media layer that holds data is deposited. The substrate is made up of aluminium alloy. This is because the alloy, though lightweight, is rigid; stable; inexpensive; easy to work and shape; and easily available. Today, material scientists are faced with the hurdle of determining which material to for the substrate. This is because there is a need to have smaller hard disks whose platters spin at extremely high speeds. Glass is currently preferred because of its improved rigidity; thermal stability, ability to be molded into thinner platters and overall better quality.

The spindle motor plays a significant role in the operation of the hard disk. This is because it provides rotation for the platters, enabling data to be read and written on them. Because spindle motors run consistently over many hours, they must be up of stable and reliable material. Most hard drives fail as a result of spindle motor failure or malfunctions. Inside the motor, there are copper or gold coils provide an electromagnetic field to rotated Neodymium magnets which are mounted on the spindle. Neodymium magnets are used because of their brute strength and reliability.

The logic board is a circuit board that carries all electrical components that provide data processing functions. The logic board consists of microchips, tiny resistors, capacitors an integrate circuits. The logic board is connected to the read/write heads via a flexible cable. In addition, the logic board also

has connectors which connect to the computer motherboard when the hard disk is installed. The logic board is made up of fiberglass and various resins, tin, lead, cadmium, varnish, solvents, lacquer, sulfates, oxides, and copper films in varying degrees (Burek, 2011). The logic board provides processing of data that has been read by the read/write heads before it is transferred to the central Processing Unit of the computer. Additionally, the logic board issues processes instructions to the read/ write for the storage of data. The read/write heads form the interface between the electronic components on the logic board and the magnetic media on which data is stored. The heads play the role of converting information in the form of magnetic pulses to bits when reading the data or from bits to magnetic pulses when data is stored on to the platter. The read/ write heads are the hard disk's most sophisticated part. This is because each platter is accessed by two read/write heads. One of the heads is mounted at the top side of the platter. The other is mounted on the lower surface of the platter. All the heads are fixed on sliders which protrude from head arms. All head arms are linked together in one structure known as the actuator. The actuator is responsible for the movement of the read/ write heads and it enables them to access the different sections of the rotating platters by making a sweeping action. The hard disk is a delicate component internally. This means that its external covering should be rigid and strong to enable it to withstand shock and vibrations. Because of the delicate nature of how data is stored, the external covering should also insulate the platters and the logic board from external electrical pulses which may lead to loss of data or damage. Material scientists and hobbyists have experimented with wood as a hard disk cover.

However, one of the challenges faced in their attempts to use wood is that of accumulation of heat. Because of the numerous rotations happening inside the hard disk as well as the electrical impulses involved in the hard disk function, some internal components become hot. Conventional hard disks have an external cover made up of aluminium alloy. This is because the aluminium alloy enables dissipation of heat from the inside on the hard disk to the outside. This keeps the electronic components intact and the hard disk durable (Goodman, 1993). Therefore, manufacturers now only used wooden hard disk covers for external hard disks only. This is because external hard disks are exposed to moving air which helps to cool it.

Because of the dangers associated with deforestation, environmental conservation proponents are against the use of wood commercially.

However, wood may be favorable for use in certain parts of the hard disk. This is because it is easily available; relatively strong and lightweight. One of the parts of the hard disk that can be made of wood is the spacers of the head arms at the actuator. This is because the head arm spacers should be rigid so as to be able to separate the head arms effectively. This can be achieved by using a strong adhesive to keep the pieces of wood and the metallic head arms stuck firmly together. Wood could also be used to hold the ends of ribbon cables in place. Instead of using plastic, wood may be used because it has equally favorable insulating properties.

## **Conclusion**

The computer hard disk is a crucial component in the computer. This is because it provides the ability to store data and to retrieve it for various functions. The computer hard disk is considered delicate because of the

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manner in which data is stored and retrieved from them. The choice of materials for the various parts of the hard disk is, therefore, a critical part before manufacturing is done. The choice of materials is informed by the purpose of the specific part and the conditions of operation. The hard disk's main parts are the platters; the substrate material; the read/ write heads; the spindle motor; the logic board and the external cover. Wood has been used by both material scientists and hobbyists for the external covering of the hard disk. However, due to its undesirable heat dissipating properties, wood is now used only for external hard disks. Wood may be used as spacers of the head arms because of its rigidity and insulation properties. However, environmental conservation proponents would not favor widespread use of wood because of the dangers associated with deforestation. The special qualities of wood should be investigated further to determine where wood would be used specifically in computer hard drives and computers in general.

## References

Bhargava, P. (2008). Numerical simulations of the head-disk interface in hard disk drives.:

Brain, M. (2010, January 1). HowStuffWorks " How Hard Disks Work".

HowStuffWorks " Learn how Everything Works!". Retrieved April 23, 2013, from <http://www.howstuffworks.com/hard-disk.htm>

Goodman, J. M. (1993). Hard disk secrets. San Mateo, Calif.: IDG Books.

Gookin, D. (2007). PCs for dummies (11th ed.). Hoboken, NJ: Wiley Pub.

Gupta, V. (2007). Air bearing slider dynamics and stability in hard disk drives. Mumbai:

<https://assignbuster.com/example-of-how-to-use-wood-in-computer-hard-disk-drives-case-study/>

HDD Tool. (2010, January 1). Hard Disk and Hard Drive Physical Components. All about hdd tools, pc tools, system utilities.. Retrieved April 23, 2013, from <http://www.hdd-tool.com/hdd-basic/hard-disk-and-hard-drive-physical-components.htm>

HDDScan. (2010, January 1). HDD from inside: Main parts. HDDScan – free HDD test utility with USB flash and RAID support. Retrieved April 23, 2013, from [http://hddscan.com/doc/HDD\\_from\\_inside.html](http://hddscan.com/doc/HDD_from_inside.html)

Mamun, A., Guo, G., & Bi, C. (2007). Hard disk drive: mechatronics and control. Boca Raton, FL: CRC Press.