CHAPTER 3

GENERAL INFORMATION

3.1 Company Background

Seagate Technology was the first company to build 5.25" hard disc drives specifically for the personal computer. For 23 years, Seagate has been developing the technology and manufacturing the products that helped make the data storage product improved significantly.

The developments always base on the technology environment. As digital information expands, Seagate continues to revolutionize the way people live, work and play by connecting individuals with information. People can easily store massive amounts of digital content on their PC, TVs and home networks. Seagate also get the opportunities on new consumer electronics devices that use hard drives to store and access music, TV shows, Movies and even video games.

Seagate storage products are where the Internet lives, and the growth of the Web has led to worldwide demand for storage doubling every nine months. It used to be that storage was a "thing" inside a PC or Data Center. But in today's networked world, people want the security of knowing that storage, and the information that resides in it, is available and ready to be tapped from anywhere, at anytime. So anyone can get the information they want, when and how they want it. It's storage technology, the core of Seagate's business that is making this all possible.

Seagate's position as the world's largest manufacturer of disc drives, magnetic discs and read-write heads, and a leader in Storage Area Network (SAN) solutions puts it at the heart of today's "information-centric" world. Throughout its history, Seagate has successfully relied on a strategy of vertical integration: designing, developing and producing the key, enabling technologies that go into

its storage products, rather than relying solely on outside suppliers. This isn't easy, because building disc drives is widely recognized as the top end section of the technology industry. It requires expertise in physics, tribology, aerodynamics, fluid mechanics, information theory, magnetic, process technology and numerous other disciplines. This is why Seagate has some of the brightest minds in the technology industry working to ensure that it stays on the leading edge. Seagate's technology advantage has enabled the Company to consistently set and then shatter world records with the highest performing disc drives in the industry.

Owning the underlying technology has enabled Seagate to lead the industry in the enterprise, PC and consumer electronics markets. With a focus on innovation, time-to-market, ownership of enabling technologies and a proven strategy of vertical integration and advanced R&D, Seagate continues to be best positioned for the future. With the race on to discover newer, faster ways to store, access and manage information, look for Seagate to continue to be at the front of the pack.

3.2 Manufacturing and Facilities

Seagate Technology has R&D and product sites in: Silicon Valley, California; Pittsburgh, Pennsylvania; Longmont, Colorado; Bloomington and Shakopee, Minnesota; Oklahoma City, Oklahoma; Springtown, Northern Ireland; and Singapore. Manufacturing and customer service sites are located in: California; Colorado; Minnesota; Oklahoma; Northern Ireland; China; Indonesia; Malaysia; Mexico; Singapore and Thailand.

3.3 Products

3.3.1 Disc Drives

Seagate is the market leader in each of the segments in which it competes and produces a broad range of disc drives in capacities ranging from 20 Gbytes to 180 Gbytes. This comprehensive line of disc drives includes products for the price-sensitive desktop PC market, consumer market, higher performance PCs and workstations, and performance-intensive network servers, disc arrays and audio-visual (A/V) markets. Seagate is also the market leader in storage technology for consumer electronics devices, and has shipped nearly million disc drives into this segment, which includes Personal Video Recorder (PVR) products, gaming consoles and digital audio jukeboxes.
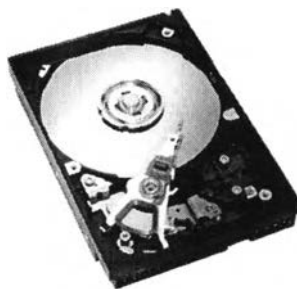

Figure 3-1: Hard disc drive

Seagate's leadership in Fiber Channel-interface disc drives and its XIOtech subsidiary provide the Company with the opportunity to develop the Storage Area Networking (SAN) solutions market.

3.3.2 Recording Heads & Media

Magnetic recording heads and rotating media are critical enabling technologies for advanced storage devices, and Seagate's strength in these areas enables it to supply the vast majority of its own components internally. Seagate's recording head operations manufactures and markets advanced read/write heads for disc drives and tape drives, and is recognized as the world's highest volume supplier of magnetic recording heads. Seagate currently manufactures thin-film

inductive, MR and GMR heads at its worldwide facilities. The Company's advanced head designs include giant magneto-resistive (GMR) heads, tunneling GMR, perpendicular heads and MEMS technology.

The world's largest supplier of disc media, Seagate produces advanced magnetic disc media and substrates at locations in California, Northern Ireland, and Singapore. The Company's production processes include the Company's proprietary MINT (Magnetic Information Technology) system developed to produce the industry's lowest-cost, highest-density magnetic discs for hard drives.

1.3.3 SAN Products

In January 2000, Seagate acquired XIOtech Corp., a pioneer in the rapidly growing SAN market, that now does business as a wholly-owned subsidiary of Seagate. XIOtech designs, manufactures, and markets high performance, application-driven SAN solutions. The XIOtech MAGNITUDE™ Hardware Platform and its exclusive REal-Time Data Intelligence (REDI™) Software Family provided the industry with the first true open systems storage virtualization technology. The MAGNITUDE Hardware Platform, along with its comprehensive suite of application-specific software, makes storing, managing, safeguarding, and retrieving data on heterogeneous computing platforms easy and cost effective.

3.4 Organization Chart

The company organization chart is designed based on function responsibility. Figure 3.2 and 3.3 show the corporate organization chart and the local operation organization chart respectively.
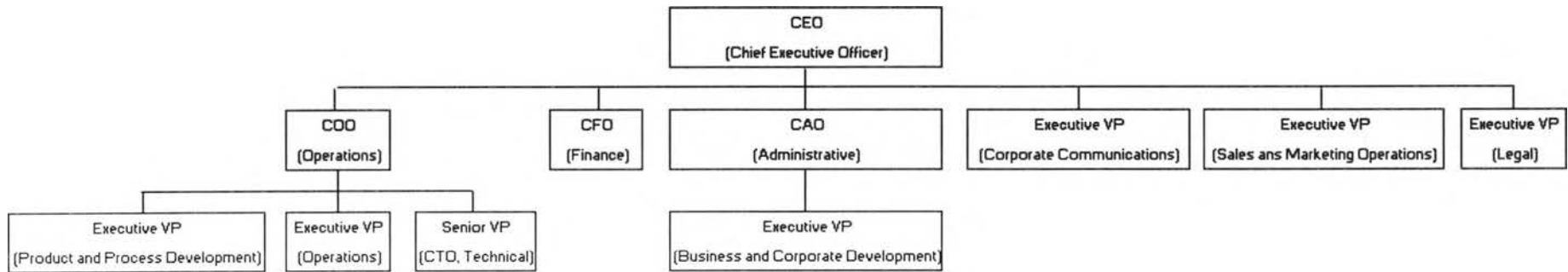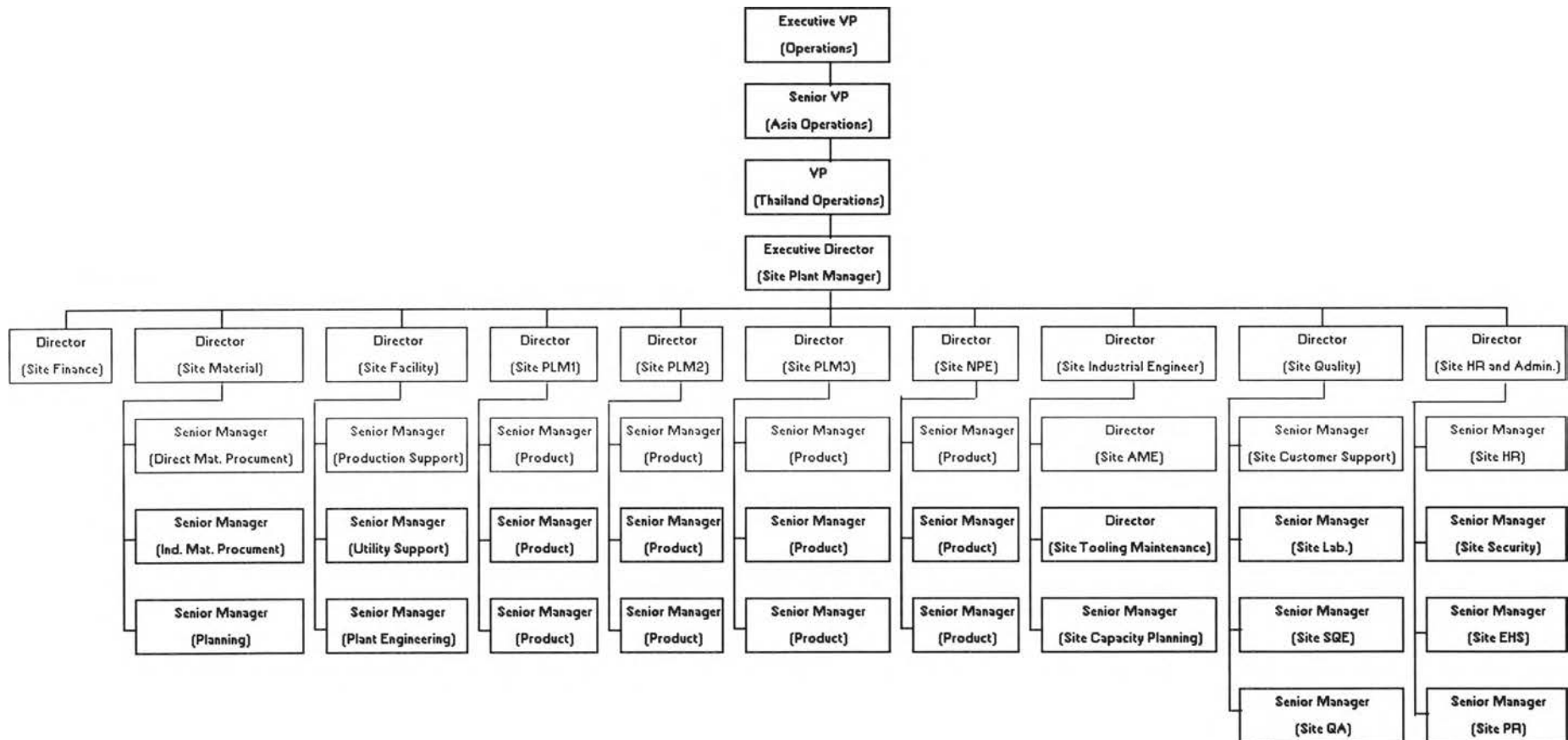
Figure 3-2: Seagate Corporate Organization Chart

Figure 3-3: Seagate Teparuk Plant Organization Chart

3.5 Manufacturing Process

This part will explain about the manufacturing process of Hard disc drive, the components of Hard disc drive, HDA (Head Disc Assembly) and HDA parts produced in Thailand sites which are Slider, HGA (Head Gimbal Assembly) and HSA (Head Stack Assembly).

Hard disc drive consists of 3 major components which are

- Top cover

- HDA (Head Disc Assembly)

- PCBA (Printed Circuit Board Assembly)
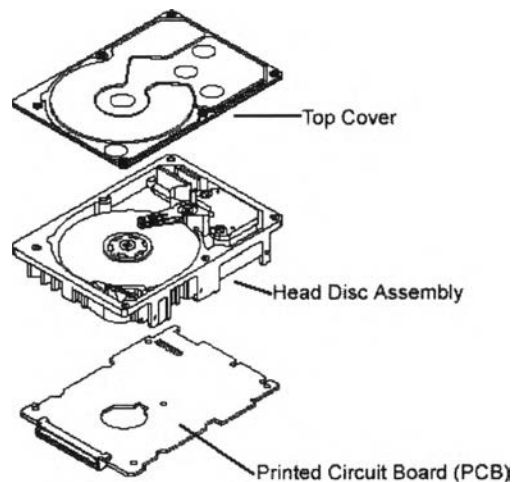
Figure 3-4: Hard disc drive components

HDA consists of 5 main components which are

- Basedeck: The basedeck is a sealed aluminum box with controller electronics attached to one side. The entire disc drive is found within the basedeck.
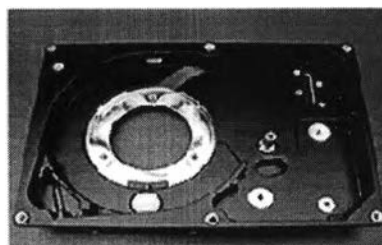
Figure 3-5: Basedeck

- Spindle Motor: Responsible for spinning the discs. Spindle motors allow access to all sectors on a track. They also provide an air bearing cushion for head flight.
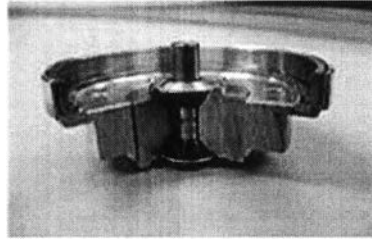

Figure 3-6: Spindle Motor

- Media: Media is where the drive read data from and write data to. On the media, there is an area for the head landing and the rest is head flying area.
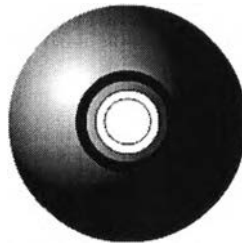

Figure 3-7: Media

- Head Stack Assembly: Transfer the data from and to media through HGA and Flex to the Print Circuit Board Assembly connecting to computer.
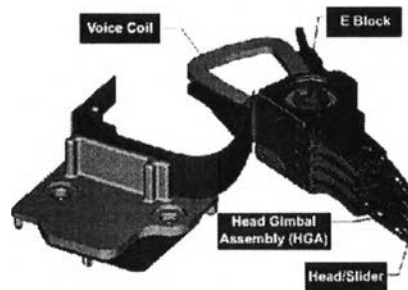

Figure 3-8: Head Stack Assembly (HSA)

- Voice Coil: The Voice Coil controls the radial position of the head. It is responsible for moving the head stack from cylinder to cylinder on the media.
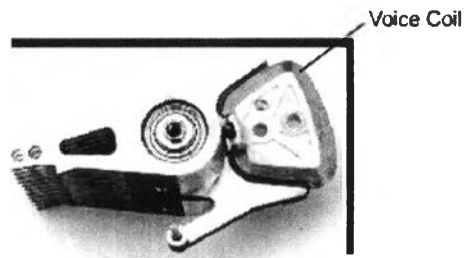
Figure 3-9: Voice Coil

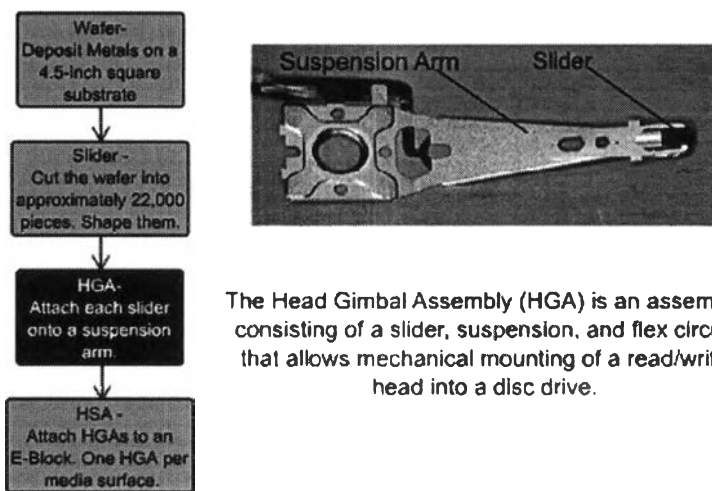Head Stack Assembly consists of 3 components which are

- HGA (Head Gimbal Assembly)

The Head Gimbal Assembly (HGA) is an assembly consisting of a slider, suspension, and flex circuit that allows mechanical mounting of a read/write head into a disc drive.

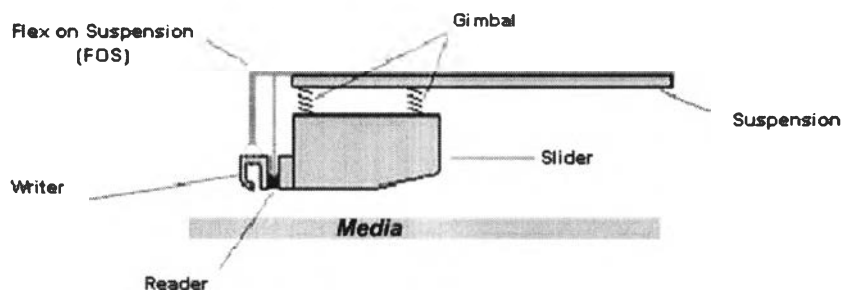Figure 3-10: Head Gimbal Assembly and HSA Process

Figure 3-11: Head Gimbal Assembly over the Media

- Arm coil
- PCC (Printed Circuit Chip)

HDA Manufacturing Process

Hard Disc drive process starts from the assembly of HDA which is automation process then attaches the top cover on it and attaches the PCBA at the final stage.

Figure 3-12 shows the flow and location of the components of the hard disc drive manufacturing.
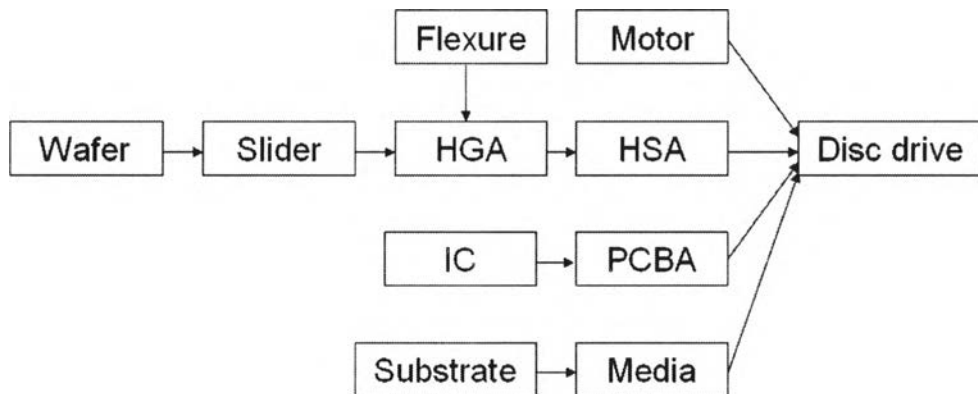

Figure 3-12: Head Disc Assembly

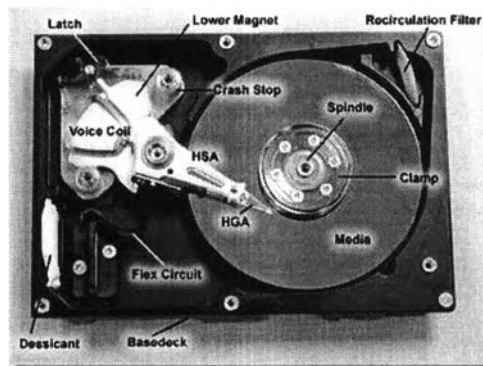Following information will explain step by step of the manufacturing process of the HDA.

Figure 3-13: Head Disc Assembly

- Basedeck Load: The automation process begins with the basedeck load station. Basedecks are loaded into the station, where they get a barcode label and an RFID tag. The RFID tag holds a lot of information pertaining to the drive being built, such as its configuration. An example would be if a particular manufacturer's spindle motor is being used.

- Lower Voice Coil Magnet install: This is a pick and place tool. It picks a Lower Voice Coil Magnet and place into the specific location in the basedeck.

- Breather Filter Install: This station installs a breather filter into a specific area of the basedeck and then and camera inspects for proper installation.

- Disc and Spacer Install: This station installs disc and spacer onto spindle motor.

- Clamp and Screw Install: The Clamp/Screw station biases the disc (if there is more than one) against the motor and installs a clamp ring and six screws.

- Balance Station: The balance station is used to detect and correct any imbalances in the discs.

- Head Stack Assembly Install: Another pick and place station, HSA is picked up from tray and placed into the basedeck.

- Head Merge: This station is a static merge of the heads on the discs. This means that the heads are lifted above the discs and rotated on the Head Stack Assembly bearings to the inner diameter-landing zone of the discs and placed down at that point while the discs are stationary.

- Upper Voice Coil Magnet install: This is a pick and place tool. It picks a Upper Voice Coil Magnet and place into the specific location in the basedeck.

- Top cover assembly: This station installs the top cover onto the HDA.

- Unload: A drive is conveyed into the station, and the RFID tag is read to determine its status. If the drive passes, the RFID tag is removed form the base deck, and the drive is sent out of the station. If it fails, the drive is placed into a drive magazine rack with the RFID tag left on for repair disposition later.

- Servo Track Writer: This station tests and writes the initial information of disc drive onto media.

- PCBA install: This station installs PCBA and screws onto the sealed HDA with top cover.

- Functional Test: This station tests the disc drive in 3 main categories; Parametric Test, Serial Port Test, and Board to Drive Test.

- Packaging: This station packs the drive into container and transfer to finished goods storage.