**Chapter 6 output device**

**You need to describe/select suitable output devices in relation to the requirements of the application**

1. **Printers (打印机)**
2. **Laser(激光) printer**

**Advantage**

* Cheap to run
* Text printing quality is excellent
* It is quick at printing
* It is suitable for duplex printing, this reduces paper costs

**Disadvantage**

* It is expensive to buy
* Image printing quality on photographic paper is not as good as inkjet printer

**The step of laser printer**

* Laser printer use a laser to create static electricity on certain area of the page
* Toner is then scattered onto the page
* The static electricity attracts the toner and causes it to stick to the page
* A fusing element makes sure the toner is bonded to the page.

1. **Inkjet(喷墨) printer**

**Advantage**

* They are very cheap to purchase in the first place
* They produce high quality output when used to produce photographs

**Disadvantage**

* Expensive to run as they can use a lot of ink
* Image quality can be poor when printing on ordinary paper
* It is difficult to print on both sides of paper
* They are slow at printing
* **Compare with inkjet and laser printer**
* Laser printer print the whole page in one go ( inkjet printer print the page line by line)
* Inkjet printers are best for one-off photos or where only a few pages of good quality, colour printing are needed.
* Laser printers produce high quality printouts and are very fast when making multiple copies of a document. It is suited for high-volume printing.

1. **3D printer**

**Advantage**

* Bespoke items can be made quickly
* Any shape can be printed
* Costs to a designer can be reduced as they can easily re-print it
* Design can be shared by sharing the digital file

**Disadvantage**

* Expensive
* It is not durable
* Dangerous items may be printed
* Copyright issues may exist

**Uses of 3D printing**

* Prosthetic limbs 假肢 made to fit the recipient.
* In aerospace, manufactures are looking at making wings and other parts.
* In fashion and art

1. **Monitors（显示器）**
2. **LCD 液晶显示屏**

* LCD means the front layer of the monitor is made up of liquid crystal diodes, these diodes are grouped together in threes or four which are known as pixels(picture elements)
* LCD monitors used a cold cathode fluorescent lamp (CCFL 冷阴极荧光灯) as the backlighting method which supplies the light source.

1. **LED 发光二极管**

* LEDs reach their maximum brightness almost immediately
* LEDs give a whiter light which sharpens the image and make the colours appear more vivid
* It is much thinner than using CCFL
* LEDs last almost indefinitely, this makes the technology more reliable
* LEDs consume very little power which means they produce less heat

1. OLED 有机发光二极管

It uses organic materials to create semi-conductors which are very flexible.

It allows the screen to be curved which ensures a good picture from any angle.

**Feature:**

* The layers of an OLED are thinner, lighter and more flexible
* OLEDs give a brighter light than LEDs
* OLEDs do not require backlighting like LCD screens which means use much less power
* OLEDs have a very large field of view (170 degrees) which makes them ideal for use in television sets.

1. **2D and 3D cutter**
2. **Loudspeaker（扬声器）**

* Sound is produced from a computer by passing the digital data through a digital to analogue converter (DAC) and then through an amplifier, finally the sound emerges from a loudspeaker.
* **Sampling rate** is the DAC translate the digital output into analogue voltages
* **Advantage**

They allow a variety of information to be provided to the user

They can aid a disabled user when operating a device

They are useful to warn a large a mount of people at once about an emergency

* **Disadvantage**

Built-in speaker gives low quality sound reproduction

The sound produced may disturb other users

A sound card with a digital-to-analogue convertor is needed to convert information to a form a speaker can output

1. **Light projectors**

Projectors are used to project computer output onto larger screens or even onto interactive whiteboards

(1 )Digital light projector (DLP) 数字光投影仪

* Digital Light Processing (DLP) projector uses millions of tiny mirrors to reflect light towards the projection lens. This creates an image with excellent colour reproduction.
* DLP projector has a good quality in colour reproduction.
* DLP projector are smaller, this makes them more portable.

(2) LCD projectors 液晶投影仪

* An LCD projector contains three separate LCD glass panel, one for each of the RGB colours in an image.
* LCD projector has a good quality in contrast and brightness.