

溫度、角度、力量、振動感測器

(應用例)

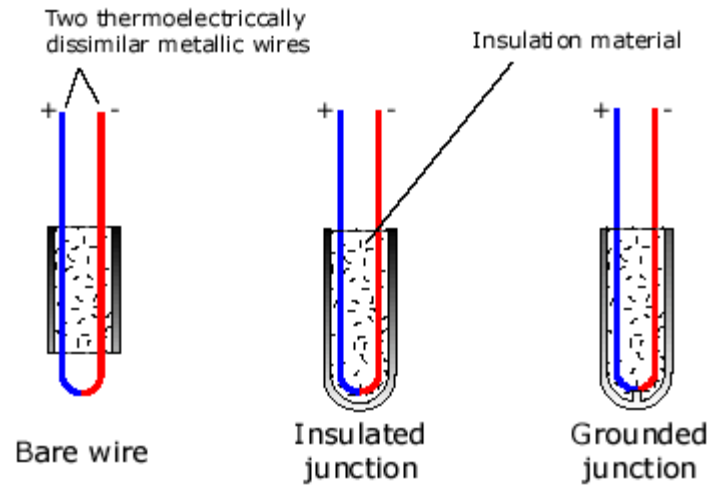


范光照

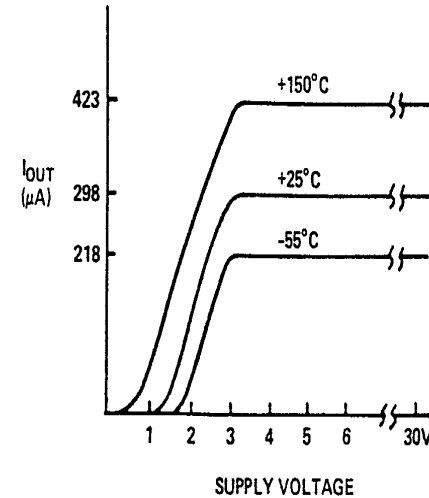
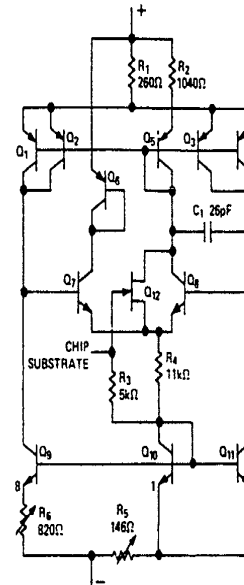
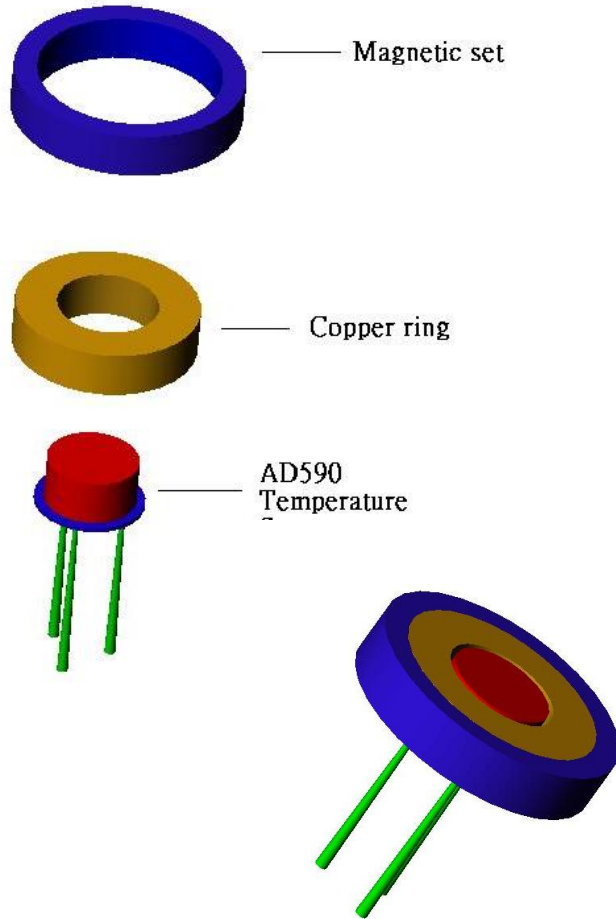
台灣大學

2014

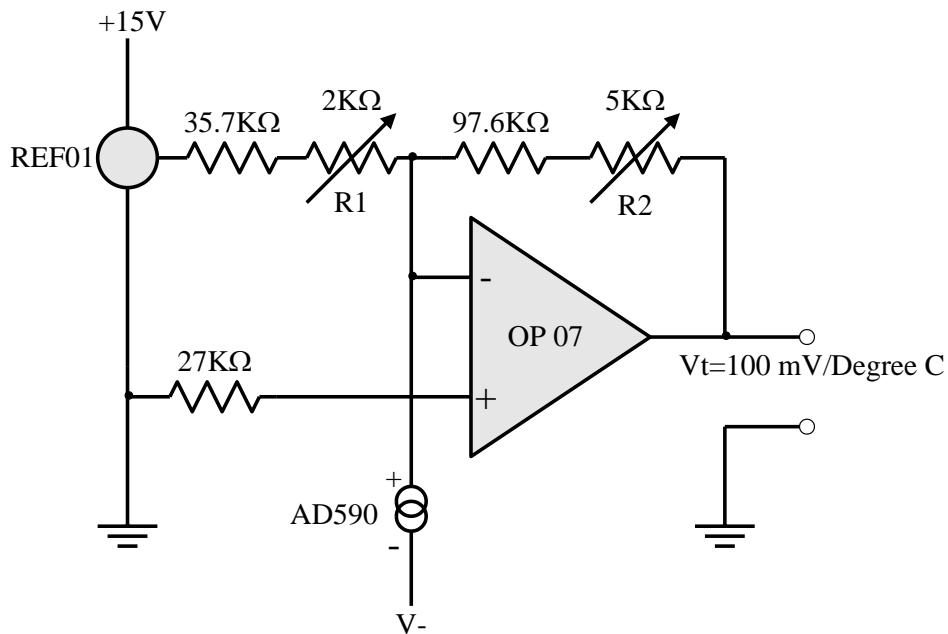
一、溫度感測器應用例



工作原理



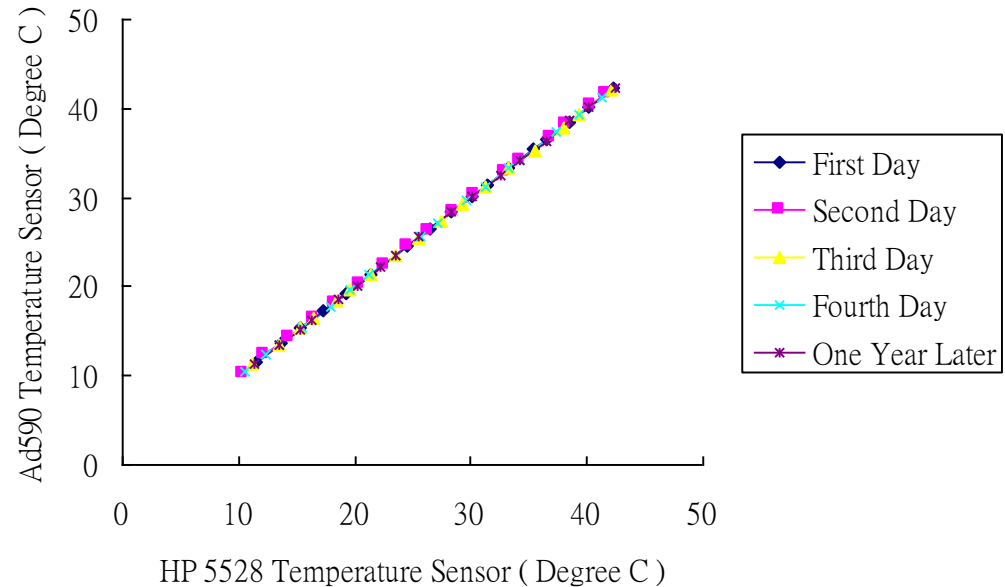
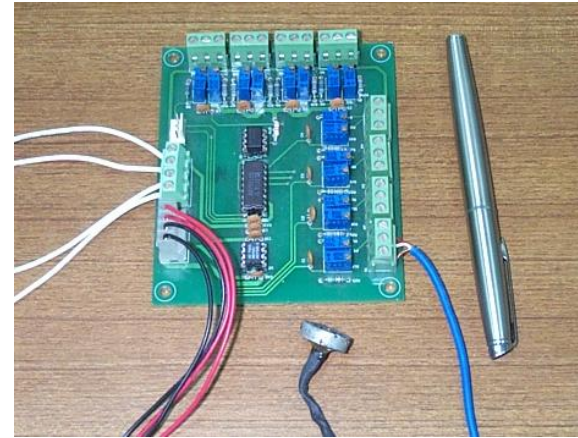
電晶體Q8、Q11產生正比於絕對溫度電壓，電阻R5、R6轉換電壓為電流，電晶體Q10使總電流正比於絕對溫度。AD590供應電壓與電流輸出特性，顯示供應電壓至少+4V以上。



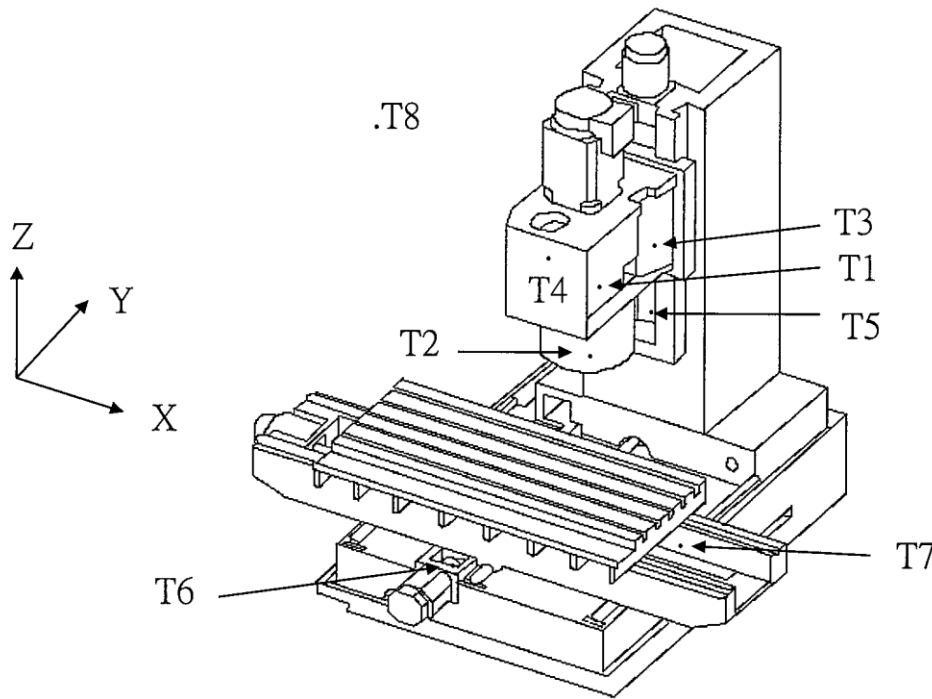
AD590在正常工作下，1K的溫度可轉換電流 $1\mu\text{A}$ ，電流信號不因導線長度不同而產生衰減差異，用一顆工作放大器(OP07)即可輕易將電流信號轉換成電壓信號

多工器(multiplexer AD7501)
 切換8顆不同溫度感測器；

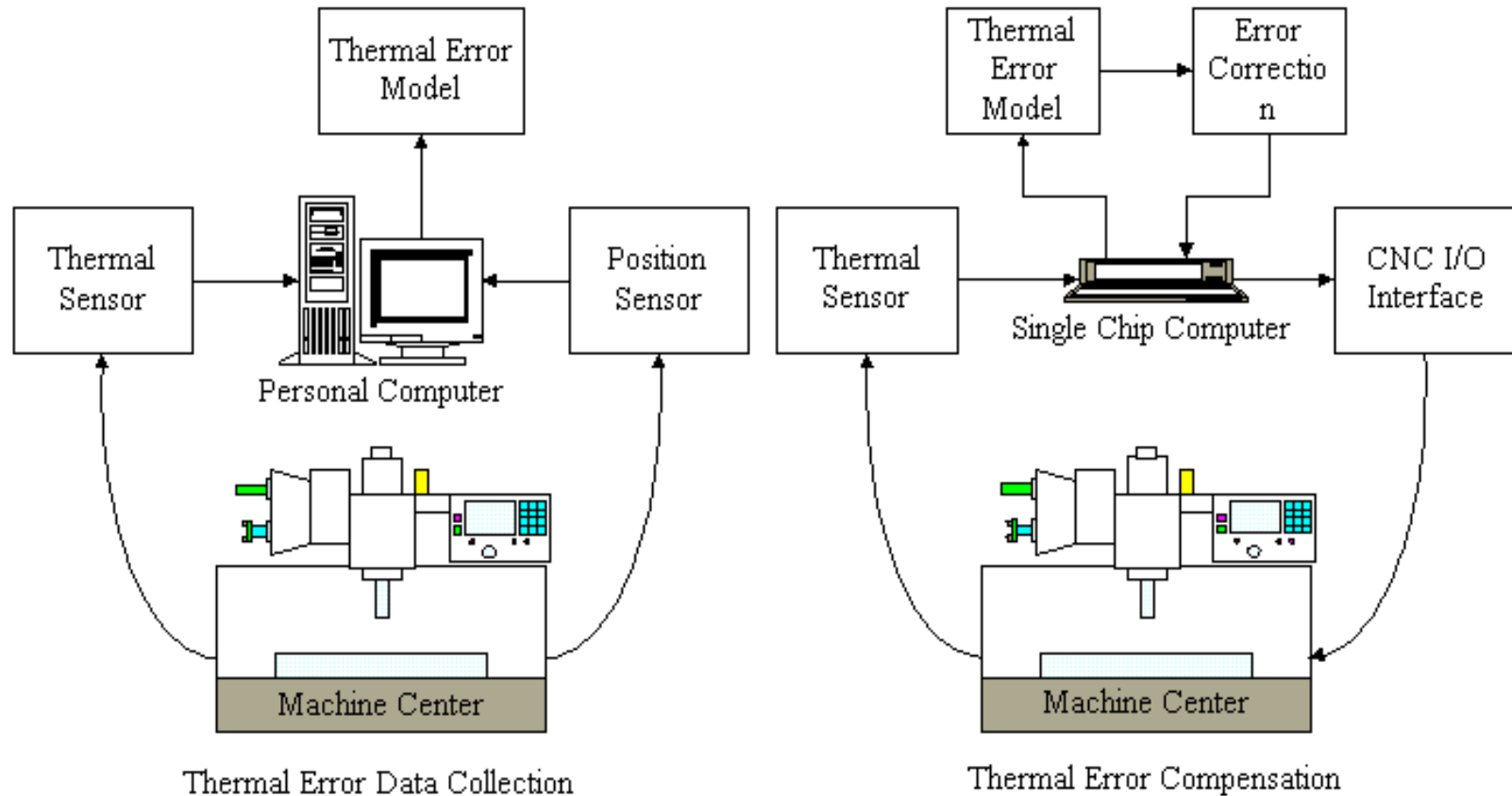
類比的電壓信號則透過A/D
 轉換成數位信號，進入微處
 理器(可選擇使用單晶片
 8051或AVR，透過I/O介面
 卡進入一般PC)作運算處理
 ，計算出實際溫度值。



Initial Locations for Temperature Sensors

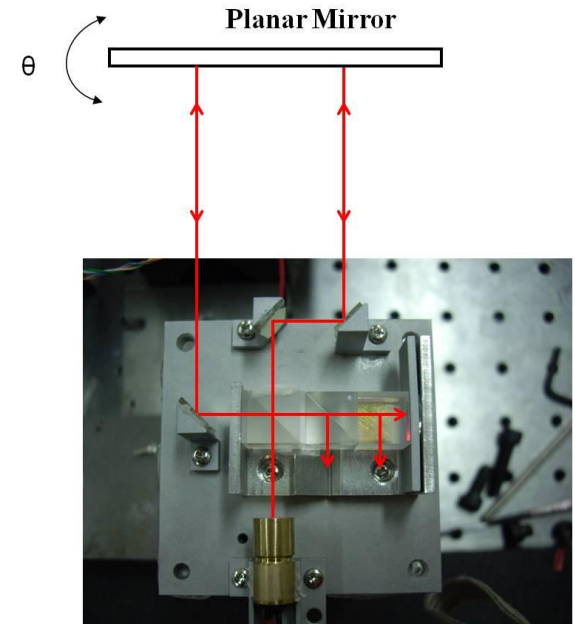
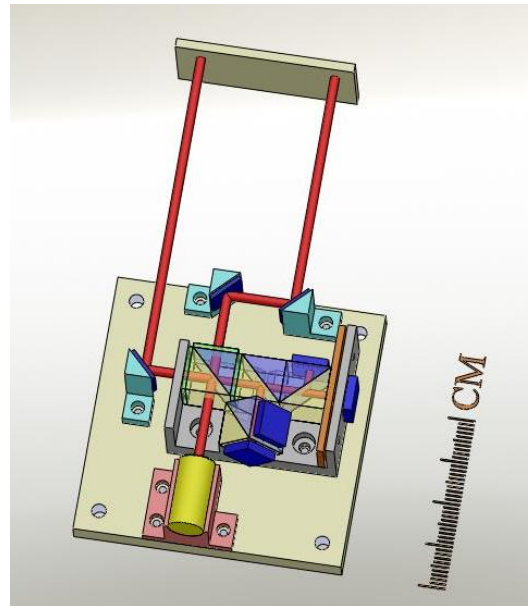
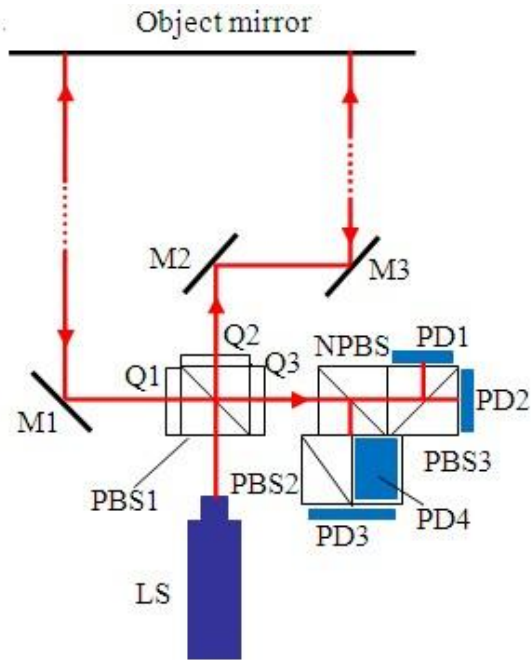


| 感測器號碼 | 吸附位置 |
|-------|-----------|
| T1 | 主軸頭部右側 |
| T2 | 主軸套筒後方 |
| T3 | Z軸滑軌右側 |
| T4 | 主軸馬達 |
| T5 | Z軸滾珠導螺桿螺帽 |
| T6 | Y軸滾珠導螺桿螺帽 |
| T7 | X軸滾珠導螺桿螺帽 |
| T8 | 室溫 |



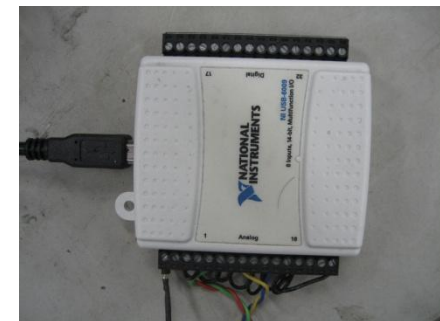
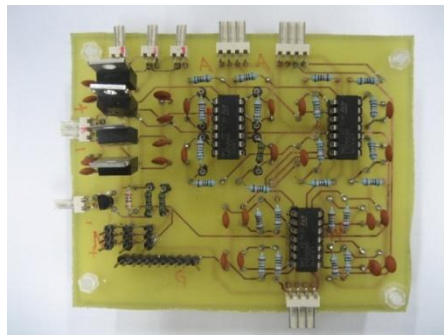
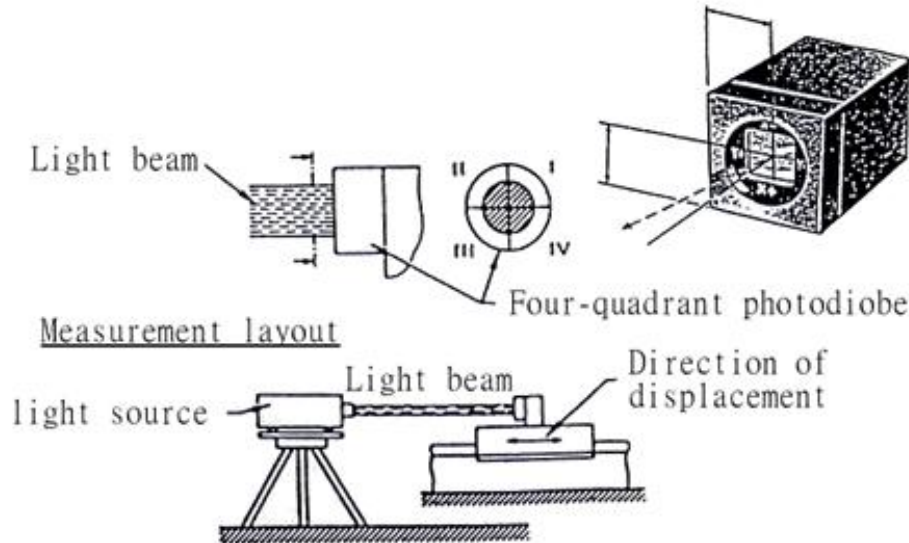
二、角度感測器應用例

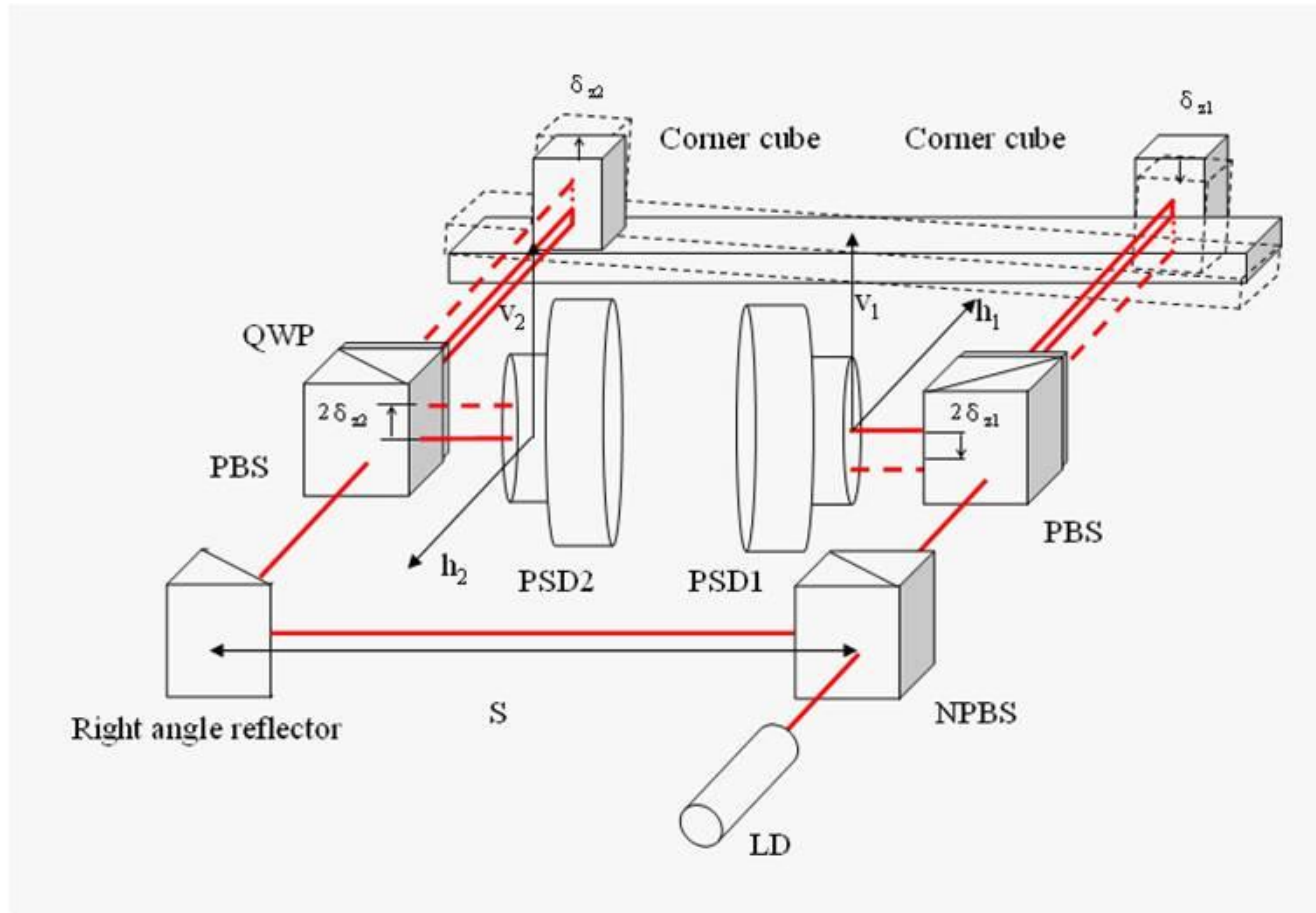
Example: a yaw interferometer



雷射準直儀原理：
準直雷射光 + 四象位光感測器

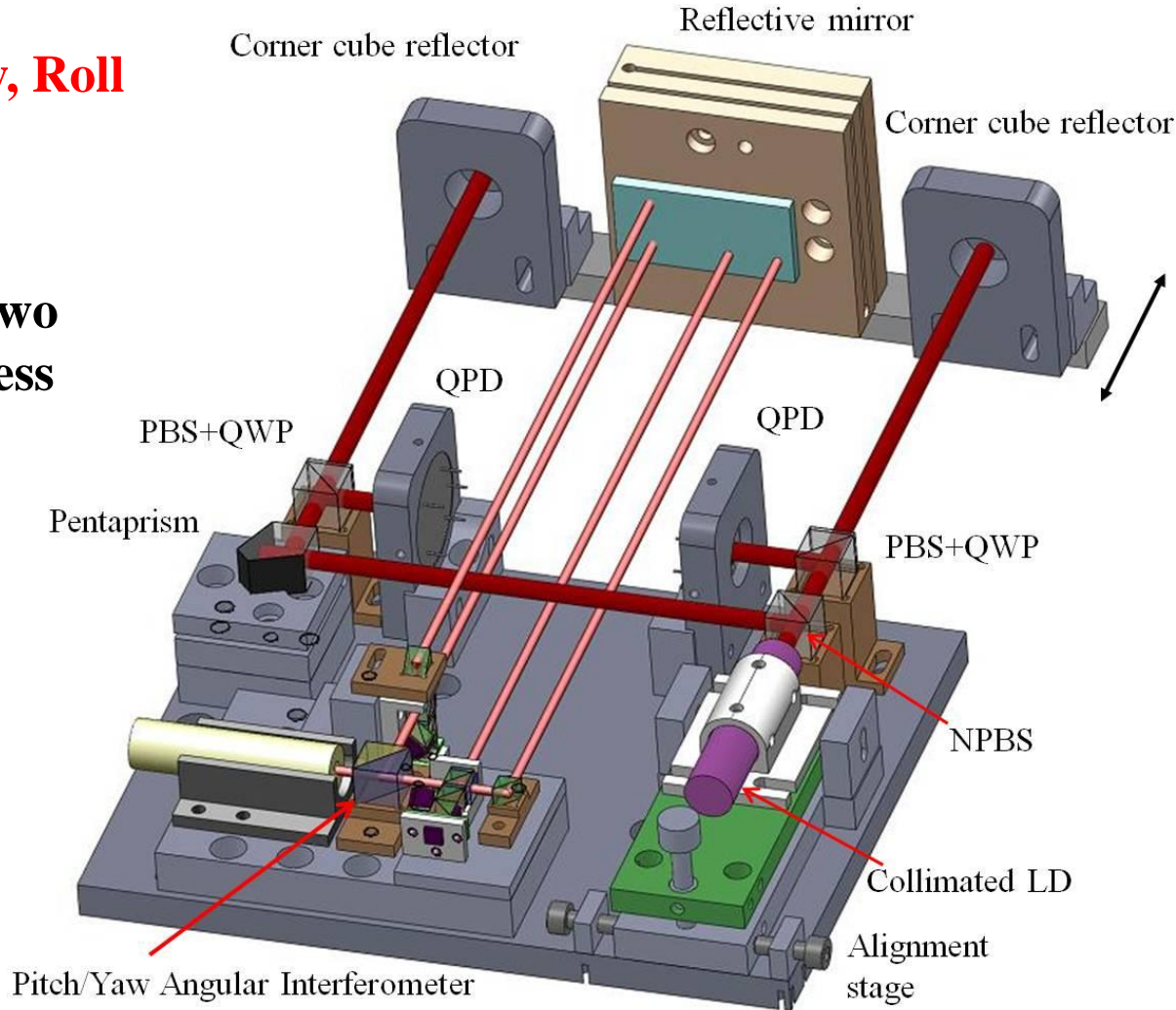
1. 四象位感測器(SPOD-9d)
2. 準直雷射(Thorlabs Laser)
3. 電流轉電壓&放大電路板
4. 單晶片處理器(AVR)
5. DAQ卡

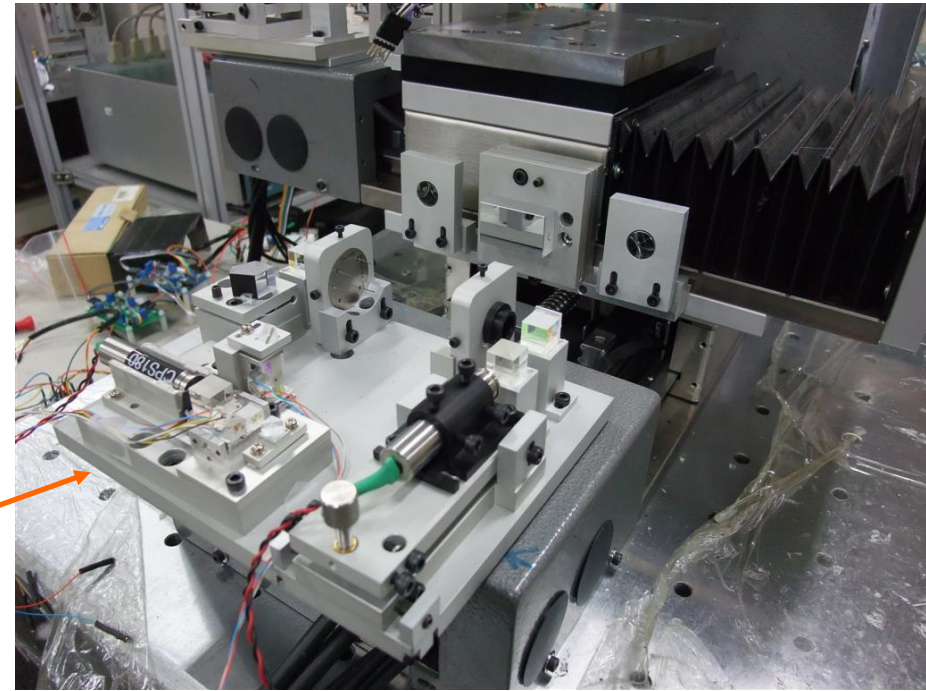
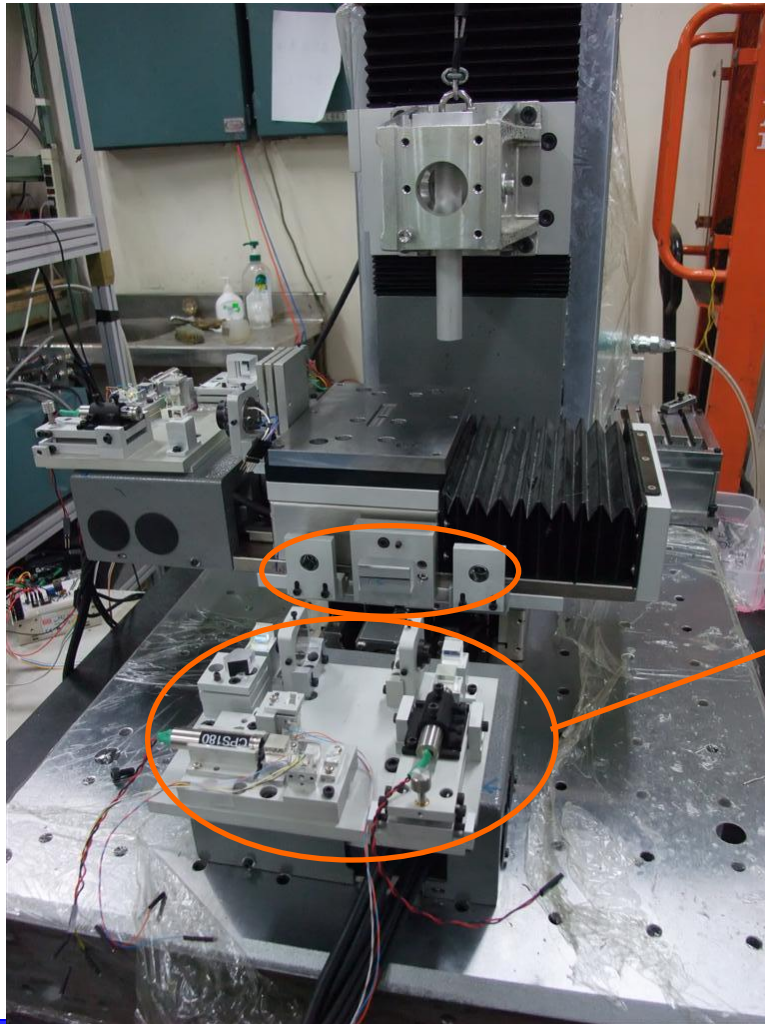




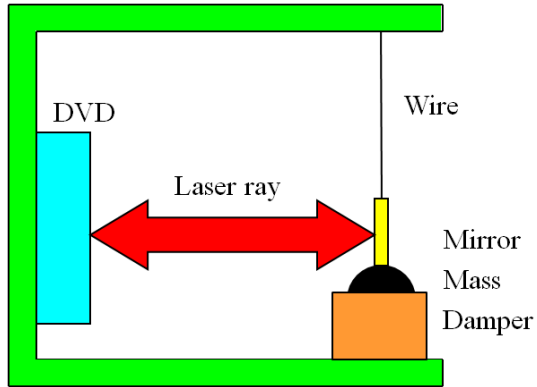
Pitch, Yaw, Roll

**Also for two
straightness
errors**

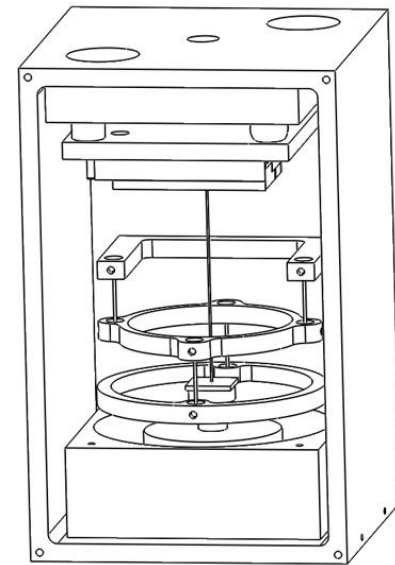
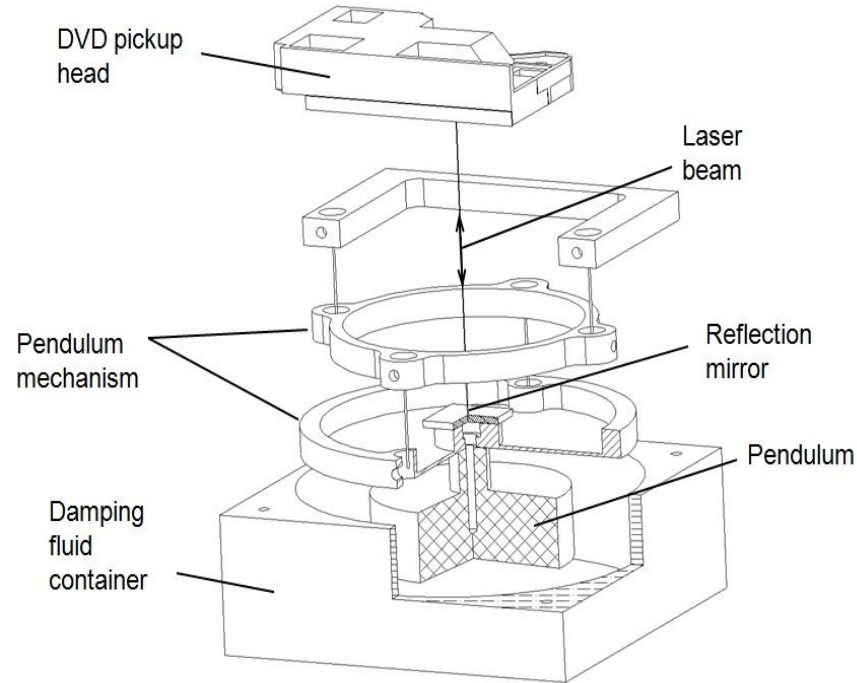




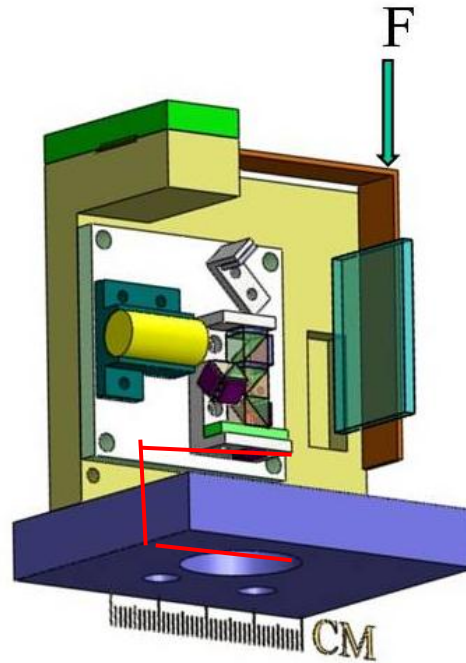
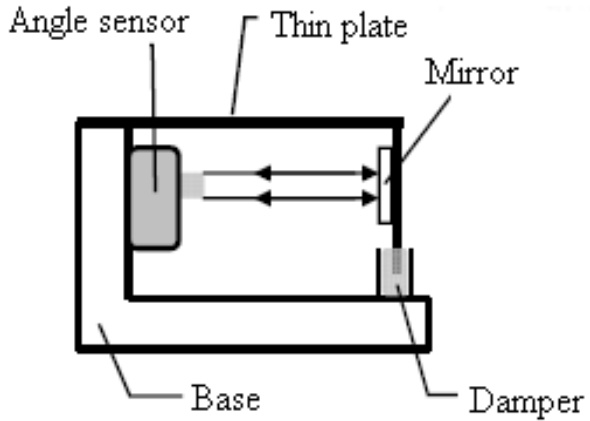
單擺原理



雙軸水平儀設計

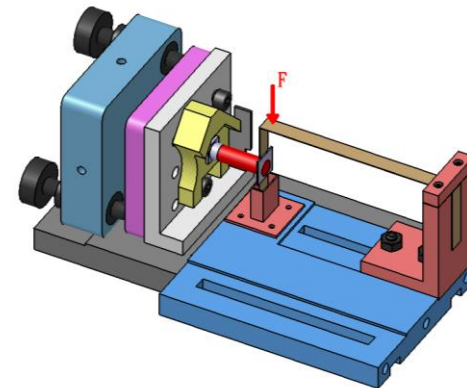
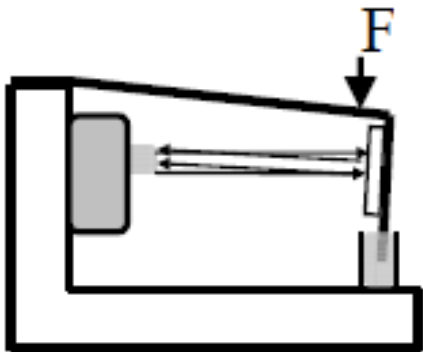


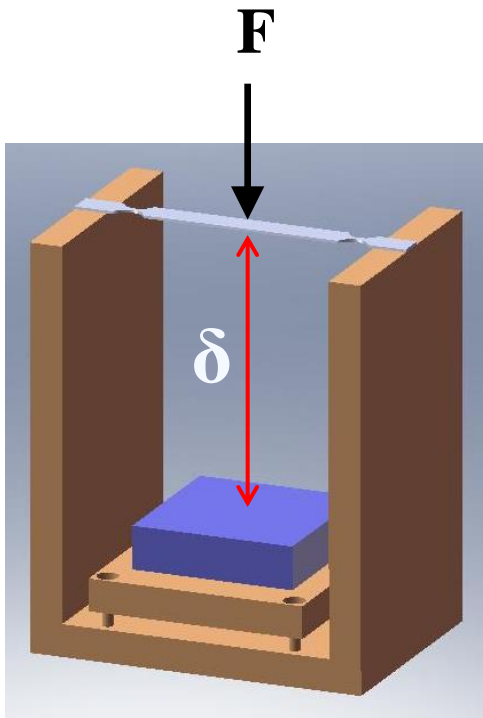
三、力量感測器應用例



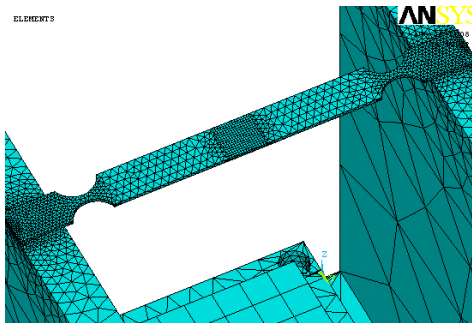
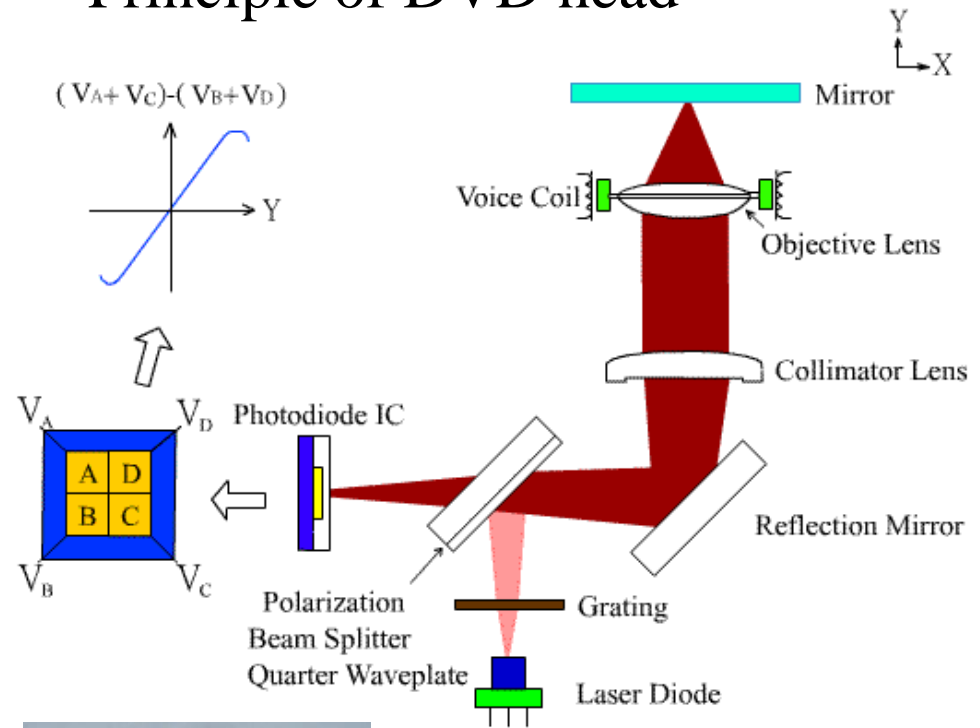
工作原理

1. 懸臂梁受力彎曲
2. 量測彎曲角度
3. 裝置角度感測器



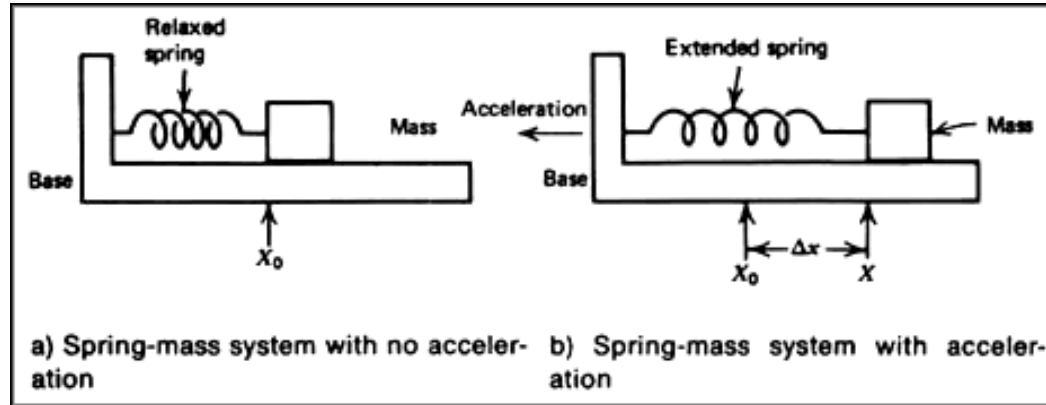


Principle of DVD head

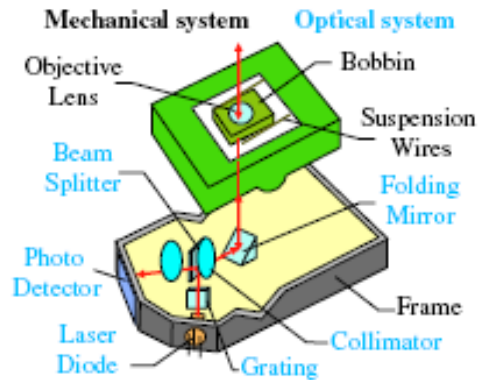


更換受力片可
改變測力大小

四、振動感測器應用例

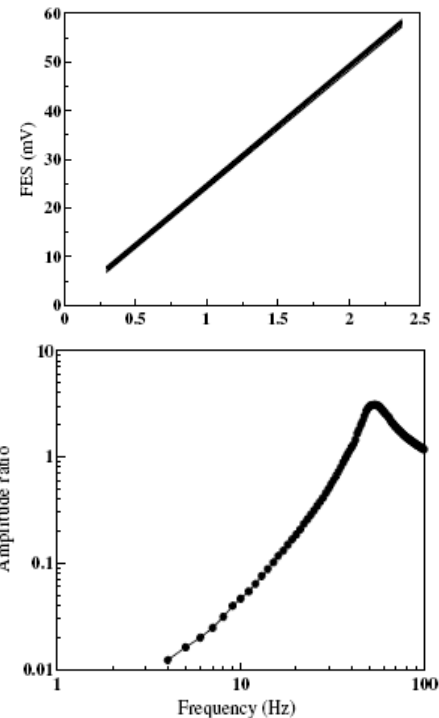
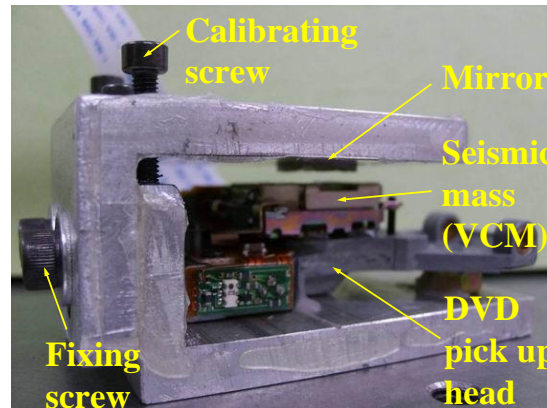
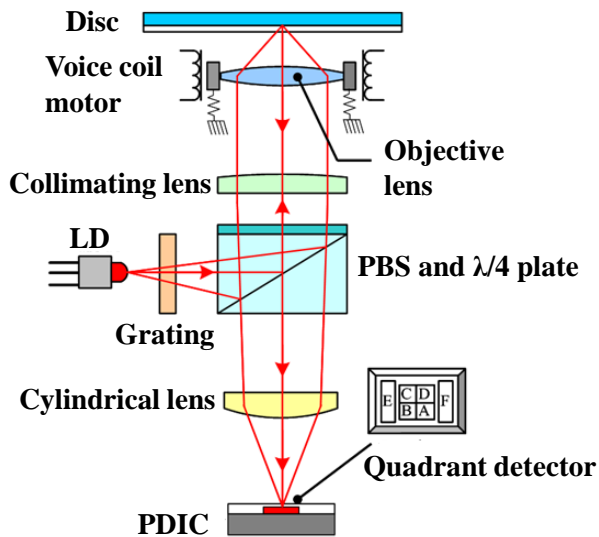
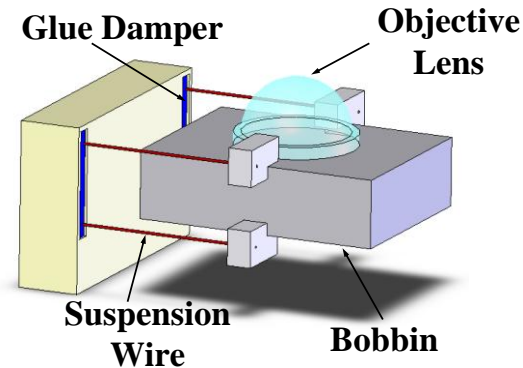


$$m\ddot{x} = K \Delta x$$

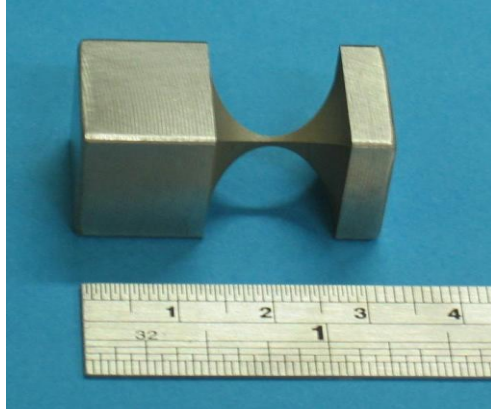


(a) Basic structure of DVD pick-up head

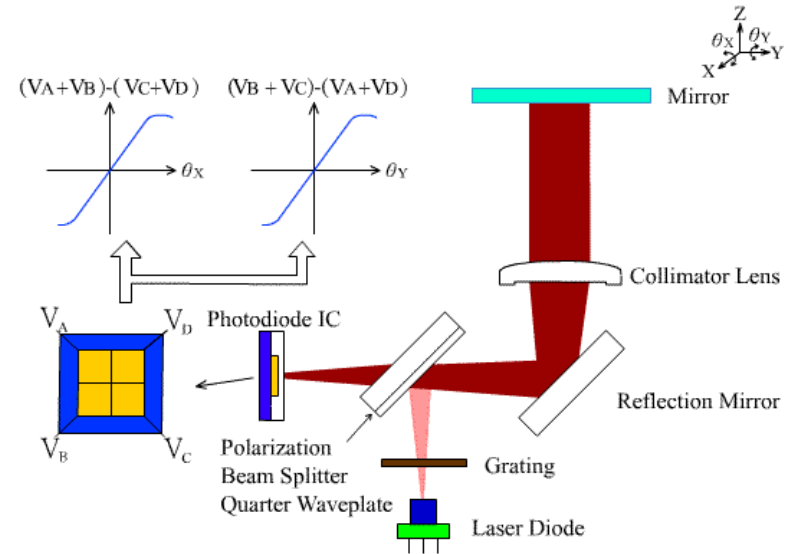
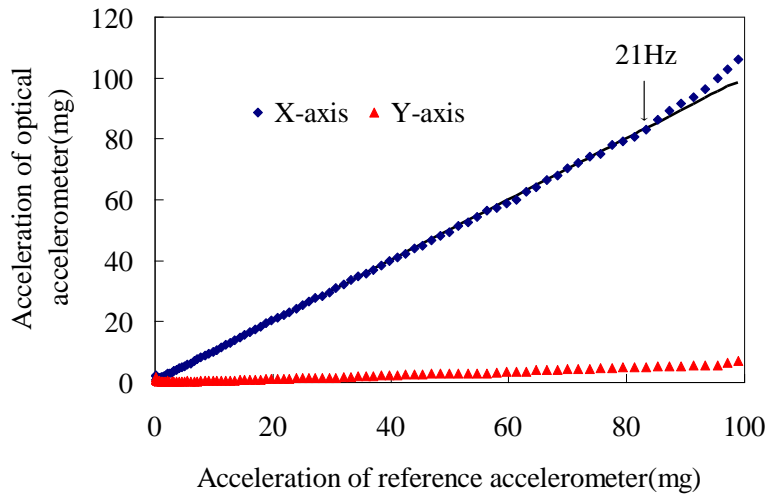
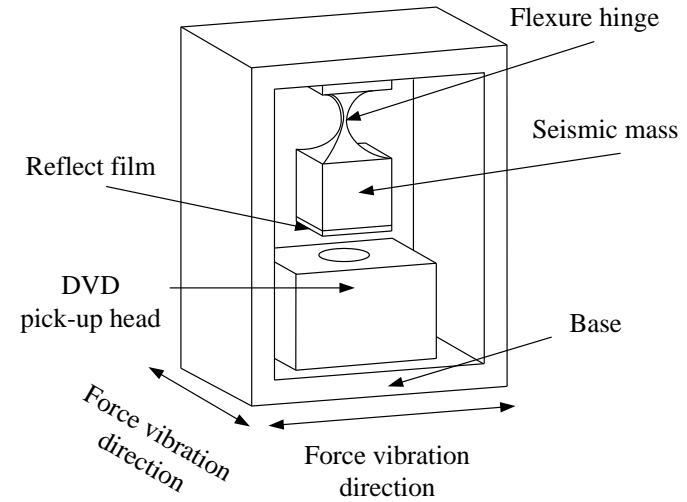
1D



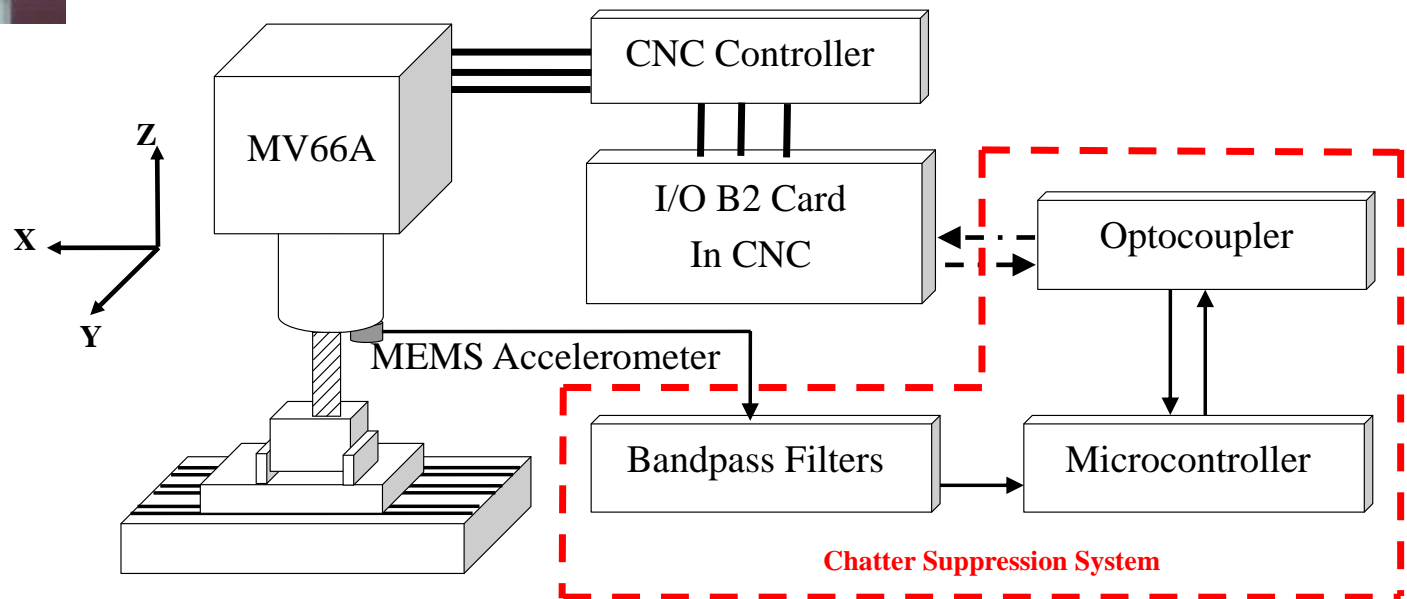
2-D DVD Accelerometer



2D



3-D MEMS accelerometer



Chatter marks



 Cutting Path

