

## 附錄A 透鏡X軸方向切削位置與刀具的面傾斜角 ( $\alpha$ )及逃隙角( $\beta$ )之間切削接觸角度圖

$\alpha'$ ：代表透鏡鉋削時與刀具的法線向量角度

$\beta'$ ：代表透鏡鉋削時與刀具的切線向量角度

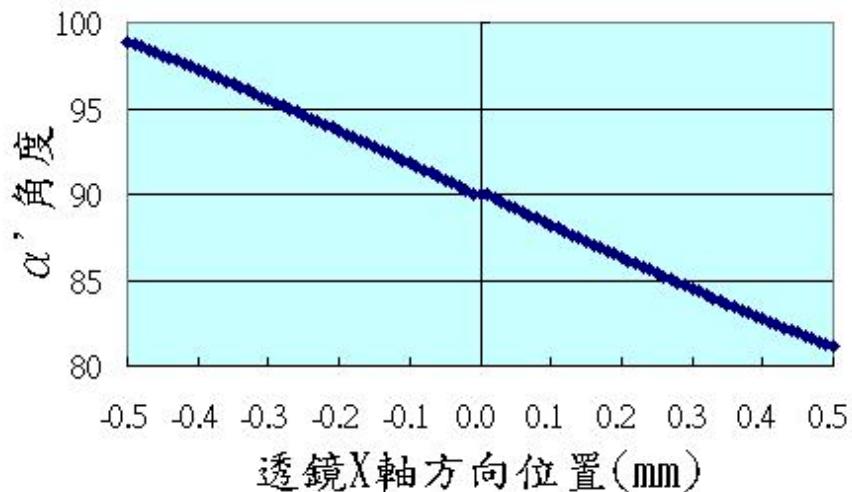


圖 A1 鉋削實驗一：透鏡鉋削時與刀具的法線向量角度

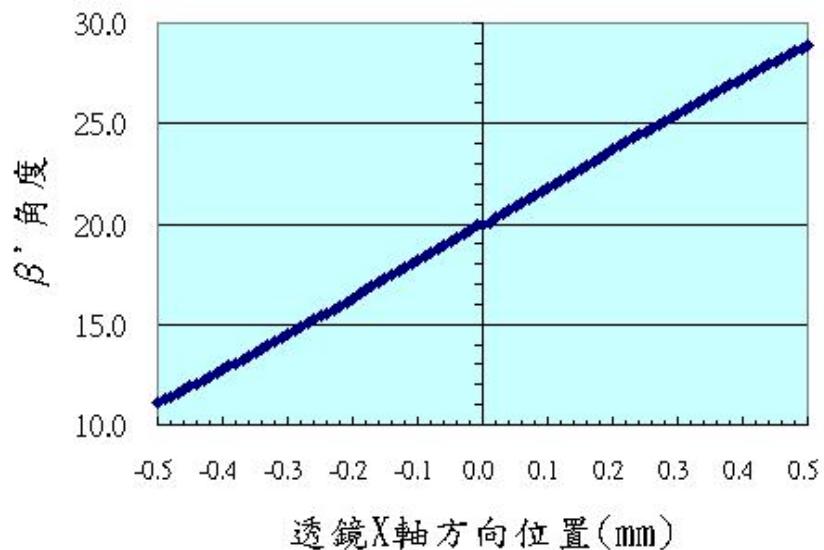


圖 A2 鉋削實驗一：透鏡鉋削時與刀具的切線向量角度

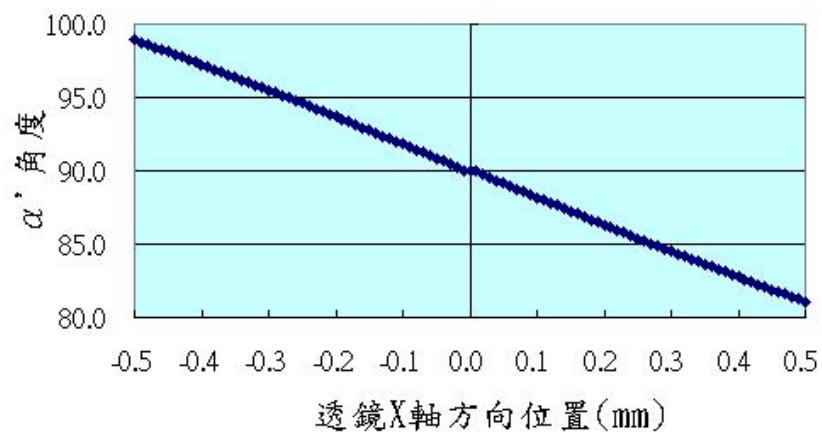


圖 A3 鋪削實驗二：透鏡鋤削時與刀具的法線向量角度

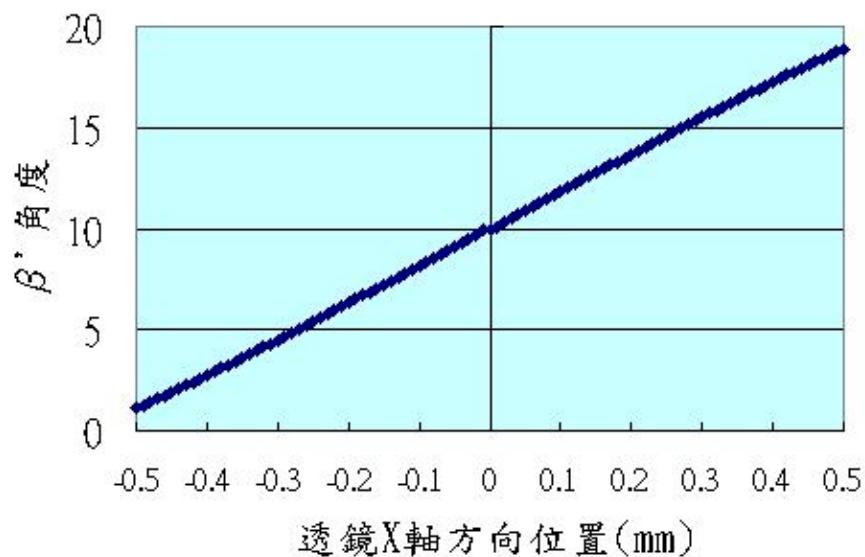


圖 A4 鋪削實驗二：透鏡鋤削時與刀具的切線向量角度

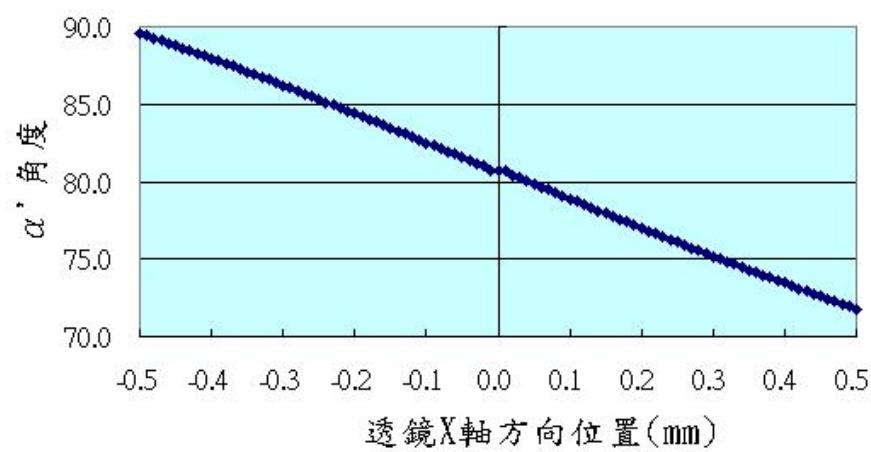


圖 A5 鋪削實驗三：透鏡鋤削時與刀具的法線向量角度

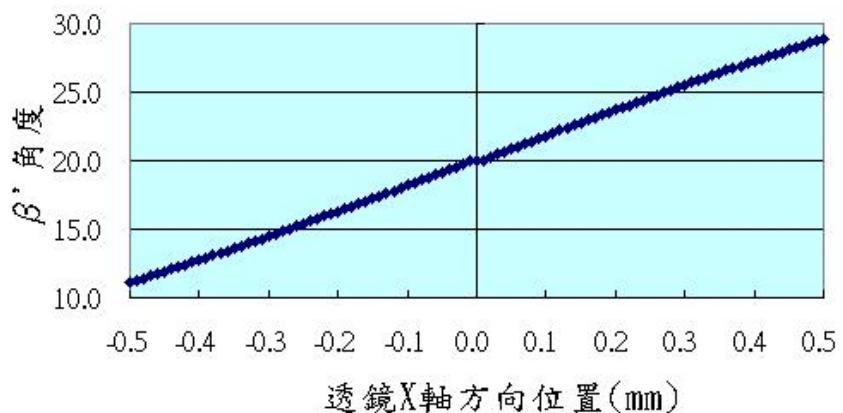


圖 A6 鋸削實驗三：透鏡鋸削時與刀具的切線向量角度

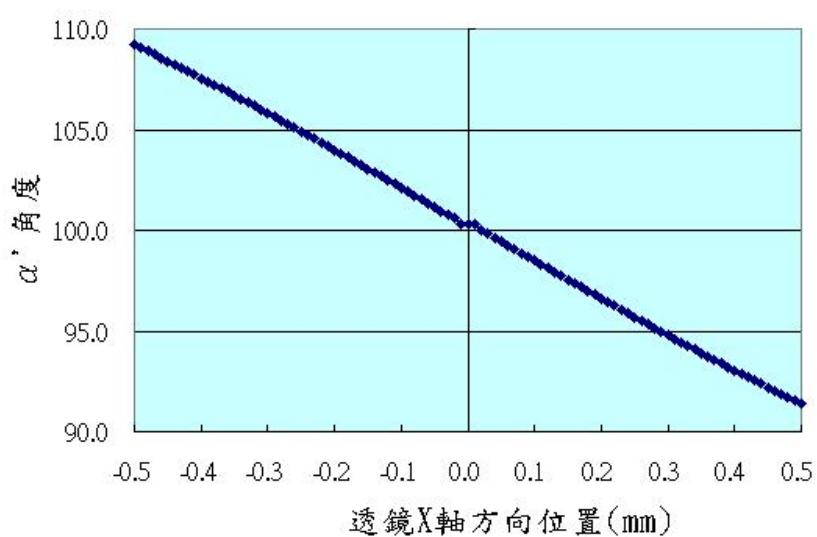


圖 A7 鋸削實驗四：透鏡鋸削時與刀具的法線向量角度

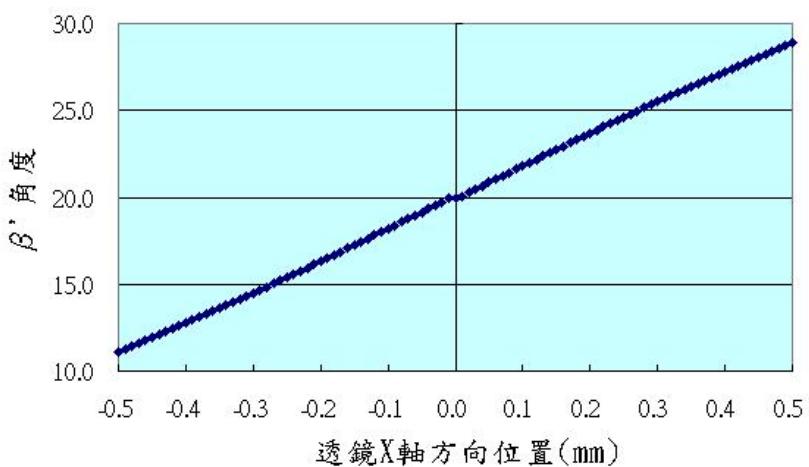


圖 A8 鋸削實驗四：透鏡鋸削時與刀具的切線向量角度

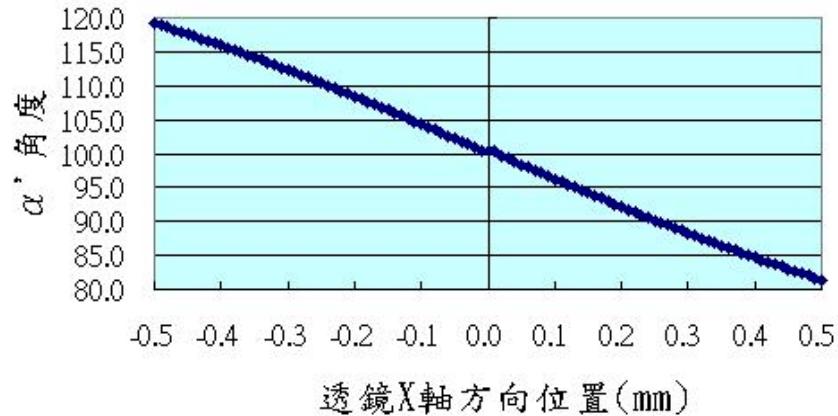


圖 A9 鋸削實驗五：透鏡鋸削時與刀具的法線向量角度

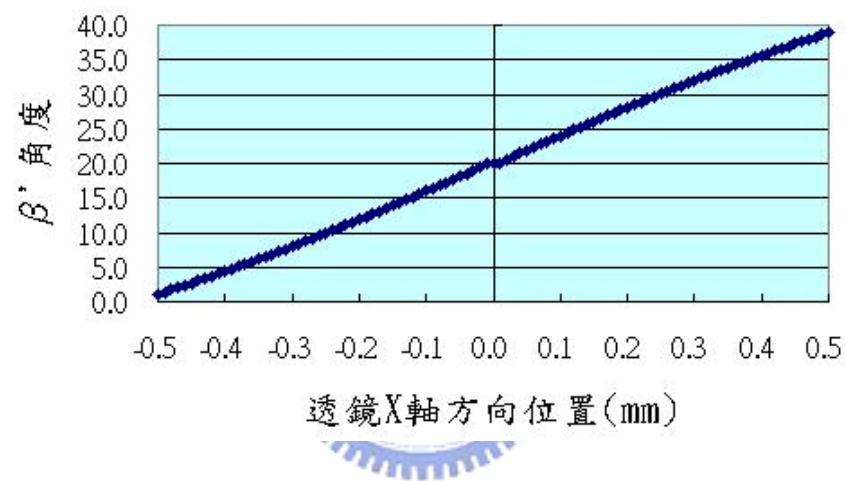


圖 A10 鋸削實驗五：透鏡鋸削時與刀具的切線向量角度

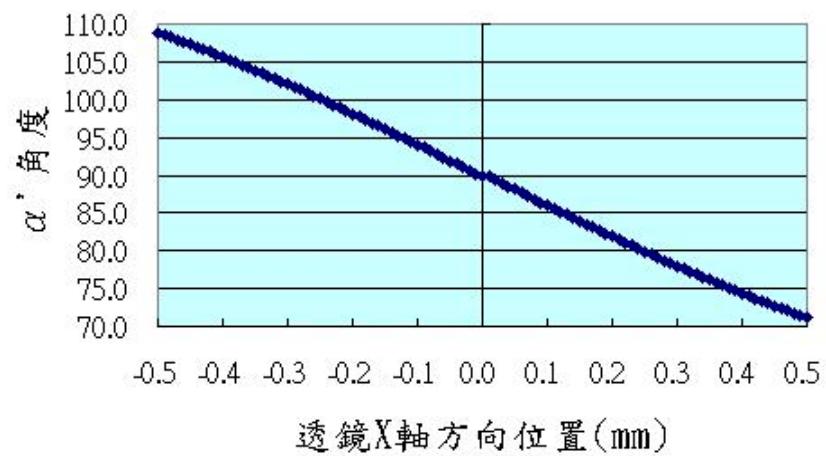


圖 A11 鋸削實驗六：透鏡鋸削時與刀具的法線向量角度

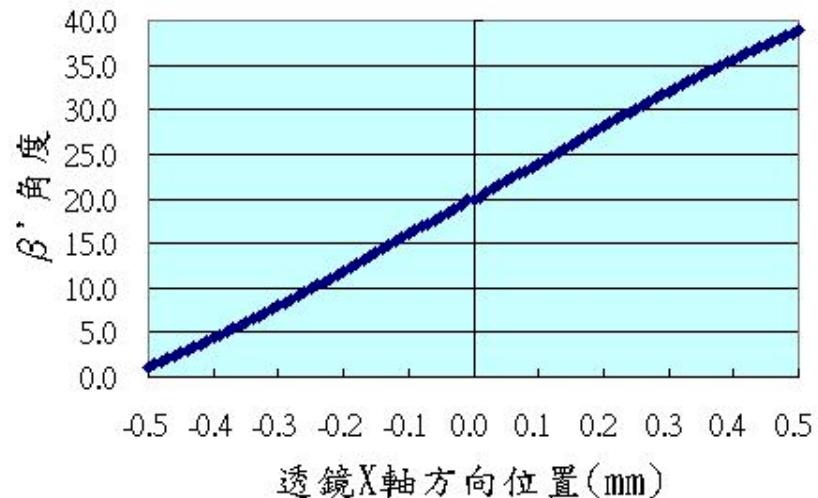


圖 A12 鋸削實驗六：透鏡鋸削時與刀具的切線向量角度

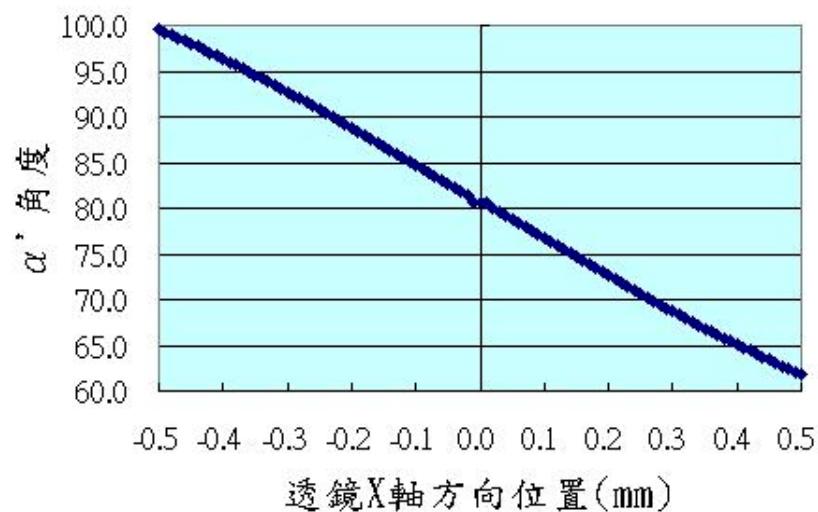


圖 A13 鋸削實驗七：透鏡鋸削時與刀具的法線向量角度

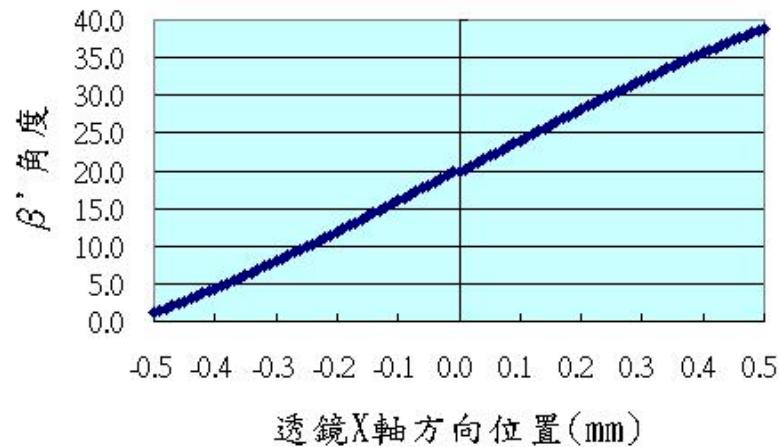


圖 A14 鋸削實驗七：透鏡鋸削時與刀具的切線向量角度

## 附錄 B 鋸削完成的微透鏡形狀精度及粗度量測報告

### 透鏡鋸削實驗一

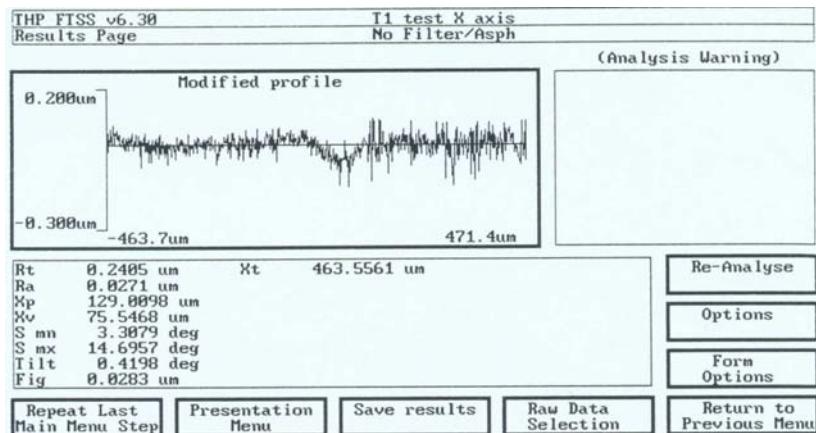


圖 B1 透鏡 X 軸形狀精度( $R_t=0.2405\mu m$ )

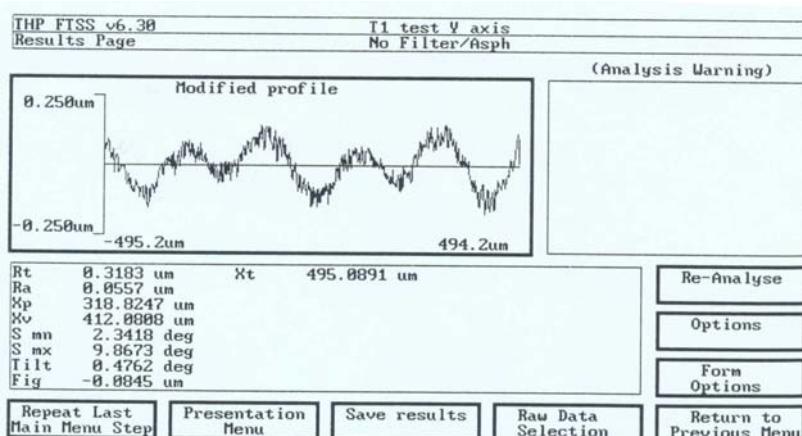


圖 B2 透鏡 Y 軸形狀精度( $R_t=0.3183\mu m$ )

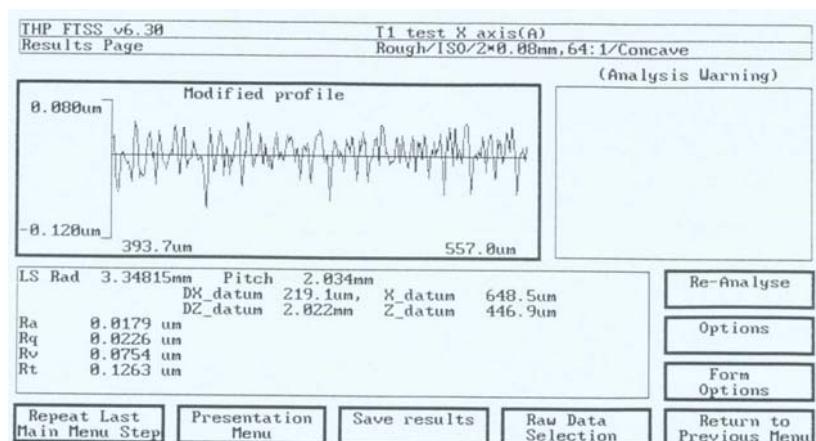


圖 B3 透鏡 X 軸 A 區域表面粗糙度( $R_a=17.9nm$ )

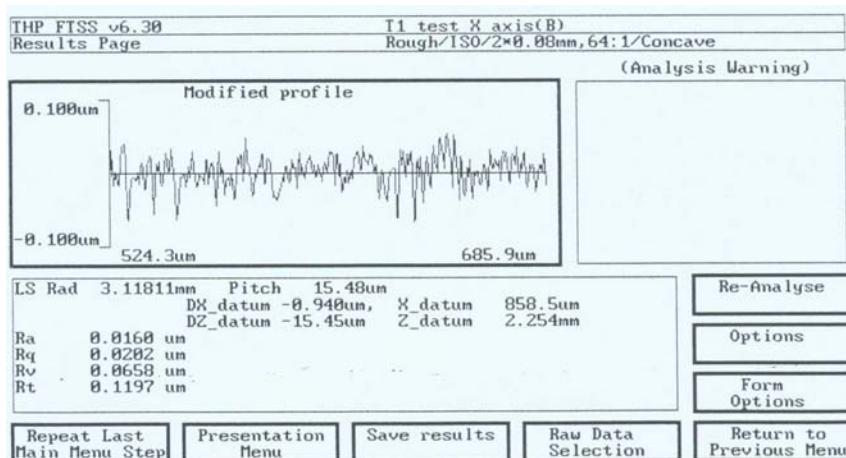


圖 B4 透鏡 X 軸 B 區域表面粗糙度(Ra=16.0nm)

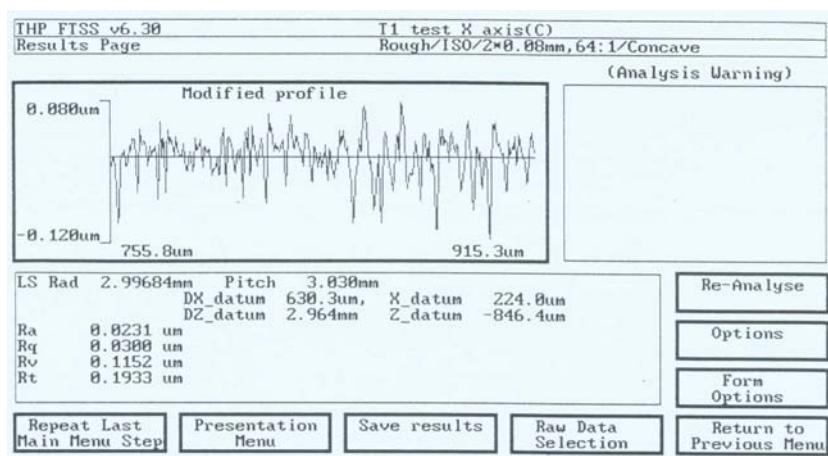


圖 B5 透鏡 X 軸 C 區域表面粗糙度(Ra=23.1nm)

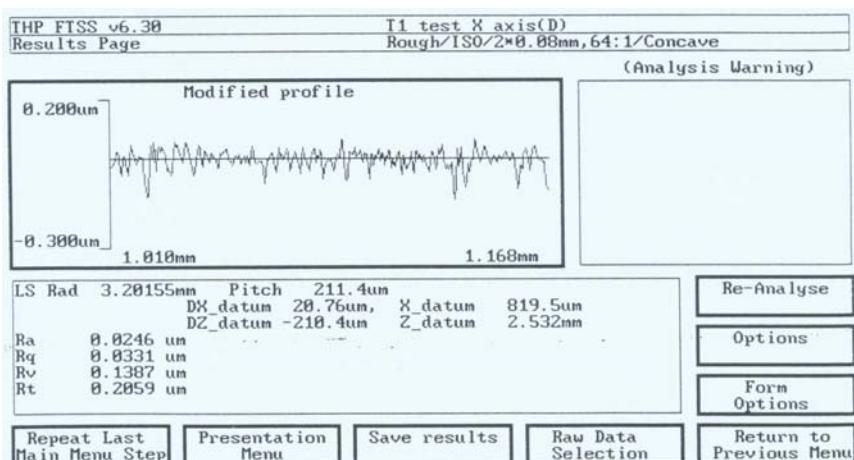


圖 B6 透鏡 X 軸 D 區域表面粗糙度(Ra=23.1nm)

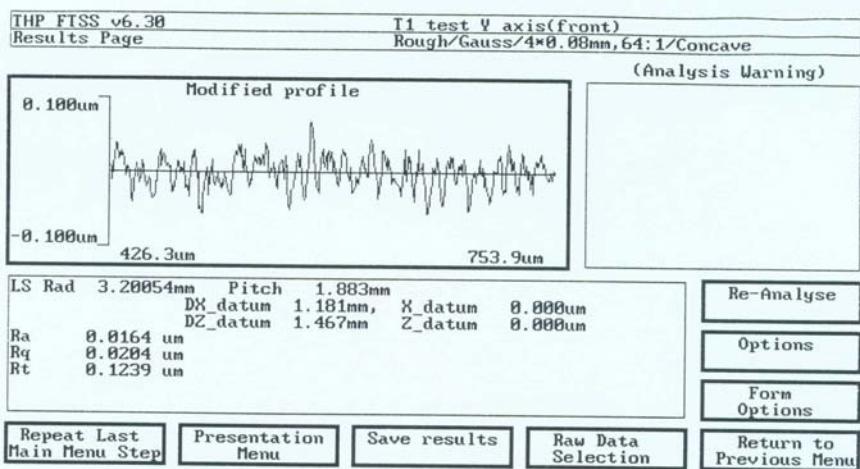


圖 B7 透鏡Y軸前半部表面粗糙度(Ra=16.4nm)

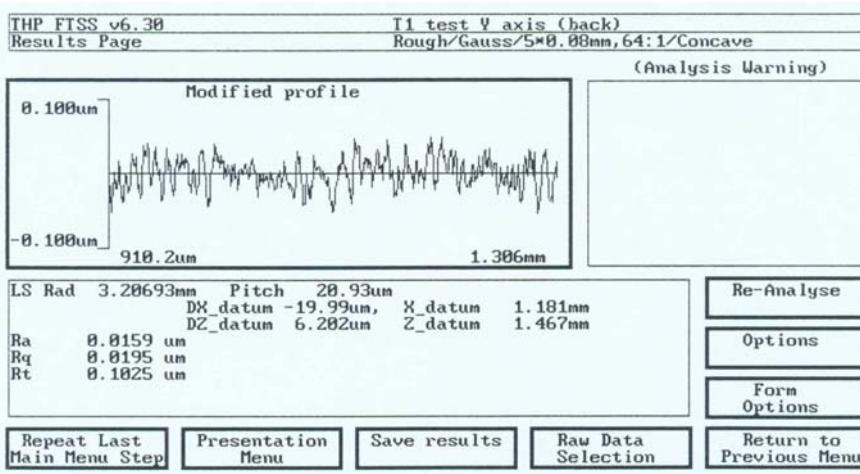


圖 B8 透鏡Y軸後半部表面粗糙度(Ra=16.4nm)

## 透鏡鉋削實驗二

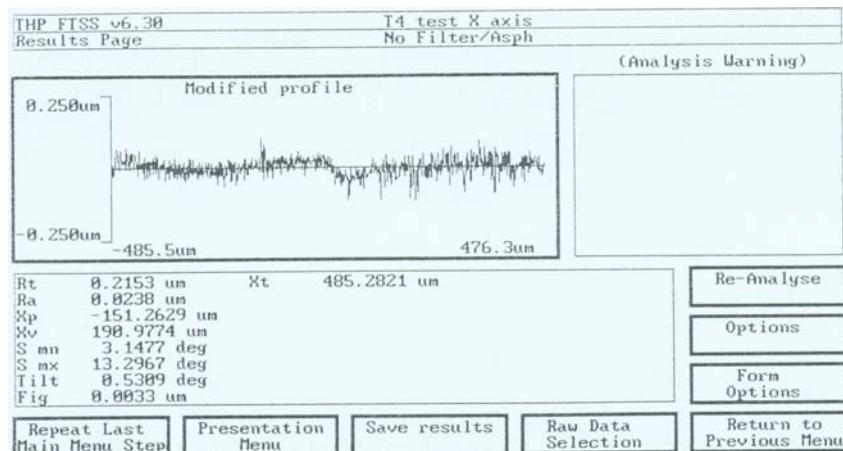


圖 B9 透鏡 X 軸形狀精度( $Rt=0.2153\mu m$ )

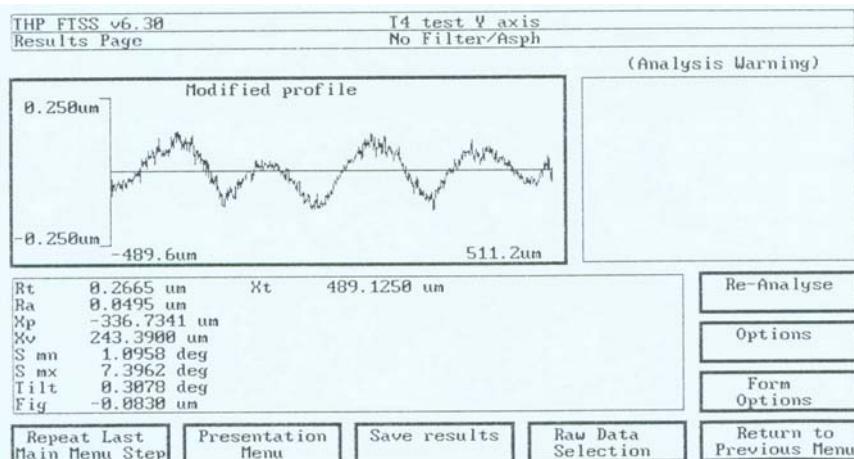


圖 B10 透鏡 Y 軸形狀精度( $Rt=0.2665\mu m$ )

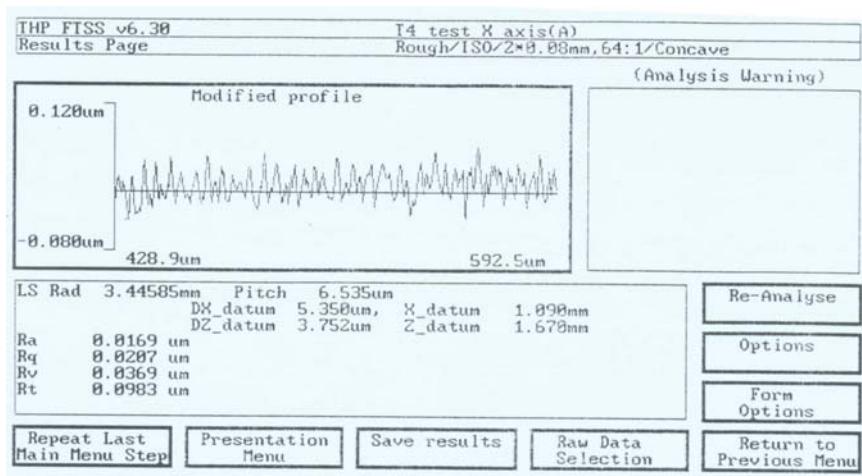


圖 B11 透鏡 X 軸 A 區域表面粗糙度( $Ra=16.9nm$ )

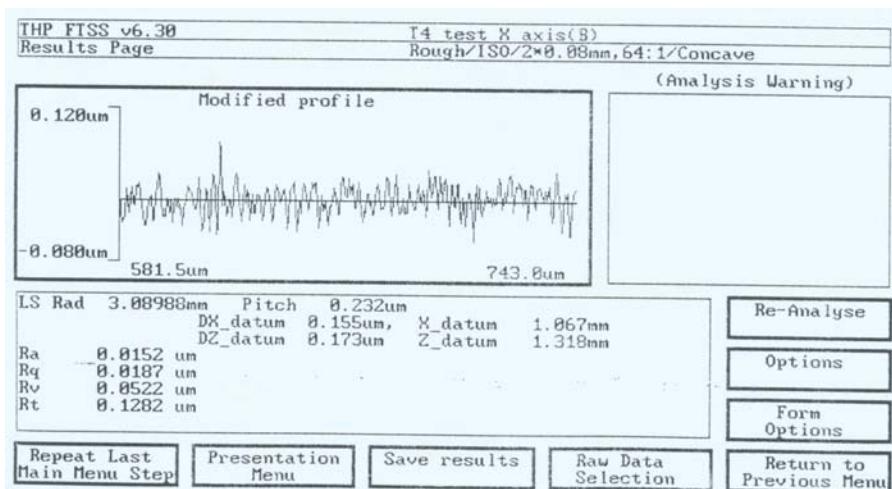


圖 B12 透鏡 X 軸 B 區域表面粗糙度( $R_a=15.2\text{nm}$ )

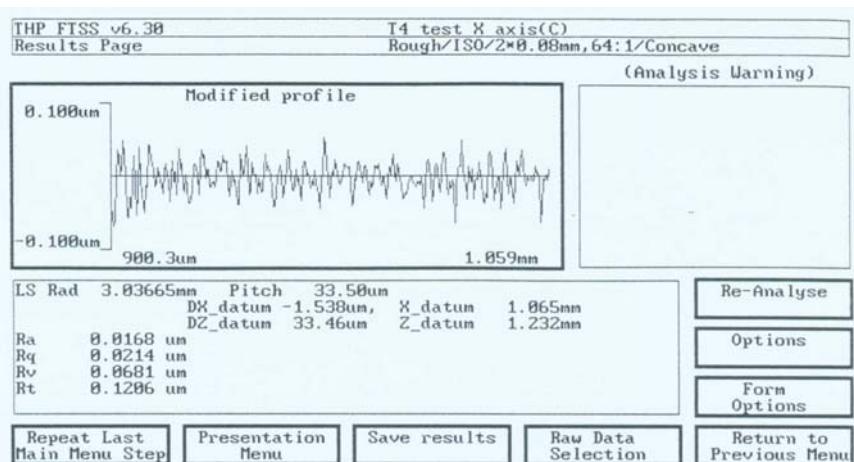


圖 B13 透鏡 X 軸 C 區域表面粗糙度( $R_a=16.8\text{nm}$ )

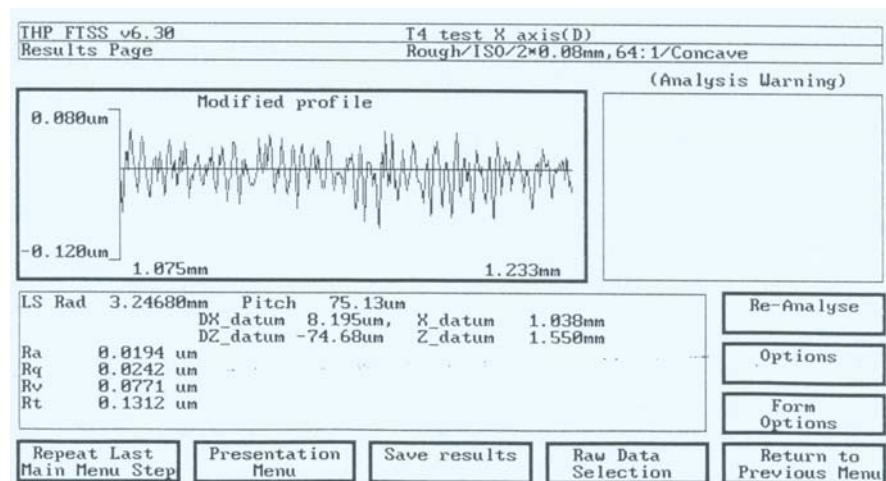


圖 B14 透鏡 X 軸 D 區域表面粗糙度( $R_a=19.4\text{nm}$ )

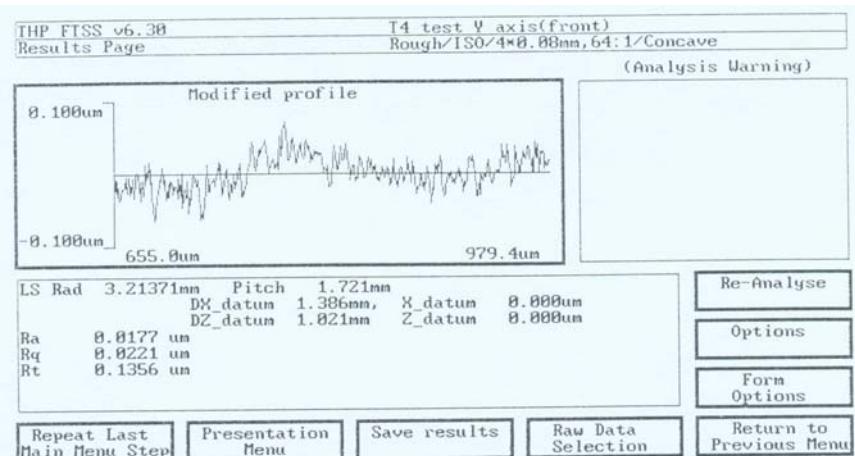


圖 B15 透鏡 Y 軸前半部表面粗糙度(Ra=17.7nm)

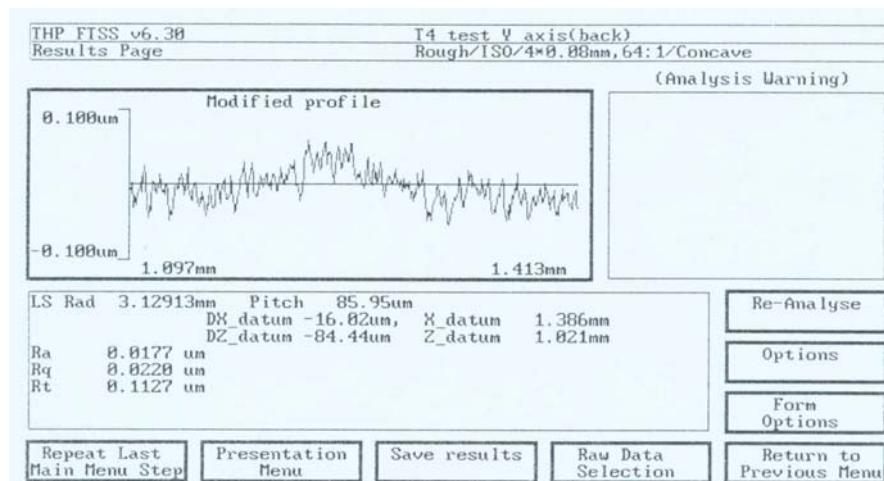


圖 B16 透鏡 Y 軸後半部表面粗糙度(Ra=17.7nm)

### 透鏡鉋削實驗三

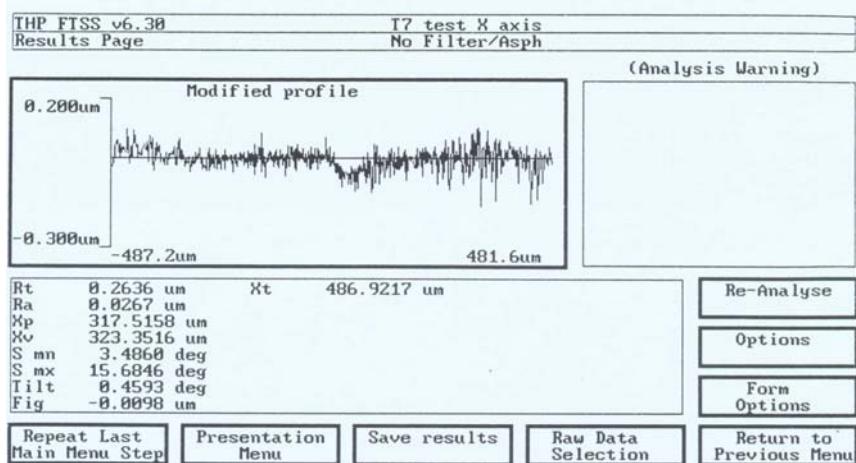


圖 B17 透鏡 X 軸形狀精度(Rt=0.2636um)

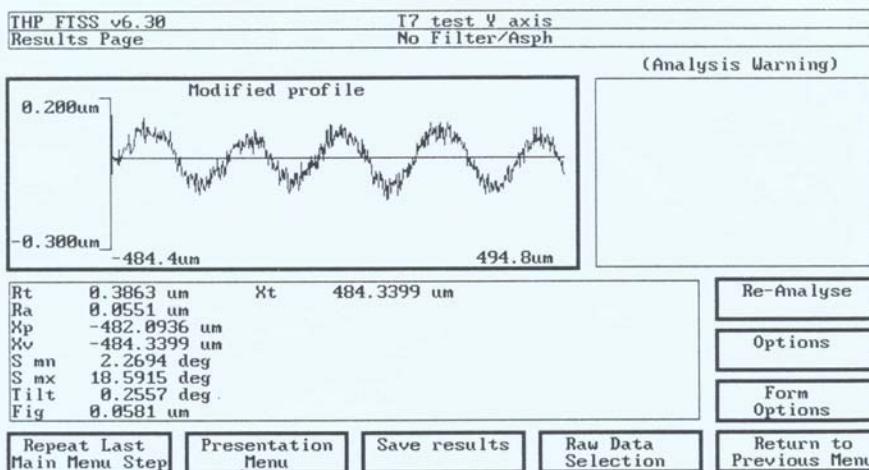


圖 B18 透鏡 Y 軸形狀精度(Rt=0.3863um)

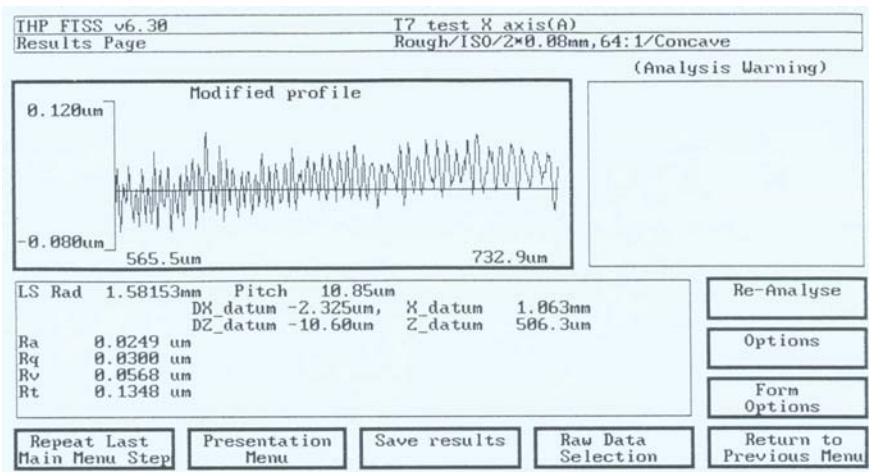


圖 B19 透鏡 X 軸 A 區域表面粗糙度(Ra=24.9nm)

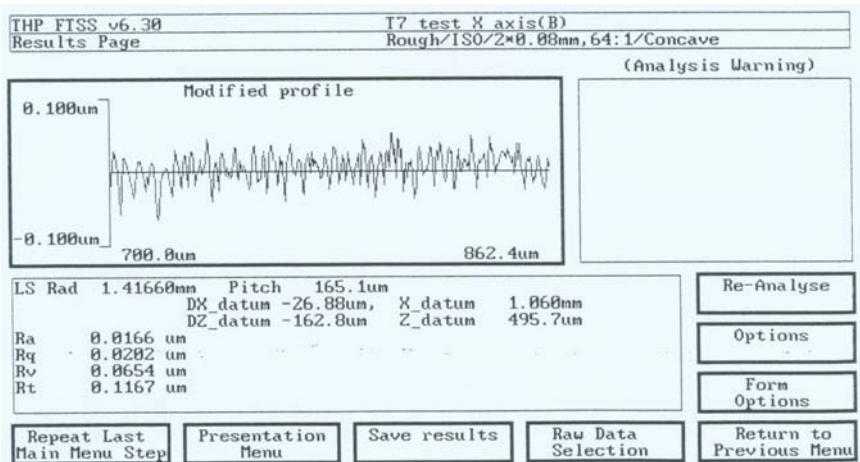


圖 B20 透鏡 X 軸 B 區域表面粗糙度(Ra=16.6nm)

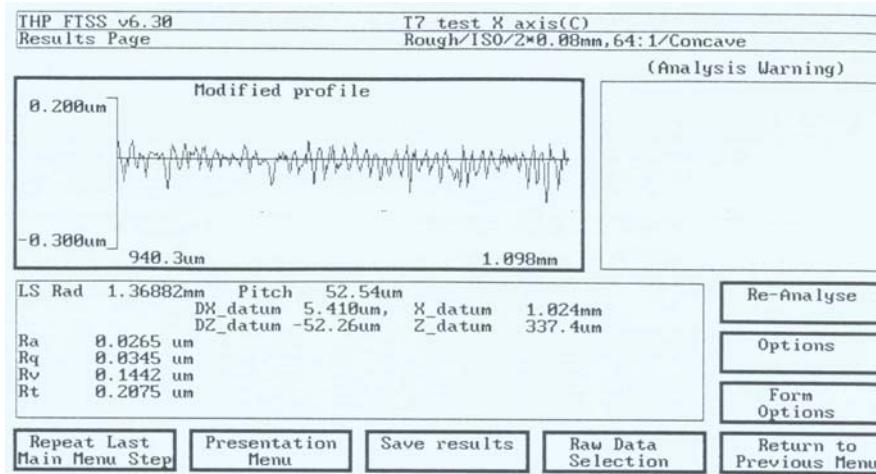


圖 B21 透鏡 X 軸 C 區域表面粗糙度(Ra=26.5nm)

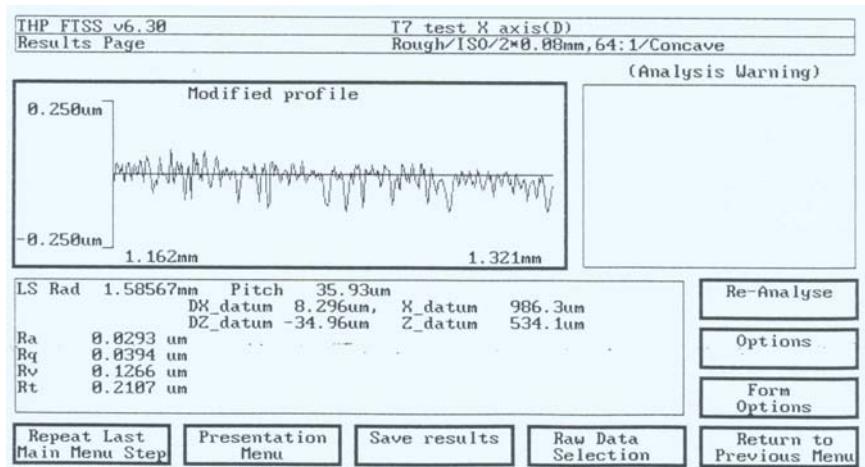


圖 B22 透鏡 X 軸 D 區域表面粗糙度(Ra=29.3nm)

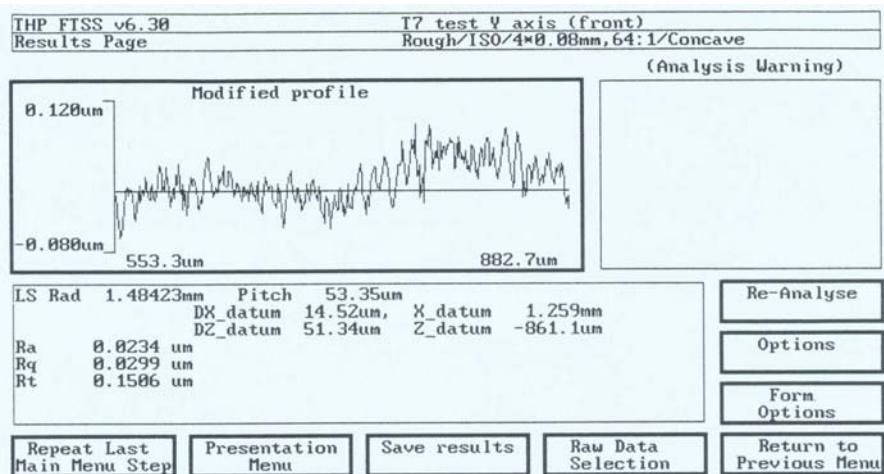


圖 B23 透鏡 Y 軸前半部表面粗糙度(Ra=23.4nm)

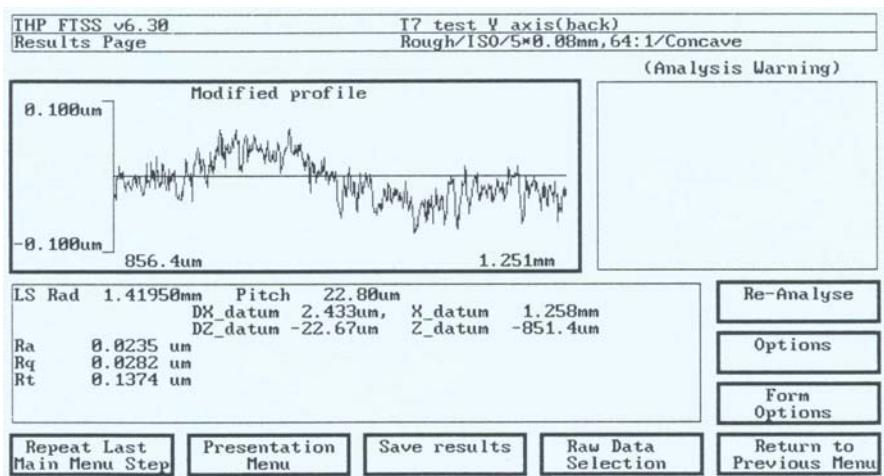


圖 B24 透鏡 Y 軸後半部表面粗糙度(Ra=23.5nm)

## 透鏡鉋削實驗四

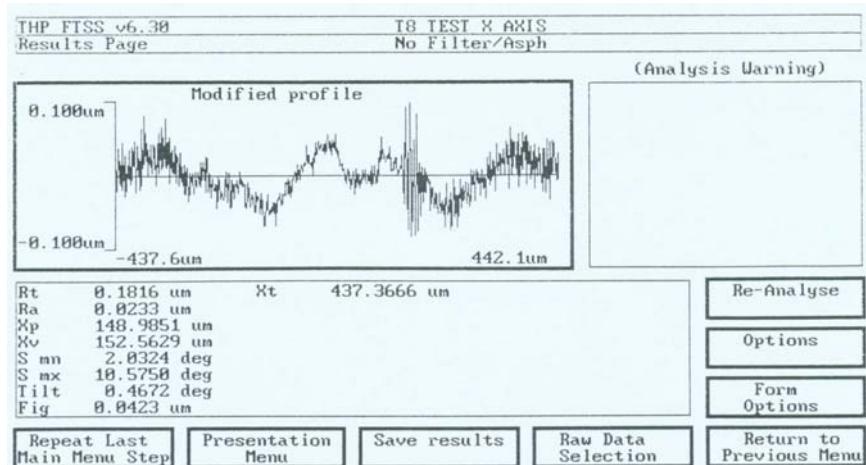


圖 B25 透鏡 X 軸形狀精度(Rt=0.1816μm)

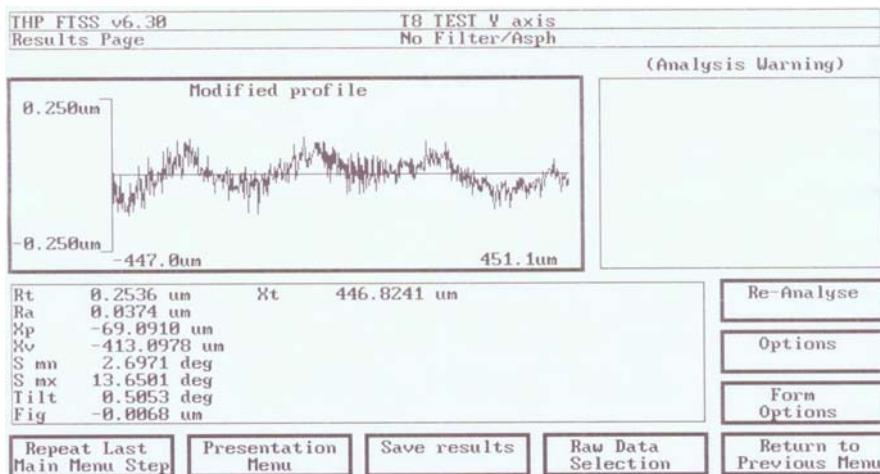


圖 B26 透鏡 Y 軸形狀精度(Rt=0.2536μm)

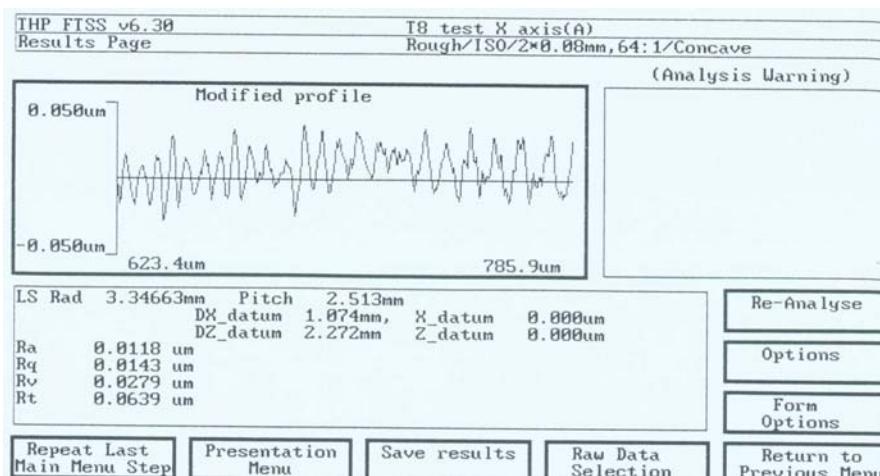


圖 B27 透鏡 X 軸 A 區域表面粗糙度(Ra=11.8nm)

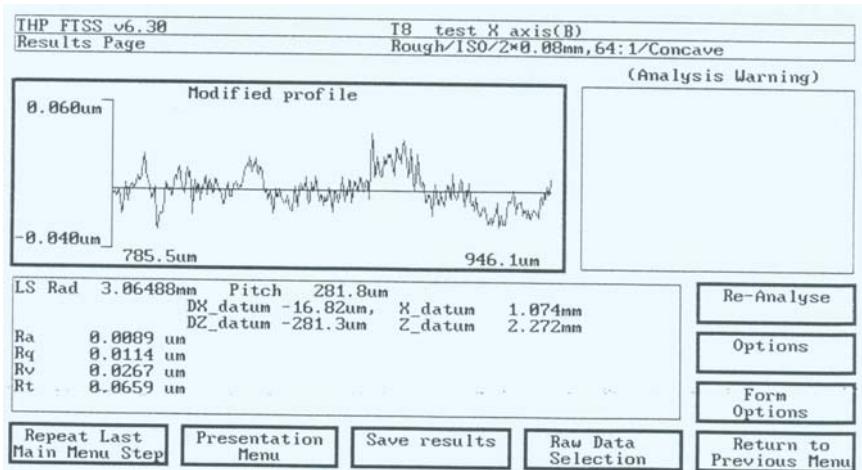


圖 B28 透鏡 X 軸 B 區域表面粗糙度(Ra=8.9nm)

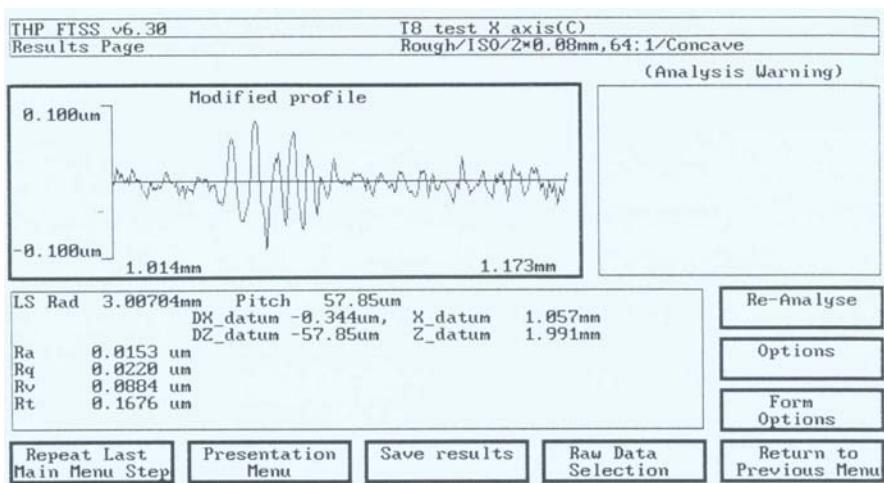


圖 B29 透鏡 X 軸 C 區域表面粗糙度(Ra=15.3nm)

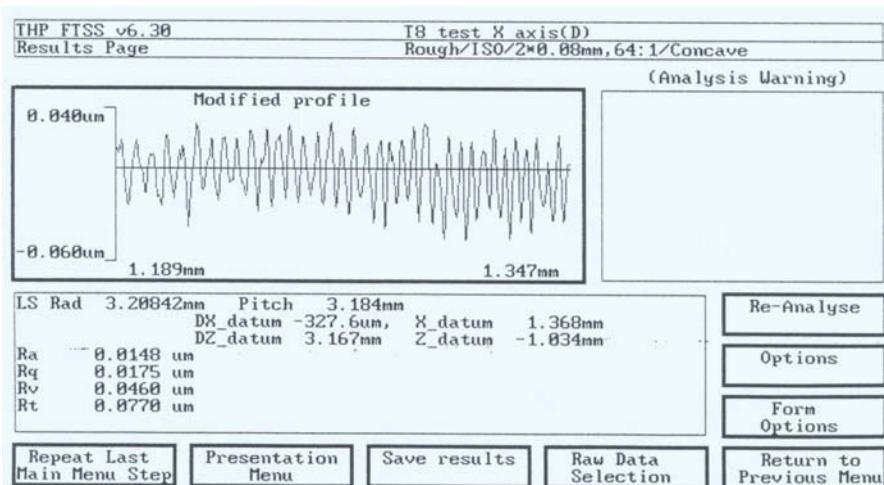


圖 B30 透鏡 X 軸 D 區域表面粗糙度(Ra=14.8nm)

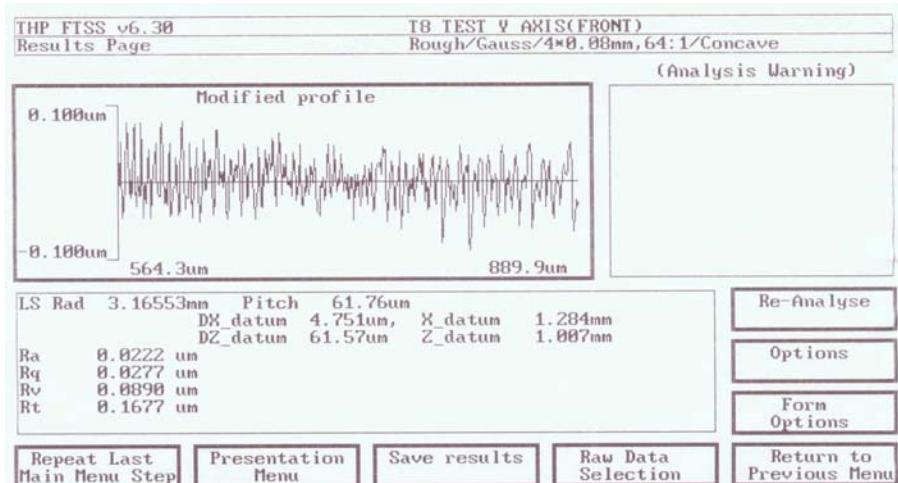


圖 B31 透鏡 Y 軸前半部表面粗糙度 ( $R_a=22.2\text{nm}$ )

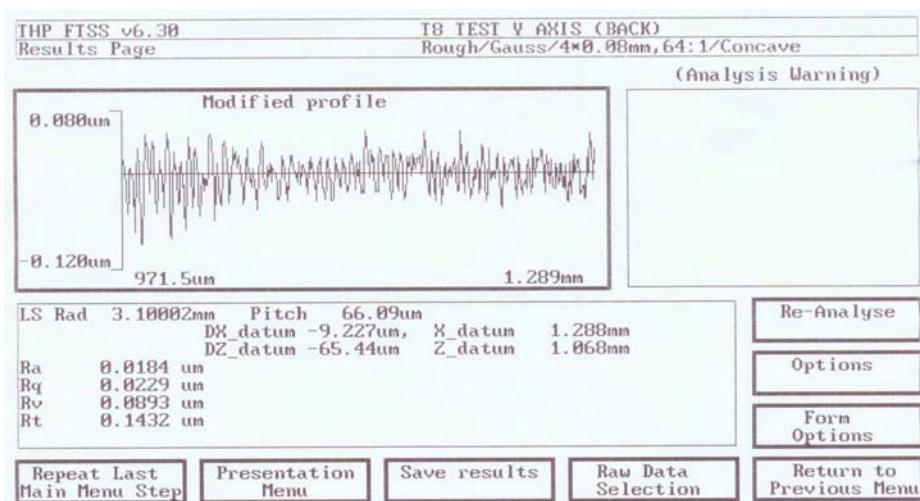


圖 B32 透鏡 Y 軸後半部表面粗糙度 ( $R_a=18.4\text{nm}$ )

## 透鏡鉋削實驗五

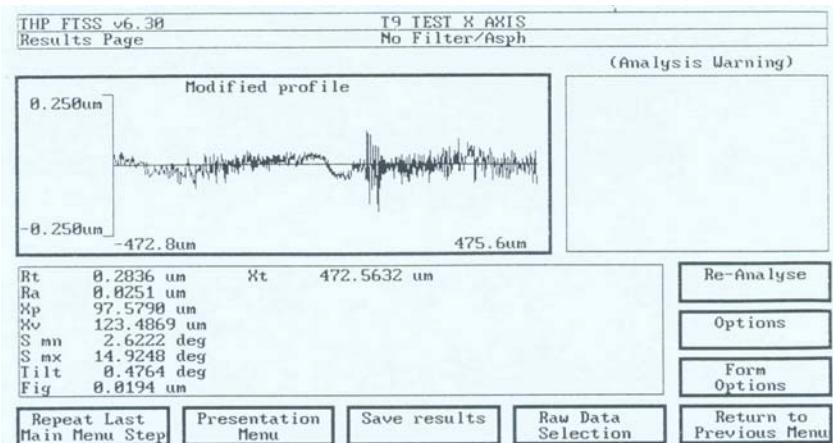


圖 B33 透鏡 X 軸形狀精度(Rt=0.2836um)

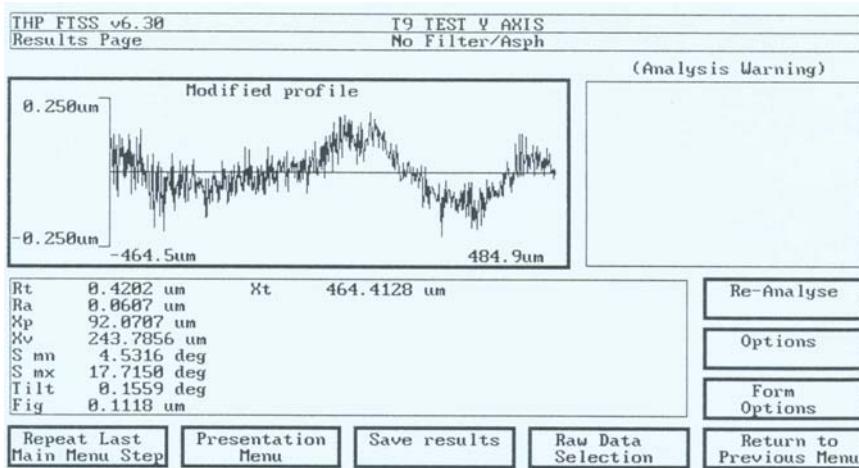


圖 B34 透鏡 Y 軸形狀精度(Rt=0.4202um)

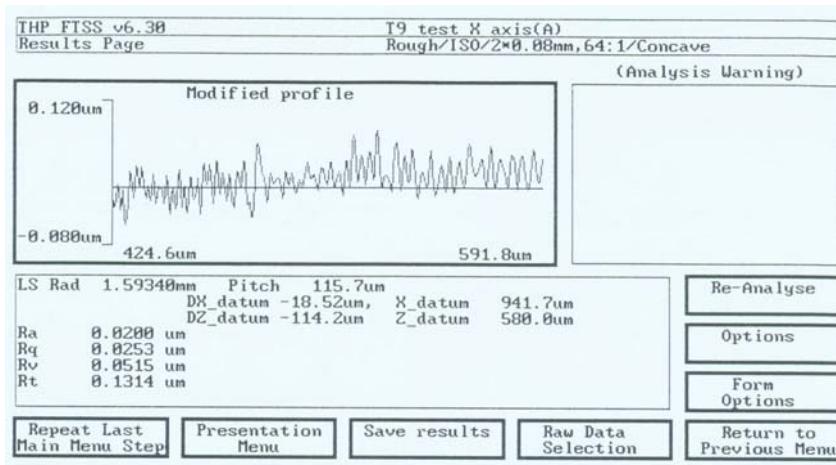


圖 B35 透鏡 X 軸 A 區域表面粗糙度(Ra=20.0nm)

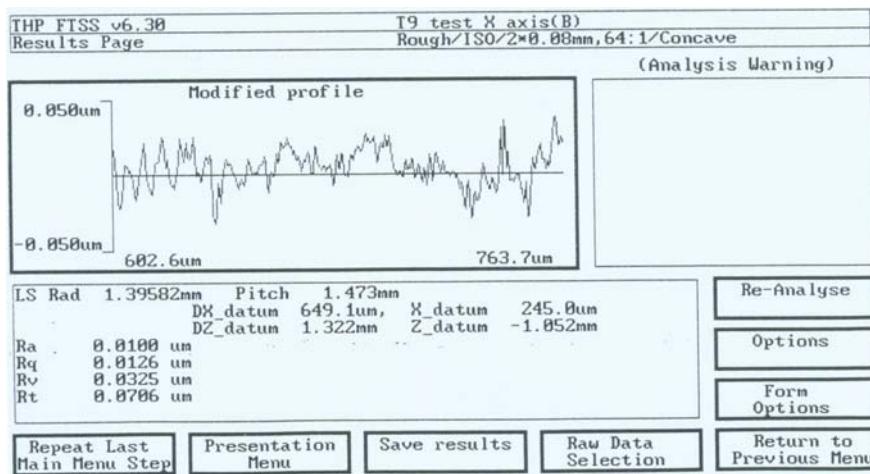


圖 B36 透鏡 X 軸 B 區域表面粗糙度(Ra=10.0nm)

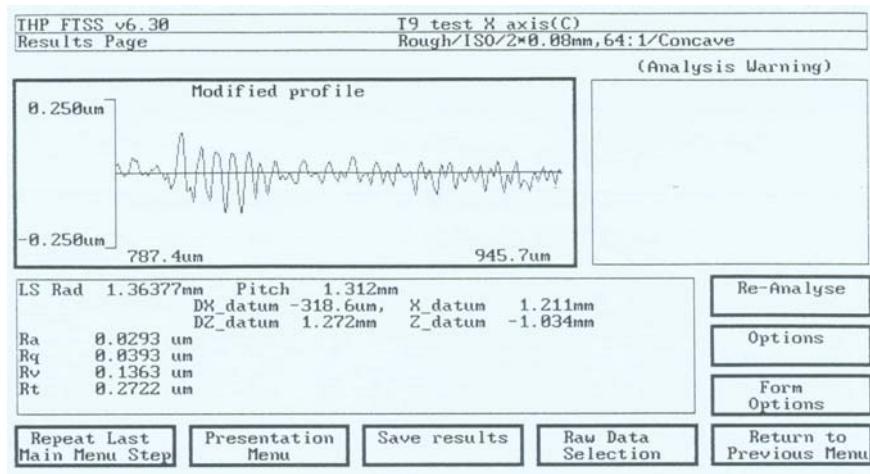


圖 B37 透鏡 X 軸 C 區域表面粗糙度(Ra=29.3nm)

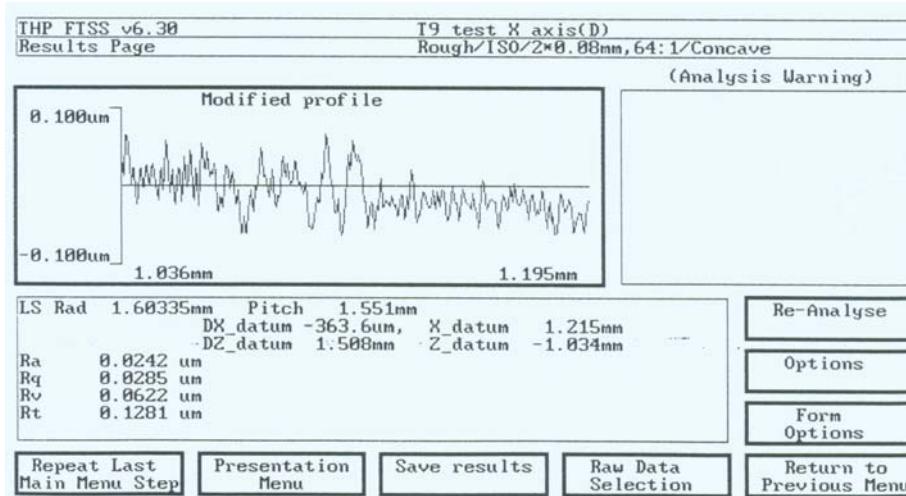


圖 B38 透鏡 X 軸 D 區域表面粗糙度(Ra=24.2nm)

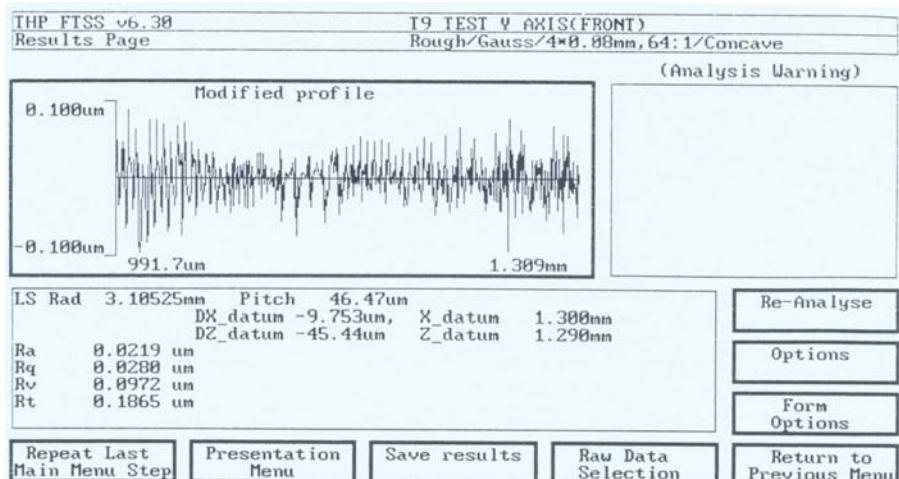


圖 B39 透鏡 Y 軸前半部表面粗糙度(Ra=21.9nm)

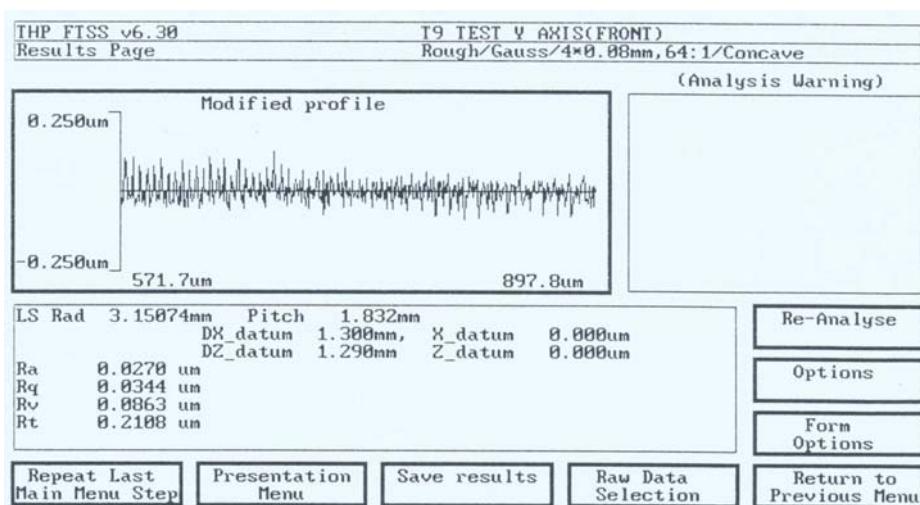


圖 B40 透鏡 Y 軸後半部表面粗糙度(Ra=27.0nm)

## 透鏡鉋削實驗六

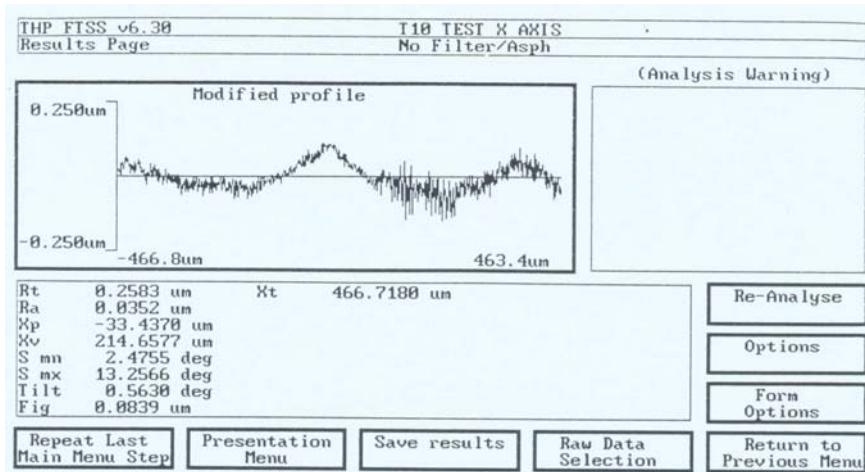


圖 B41 透鏡 X 軸形狀精度( $Rt=0.2583\mu m$ )

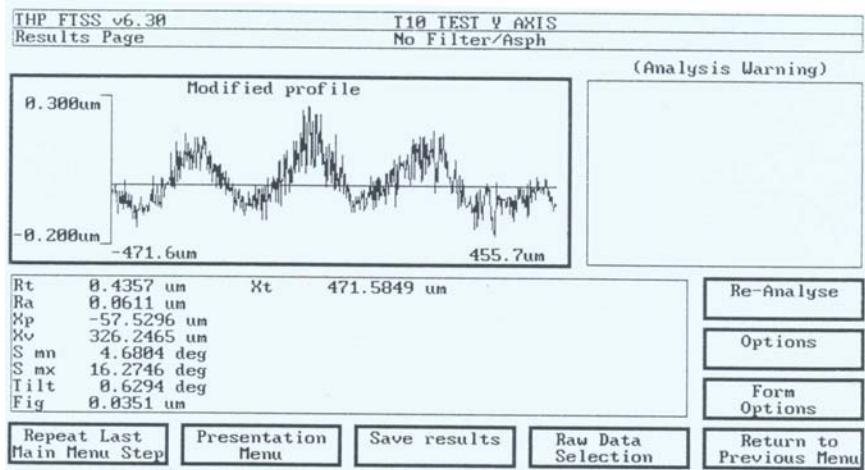


圖 B42 透鏡 Y 軸形狀精度( $Rt=0.4357\mu m$ )

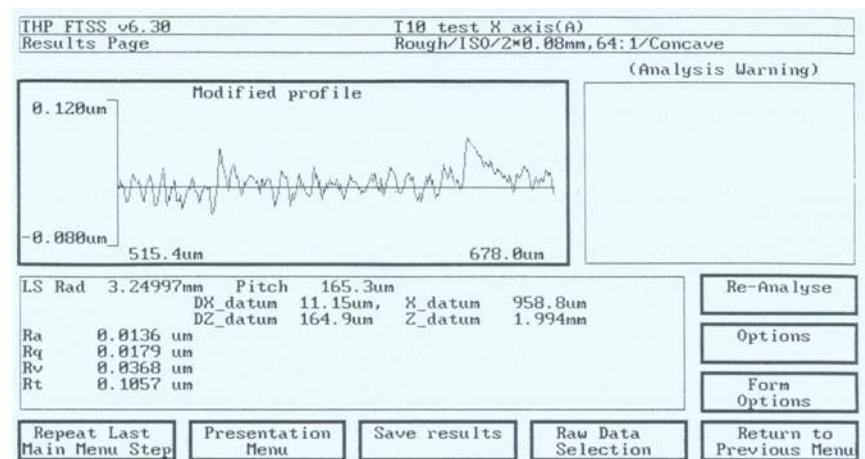


圖 B43 透鏡 X 軸 A 區域表面粗糙度( $Ra=13.6nm$ )

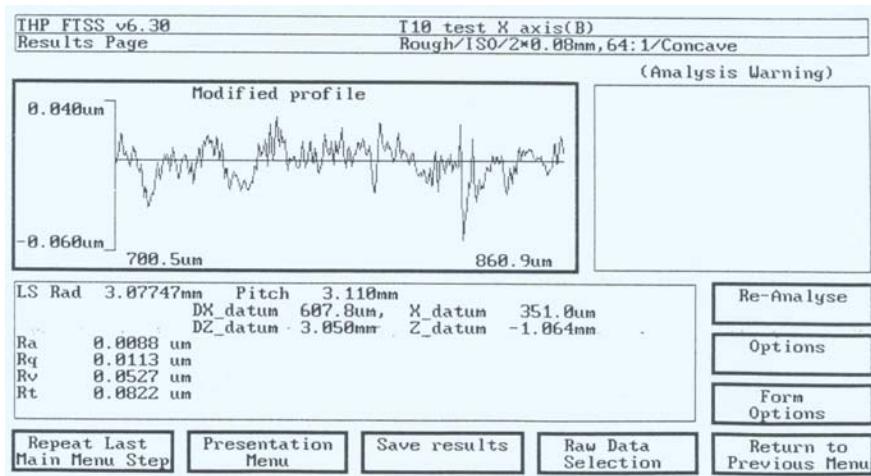


圖 B44 透鏡 X 軸 B 區域表面粗糙度( $R_a=8.8\text{nm}$ )

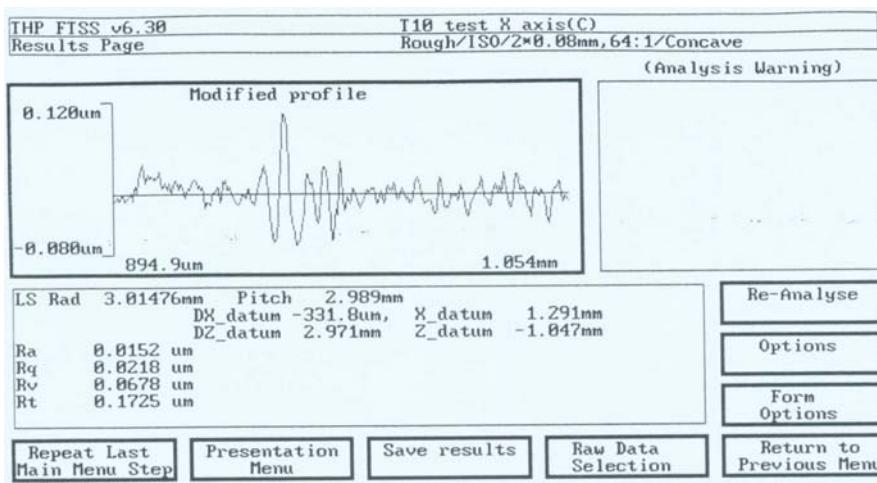


圖 B45 透鏡 X 軸 C 區域表面粗糙度( $R_a=15.2\text{nm}$ )

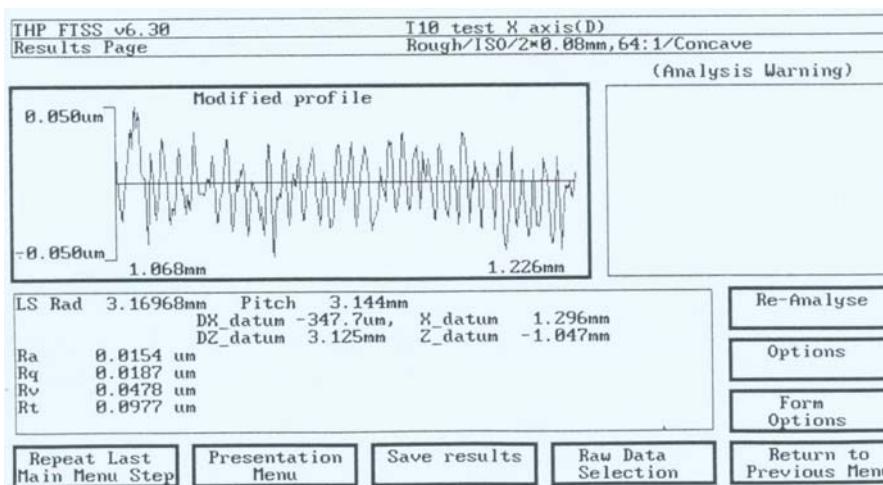


圖 B46 透鏡 X 軸 D 區域表面粗糙度( $R_a=15.4\text{nm}$ )

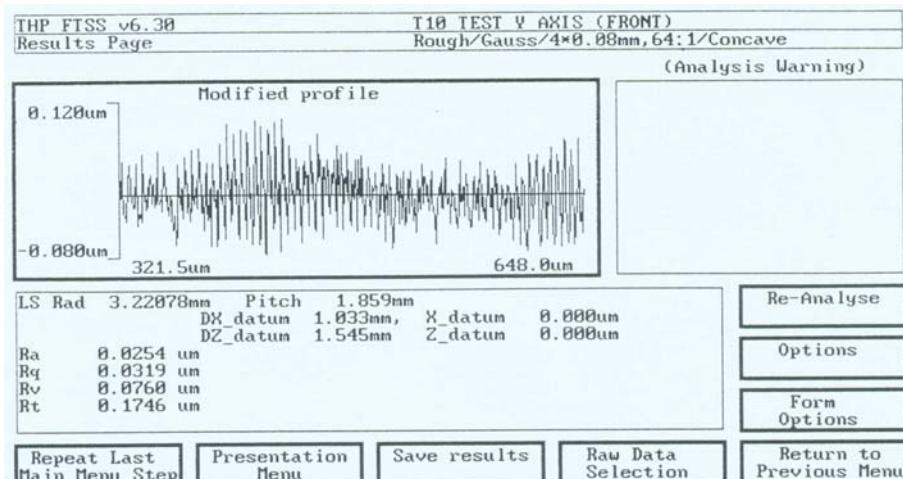


圖 B47 透鏡 Y 軸前半部表面粗糙度 ( $R_a=25.4\text{nm}$ )

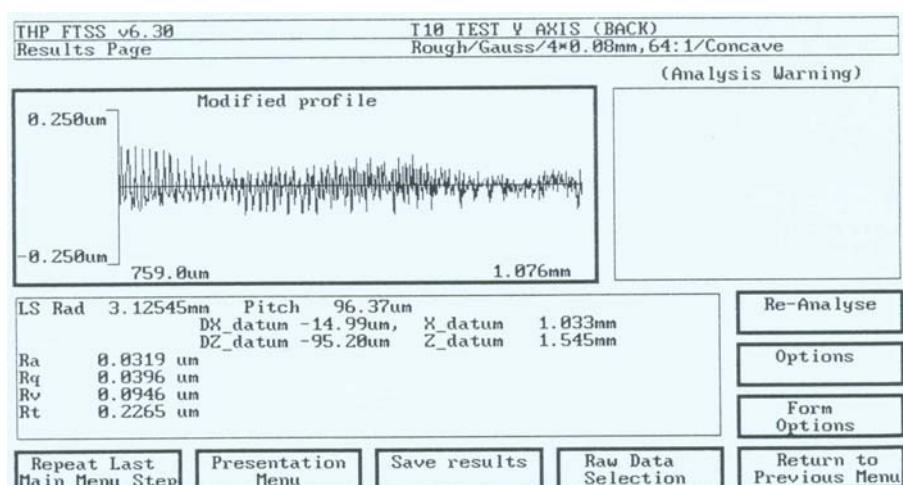


圖 B48 透鏡 Y 軸後半部表面粗糙度 ( $R_a=31.9\text{nm}$ )

## 透鏡鉋削實驗七

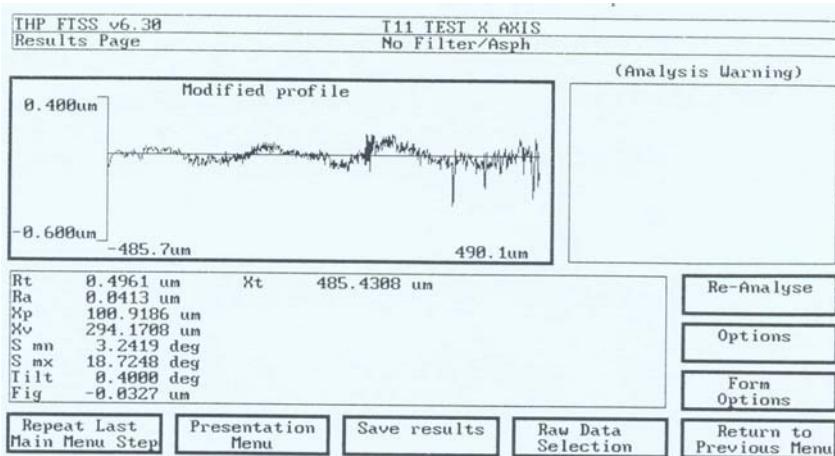


圖 B49 透鏡 X 軸形狀精度(Rt=0.4961um)

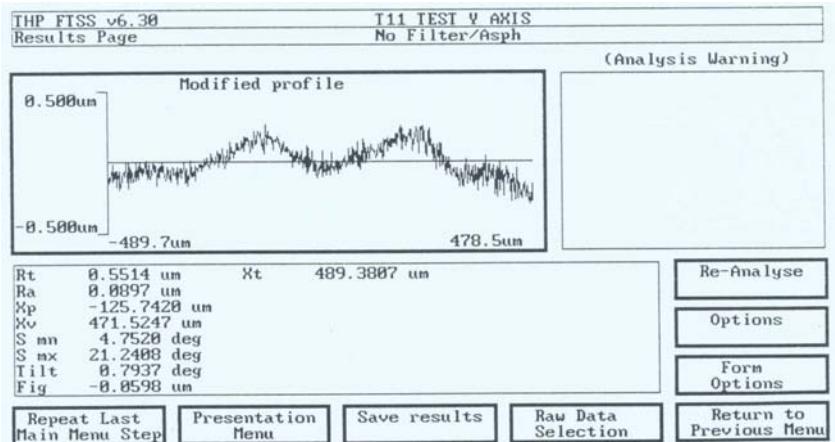


圖 B50 透鏡 Y 軸形狀精度(Rt=0.5514um)

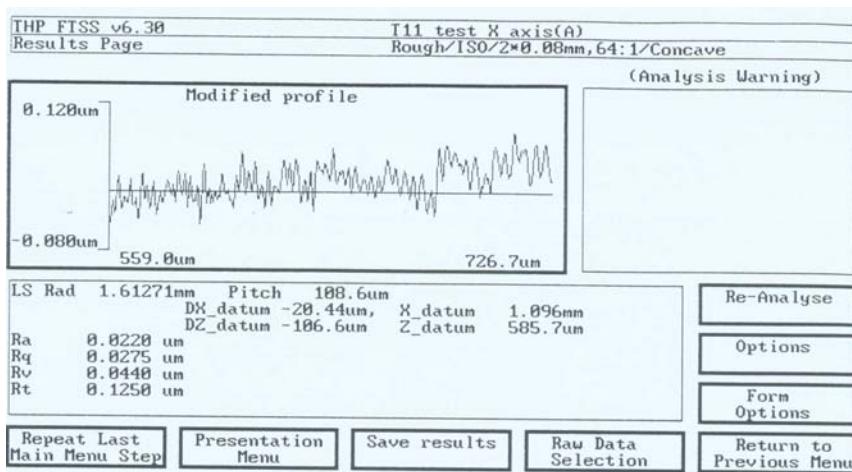


圖 B51 透鏡 X 軸 A 區域表面粗糙度(Ra=22.8nm)

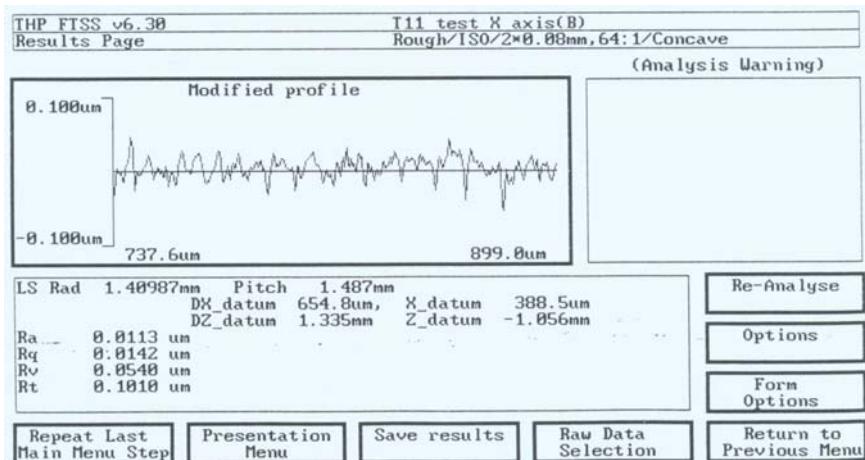


圖 B52 透鏡 X 軸 B 區域表面粗糙度(Ra=11.3nm)

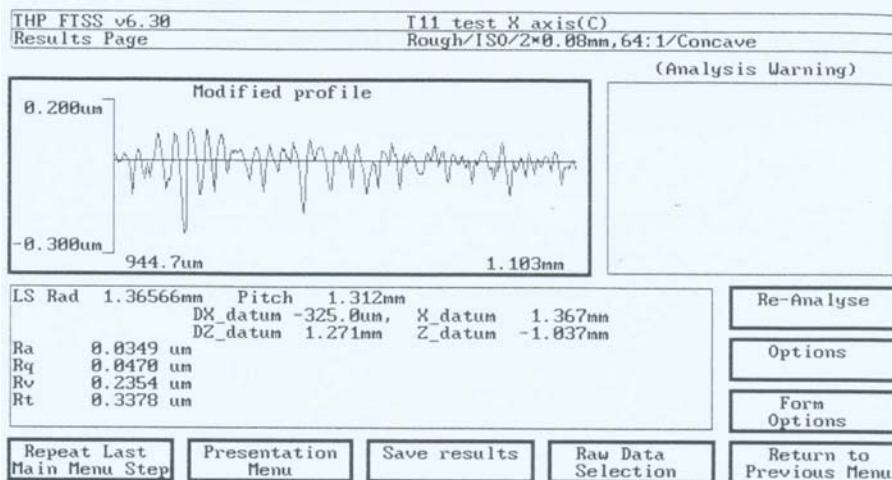


圖 B53 透鏡 X 軸 C 區域表面粗糙度(Ra=34.9nm)

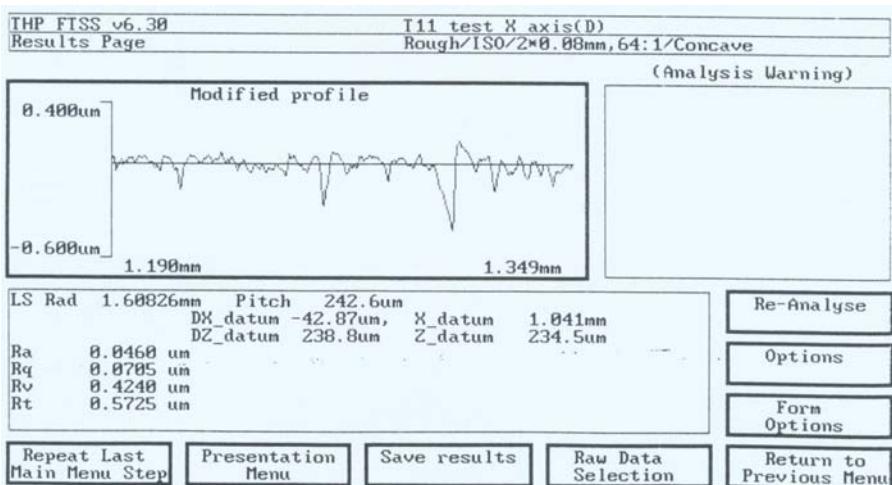


圖 B54 透鏡 X 軸 D 區域表面粗糙度(Ra=46.0nm)

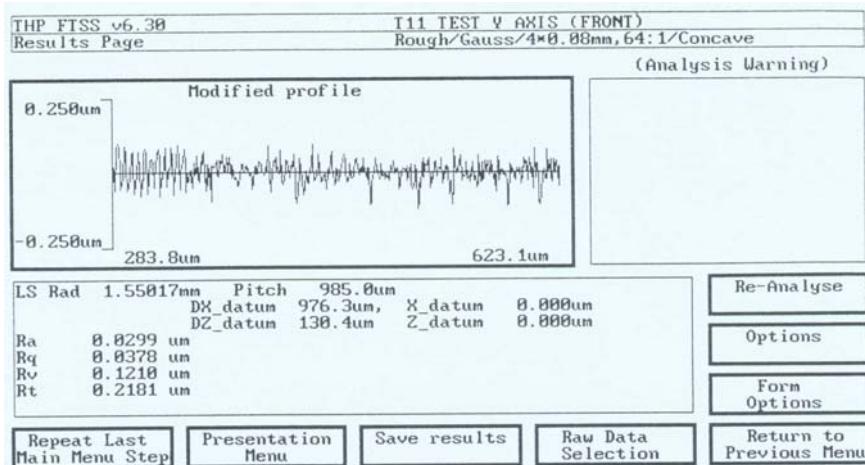


圖 B55 透鏡 Y 軸前半部表面粗糙度(Ra=29.9nm)

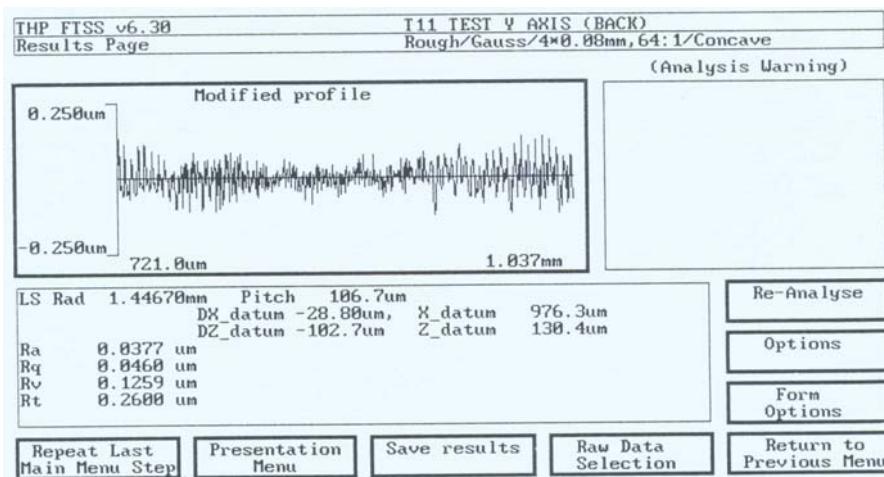


圖 B56 透鏡 Y 軸後半部表面粗糙度(Ra=37.7nm)