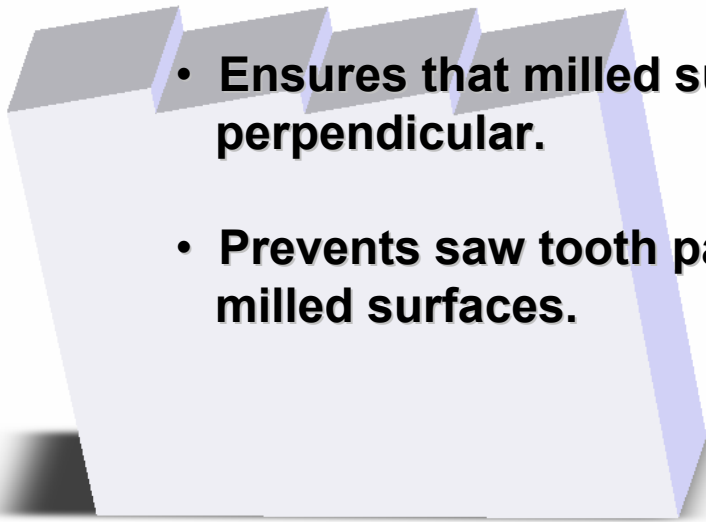


# How to Tram a Mill Head

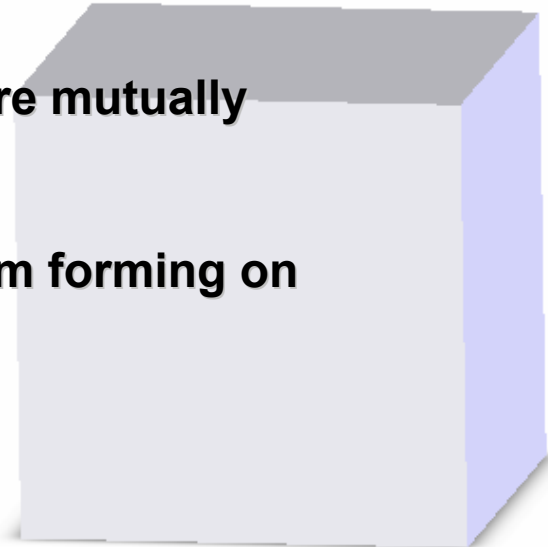
**ME 410 Kaizen Project  
Summer 2005**

# Why is tramming a mill head important?

- Ensures Tool is perpendicular to table surface in both the x and y directions.
- Ensures that milled surfaces are mutually perpendicular.
- Prevents saw tooth pattern from forming on milled surfaces.



**Un-trammed Mill Head**



**Trammed Mill Head**



# Tools for Tramming a Mill

- Dial Indicator (Fig. A) from the second drawer in the brown cabinet (Fig. B)
- Mill Wrench (Figure C) from the mill



**Figure A**  
Dial Indicator for chuck



**Figure B**  
Location of Dial  
Indicator

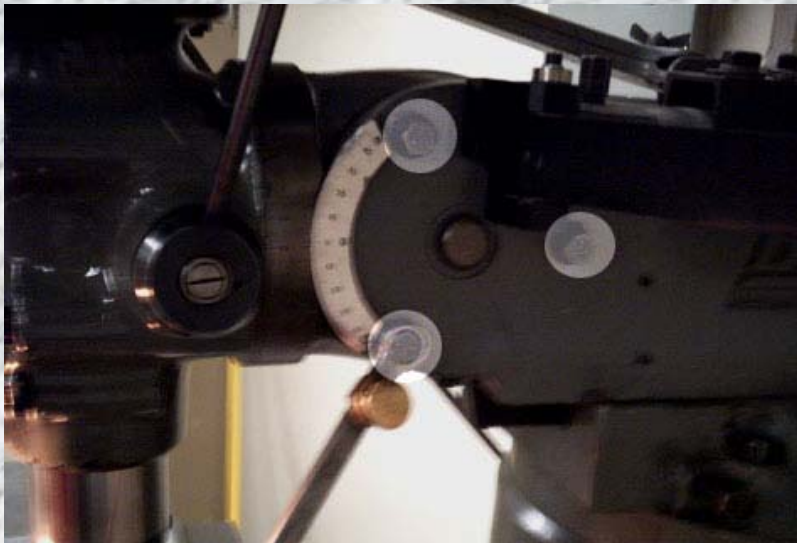


**Figure C**  
Mill Wrench

# Tramming about the X-axis (Side View Tilt of Mill Head)

## Process:

- 1.1 Loosen the three clamping bolts as shown in Figure 1
- 1.2 To adjust the head, turn the adjusting bolt on the top of the mill as shown in Figure 2



**Figure 1**  
Clamp bolts on mill for Y-axis adjustment



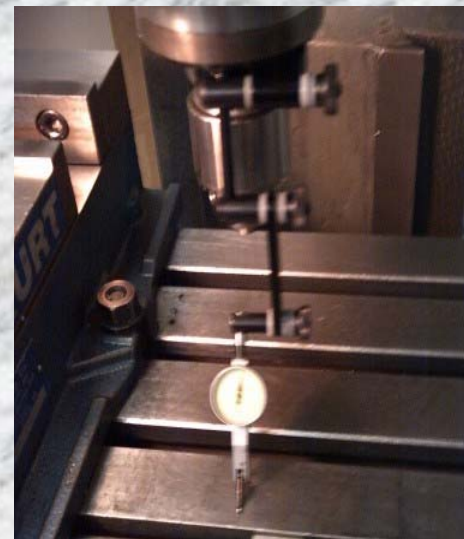
**Figure 2**  
Adjusting bolt for X-axis tramming



- 1.3 Adjust the head to the zero on the mill protractor as shown in Figure 3 by turning the adjusting bolt
- 1.4 Attach the dial indicator to the chuck as shown in Figure 4
- 1.5 Raise Table/Lower Chuck so that the indicator contacts the table surface
- 1.6 Adjust the table/chuck height until the indicator is preloaded with .005 - .010" of travel



**Figure 3**  
X-axis protractor on mill



**Figure 4**  
Dial indicator installed on chuck

- 1.7 Position the indicator at the front of the table as shown in Figure 5**
- 1.8 Zero the dial indicator by turning the dial housing**
- 1.9 Rotate the chuck so the indicator is at the back of the table**
- 1.10 Read the measurement and determine which way the head needs to be moved**
  - a. A negative reading (ccw needle rotation) means the head must be tilted up**
  - b. A positive reading (cw needle rotation) means the head must be tilted down**



**Figure 5**  
Indicator positioned at the front  
of the table



**1.11 Adjust the head so the difference between the front and rear readings is no greater than .003”**

**a. Adjust out  $\frac{1}{2}$  the difference between the two dial indicator measurements at a time**

**1.12 Tighten the clamping bolts**

**1.13 Recheck the front and rear measurements to make sure the head did not move when tightening the clamping bolts.**

# X-Axis Tram Video





# Tramming about the Y-axis (Front View Tilt of Mill Head)

## Process:

**2.1 Loosen the four clamping bolts as shown in Figure 1a**

**2.2 To adjust the head, turn the adjusting bolt on the top of the mill as shown in Figure 2a**



**Figure 1a**

**Clamp bolts on mill for Y-axis adjustment**



**Figure 2a**

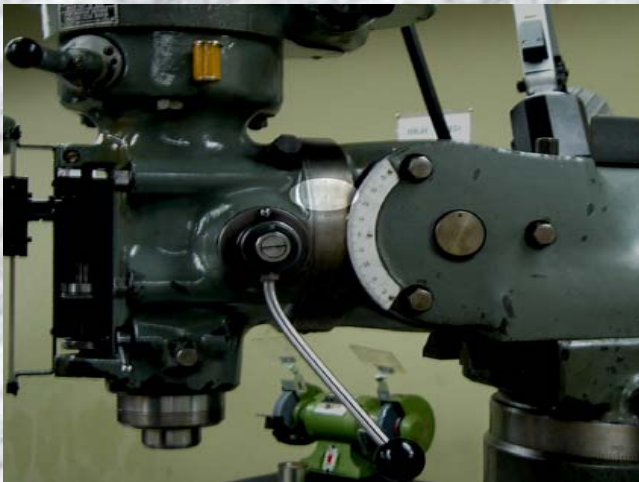
**Adjusting bolt for Y-axis tramming**

**2.3 Adjust the head to the zero on the mill protractor as shown**

**in Figure 3a by turning the adjusting bolt**

**2.4 Attach the dial indicator to the chuck as shown in Figure 4a**

**2.5 Raise Table/Lower Chuck so that the indicator contacts the table surface**



**Figure 3a**  
**X-axis protractor on mill**



**Figure 4**  
**Dial indicator installed on chuck**



- 2.6 Adjust the table/chuck height until the indicator is preloaded with .005 - .010” of travel**
- 2.7 Position the indicator at the right side of the table as shown in Figure 5a**
- 2.8 Zero the dial indicator by turning the dial housing**
- 2.9 Rotate the chuck so the indicator is at the left side of the table**
- 2.10 Read the measurement and determine which way the head needs to be moved**
- a. A negative reading (ccw needle rotation) means the head must be rotated ccw**
  - b. A positive reading (cw needle rotation) means the head must be rotated cw**



**Figure 5a**  
Indicator positioned at the front of the table

**2.11 Adjust the head so the difference between the front and rear readings is no greater than .003”**

**a. Adjust out  $\frac{1}{2}$  the difference between the two dial indicator measurements at a time**

**2.12 Tighten the clamping bolts**

**2.13 Recheck the front and rear measurements to make sure the head did not move when tightening the clamping bolts.**



# Y-Axis Tram Video



# Helpful Hints

- **Make small adjustments and always watch the indicator.**
  - **A good adjustment is half of what the dial indicator reads.**
  - **This will prevent over adjusting the head.**
- **Think about what is happening as the indicator is moving.**
  - **This will help determine which way the head needs to be moved**
- **CCW needle motion indicates the table is getting lower, or the angle between the mill head and that side of the table is less than 90 degrees.**
- **CW needle motion indicates the table is getting higher, or the angle between the mill head and that side of the table is greater than 90 degrees.**