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

   a. Adjust out ½ 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.
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
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.