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# Drawing Layout 3

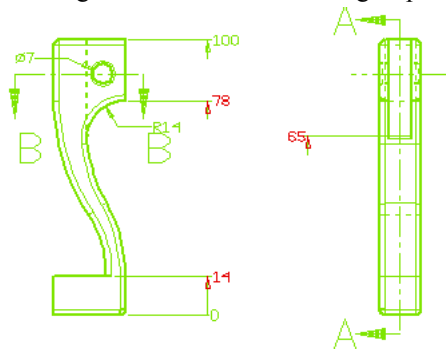
This 2D drawing from the bell hammer drawing task does not have some of the linear dimensions. You need to add the dimensions back, using ordinate dimension command instead of linear. NOTE: This task requires you to have a printer installed on your system. Refer to your printer manuals or contact your system administrator for installation instructions.

## Table of Contents

1. Step 1: Let's Go Ordinate .....	1
2. Step 2: Parallel for One, Chain for Another .....	7
3. Step 3: GDT and Symbols Can be Fun .....	11
4. Step 4: Tolerance for More Changes? .....	14
5. Step 5: Is a Hard Copy Really Hard? .....	15
A. ....	17

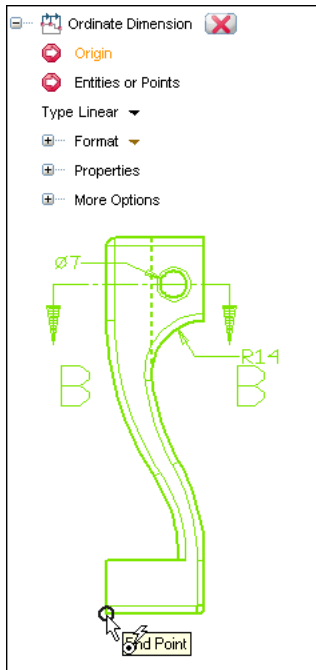
## 1. Step 1: Let's Go Ordinate

We shall start off by inserting the deleted dimensions to the front and right side views. Instead of putting back the same type of dimensions, we shall place some ordinate dimensions. You will need both the Drafting and Drawing toolbars for the following steps.

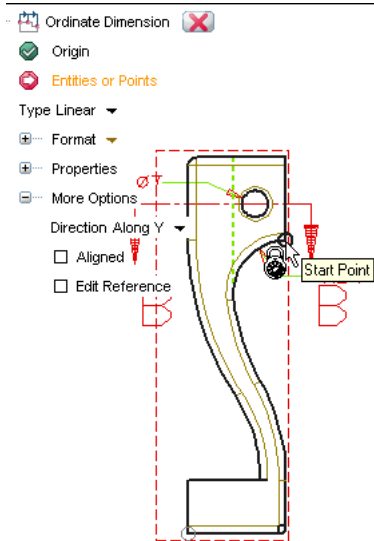


Let's start with the **Ordinate Dimension** command and learn how to use it in a drawing.

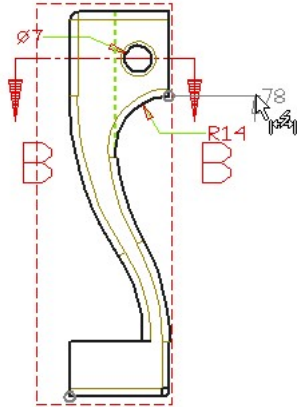
- Go to **Insert**  $\rightarrow$  **Dimension**  $\rightarrow$  **Ordinate** to start the command. Let's see how to use Linear type of ordinate dimensioning.
- Select the left hand bottom corner of the Main View for the origin point as shown with the lock symbol below.



- Upon selection of the origin, a dashed box is inserted around the View and now you are prompted to select a snap point or an entity.
- Under More Options set Direction Along Y and uncheck the Aligned option. Select the point as shown in the image below.

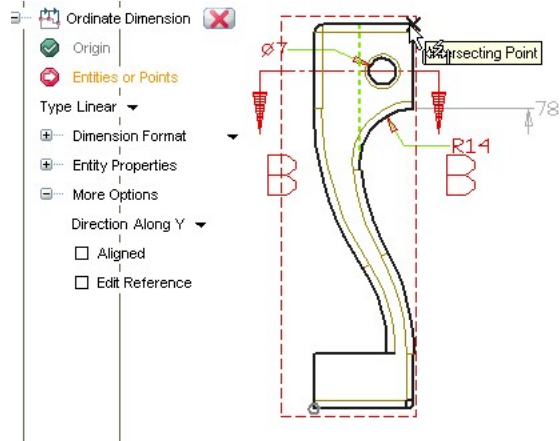


- Move the cursor to the right of the View and place the dimension 78.

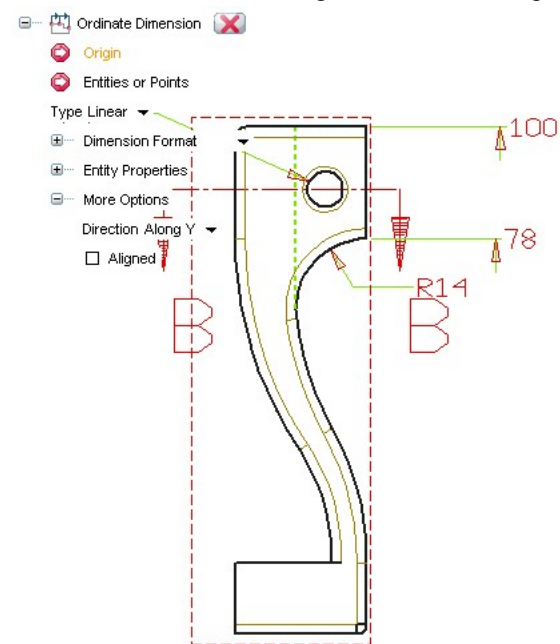


With the **Ordinate Dimension** command still on, let's select another point to place one more dimension of Type Linear.

- Select end point of the vertical line as in the image below.



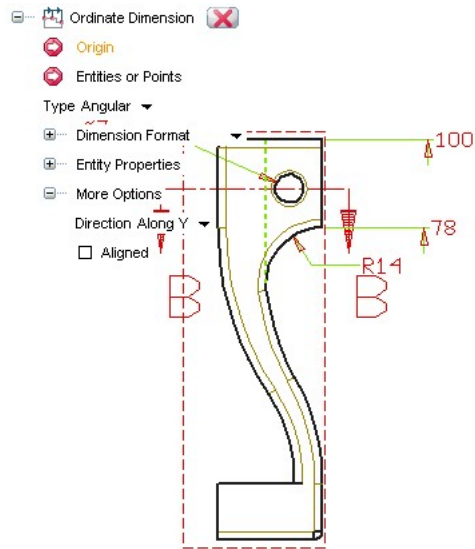
- Move the cursor to the right of the View and place the dimension 100.



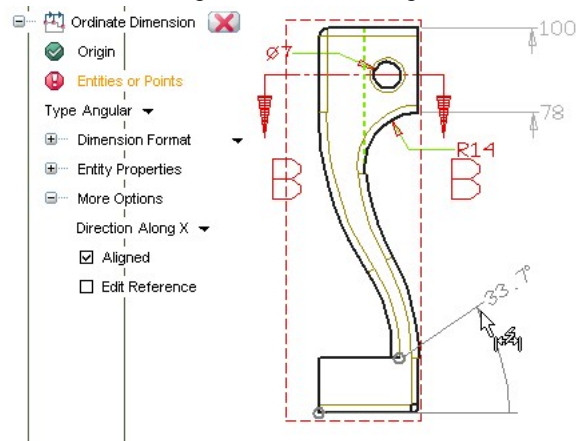
Now you can see that dimension 100 references the same Origin, thereby demonstrating the use of linear type of **Ordinate Dimension** command.

Let's work on Angular type of ordinate Dimension. If the Ordinate Dimension command is still on, continue by changing the Type to Angular or once again start the command from **Insert** → **Dimension** → **Ordinate**.

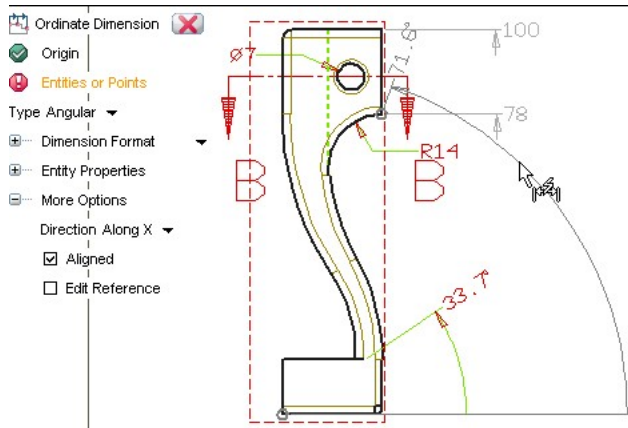
- From the pull down menu under Type - select Angular.



- If you had to start the command once again, select the same origin point as earlier.
- Under More Options set Direction Along X.
- select the end point as shown and place the first angle.

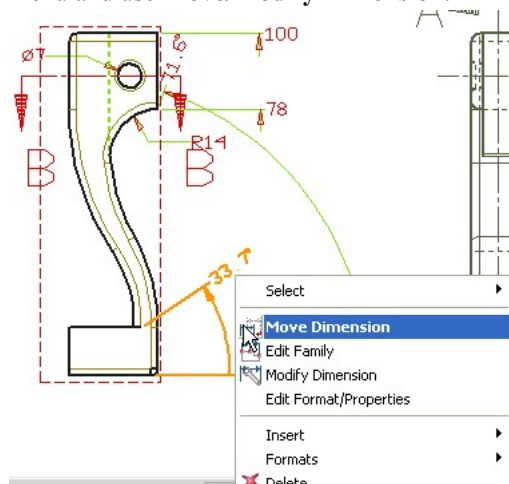


- With the command still active, select one more point.
- And place the second angle 71.6 deg.



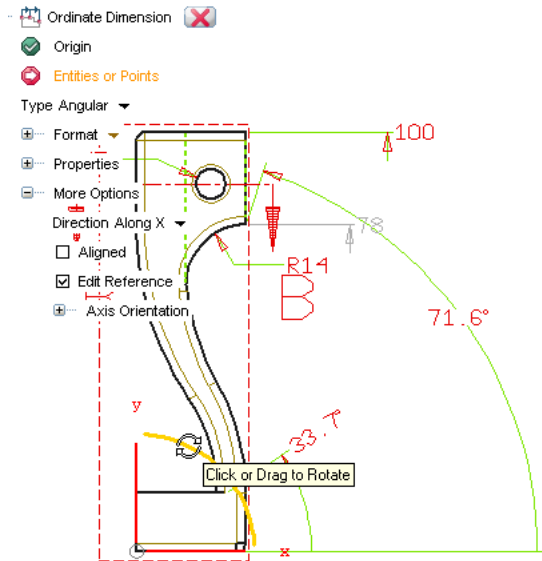
As before you will notice that the Ordinate angular dimension takes the same Origin reference for dimensioning. In this way you can select as many points as you want to place the angular dimensions on your drawing view.

If you do not like the placement of the dimension text, you can select the dimension and right click for context menu and use **Move/Modify Dimension**.



Let's explore other options available in the **Ordinate Dimension** command.

- Right click on the last inserted Ordinate Dimension and Select Edit Family.
- Expand More options and check the option Edit Reference
- Now  Edit Reference so that you can rotate the origin (X and Y ordinates).



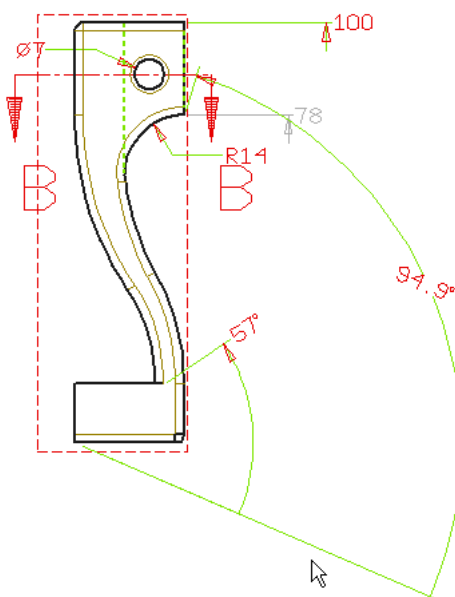
- When you start rotating the origin all the linear and angular dimensions also get updated according to the reference origin.

Now wait a minute!! nothing is changing for you? Don't worry see the note below..

**Note:**

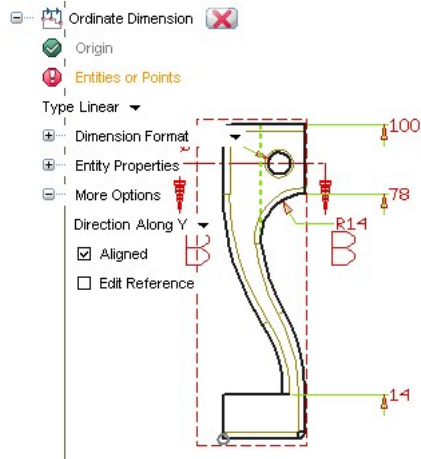
When you edit the origin, during the process of creating Ordinate dimensions, all the dimensions you have created will get updated to the new origin. Once you exit the command all the dimensions created in a session of the command belong to a "Family". To change the origin of the ordinate dimensions, after exiting the command that you previously created, you have to use the new **Edit Family** command available in version 9.0.

Try creating the Angular type Ordinate dimensions once again and see if you can get something like the image below.

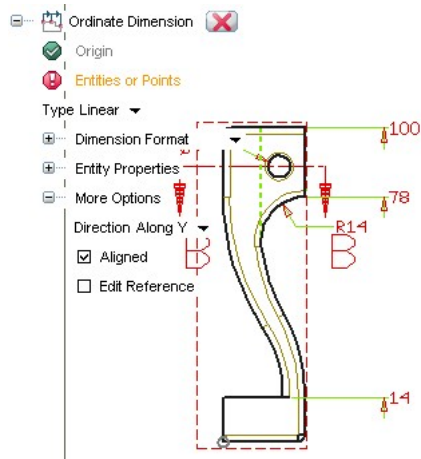


Let's get to work with Option  Aligned checked and see how it works for us. Let's study this first on Linear

type of **Ordinate Dimension** and again Along Y.



- Select the very same Origin point that we have been using so far.
- Select the first point and place it somewhere between the front and right side view.
- Select the next two points as circle above and you will notice that the dimensions align themselves with the first one. Pretty cool eh !!.



- Hit **[Esc]** to exit the command.

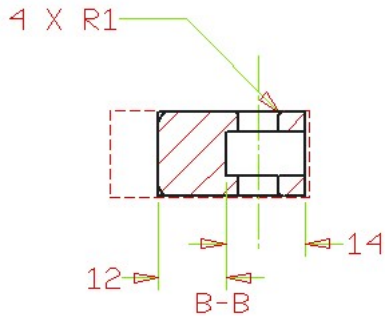
**Note:**

Did you know you can just hit the **[Enter]** key to start the last command used?

Let's see what other types of dimensions we can add in the next Step.

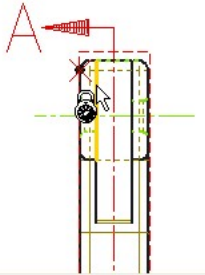
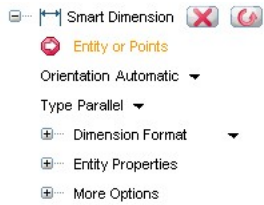
## 2. Step 2: Parallel for One, Chain for Another

We know that linear dimensions and ordinate dimensions are easy to manipulate and place. In this step we shall add other types of dimensions like parallel and chain, to our drawing.

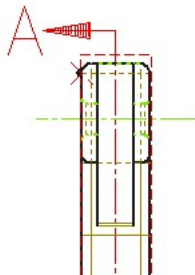
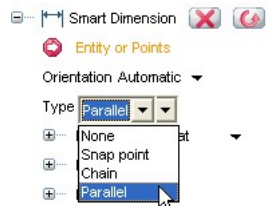


First we shall add the missing parallel dimensions to the top of the right side view.

- **Zoom Window** closer to the top of the right side view.
- Start the **Smart Dimension** command.
- Select the left vertical edge as the start point in the right side view.

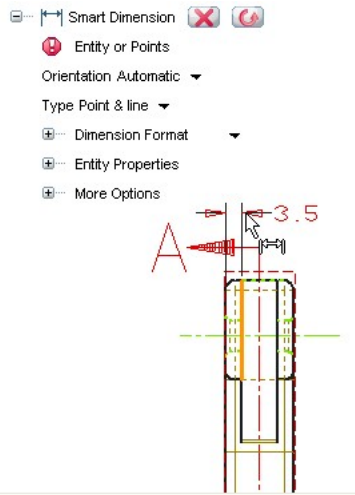


- Set the Type to Parallel in the Selection list.

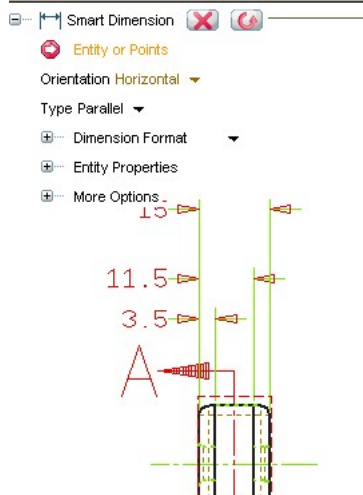


- Select the left slot line start point.





- Change the Orientation: to Horizontal.
- Place the dimension above the right side view.
- Select the right slot line start point.
- Select the start point at the upper right corner.

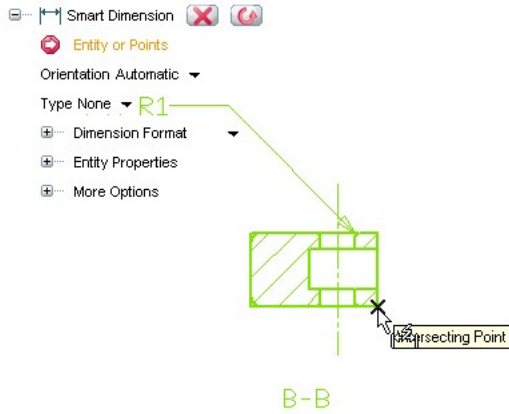


Now we shall add a chain dimension to the small sectioned view.

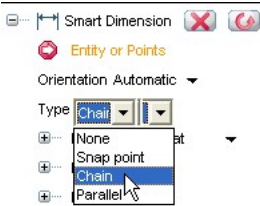
- **Zoom Window** in on the small sectioned view.
- Set the Type in the Selection List back to None to reset the dimension style.

We did this instead of hitting the **Esc** key to completely end the command.

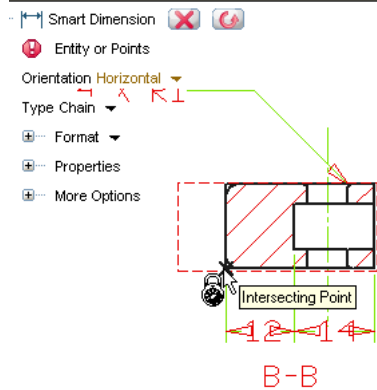
- Select the intersecting point at the bottom right corner.



- Set the Type to Chain in the Selection List.



- Select the lower left corner of the slot.
- Make sure the Orientation: is set to Horizontal.
- Place the dimension below the sectioned view.
- Select the bottom left corner.

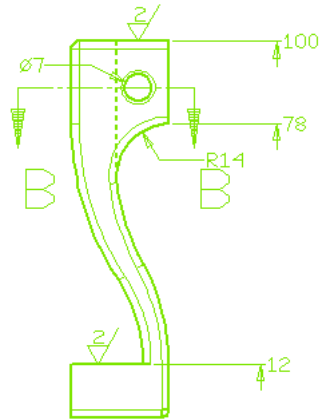


- Hit **[Esc]**.
- Right click on 14 dimension just entered, select the Move/Edit option and reposition it to a less congested location.
- Right click on the 12 dimension to open it so that you can then Move/Edit it as you did the previous dimension.


Ready to add some GDT symbols? Here we go!

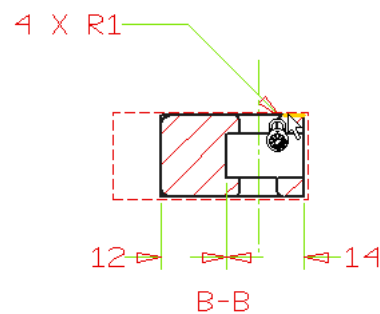
### 3. Step 3: GDT and Symbols Can be Fun

Some people actually find that Geometric Dimension and Tolerance Symbols (GDT) are tricky to use, this step should clear up any fog that may be looming large. We shall also add some surface texture symbols for an added measure but it'll be a snap, trust us.

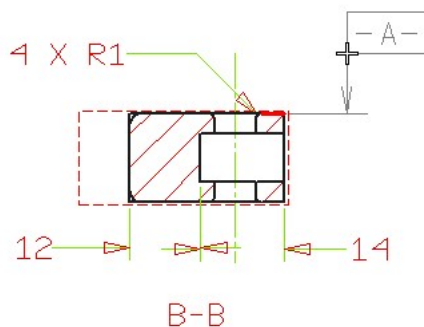


Since we left off with the small sectioned view and it's already set as writable, it would be a shame to leave so soon; let's start here.

- Select **Feature Control Frame** from the Drawing toolbar.
- Click on the  Datum Feature in the Parameter Area.
- Click the upper right horizontal line.

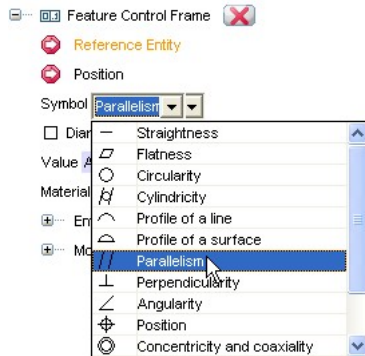


- Click to the right of the view to place it.
- Right click and select End of Input.

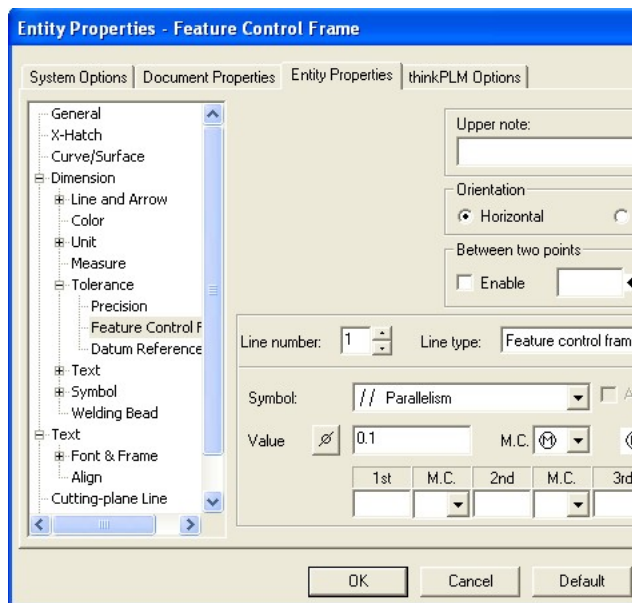


Now that we have a datum feature as a reference point, it's time to put the GDT symbols to use.

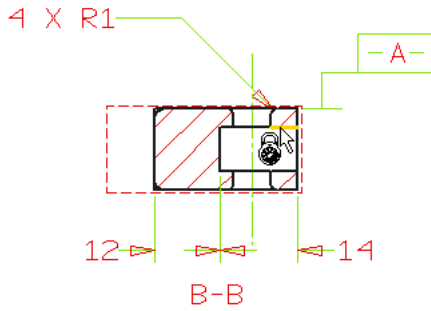
- Select **Feature Control Frame** in the Parameter Area.
- Set the Symbol: to Parallelism.



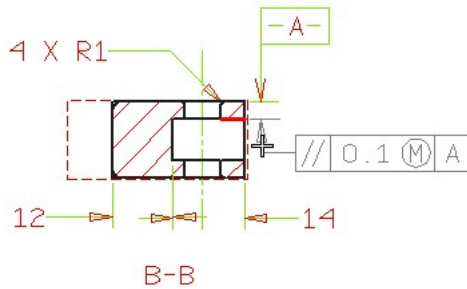
- Click the button in the Parameter Area (if needed).
- Set the Value: to 0.5.
- Click the More button to open the Properties dialog box. Click the button in the Parameter Area (if needed).
- Set the M.C. (Material Condition) to (for maximum) on the Tolerances tab.
- Type in "A" in 1st under Datum reference.
- Hit OK.



- Click the horizontal slot line.

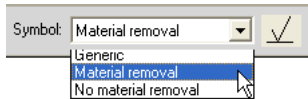


- Click to the right to place it.
- Right click and select End of Input.

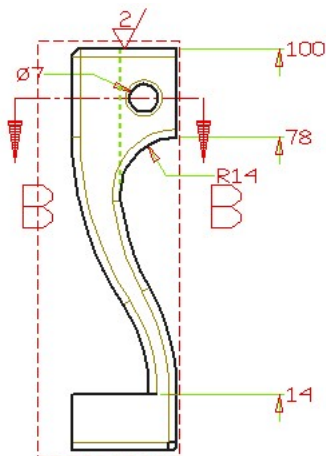


All right, this is just too easy. Maybe adding a few surface texture symbols on the front view might pose some challenge.

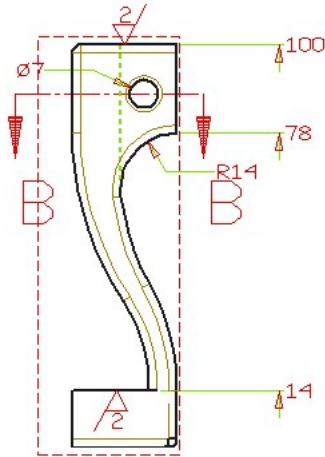
- **Zoom Window** in on to the front view.
- Select **Surface Texture** from the Drawing toolbar.



- Set the Symbol: to Material removal in the Parameter Area.
- Type in 2 for the Value: in the Parameter Area.
- Click on the top horizontal line.



- Click it again to place the symbol.
- Repeat for the lower horizontal line as shown.

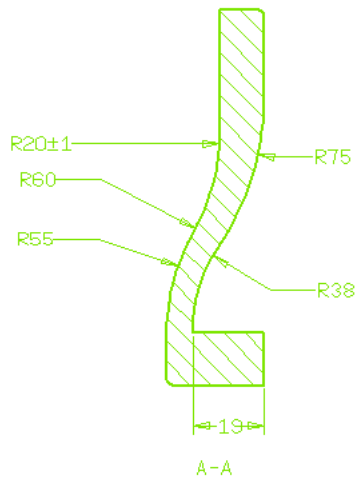


- Hit **Esc**.
- **Top Level Group** . This command is also referenced as Top Level Group.

This has all been just too easy! Let's see if we get into trouble with tolerances.

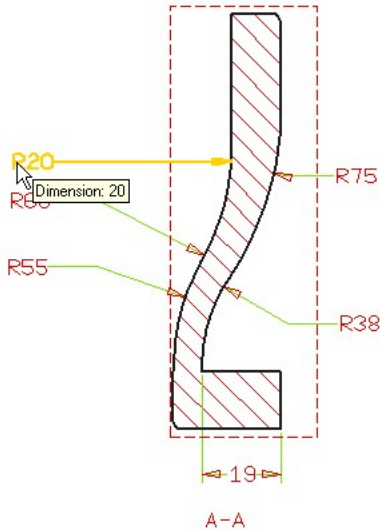
## 4. Step 4: Tolerance for More Changes?

The last type of dimensioning to add is tolerance.



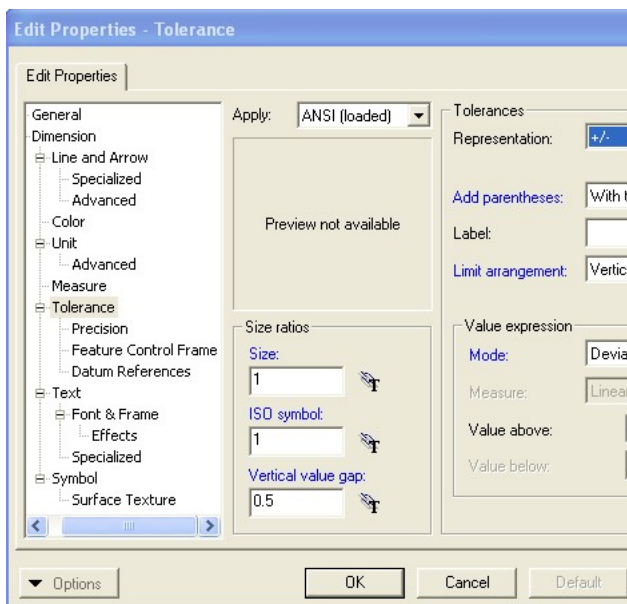
Fortunately tolerances are as straight forward to add as the other types of dimensions, so we only have to do it once to get the hang of it.

- **Zoom In** on to the large sectioned view.
- Right click the view and **Open Group** it.
- Right click the R20 dimension and hit Properties.



As you make the following changes (and if it's possible for you to do so), move the dialog box out of the graphics area so you can see the dimension change as you make your selections.

- Hit the Entity Properties tab.
- Under tolerance, change the Representation: to +/- under Tolerances.
- Make sure the Value expressed as is set to  Deviations.
- Set the Value above to 1.
- Hit OK.



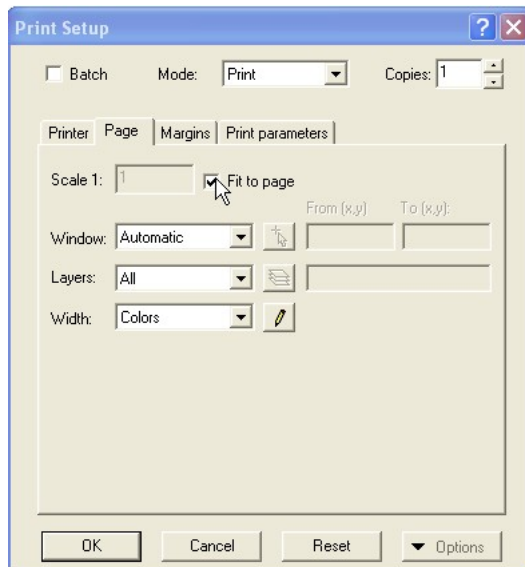
- Right click on the view and close it.

Just to be on the safer side, let's print out this drawing.

## 5. Step 5: Is a Hard Copy Really Hard?







Let's **Print**.

- Start **Print Preview**.
- Set the orientation to Landscape.
- **Print** .

There's no way the aliens are going to mess with the bell hammer again!

**A.**

- Drawing Layout 1.
- Drawing Layout 2.