Machining the TV Remote
Wildfire 2.0/Haas Minimill

There are restrictions on machining this part. The first is that we have a material issue. Cast aluminum blocks that are squared and drilled are available from a previous project. These are to be used, but they are slightly undersize relative to the length of our actual part. This means we will scale our model.

We have a fixturing issue if we machine the surface with the buttons and/or the opposite side with all the 3-D surfaces. While it is possible to machine the part in two halves (right and left), we would have to build (machine) custom fixturing for each individual remote that would allow us properly support the part in the vertical direction while machining it. This is beyond the scope and time we have available for this project. This means we will machine a simplified version of the remote.

Create another copy of your remote, stripping off the buttons and raised area from the top side. Cap the open end and solidify it as shown below.

Use Edit – Scale to scale the model to 80% of the original. Build new datum planes to help us align this in the workpiece. Note that DTM3 goes through two points at the ends of the curved ends, and the DTM4 is simply offset from DTM3 at some distance. This distance value is simply used to aid us in determining if the workpiece is large enough in that particular direction. An axis needs to be created so we can create another datum normal to DTM3 for constraining the part to the workpiece in Manufacturing mode.
Model a new part (workpiece) that is exactly the size of the aluminum block issued to you. Be sure to include the location and depth of the fixturing holes that are already in the block.
You now see why DTM3 and DTM4 were created at the part level for the reference part.

Make note of what is going on relative to pre-drilled holes. While the holes lie within the reference part, they are too deep. This means that the workpiece will have to be faced off (from the bottom) to effectively reduce the depth of those holes and make sure they don’t protrude through the reference part. We have enough material above the part to accomplish this task.
Produce a detailed drawing of this assembly showing how far the hole protrudes through the top surface similar to the one shown below. Show the centerlines for the holes.

Reduce the height of your workpiece by this distance plus about 1/4".

Produce a new drawing showing the new height of the workpiece and the depth of the fixturing holes. The workpiece will need to be modified to these dimensions. Make sure you machine (reduce) the surface of the block that has the hole in it!
Pro/Manufacturing Specific Instructions:

Reference Activity 6 for METBD 306 to review how to get started with Pro/MFG. You will have to model and assemble your “fixture”.

Note the orientation of the reference part in the assembly. Since we are going to spend the majority of the time working with the 3-D surfaces, we want them facing the screen in the isometric view.

Also note that the part is shown in gold, the work piece in transparent green and the fixture in gray.

Tooling for this project is located on the V:/METBD_410 drive.

If you have set access to the pro_e drive, you will be able to browse to these tools.

Instead of creating tooling as you did in METBD 306, use the following method to generate your tools. In the Tool Setup dialog box, select File – Open Tool Library. Browse to the METBD_410 subdirectory and Select By Copy. You will be prompted for tool diameter and length.

Note that when using adding a ball end mill, you will also have to set the Corner Radius in the Tools Setup dialog box.

The following tools will be used for this project:
MM_1_2_Flat (Minimill ½ Diameter, flat (square) end) for roughing.
MM_1_2_Ball (Minimill ½ Diameter, ball end) for surface machining.

There will only be four NC sequences generated for this part. A roughing, two surfacing (cut line and iso line) and one trajectory sequence.

For the roughing sequence, set the following options:

Feeds and Speeds:
Cut_Feed – 40 “/min
Speed – 4000 rpm
Step Over - .125
Step Down - .125
Clear_Dist. - .25

Scan_Type – Type_One_Dir (along the X (long) axis).
Profile_Stock_Allow - .06
Rough_Stock_Allow - .06
Rough_Option – Rough_Only

Under Advanced: Plunge_Feed – 2 “/min

Make sure you set the Start and End point to be one inch above your machine coordinate system. Each sequence must start and end at this point.

You will be producing a COLOR screen capture from Pro/E and Vericut to document each NC sequence. Follow the instructions on page 8 and 9 of the METBD 306 lab for setting colors and saving in process files in vericut.

Rouging sequence:
For the surface milling sequences,

In general, use a step over of .125 until you are happy with the machining. Then and only then should you alter this to a smaller number (Scallop_Hgt at .0002) to get a finer surface finish. Refer to the class discussion on this topic.

Speed 4000 rpm
Feed 15”/min
Under Advanced: Plunge_Feed – 2 “/min

The Cut Definition should be Cut Line for the center of the part.

Note the screen capture shown on the right has the step over set to .125.

Specifically, for the cut line sequence:
Select you surfaces from the Model

There will be two Cut Lines (Open Ends)
Select the + to create a new cut line and use One By One. Select the Upper edge (we want to start machining from the top of the part). After selecting Ok and Done and Ok (Dialog box this time), select the + to add an ending cut line. Select the Lower edge in the same fashion.

Vericut Display:
The Cut Definition should be From Surface Isolines for the ends

Make sure the Surface List has its directions properly defined as we wish to machine more or less in the horizontal direction. After watching the tool run you might have to re-define some of the directions.
Trajectory Milling Sequence

Speed 4000 rpm
Feed 15 “/min

Rotated in Vericut:
Creating a Route Sheet

Select Info – Manufacturing – Route and Apply. This will generate a .ppl file which can be opened and printed using Wordpad.

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