

Application Note

Auto-programming the OPTEK is easy. Provided that the DXF file contains only what you need to measure. Typically, the existing CAD files contain much more than we need. What we really need is a simplified two-dimensional drawing of the finished part.

A common misconception is: “we need to measure everything”. The perception of “everything” In a process engineer’s or quality manager’s mind is invariably a subset of the contents of a CAD file. CAD files tend to be rich with features that are very relevant to their original purpose. Like plotting or machining operations. Also, most CAD systems consider each aperture as a single entity. When converting to a DXF, the CAD system faithfully explodes the apertures, generating a multitude of fill lines, corner vertices, and paths. We often see polyline segments in place of arcs and circles.

Measurement is a simpler process. All the OPTEK system needs to know is where to find the physical edges to be measured. And usually a representative sampling of features is all that’s really needed. You know far better than we do what matters. And your CAD/CAM workstation is the optimal editing tool for your files.

A few minutes at your CAD/CAM station would be well spent to reduce the usual clutter to simple edges. Decide on a few dimensions you want to measure, and make a “measurement layer”, including only features needed to measure those dimensions. For a first demonstration, don’t get carried away. Just a few representative measurements to prove the principle is best. We can develop a more elaborate program later if necessary.

To filter the CAD data to a demo measurement file:

- Identify a sampling representative of critical measurements you need.
- Determine the features that must be located in order to report those measurements. Keep in mind that in order to be measured, these features must have edges with contrast that can be seen in the video image of the part. Video edge detection can automatically locate lines, arcs, and circles. If you need a point, put edges into the file that can be used to construct the point.
- Explode all block entities and strip out features that are not their real edges.

- Polyline arcs and circles in some CAD formats are actually a multitude of line segments. That's not the way you want them measured, so convert the ones you need to measure in your CAD/CAM system into real arc or circle entities.
- Eliminate duplicate or overlapping features, retraces, crosshatching and fill lines, legends, dimension lines, vertices and other points, and any other unmeasurable entities in the file.
- Eliminate features like radiused or beveled corners unless they are truly significant.
- Review what you've done, and eliminate more, if you can.
- Include a point that we should use as the datum, if it's the center of a tooling hole or fiducial, great. That's measurable. If not, write a note or draw a sketch to tell us which measurable features are reliable enough to construct it from. For instance, we can measure the lines along two adjacent edges of a circuit board, skew on one, and make the intersection zero. Even though the corner point doesn't exist on the board. We can create an offset point from there if needed, and assign that to zero.
- Save the file as a flat single layer with no blocks and send it to us.

The native file format for import to the OPTEK measurement software is two dimensional DXF without blocks.

We also offer PC FAB conversion utilities that will convert Gerber files and most Drill / Rout formats as well.

If your CAD/CAM system can output the file in .DXF format, so much the better. If your system currently outputs in another format like .DWG, we'll need to open it in AutoCAD and convert it for the import to the OPTEK.