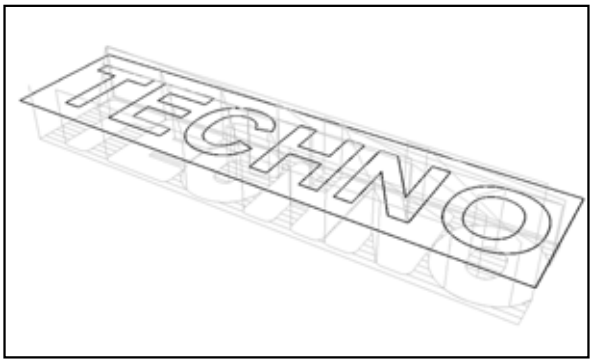
The main drawback of using a cold air gun is that a fairly large compressor is required. This need for a substantial compressor does add to the overall cost of the unit.

CAD / CAM & CNC Software

CAD and CAM software packages are closely related to one another. In fact, they share the first two thirds of their respective acronyms: CAD / CAM stand for Computer-Aided Design and Computer-Aided Manufacturing. CAD programs typically are used to *draw* the part being developed. CAM programs are used for generating the toolpath for the CNC machine that will cut the part. The boundary between the two programs is often blurred as CAM programs often have drawing capabilities and CAD programs often have "plug in" programs, or added optional features, that allow them to generate toolpaths.

CAD/CAM programs get installed on a computer and, contrary to popular belief, learning to navigate the various functions is not rocket science. At first, the different file formats and industry terms can be overwhelming. The good news is that with each successive completion of the cycle, from drawing, to toolpath, to cutting a part, the method becomes more familiar and, subsequently, easier to reproduce.

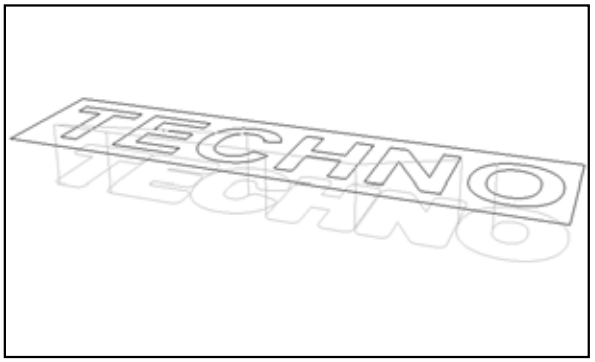
CAD software creates drawings in 2D or 3D formats. Traditionally, CAD programs were primarily for engineering drawings and drafting. Its usefulness has evolved beyond the tasks of precise dimensioning. Expanded capabilities now include realistic renderings, dynamic analysis of moving elements and various finite element engineering analyses.



A few standard 2D formats include: .DWG, .DXF, and .EPS. 2D CAD files typically share the same graphical element in that they are vector-based. Vector graphics consist of lines, arcs and other elements, in contrast to the pixels that make up a raster file, like a digital photo. Vector graphics define these lines, arcs and polylines with simple mathematical equations. 3D CAD files are similar, but much more complex. Hundreds and even thousands of facets are calculated when creating 3D CAD files such as, .STL, .3DS, and .RAW. This is just a sampling of some of the more standard formats specific to different CAD programs. Other formats, such as .IGS, define 3D surfaces and lines using complex parametric equations.

CAM software helps convert and manipulate a CAD drawing into a toolpath. CAM software imports a CAD drawing and saves it in its own native file format. There are some programs that have both CAD and CAM capabilities in one software package, which is a convenient feature, but the transfer of files between two separate and standard CAD / CAM programs is not complicated. In fact, most CAD and CAM programs have built-in capabilities to both import and export several file formats.

The toolpath generated by most CAM programs is in a standard manufacturing programming language called G-Code. Consisting of "G" and "M" codes or commands, a G-Code file guides the path of the cutter through the material by outputting code for linear or circular motions. CAM software also embeds parameters into the G-Code, such as tool width, toolpath position, cut depth, feeds and speeds, and others. These CAM parameters become increasingly important as the files being cut become more complex.



For instance, a 2D part only requires that the depth of the cut be specified along with the path once the tool reaches the desired depth. When a 3D part is being carved, the full program description can consist of hundreds of thousands of G-Code commands specifying the toolpath. The program for 3D parts usually consists of very small line segments that form the desired shape.

Another necessary step that CAM packages complete before outputting a toolpath is referred to as post-processing. This post-processing (or posting) customizes the G-Code commands and parameters to communicate with a specific CNC machine. The G-Codes and functions often remain the same, but posting serves to format the syntax of the file to meet with the protocol of a given CNC machine's controller. Because of the great deal of freedom found in the international standards for G-Code, individual controllers may require different formats. The post-processing customizes the format to the specific controller being used.

The scope of CNC machining applications is so vast, that a good CNC Software Suite (CAD / CAM) needs to accommodate a wide range of machining methods covering several different markets.