How to Transfer Old Plans into AutoCAD or similar CAD systems

These notes are intended for users of AutoCAD Rel 14, but the basic principles apply to most CAD programs. There are programs that are designed to do these conversions but they are very time consuming, expensive and most importantly do not handle freehand curves at all.

With the move to laser cut model aircraft parts and the availability of very cheap home built CNC routers it is very useful if older non CAD model aircraft drawings can be converted to full CAD drawings for eventual use on a CNC machine. You can also use this method if you require to scale up or down any existing plan or to produce a clean full size copy of an original. If we have as a start, say an A4 drawing of the model, perhaps to a very reduced and unknown scale, dirty, torn and copied from an old magazine, scaling and re-drawing this into AutoCAD can be both time consuming and very inaccurate. It may well be that the scale of your original is not an easy whole number, perhaps it is 5.76:1 multiplying all the dimensions by 5.76 and then transferring these to a new drawing will take hours and be very inaccurate. There is however a very easy way to do this that is fairly quick and accurate. It can be accurate to within half the line width of the original drawing.

First of all scan the drawing into your PC and save it as a .gif (.bmp, jpeg or any other raster format) in a file you can return to quickly. (e.g. spitfire.gif) I have a dedicated folder in my photo album called *Modelscan.* All my scanned files are archived here for possible future use. Now follow the steps below:-

1) Open up your CAD program and create a new drawing layer called "scan" or any other convenient name. (this layer will be discarded later)

2) Import the .gif file (.bmp, jpeg etc.) onto this layer using the **Insert - Raster - Image** facility. (you can import more or less any raster image including photograph's.)

3) AutoCAD will allow you to browse your PC to locate the file, **but do not rotate or scale at this stage**. It may ask you to rename the file to one acceptable to AutoCAD. The file will now be pasted onto the new drawing layer "scan" etc. You are asked for a location & scale again. Set location to 0,0 and scale at 1:1.

4) The pasted image is a single non AutoCAD drawing that you cannot add to or alter in any way, except that you can enlarge or rotate the **whole image** as required.

5) Now open a new drawing layer 1 or 0 and proceed to trace the original scanned image onto this layer. Make sure you are NOT tracing onto the "scan" layer or you are wasting your time. It must be a new empty layer. When tracing I normally use the **Line** option, but you can also use **Polylines, Arcs, Circles, Ellipses** and for complex curves the **Spline** facility is superb. This is particularly useful for copying airfoils (aerofoils) and other freehand curves, so beloved of aircraft designers, as it smoothes out your input to give a more or less perfect result. It all depends how accurate your initial tracing is, but if you work on a large enough scale you can spot within the original drawing line width. Also useful is the **Ortho** mode where all drawn lines will be either vertical or horizontal.(see para.6) It helps to alter the cursor to a small circle, say 1/16" diameter for even more accurate "spotting"

6) If the scanned image is not exactly square it can be rotated in very precise way to line it up exactly to the ortho lines or the drawing edge.

7) Once you are happy that you have all the traced lines you need (I tend to do say a wing, and then the fuselage as separate tracings on different layers) you can turn off the "scan" layer and see your result. You do not need to trace every single line, just enough to enable the drawing to be completed.

8) You will always miss some lines so go back and add these as required. This gives you a very precise bare bones drawing of the model and you can proceed to add detail as required. Dimensions, wood sizes, notes etc. Do these on a different layer. Say layer 2. When you are 100% happy, delete the scanned image and the layer"scan" as this is no longer required. When tracing wings and taiplanes I usually trace one side only, complete and then use the **Mirror** facility to produce two identical halves.

9) We now need to scale the new scanned drawing. For this we need a reference dimension, say the span of the original model. First measure the span of the scanned and traced image. This may come out very small indeed. (If you cannot see it, **Zoom to Extents**) Lets assume the span comes out at 0.87542 and the span we need is 72. Scale the drawing by 82.246236. (72/0.87542 = 82.246236) We do not need to bother about metric or imperial units, this comes at the printing stage. To scale the drawing you must have a positive known dimension, say a wheel diameter, even wood sizes can help. We are working to these fine limits for the benefit of the CNC machine but are hidden and rounded up to two decimal places later.

10) This will "blow up" your scanned image in both axis to the new span of 72. Check this. Say it comes out at 72.025 Re scale by a factor of 0.9996528 (72/72.025 = 0.9996528) and you should get a wing exactly 72 span. Set up AutoCAD to show to two decimal places or 1/64" etc. Plenty accurate enough for model aircraft use. You can of course work in mm if required.

11) There is still plenty of work to do if you intend to publish the drawing but at this stage there is probably enough information for a competent modeller to build a very accurate model, based 100% on the original drawing. I produced an AutoCAD drawing of Carl Goldberg's Comet Zipper from two A4 sheets published in 1981. It was probably more accurate than the original. Getting all those superb freehand curves and ellipses would have been impossible any other way. Even an enlarged photo copy is not 100% accurate as it may pass thro' a lens which can distort the image slightly.

12) For a CAD drawing you will need to split out the various component parts as required and this does of course take at a lot of time and some degree of CAD skill. Where possible use **Polylines** and a **0.10" Line Width** as standard.

13) Name the drawing and save it. One final point, watch out for any drawing copyright. Use any drawings for personal use only, publication could land you in trouble.

14) All you need to do now is take your work of art to the copy shop and you have a perfect new drawing for your new model.

Best of Luck. Colin Usher

[Back to Home Page](#)