CLCAM (common line cam) is a very useful APP for cutting operation like Gas Cutting, Plasma Cutting, Laser cutting and Wire Cut EDM. However the main application is Gas Cutting and Plasma cutting because in both these cutting operations piercing is at the start of cutting is very costly as bursting or splashing of molten material can occur that can deposit on the nozzle blocking the flow of air/gas and damaging the nozzle.
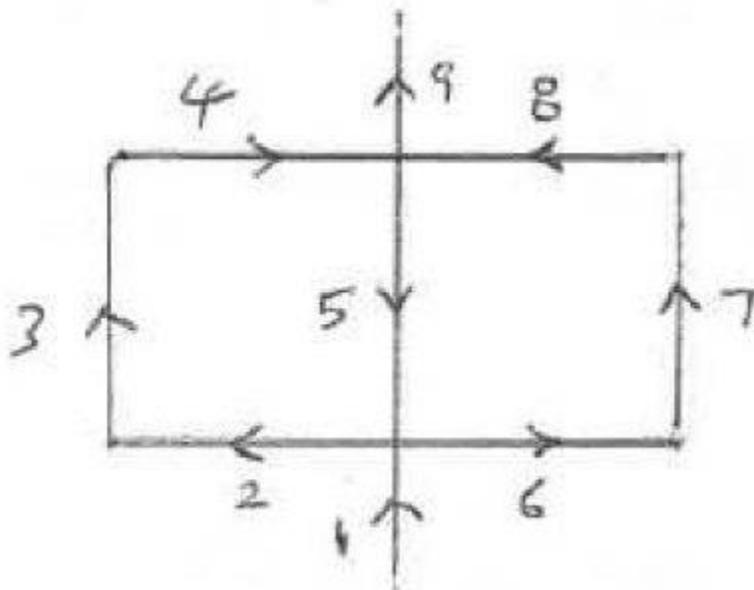
About:

In a cutting process, two parts having a side/edge of same dimension can be arranged such that the side is common for the 2 parts. Once arranged like this, it is enough if we machine the common side once instead of twice. This results in reduced machining time.

But in certain process like gas cutting, it is important that the cutting path does not intersect itself. And in certain processes like plasma cutting, it is desirable to cut the part in a clockwise direction, to avoid bevel edges in the final part. And in certain processes, it is desirable to choose the common line cutting such that most optimal nesting of parts can be performed for material savings.

 Hence there is a need to develop a process dependent Common Line cutting method, which will overcome the above problems and automatically generates the optimal tool path as per the user choice.

So to avoid piecing at multiple points a single piercing is done after which the cutting starts and cuts out all the nearby parts without any further piercing by continuously following the cutting path. There are different types of tool paths for Gas and Plasma cutting.

The following images illustrate the cutting paths in Gas and Plasma cutting:

The above figure sows the tool path for Gas Cutting. Notice that the numbers show the tool path and direction. So it is clearly seen that the tool path is first in clock wise direction (CW- 2, 3, 4 and 5) and

then it is in counter clockwise (CCW- 5, 6, 7 and 8) direction. You can also see that there is no intersection during the cutting path as the common line is cut in the last and not in the first place.
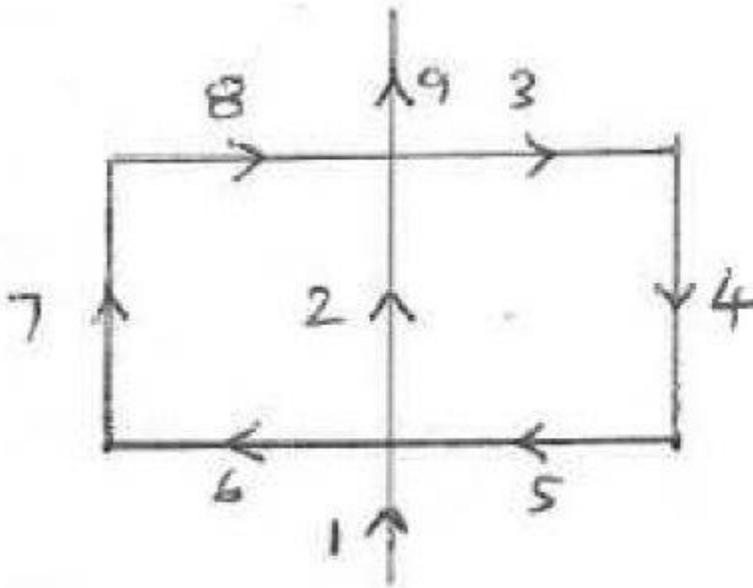

The above figure shows the tool path for Plasma cutting. Notice that the tool path is continuously in clock wise direction (CW-1, 2, 3, 4, 5, 6, 7, 8 and 9). Here you can clearly see that there is an intersection in the cutting path as the common line is cut in the first place and then the path 5,6 intersects the common line.

In both figures shown above the common line is maintained- in gas cutting it is 9, 5, 1 and plasma cutting it is 9, 2, 1.

Using the app:

To use this APP type "clcam" in the command line of Auto-Cad and the following dialog box will open:
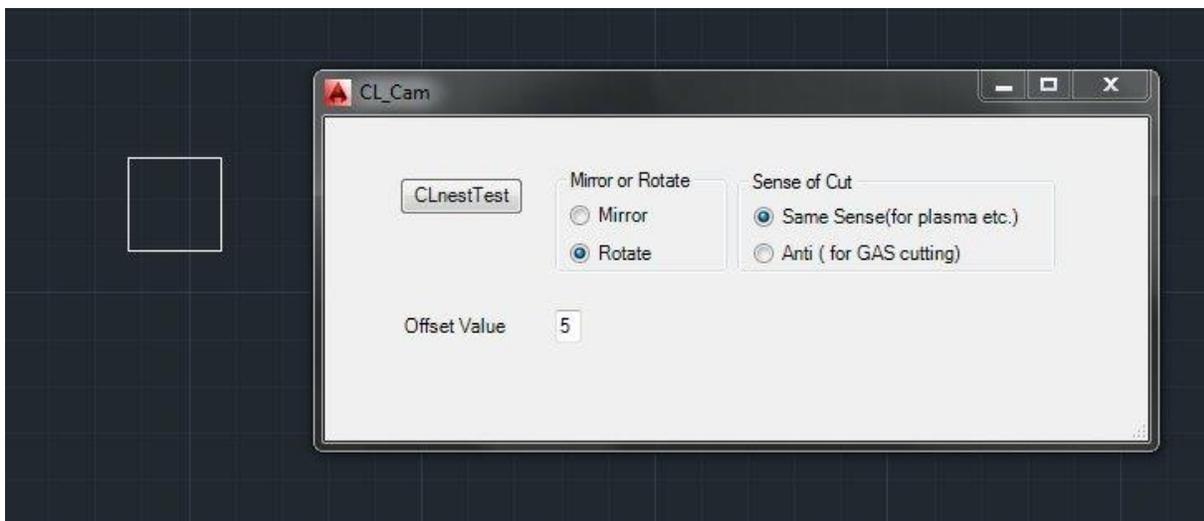
You can see the following parameters to be defined:

1. Mirror or rotate: this option either rotates or produces a mirror image of the drawing selected

2. Sense of Cut: this option is for choosing the cutting paths for Gas cutting or Plasma cutting.

3. Offset value: this is similar to tool/cutter compensation to offset the Gas flame or plasma flame diameter so that the part cut out is of proper dimension.

For this demonstration we will use the "rotate" feature for Plasma cutting process. In the above image you can see the offset value is 5mm and cutting process is "plasma cutting". When the options are specified click "CLnestTest" button and select the geometry that you want to cut and hit enter button. The selection will appear in dotted lines:
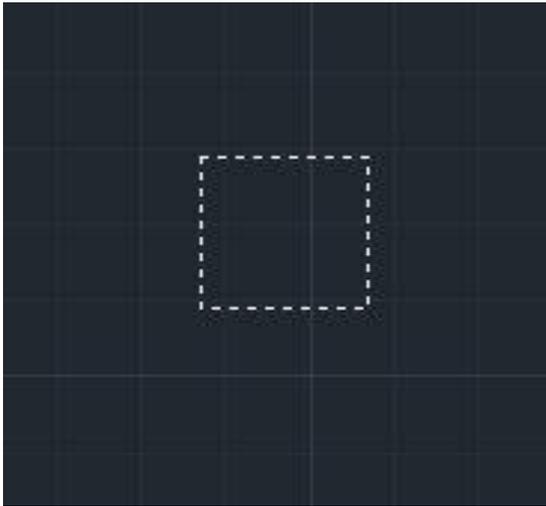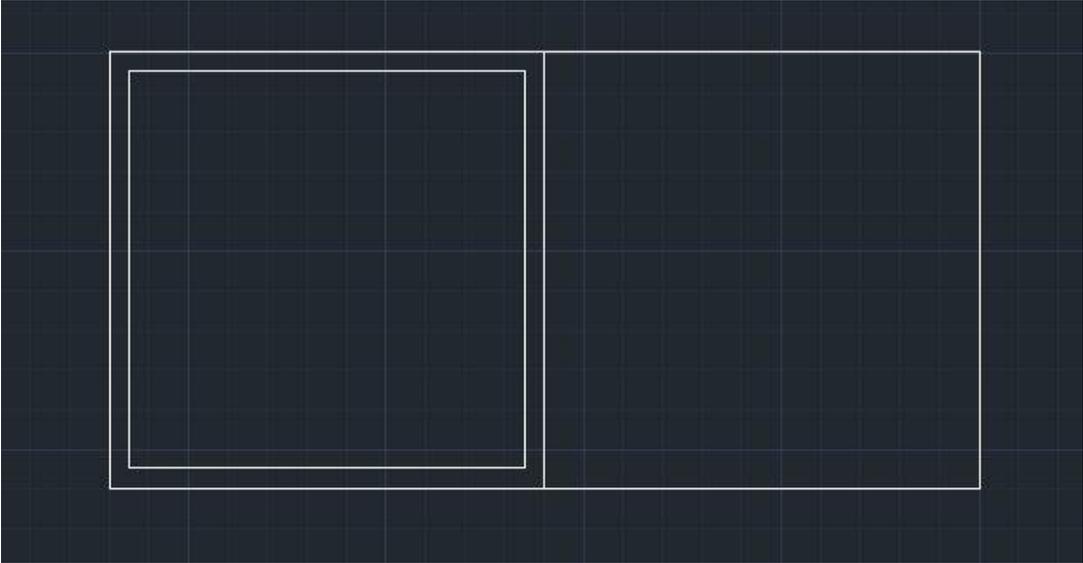

Then you need to click a point on the square like a corner point and when you do that a message box appears showing you the selected points:
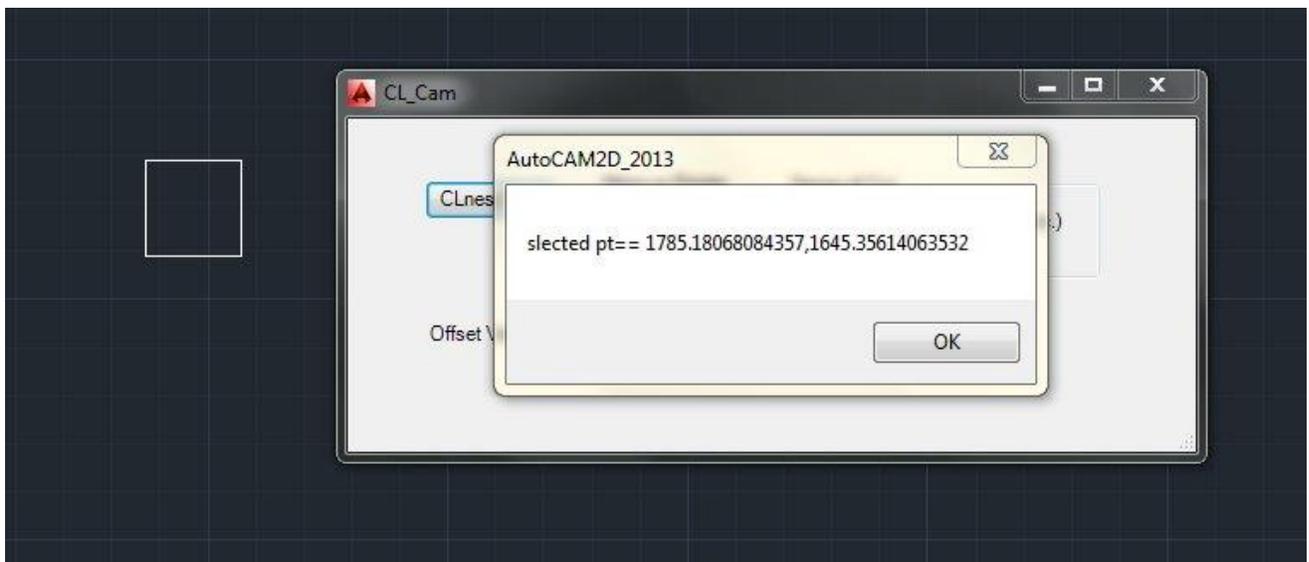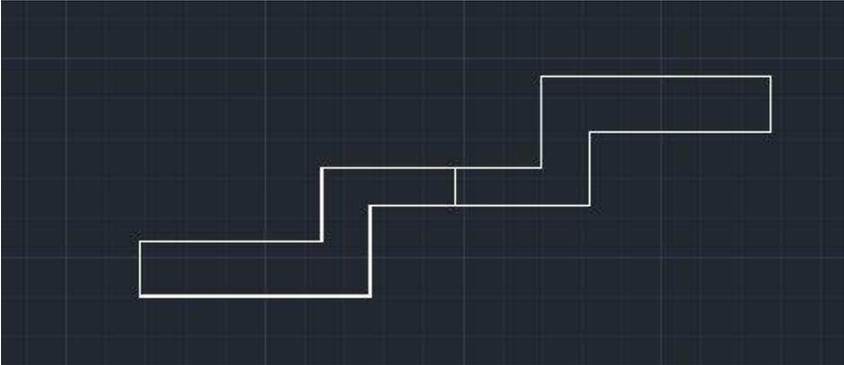
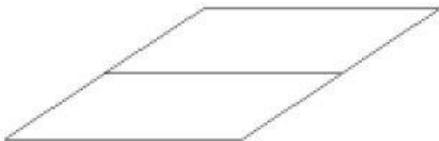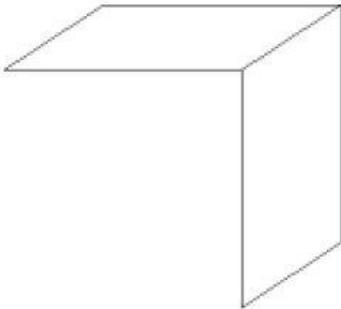When you click OK another message box appears:
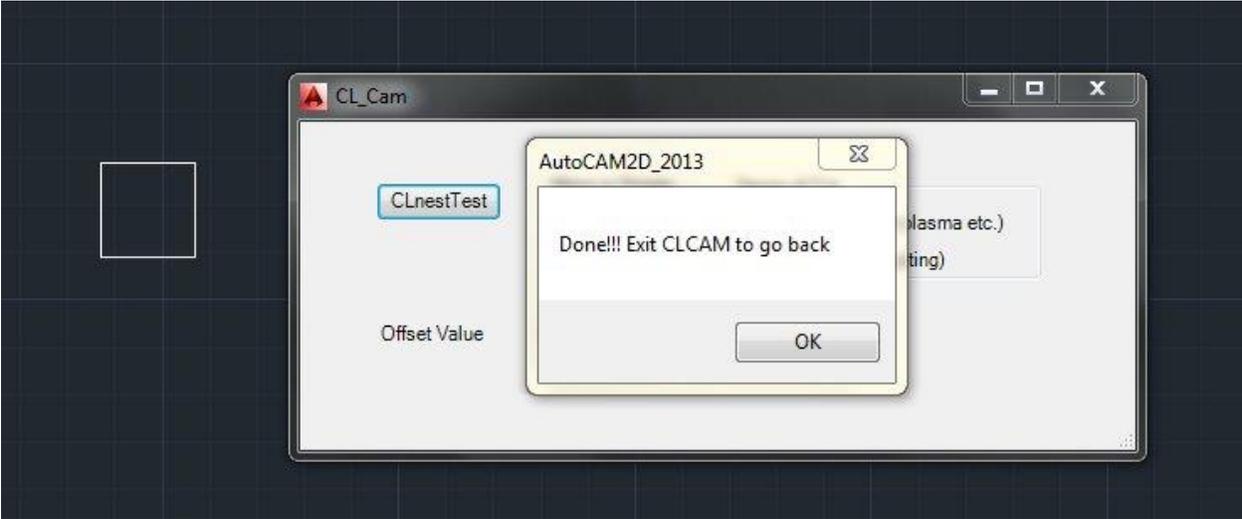
Again click OK and close the "ClCam" dialog box. Now the geometry will be offsetted and it will rotate.

Another example of rotate is shown below. The offset value is small so it cannot be seen clearly in this drawing:

Other examples of rotation are:

By rotating or mirroring the geometries; this app allows you to nest the drawings in a manner that allows for maximum density of parts to be cut out in a single work piece material by arranging parts properly to avoid waste space as shown: