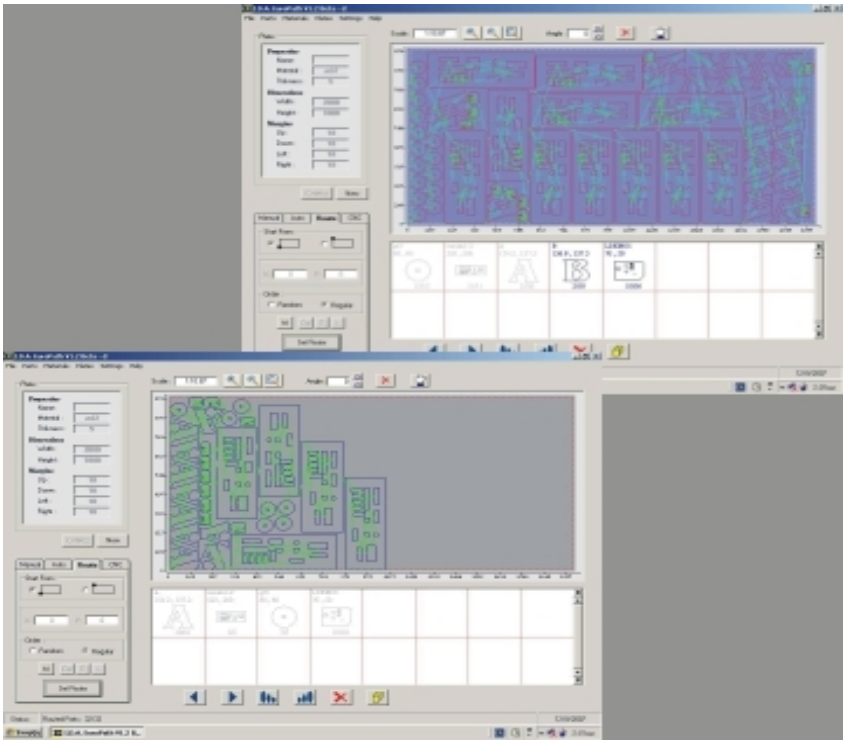
EUROPATH CAM



INDUSTRIAL DIGITAL APPLICATIONS CONTROL
INDUSTRIAL RESEARCH & APPLICATIONS OF MICROELECTRONICS
PANOS M. PIKIS & COMPANY G.P. - IDA CONTROL
243, Ag. Dimitriou Str. - Ag. Dimitrios, ZIP Code 173 42
Tel +30 210 9821806, FAX +30 9832431
www.idacontrol.com / **info@idacontrol.com**

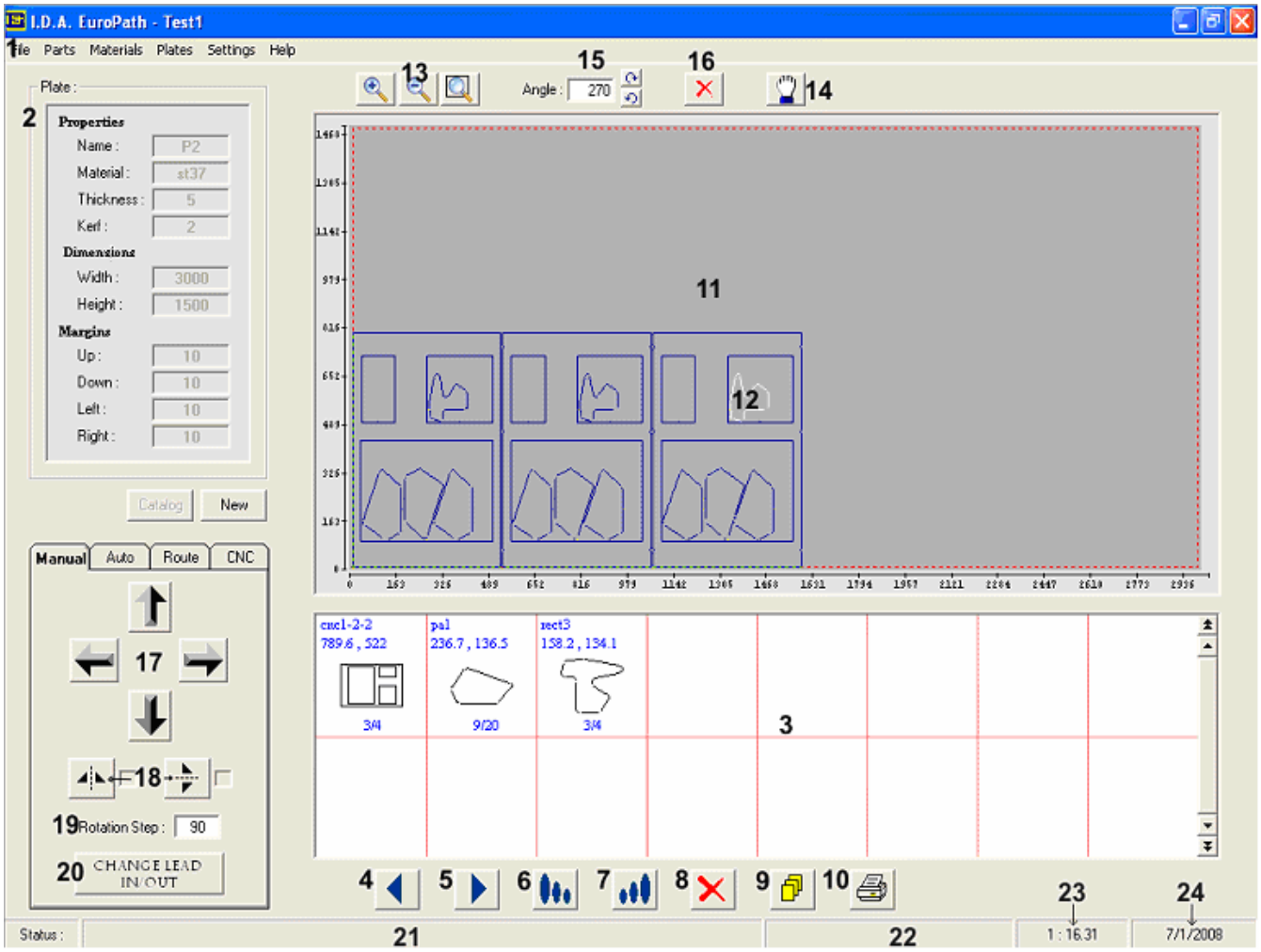
EUROPATH CAM V2.0

Detailed User Instructions Manual

(Before reading this tutorial, it is strongly recommended that you study our Quick Start-up Guide. Thus, users of this product will have the best chance to understand in depth the use of this Cutting Code Generator Software)

Contents **Page**

1. Main Form:

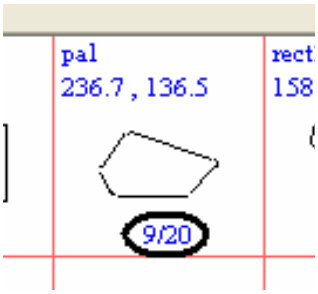


Description:

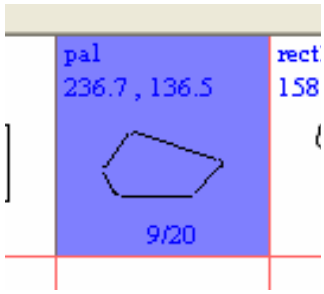
1.1. ***Main Menu of the Program.*** Here users can Save and Load any **Cutting layouts** that have been produced. One can also change the program parameters, Create Materials and Plates lists, Import Parts and more. Below follows a detailed reference to each and every Menu command.

1.2. ***Specifications of the plate on the Cutting Table.*** Here users can either type in the actual values or load any plate already saved in the Plates Catalog by pressing the **Catalog** button underneath. We must have in mind that by pressing the **OK** button for the specified plate to appear on the cutting table, the program automatically checks the existence or not of the relevant material with the specified properties; if the relevant material is missing, we get a warning message. In the latter case, though, the program is unable to provide us with information like the weight of the parts, cutting duration etc. Nevertheless, even when material specifications are missing, part import and placement is possible. More functions of the **OK/New** button are given in Step 1.31

1.3. ***Job list.*** Here users can see the parts ready to be placed. The two numbers under the Part inform us on how many copies of the total needed of the actual Part have already been placed in the plate.



By selecting one of the Parts, it receives a blue background.



Placement of the selected Part into the plate is possible by either clicking on the plate or clicking on one of the buttons (4,5,6,7,8,9,10) found underneath, to execute the relative command. These commands are described in detail in the following.

1.4. ***Transfer of the selected Part one step to the left in the Job list queue***. This button is used to give higher priority to the selected Part, as compared to the others, during the automatic nesting process, when all Parts are placed in the plate in their turn, determined by the place they occupy in the Job list.

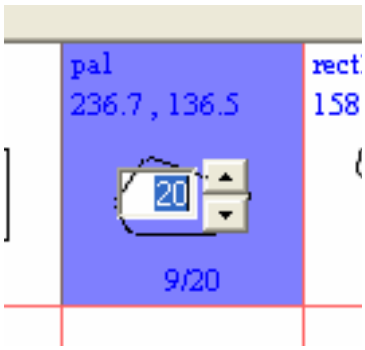
1.5. ***Transfer of the selected part one step to the right in the Job list queue***. This button is used to give lower priority to the selected Part, as compared to the others, during the automatic nesting process, when all parts are placed in the plate in their turn, determined by the place they occupy in the Job list.

1.6. ***Sorting of the Parts in the list in descending order as per their area***.

1.7. ***Sorting of the Parts in the list in ascending order as per their area***.

1.8. ***Deletion of the selected part from the Job List.*** It should be mentioned that deletion of a part is only possible when it has not been placed in the plate.

1.9. ***Change of the number of the copies of a part we wish to be cut.*** By clicking on this button, there appears a small box on the part, where we can type in or select any number for the copies we like to have and press **Enter**. It should be mentioned that we will not be allowed to ask for any number lower than the number of copies already placed in the plate. In our example, any number lower than 9 would not be accepted.



1.10. ***Printout of the selected Part's properties.*** By pressing this button we can have a printout of all the detailed properties of any selected Part, e.g. the perimeter, area, weight (thus, also the cost), cutting time etc.

1.11. ***The Plate.*** Here the user has a preview of the cutting job. The parts can be placed in the plate, any way the user chooses, following a simple procedure. When a part in the plate is selected, it can be placed in the exact position we wish as described in 1.12. It can also be rotated to the angle we wish; the whole plate can be moved so that we can check the final placement in detail. Details of how this is achieved are to be found in paragraphs 1.13 and 1.14.

1.12. ***Selected item in the plate.*** We select an item in the plate by just clicking on it. Now we can delete it, rotate it, etc. To move it to any other place in the plate, we can click on it and drag it. To deselect any item we just click on any free spot in the plate. It is useful to know that part selection is made on the basis of the square circumscribed about any shape.

1.13. ***Zoom buttons for the plate***. The user here can zoom in, zoom out, and reset a plate back to its default view instantly Εδώ ο χρήστης έχει την δυνατότητα να εστιάσει εντός, εκτός ή να επαναφέρει την λαμαρίνα στην αρχική κατάσταση. Besides these buttons, zooming in and out is possible using the mouse: Keeping the right mouse button pressed and moving the mouse upwards we zoom in (enlarge) the plate, moving it downwards we zoom out of (diminish) it.

1.14. ***Moving the whole plate***. Activating this button, the user can move the whole plate instead of moving the items placed on it, especially useful when we have enlarged (zoomed in) the plate; the same function is possible by pressing the mouse middle button.

1.15. ***Rotation of the selected item***. After selecting a part in the plate, we can rotate it both clockwise and anti-clockwise. In the small box nearby the actual rotation angle is shown; alternatively, we could rotate the object to the wished angle by directly typing the rotation angle in the box and press "Enter". We can also perform a rotation by pressing the "R" key even while moving the mouse. Rotation step is determined in step 1.19.

1.16. ***Deleting a selected item off the plate***. Delete action can also be realised by pressing the "Delete" key of the keyboard, very practical when we wish to delete many items.

1.17. ***Transfer of the selected item in the plate as far to the relevant direction as possible.*** This way we get more accuracy as compared to using the mouse. Alternatively, we can use the "Arrows" keys in the keyboard; the item is moved one step at a time but, using the "shift" and the relevant "arrow" button combination we have a continuous movement of the item.

1.18. ***Mirroring of the selected part in the plate.*** After selecting a part in the plate we can mirror it on both the x and y coordinates. Also, pressing the "M" key we can mirror it on the x axis; using the "shift" + "M" combination we can mirror the item on the y axis, even while moving it with the use of the mouse.

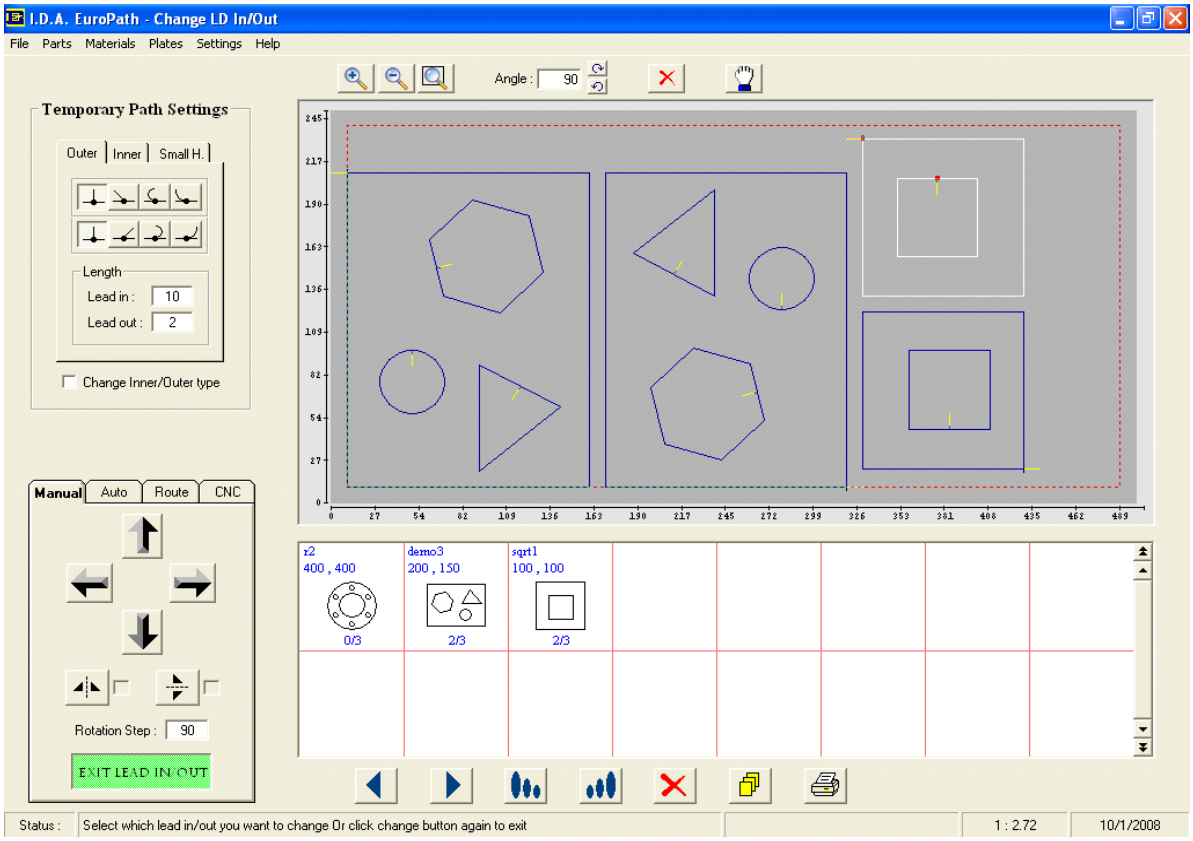
1.19. ***Determining the rotation step.*** Here we determine the rotation step mentioned in 1.15. All angles are measured in degrees (^{o}).

1.20. ***Changing the Lead In/Out of the selected parts in the plate***. The procedure to change the assigned Lead In/Out for a part is the following: First, the relevant item must be selected. Then the button **Change Lead In/Out** 

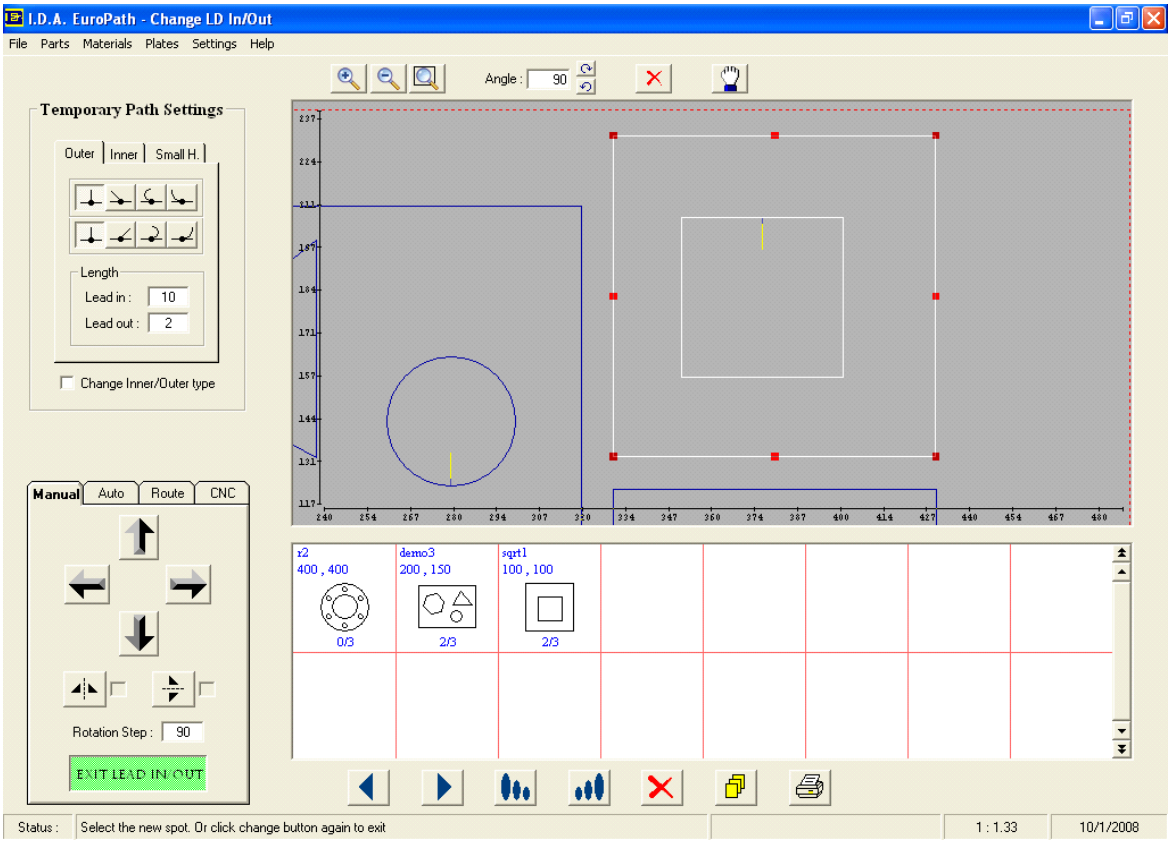
is pressed and we are asked by the program to determine which Lead we wish to change, as shown in drawing 1.20.1. Supposedly we wish to change the Outer one. To make our job easier, we zoom in the item and choose the Lead In/Out option we wish, as shown in the drawing 1.20.2. We are next asked to decide the exact spots to place the part: Dark red color indicates the most advantageous placement, red color indicates a mediocre one and the light red color shows the positions that are next to forbidden.

We have the option to also change the type and size of the assigned Lead In/Out, putting in the related settings in the Temporary Path Settings field shown on the left of the form, where the plate properties usually are. Now we also have the option of changing the direction of Lead In/Out. 

This way, for example, we could cut an inner cutting path as if it were an outer one with Lead In/Out set outside the Part's contour, very helpful in case we have to cut an inner contour inside other inner contours.

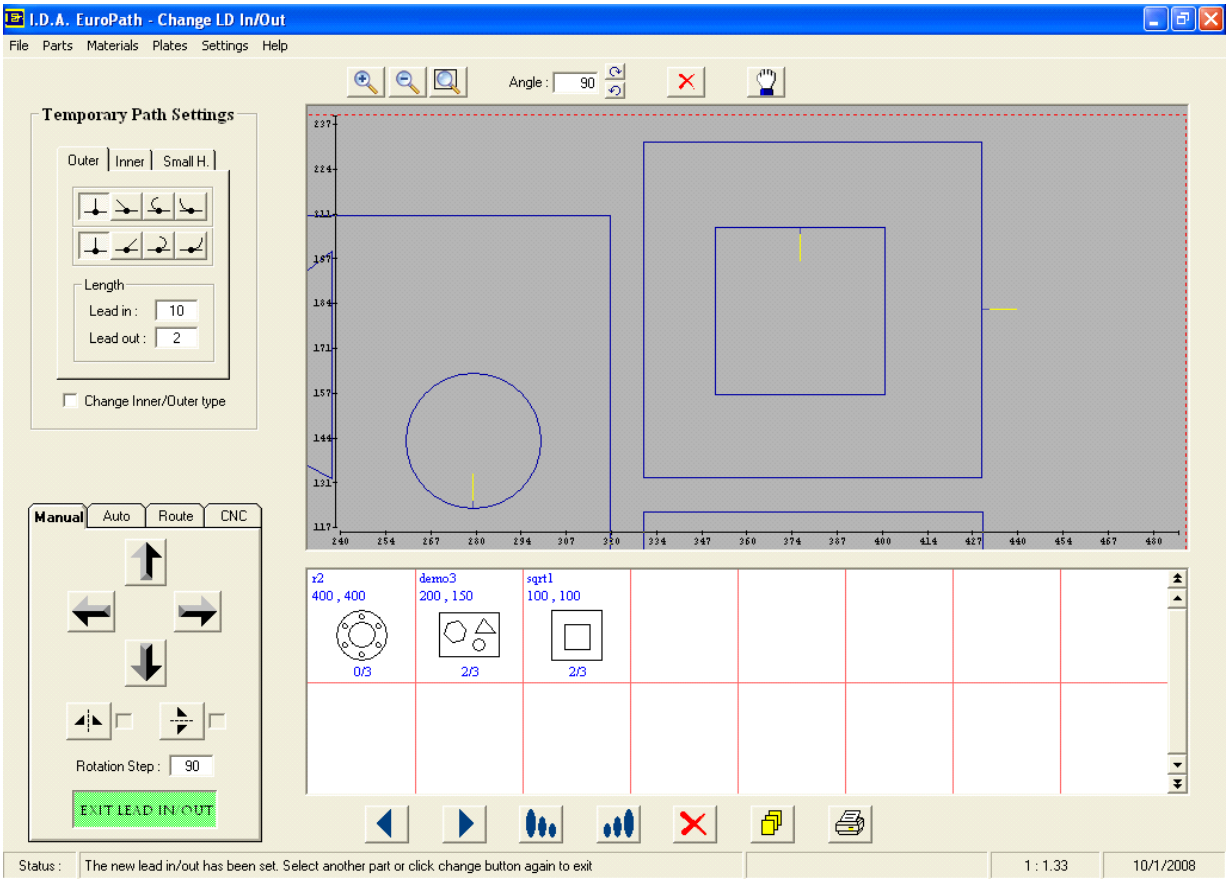


Drawing 1.20.1



Drawing 1.20.2

In our example, we do not change the type or the size of Lead In/Out, we just pick another position. After clicking, we see that the change of Lead In/Out position is made, and the part is no longer selected. Drawing 1.20.3 If we want to make any other Lead In/Out changes to more parts, we select the item in question again, and the program asks us which Lead In/Out we wish to have changed, the same way as before, in which case the whole procedure is repeated. In Case we wish to put a stop to this procedure we click **Exit Lead In/Out** EXIT LEAD IN OUT or, simply, click **Escape**.



Drawing 1.20.3

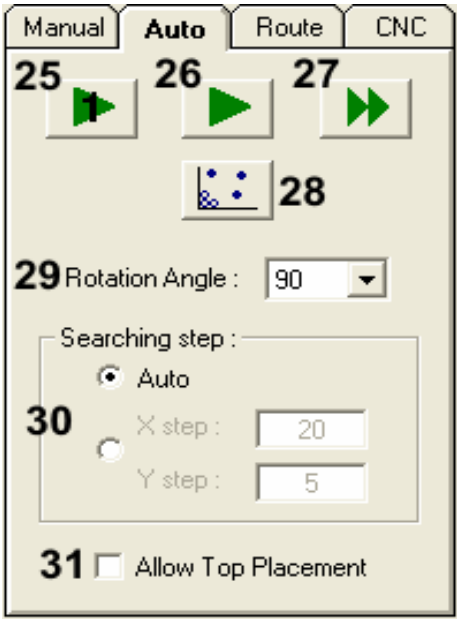
1.21. ***Status Bar related to the actual program procedure.*** Here we see some urging or informative messages related to the actual program procedures.

1.22. ***Progress Bar.*** It is available only during Autonesting and shows the progression of the parts placement.

1.23. ***Scale Ratio***. It is the scale ratio of the depicted cutting job representing the original proportionally. The actual proportions are calculated on the basis of this ratio.

1.24. ***Current Date***.

Automatic nesting: (Auto Tab)



1.25. ***Automatic placement of only one copy of the part in the catalog selected***. After having selected one of the parts in the list, we click on this button and one copy of this part is automatically placed in the plate, in the optimal position. If it cannot fit in the plate, we get a relevant message. The optimal placement is determined in relation to the user's preferences as far as the parameters 1.29, 1.30 and 1.31 are concerned, described in detail in the following page.

1.26. ***Automatic placement of all copies of the part in the catalog selected***. After having selected one of the parts in the list, we click on this button and all copies of this part are automatically placed in the plate, in the optimal position. If they cannot fit in the plate, we get a relevant message. The optimal placement is determined in relation to the user's preferences as far as the parameters 1.29, 1.30 and 1.31 are concerned, described in detail in the following page.

1.27. ***Automatic placement of all copies of all the parts in the catalog***. Without being obliged to select any part in the catalog, clicking this button we can proceed to the autonesting of all parts in the optimal positions in the plate. If any items do not fit, they are simply left out. The optimal placement of each part is determined in relation to the user's preferences as far as the parameters 1.29, 1.30 and 1.31 are concerned, described in detail in the following page. Parts are placed in the plate in their turn, determined according to how they are sorted in the Job list. Because of this, we get the best possible placement if we sort the parts in a descending order based on their area. To do it, we just click on the 1.6. button 

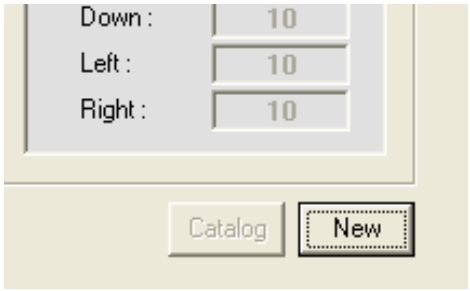
1.28. ***Automatic nesting of the parts placed in the plate.*** By clicking on this button, all items placed in the plate are arranged as near one another as possible. They are first moved as far to the left as possible, then as far down as possible, making optimal use of the plate.

1.29. ***Rotation angle of a part in the process of automatic nesting in the plate, while automatically testing for its optimal placing.*** For example, if we select 90^o as the wished rotation angle, any part in the plate will be checked subsequently in angles 0^o, 90^o, 180^o and 270^o and finally placed in the optimal angle. This is why we see the Progress Bar 1.22 fill in four times before each item gets its final placement. Consequently, when 90^o are selected, four checks take place, instead of only one when a zero degrees angle is the case, resulting in a four times longer execution time. In the same way, it takes eight times longer when the angle is set to 45^o. We must, therefore, make a compromise between placement time and quality.

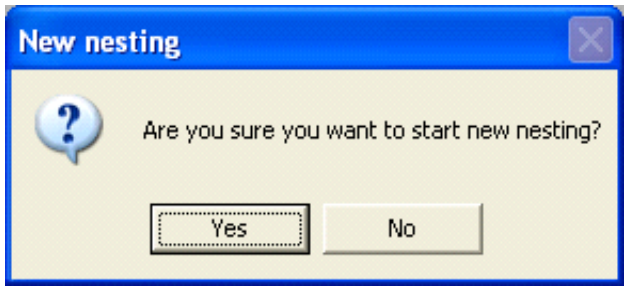
1.30. ***Searching step during Auto Nesting***. While Auto Nesting, when we have tried one placement and what we get is not what we want, we try another one, and so on. The searching step is determined here. As it is easily understood, a smaller step results to a better placement but a longer procedure. This is one reason among many (shortest distance between the parts in the plate, Lead In/Out length and more) that the present option should always be set to Auto. By selecting Auto, the values seen on our screen are the ones used by the program.

1.31. ***Allow top placement checkbox***. Since theoretical explanation is long and difficult to be understood, we shall try to explain what this is about using an example of two different placements, one making use of this choice, and another one without. Let us suppose we have the Job appearing in drawing 1.31.4. We start checking the Allow Top Placement checkbox (☑ Allow Top Placement). The result is shown in drawing 1.31.5. We see that when the selected part was automatically put in the top position, the uniformity of the Parts placement was disrupted.

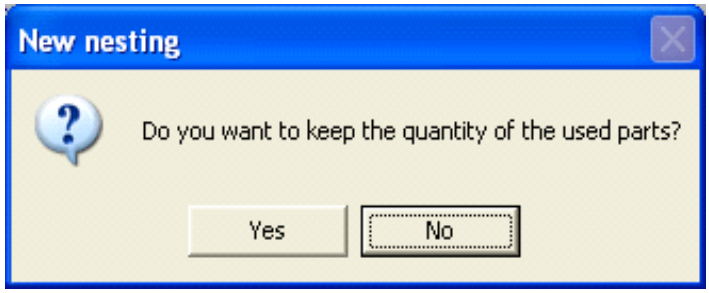
Now we try the same Job a second time by pressing the "New" button found under the Plate Properties rectangle, drawing 1.31.1, and we answer affirmatively to the pop-up question whether we want to start a new nesting, drawing 1.31.2, but negatively to the question whether we want to keep the quantity of the used parts, drawing 1.31.3. This second question is, of course, only valid in the case we have parts left that it has been impossible to fit in the plate and be included in the cutting job.



Drawing 1.31.1

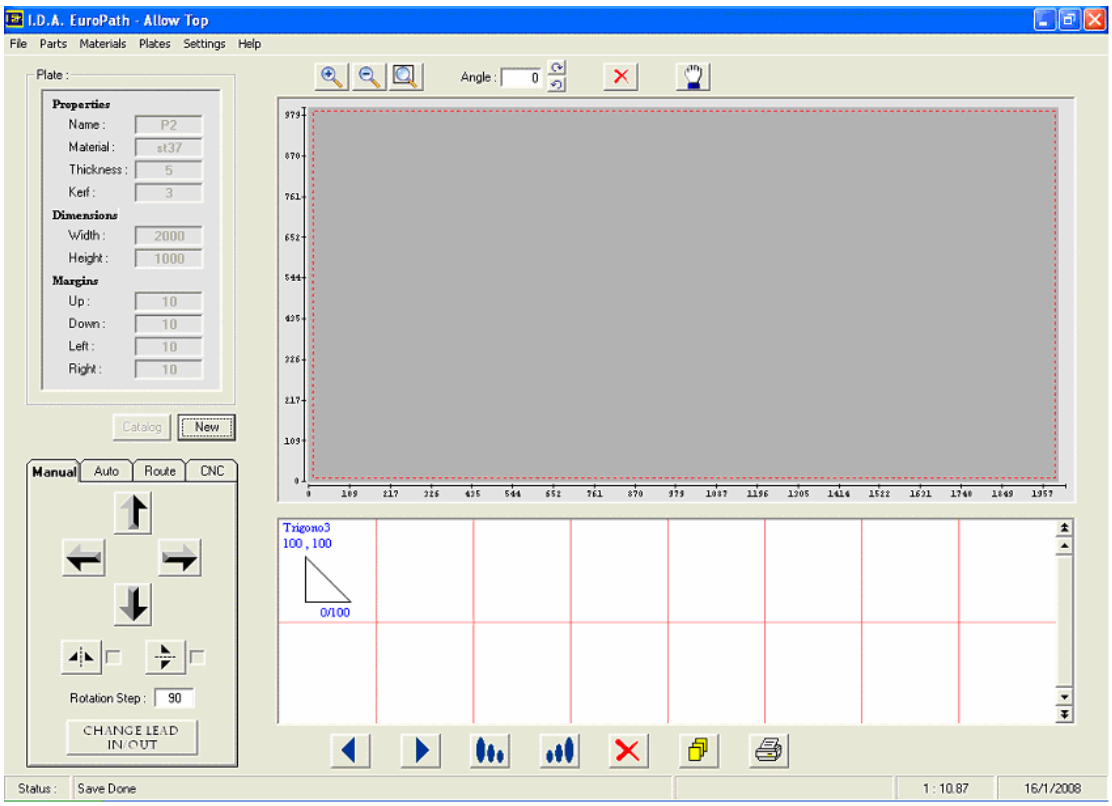


Drawing 1.31.2

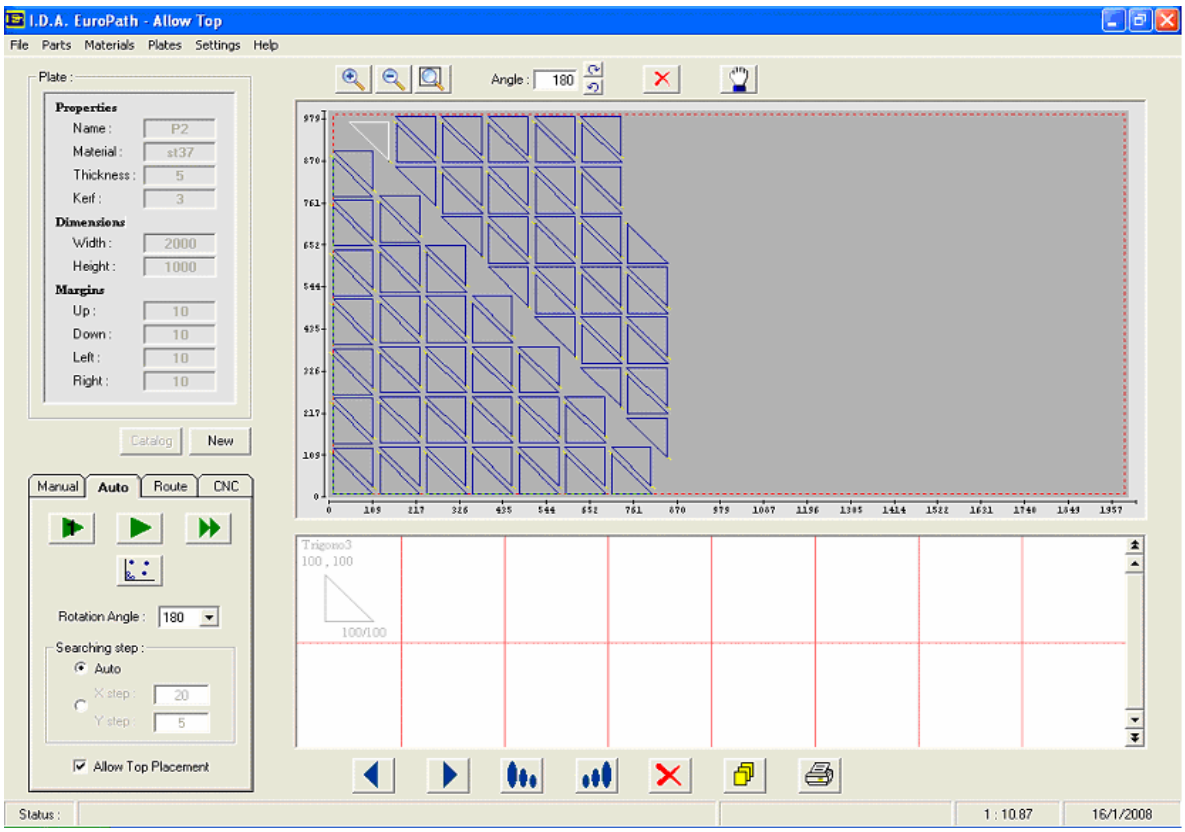


Drawing 1.31.3

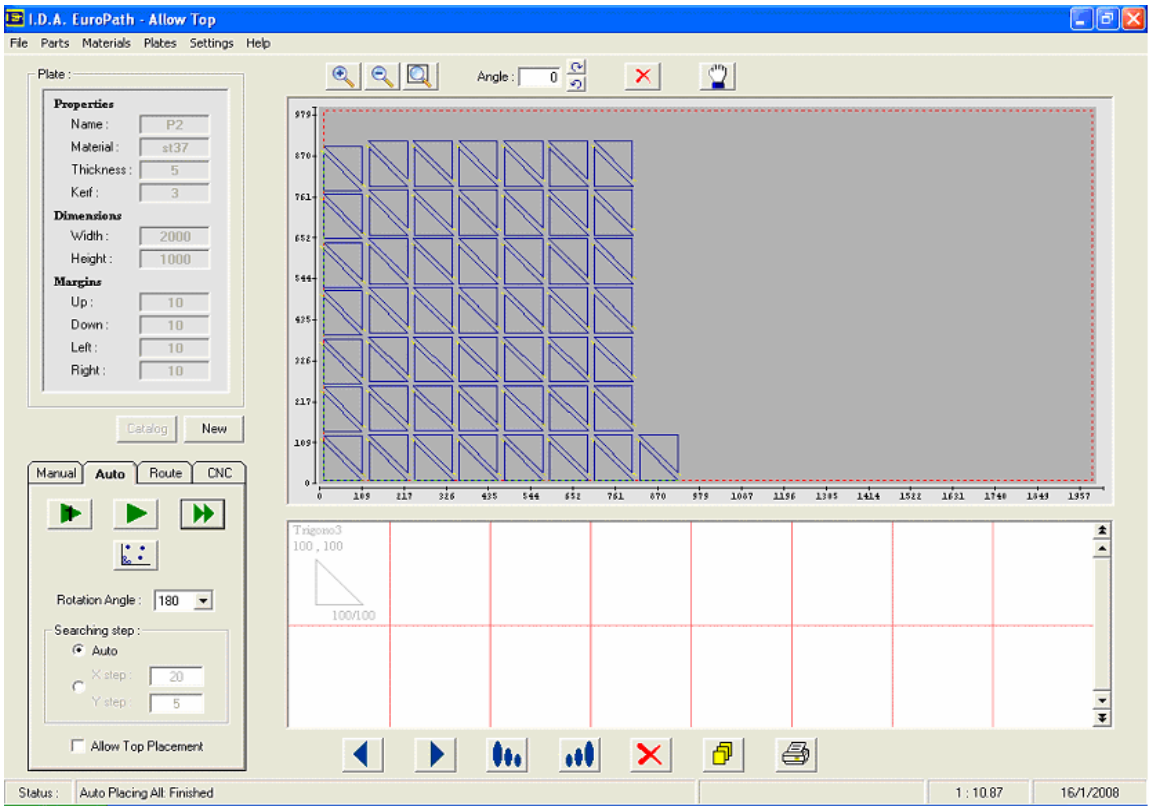
Now we are in our initial state, drawing 1.31.4, and we ask for a new Auto Nesting, this time without having checked the Allow Top Placement Checkbox (☐ Allow Top Placement). We can now see that the result is much better. (Drawing 1.31.6)



Drawing 1.31.4

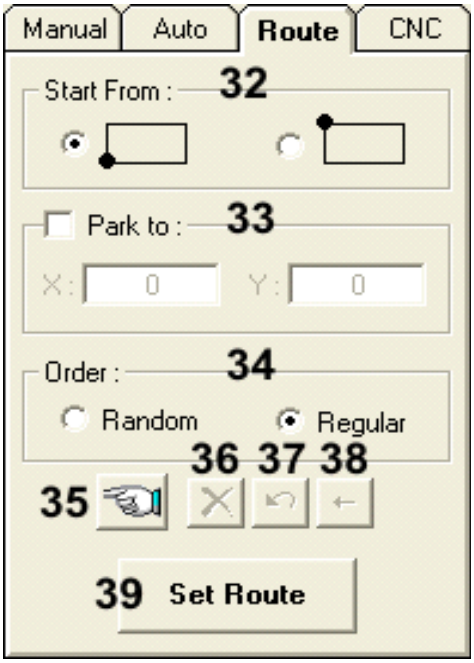


Drawing 1.31.5



Drawing 1.31.6

Routing: (Route Tab)



1.32 ***Torch Starting Point***. Here the starting point of the torch is determined; This can either be the lower left plate corner (point 0,0) or the upper left corner (point 0,*plate height*).

1.33 ***Torch Parking point***. Here we can determine the final parking spot of the torch, after completion of the Job, giving its coordinates. To activate the coordinates' fields, the user must check the "Park to" box.

1.34 ***Random or Continuous Cutting Succession***. If we wish to avoid overheating of the plate, we select "Random" for the parts to be cut in a random order, otherwise we select "Regular".

1.35 ***Activation of Manual Routing option***. The user, after having enabled this option, must mouse-select one by one all the parts he wishes to have cut. Whenever one of the parts is selected, the relevant Route (Cutting Sequence) is created. The user has also the option to end manual routing at any point by clicking on the same button again to disable this function. The rest of the parts can be automatically routed by pressing the "Set Route" button, step 1.40.

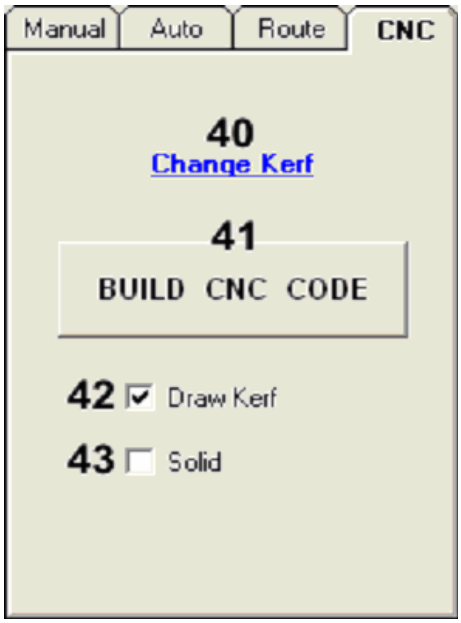
1.36 ***Deletion of the already created Routing***. After having activated manual routing, we can delete the whole Route in one click, instead of deleting it step by step.

1.37 ***Restoring the whole Route***. With the manual Routing option activated, we can restore a Cutting Sequence that has been accidentally deleted.

1.38 ***Deletion only of the last Routing step in an existing Routing***. With the Manual Routing option activated, we can delete the last Route in a routing routine by pressing this button.

1.39 ***Setting the cut route of the parts in the plate automatically***. When we have finished with part placement in the plate, we determine the order in which we wish the actual parts to be cut. This is done automatically by pressing this button. In case we wish to change our preferences, we can create a new routing procedure by pressing the same button again, without any restrictions. Furthermore, we can come back to the same Job to make any change we wish, since, by selecting the first Part, any Route is automatically deleted.

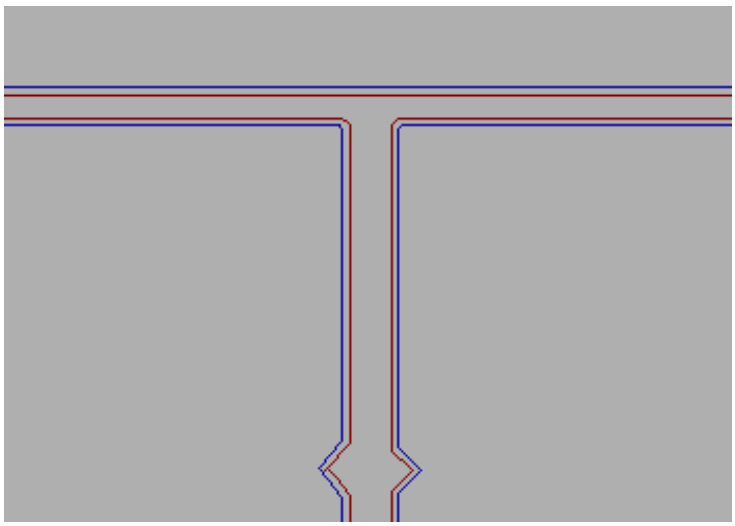
CNC Code Generation:



1.40 ***Changing Kerf before generating the final code.*** When all Parts are placed in the plate and the Route has been established, before the final code is generated, cut width (Kerf) can still be changed. Some restrictions, though, are imposed at this stage: Kerf, for example, cannot exceed half of the minimum Part to Part Distance. Users will be informed of any not allowed values before the final code is generated.

1.41 ***Generation of the final CNC code***. After we are through with Part placing in the plate and Cut Routing, we are ready to generate and save the file containing the final CNC code, a file to be transferred to the machine for the actual cutting job to materialize.

1.42 ***Presentation of the actual cut***. If this option is activated, after the generation and saving of the final CNC code by pressing the "Build CNC Code" button, on our screen we see the actual itinerary of the machine cutting head, in other words the actual cutting code. What we see are the actual parts magnified by one half of the Kerf. Drawing 1.42. We can now zoom in and check the correctness of the code generated. To be in a better position to check the layout details, Routing disappears, but it is not deleted; by deactivating this option routing is restored, reactivating it the actual cut is visible again.

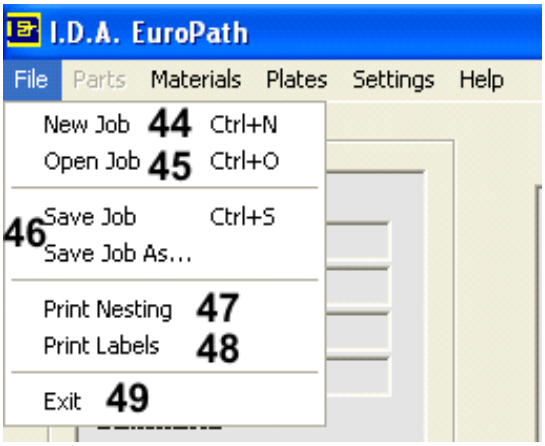


Drawing 1.42

1.43 ***Kerf shown in its actual thickness***. This option is directly connected to the previous one 1.42. When 1.42. is checked and on our screen we can see the actual cutting head itinerary, by checking also 1.43. we are presented with the actual width of the cut, resulting in getting an exact simulation of the final cut.

Main Form Menu:

Here, we will refer to File Menu only, because it is directly connected to the Main Form. Instructions on other menus are given in relation to their respective field.



1.44 ***New Job.*** By clicking on this command we are shown to a form where we can give a name to a New project.

1.45 ***Open Job***. This option allows us to load a previously saved Job, regardless of whether it was materialized or not.

1.46 ***Save Job, Save Job As***. When we first ask to save a Job, whichever of the two options we click we are always shown to the "Save Job As" Form, where we can type in Where and under which Name we wish the Job to be saved. For this option to be activated we must have imported at least one Part to the actual Job List.

1.47 ***Print Nesting***. This command makes printing of the current Job possible. We get a page showing the plate and all the parts placed on it. Underneath we get a table named after the Name of the Job with all the cutting parameters: plate dimensions, type of material, and more, as well as estimates on total Cutting Time, total Cutting Length, Parts total Weight (which can be used to estimate the total cost of the Job), and more. On a second sheet appear all the different Parts imported to the Job List with all of their relevant characteristics (Name, nr of pieces, Size, Area, Weight) and information about piercing, cutting or marking related to the specific Part.

There are no restrictions as to the stage at which the Printout is possible. We can ask for one whenever we want, provided there is some printer installed. If more printers are installed, the program will make use the default one.

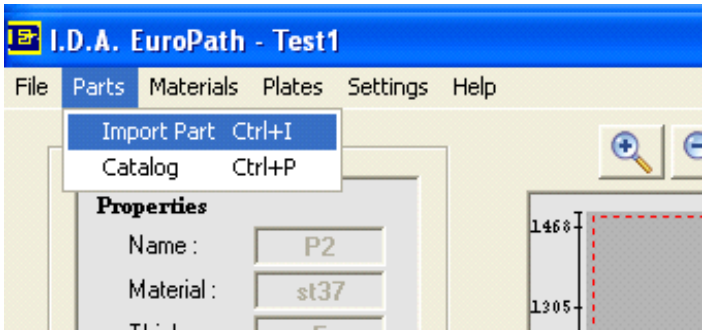
1.48 ***Label Printing***. Print Labels for the placed parts with their characteristics. Printout can be done on self-adhesive A4 sheets divided to 24 rectangles 37X70mm.

1.49 ***Exit the program***. This is one of the alternative ways to exit the program.

2. Part Import:

When we start a new Job, we have two options as far as Importing Parts is concerned. We can do it either from a file saved in a disk, diskette, CD, or from the Part Catalog in case the same part has been used in the past. At this point, we must make clear that this program is not a CAD program, neither does it embody one, consequently we cannot draw any Cutting layouts. For this purpose other programs, like AutoCAD by AutoDesk, Adobe Illustrator or any other of the Drawing programs available in the market, should be used.

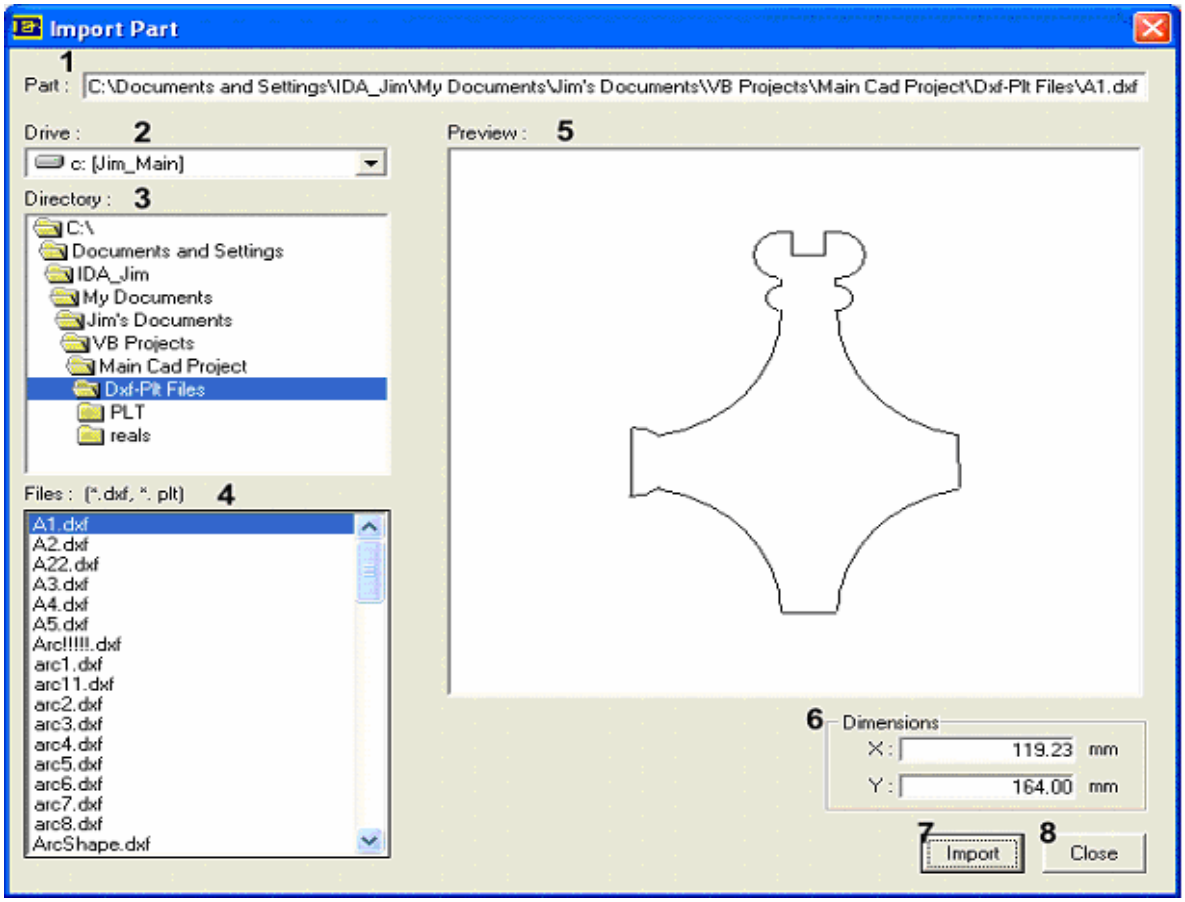
After we place a plate on the table we notice that in the Main Menu Toolbar the Parts menu is enabled. If we select it, we see the two pre-mentioned options. To begin with, we select "Import Part" to import a part from a file. Drawing 2.1.1



Drawing 2.1.1

Now we are shown to a form in which we can select the file we wish to import. Drawing 2.1.2.

2.1 Importing Parts from a file :



Drawing 2.1.2

2.1.1 ***The relevant file's path***. Here we have the full path for the relevant file.

2.1.2 ***The disk where the file is saved***. Here users can select the disk having the file they wish to import too the actual job. Any hard drive, diskette or other storage device will do.

2.1.3 ***The folder containing the File***. Here we can select the folder in which the file of the Part to be imported is included. Double-clicking on it the folder opens and we can select any of its sub-folders, and so on, until we get to the desired file containing the Part.

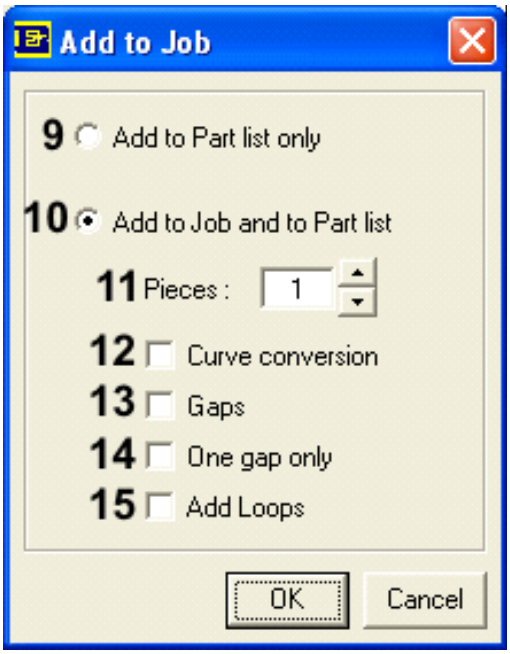
2.1.4 ***Selecting the file we wish to import to the Job.*** Here the user can select the desired file and have a preview of the Cutting layout contained in it. We must underline that only files of DXF and PLT type appear in this list. One more thing to make clear is that only two-dimensional drawings are supported by this program.

2.1.5 ***Preview of the Cutting layout contained in the file selected.*** Here we can preview the object in the selected file, so that we make sure that it is the part we wish to import. In the case we have activated the Layer filter in the Path Settings, step 5.4.1, the existing layers appear in the respective color. Layer colors are determined in the Color Settings form. Warning: In the case layers are activated, whatever appears gray-colored will not be imported if we try to realize this option; the reason is that the layer on which it exists is not recognizable.

2.1.6 ***Dimensions of the Cutting layout being previewed***. Here we can see the width and height of the object being previewed, in millimeters. Special care must be taken when working with PLT files for the proper dimensions to show. If they do not show correctly, we should check the Plotter Units in System Settings.

2.1.7 ***Import of the Cutting layout selected to the current Job***. Pressing this button, we can import the Cutting layout we have selected to the **current Job**. We are first shown to the form in Drawing 2.1.3, which is dealt with below. After the import of this Cutting layout, we can continue importing more, following the same procedure, without having to get out of this form.

2.1.8 ***Close***. Pressing this button we exit this form.



Drawing 2.1.3

2.1.9 ***Adding the Part selected to the Part list only and not to the Current Job as well***. *Checking this option, we add the Part only to the Part list filed in the program itself but not to the Current Job*

2.1.10 ***Import of the selected Part to both the Current Job List and the Part List***. This option adds the selected Part to both the **current Job list** and the **Part List**, so that, in the future, the Parts are included in the program itself and there will be no need to import them time after time.

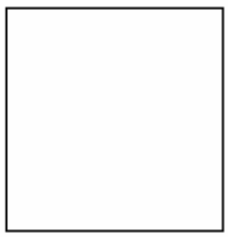
2.1.11 ***Feeding in the program the number of replicas of the selected part that are to be cut***. We can either type in the number of pieces we wish or use the arrow-buttons provided to determine the right number.

2.1.12 ***Transformation of short successive straight lines into an arc***. The option is especially useful when we work with PLT files, where all kinds of arcs are segmented in short straight lines. The parameters for this transformation are set in System Settings.

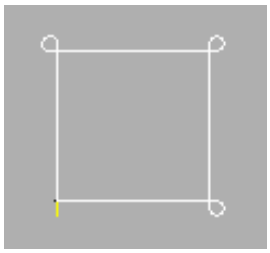
2.1.13 ***Adding cutting Tabs to objects with very long sides, for them to remain connected to the plate***. This option prevents bending of objects with very long sides, keeping them connected to the main plate on the cutting table with small Tabs of uncut material, until the cutting procedure allows their complete separation. Settings determining this procedure are found in Path Settings.

2.1.14 ***Adding a cutting Tab at the end of the Part's perimeter***. This option is related to the cutting very small objects which, after having been cut out, they fall on the cutting table and get lost. To address this problem, a Tab is left uncut just before the cutting of the part is fulfilled and, as a result, the part remains attached to the plate.

2.1.15 ***Adding Loops to angles***. This option manages to keep cut velocity constant when we deal with cutting layouts with angles, resulting in a high quality cut. The way to achieve this is to add an outer circle to our cutting path, as shown in the following drawing.



Initial Drawing

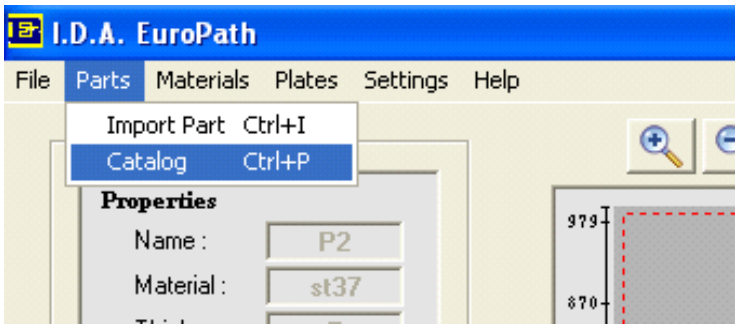


Drawing with Loops added

We must make clear, though, that Loops are not to be added to all corners. There are conditions to be followed every time, which will be taken into account by the program.

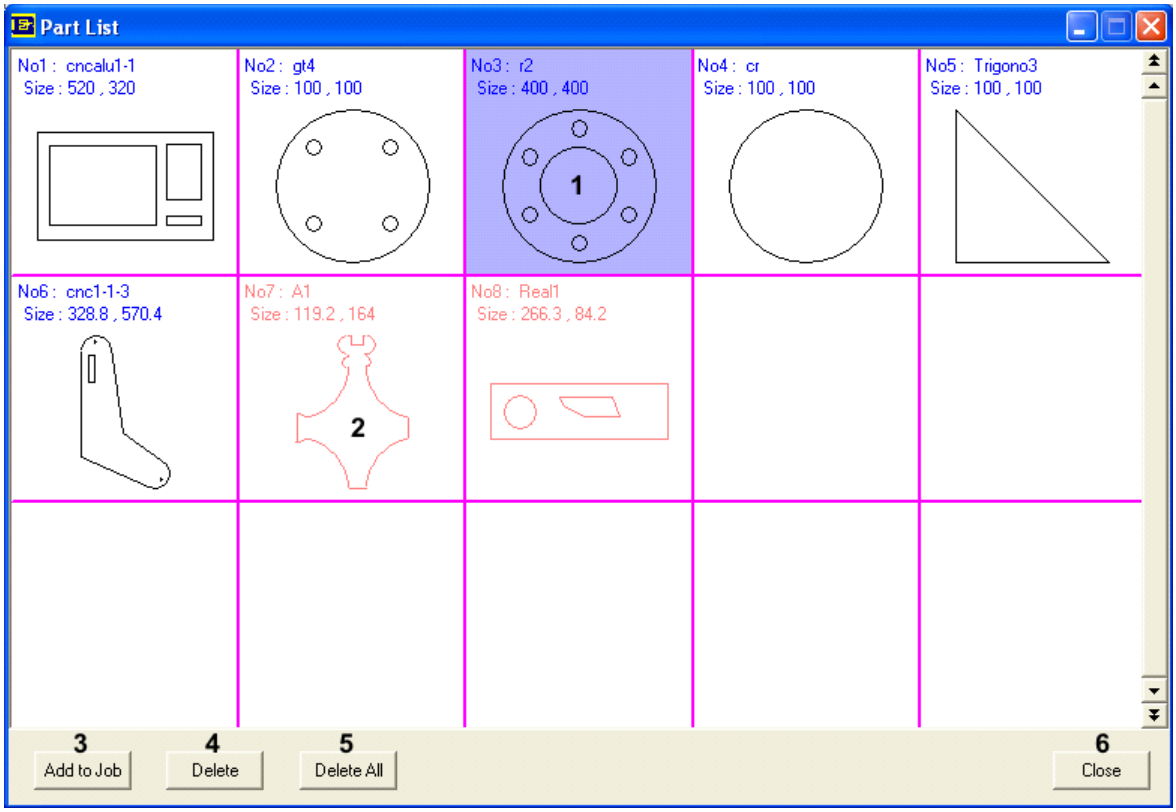
2.2 Importing Parts from the Part List:

This second option permits import of Parts that have been used in the past. Our program saves all Parts we have worked on in the past in an internal catalog, to save us importing the same Parts time and again. To import such a Part from the catalog, we select Parts in the Main Menu and then click on Catalog. Drawing 2.2.1…



Drawing 2.2.1

…and we are shown to the Program list, with all the parts having been automatically saved before. Drawing 2.2.2. We deal with this Catalog in the following paragraphs.



Drawing 2.2.2

2.2.1 *Selected Part.*

2.2.2 ***Part existing in the current Job***.

2.2.3 ***Importing the selected Part to the Current Job***. Pressing this button we get the same form on our screen as in Drawing 2.1.3, a form that has been dealt with also in Step 2.1.7. We follow the procedure we have already referred to.

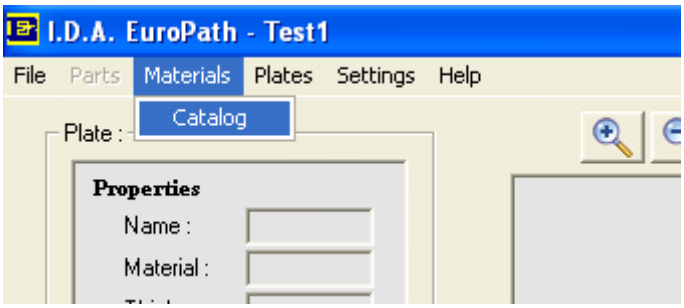
2.2.4 ***Deletion of the selected Part from the Catalog***.

2.2.5 ***Deletion of all the Parts contained in the Catalog***.

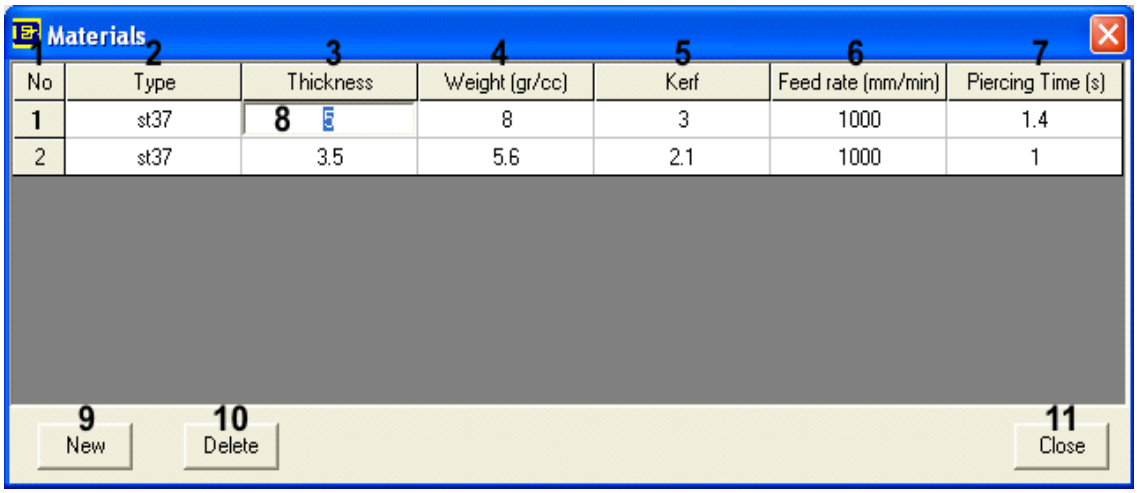
2.2.6 ***Close***. Pressing this button we exit this form.

3. Materials Catalog:

To be shown to the Materials Catalog, we select Materials in the Main Menu and click on Catalog.



We are then shown to this form:



3.1 ***Material Number in the Catalog***. We can see that the number of a selected Part shows in Bold. To select a material, we just have to click in one of its fields (Cells).

3.2 ***Τύπος υλικού***.

3.3 ***Material Thickness***.

3.4 ***Material Weight in grams per cubic centimeter***.

3.5 ***Kerf for the material in question***. This is the width of the cutting arc, that is, its diameter in millimeters.

3.6 ***Cutting rate (Feed Rate) in millimeters per minute***.

3.7 ***Piercing time***. In seconds

3.8 ***Changing a field value***. To update the value in any cell we can either double-click in it or press the Enter key.

3.9 ***Creation of a new Material***. Pressing this button a new material is created with all of its fields empty; we type in the properties of the material in question one by one.

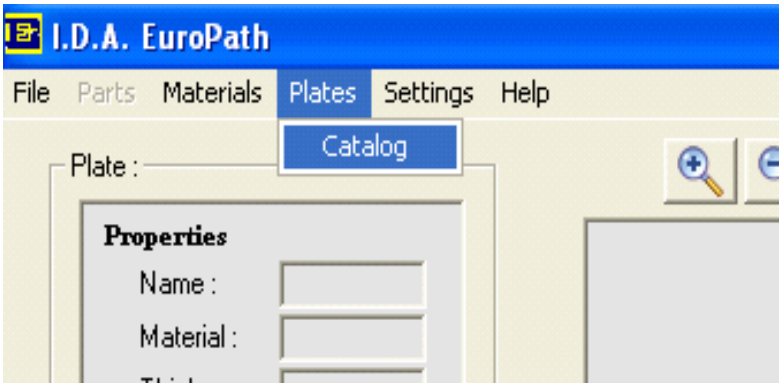
3.10 ***Deletion of the selected Material***.

3.11 ***Close***. By pressing this button we exit this form.

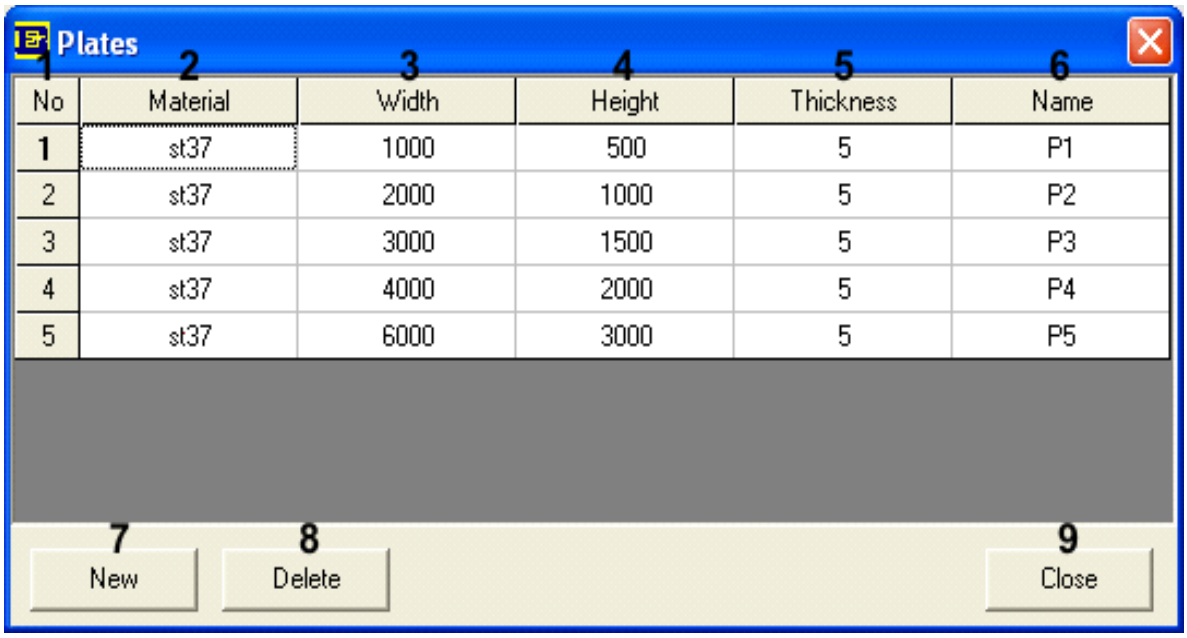
4. Plates Catalog:

Plate description is not required, but it can be very helpful when there are many plates so you can easily recognize them in the list.

To show this Catalog on our screen, we select Plates in the Main Menu and then Catalog.



We are then shown to the following form:



4.1 ***Plate Catalog Number***. We notice that the Plate Catalog number is in Bold script. To select the plate we wish we just click in any of its fields (cells).

4.2 ***Name of the material the plate is made of***. We should pay attention to giving the plate the exact name given in the Materials Catalog.

4.3 ***Plate Sheet Length***.

4.4 ***Plate Sheet Height***.

4.5 ***Plate Sheet Thickness***.

4.6 ***Plate Name***. This field is optional, and makes distinguishing which plate is which easier.

4.7 ***Import of a new plate***. By pressing this button a new plate is created; all values of its property are blank, for the user to type them in accordingly.

4.8 ***Deletion of the selected Plate***.

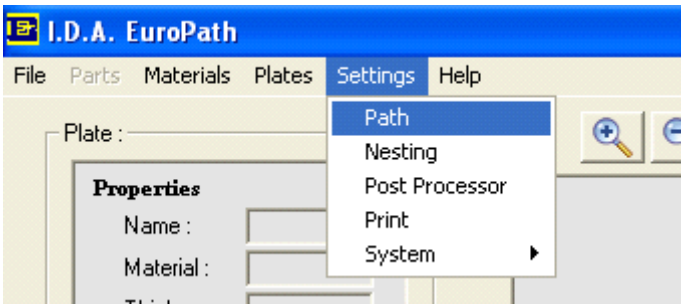
4.9 ***Close***. By pressing this button we exit this form.

If we wish to change a cell value we select the cell, then double-click it and enter a new value.

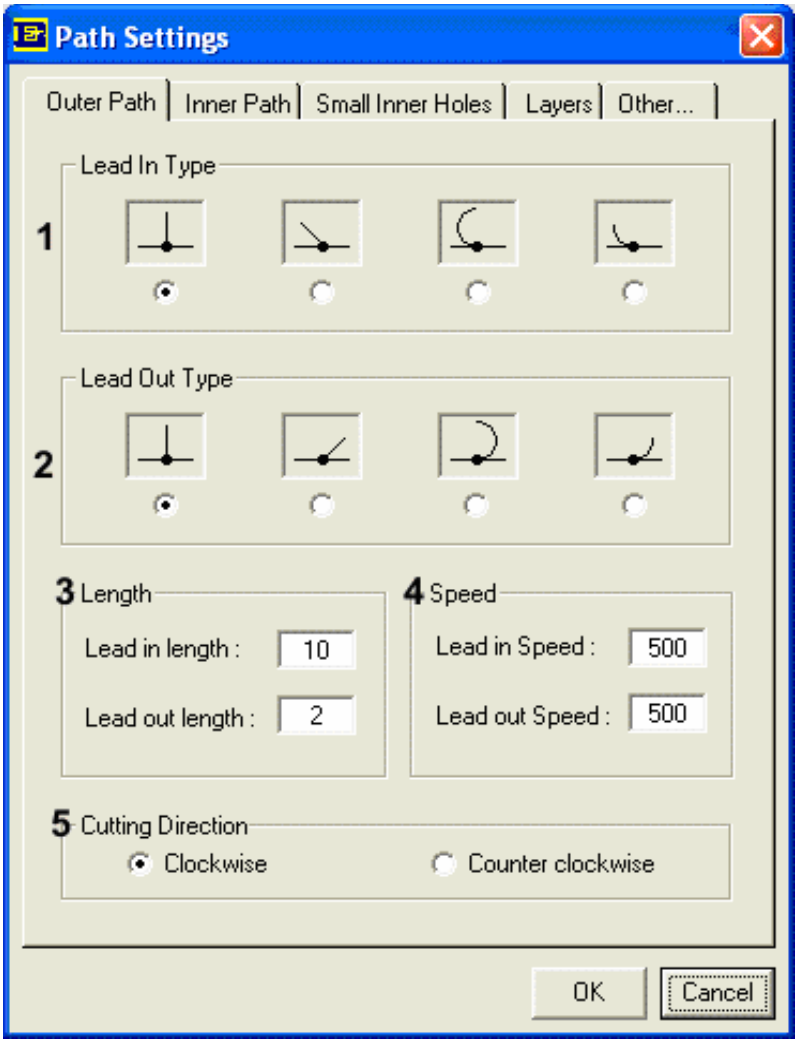
To delete a row we right-click and select "Delete".

5. Path Settings:

To be shown to the Path Settings form, we select Settings in the Main Menu and then Path in the drop down list.



We are then shown to the following "Path Settings" form:

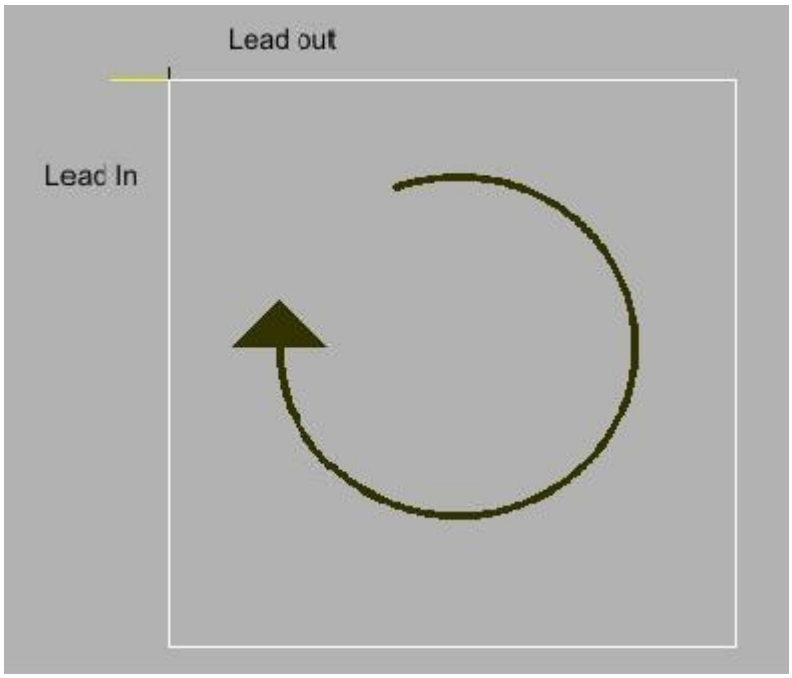


5.1 Outer Path Tab:

5.1.1 ***Lead In Type***. We do not usually wish to have the Piercing of the plate executed right on the Drawing, but some millimeters further away, and have the part cut afterwards. Here we determine the cutting head's approach path. We have various options: movement in a straight or circular line, the latter being very useful in the case we wish to cut circles. Drawing 5.1.1

5.1.2 ***Lead Out Type***. What is written above applies also here, only now we refer to the type of the cutting head's moving away from the Drawing. Drawing 5.1.1

5.1.3 ***Lead In and Out path length***. This determines the distance to or from the objects perimeter that Piercing will take place. Drawing 5.1.1

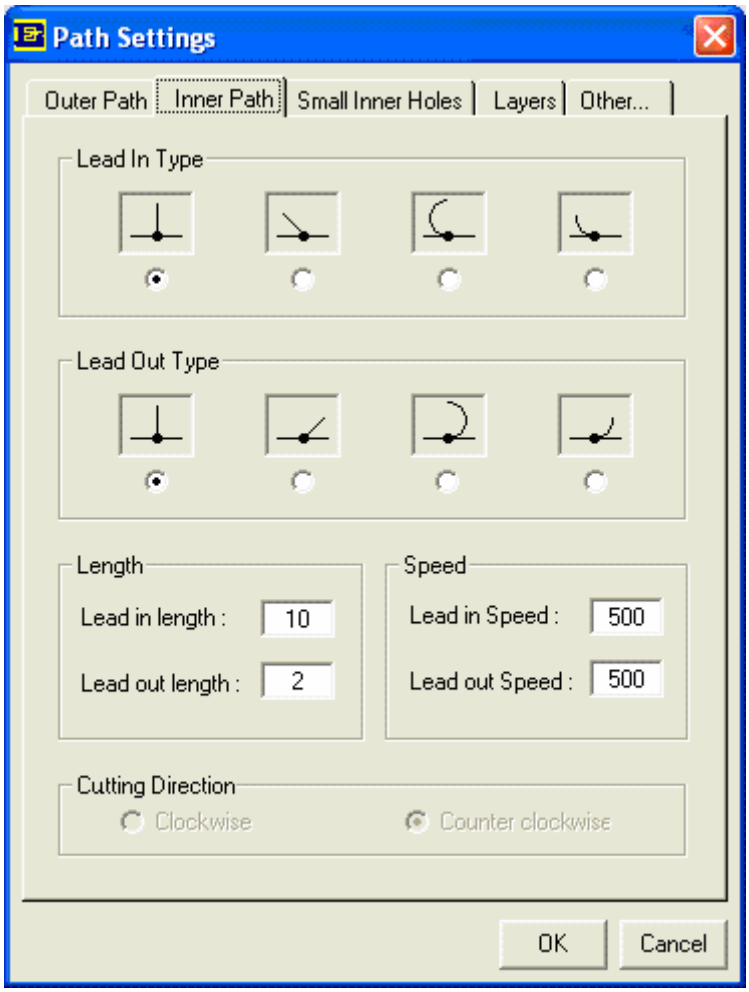


Drawing 5.1.1. A 100mm square, Lead In straight line 10mm long (Yellow), Lead Out straight line 2mm long (Black) and clockwise cutting direction.

5.1.4 ***Lead in and Lead Out Speed***. This is the Lead In and Lead Out feed rate in millimeters per minute. We must note here that these parameters are only relevant when, in the Final CNC code, the F Command is activated. This command is activated in the Post Processor Settings.

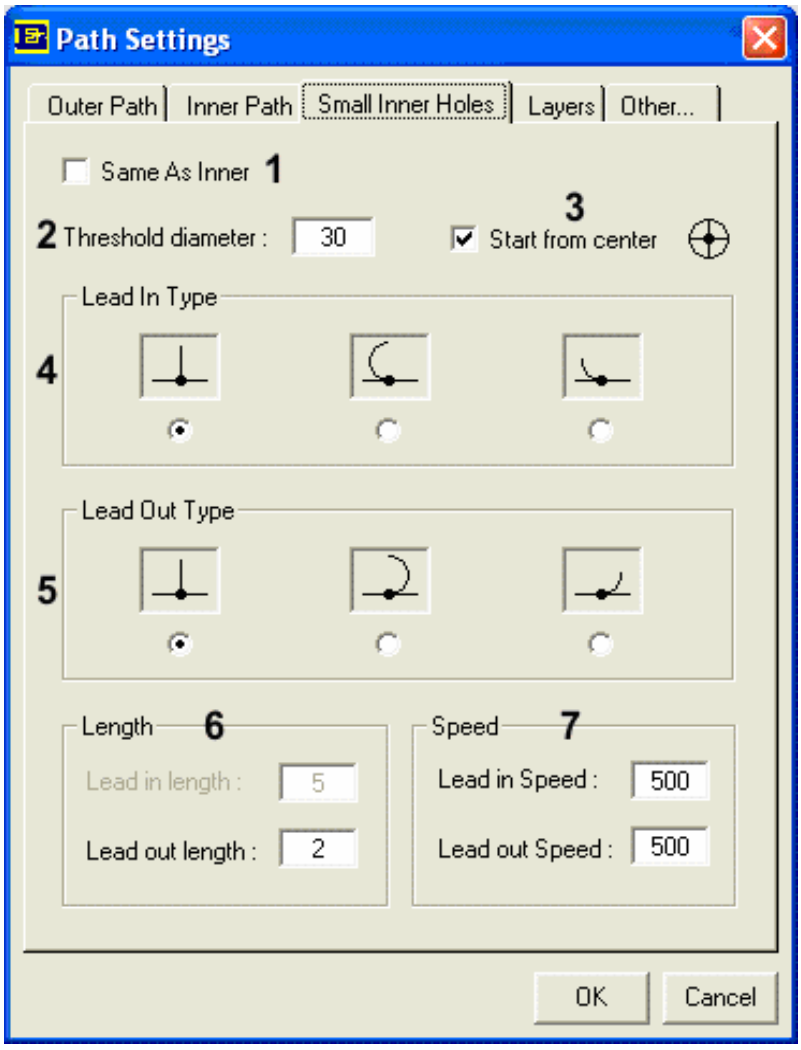
5.1.5 ***Outer Path Cutting direction***.

5.2 Inner Path Tab:



By pressing this tab we can determine the Inner Path Settings, in a way identical to determining the Outer Path ones. Here, though, the Cutting Direction is, by default, opposite to the one determined in 5.1.5

5.3 Small Inner Holes Tab:



The Settings on this Tab refer to the Small Holes that there are usually on many Parts and aim to address some specific problems related to their proper cutting.

5.3.1 ***Dealing with Small holes as if they were Inner Paths***. By activating this option, any small holes are cut as if they were Inner Paths, and no settings of the ones stated below are valid.

5.3.2 ***Threshold Diameter***. Any hole with a diameter equal or less than this value is dealt with as a Small Hole. In other words, the user determines the largest diameter of a hole for it to be considered a Small Hole and be cut according to the Inner Path settings.

5.3.3 ***Start from Center***. This option determines the piercing to be executed in the center of the circle, in which case Lead In Length equals the radius of the circle and is not controllable by the user.

5.3.4 ***Lead In Type***. What was mentioned in 5.1.1. is valid also here.

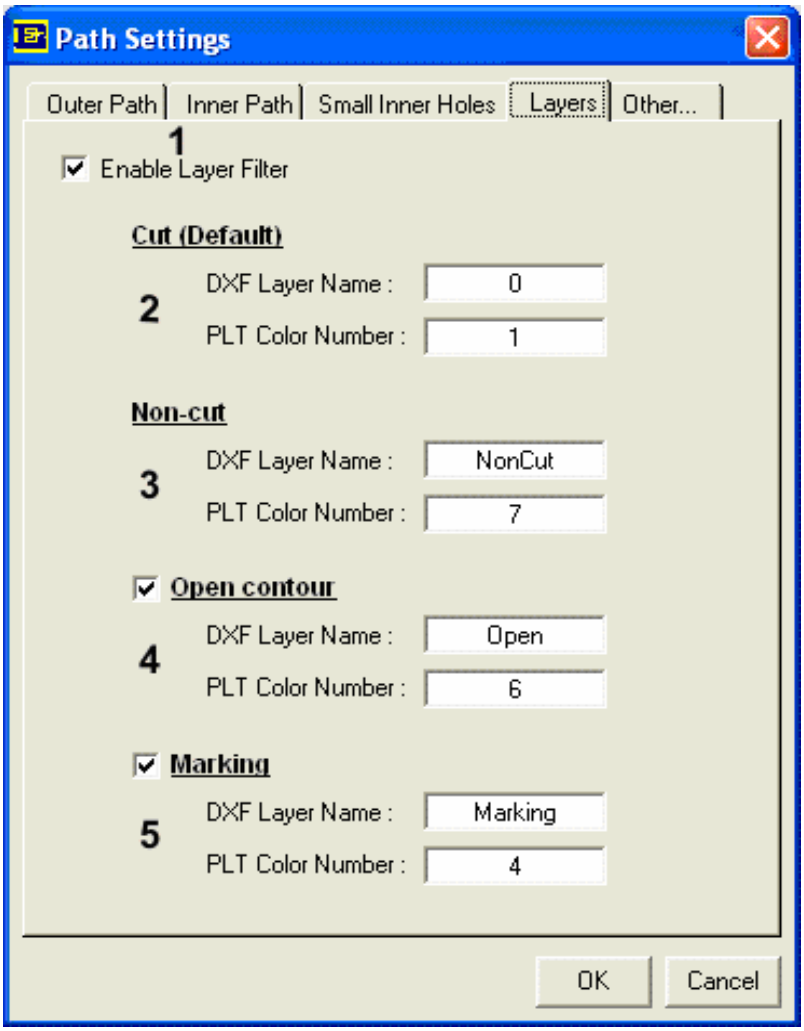
5.3.5 ***Lead Out Type***. What was mentioned in 5.1.2. is valid also here.

5.3.6 ***Lead In and Lead out Length***. What was mentioned in 5.1.3. is valid also here unless we have opted for Start from Center, in which case these values are determined by default.

5.3.7 ***Lead in and Lead Out Speed***. Feed rate during Lead In /Lead Out. What was mentioned in 5.1.4. is valid also here.

Note: Cut direction is the same as the Inner Path one.

5.4 Layers Tab:



This part of the program is perhaps the most important one: it is here that the user can determine whether the machine will function as an engraver or a cutter in the case EUROPATH drives a laser machine, whether Open Drawings can be imported and cut or even whether it is possible to Import

Parts with sides which are not supposed to be cut, in the cases we want to have common cuts, that is processing the edges of two adjoining parts with the same cut, with the purpose of saving material, cutting gas and time. We are going to give detailed instructions on how these steps are materialized, with examples.

Before we start, we should explain how we can define the layers when we want to import DXF and PLT type of files. As already mentioned, both DXF and PLT file types can be imported while working on our program: With DXF files, layers are defined by the name of the layer on which commands are drawn, PLT file layers are defined by the color commands are drawn in. We must therefore inform the program on the colors we have drawn any layer of PLT files, typing in the number of the color defining each layer; as far as DXF files are concerned, the name of each and every layer must be explicitly typed into the program. Detailed instructions on these procedures follow.

5.4.1 ***Enabling Layer Filter***. If we fail to enable this option, no multi-layered parts can be imported to our program. All commands, regardless the layer they are on, are considered as Cutting commands. If, on the other hand, Layer Filter is enabled and no layer definitions are fed into the program, importing the Part will not secure that its levels be recognized.

5.4.2 ***Cutting Layer***. Any commands on this level are typical Cutting Commands. Usual layer name for DXF files is "**0"** (number zero), for PLT files is the black color, numbered "**1"**.

5.4.3 ***Non Cut Layer***. Any commands on this layer are considered as typical Cutting commands, subject to any processing, but, on the final step, no CNC code is generated for them. Lead In and Lead Out settings for such layers are meaningless, which is the reason why they will not appear on screen. In other words, on generating the final CNC code, such commands/settings will be as good as non existent. Usual name for such a layer for DXF files is "**NonCut**", whereas for PLT files is the number "**7**" blue color.

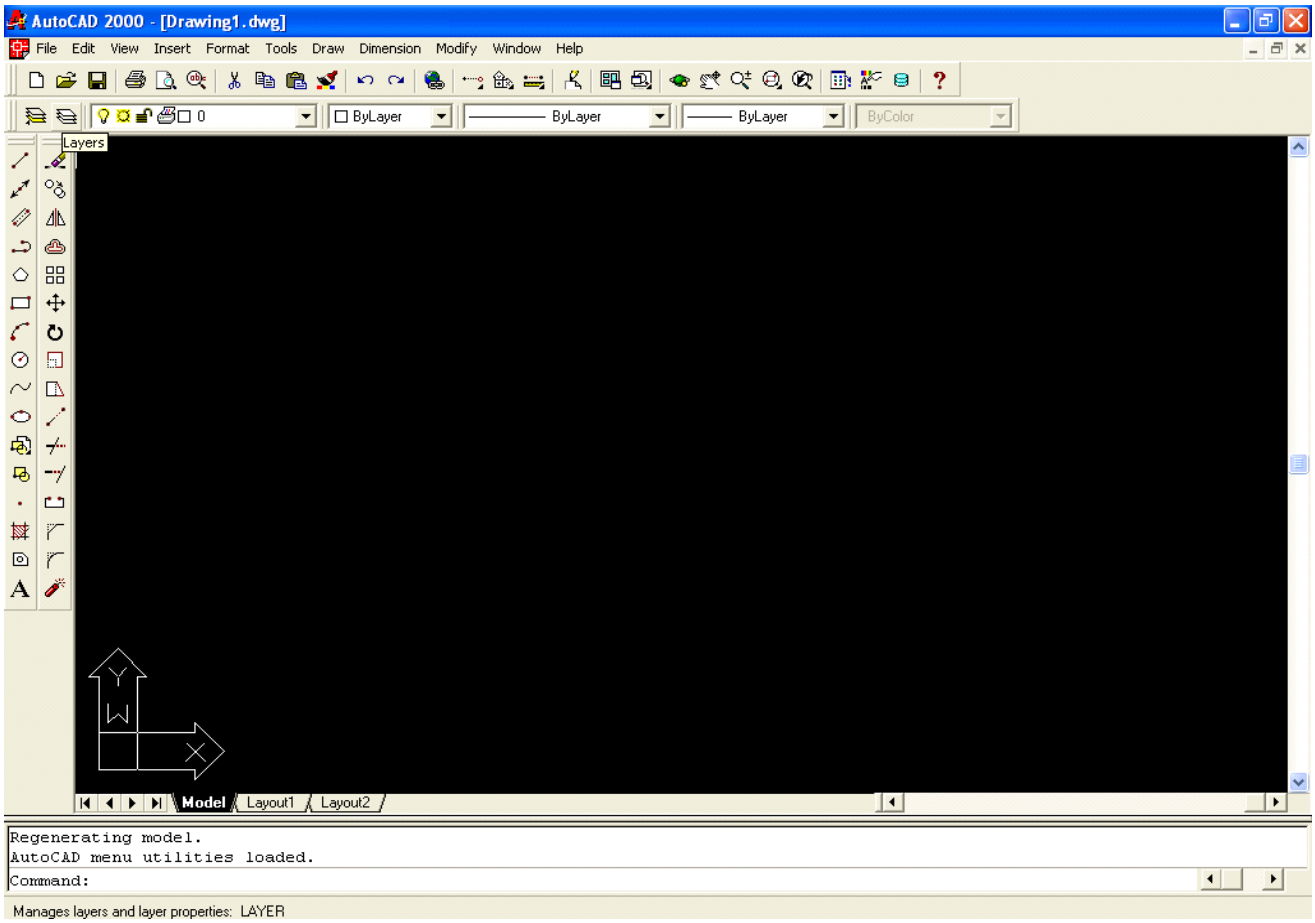
5.4.4 ***Open Contour Layer.*** Commands on this layer deal with Open Drawings. We can therefore import Open Drawings and cut them as any other Part. While cutting such contours, no control is being made, except for the cut succession, that is the "cutting route" which follows the preset order. No Kerf compensation or Lead In and Out is possible. The drawings are cut exactly as they are. These Open Drawings must, of course, be included into some other "closed" drawing, for them to be possible to Import. In case we wish to just cut an open Drawing, it should be enclosed onto a Non Cut Layer, and this way the only actual cutting will be the one of the open Drawing. Another option available is to have the layers enabled and keep the open drawings not imported. In case we disable this layer the product will be imported as usual, with the drawings open, but when we place it in the plate these drawings will not appear on our screen. This layer is usually named "**Open**" when we work with DXF files and Yellow colored (color code "**6**") when PLT files are the case.

5.4.5 ***Marking Layer***. The commands on this layer deal with marking. It is especially useful to laser cutting machines, where also marking is possible. What we mentioned in step 5.4.4 is also valid here, keeping in mind that here we enable marking. When we work with DXF files we usually name this layer as "**Marking**", in PLT files the color of this layer is green (Color Code "**4**")

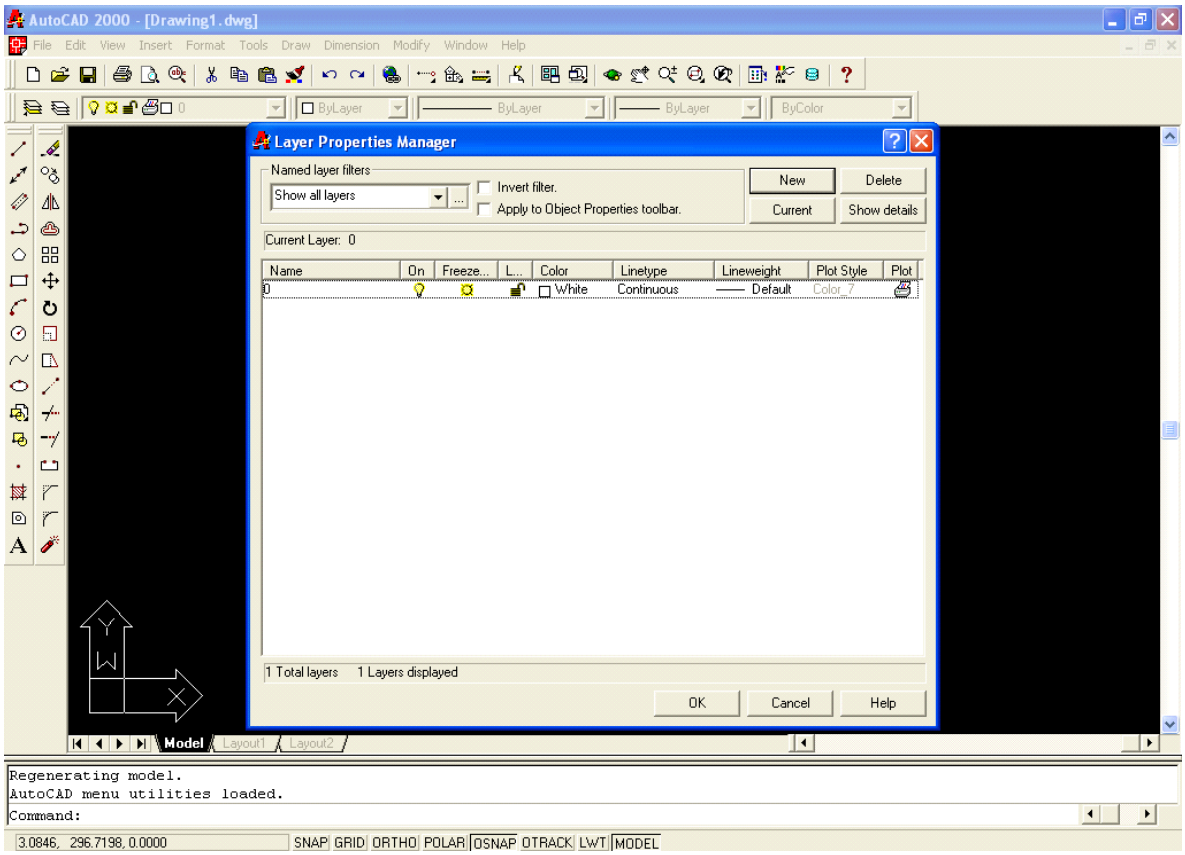
DXF Layer Creation in AutoCAD 2000:

Here, using a simple example, we will explain how we can create various layers in Autocad and save the final drawing as a DXF file.

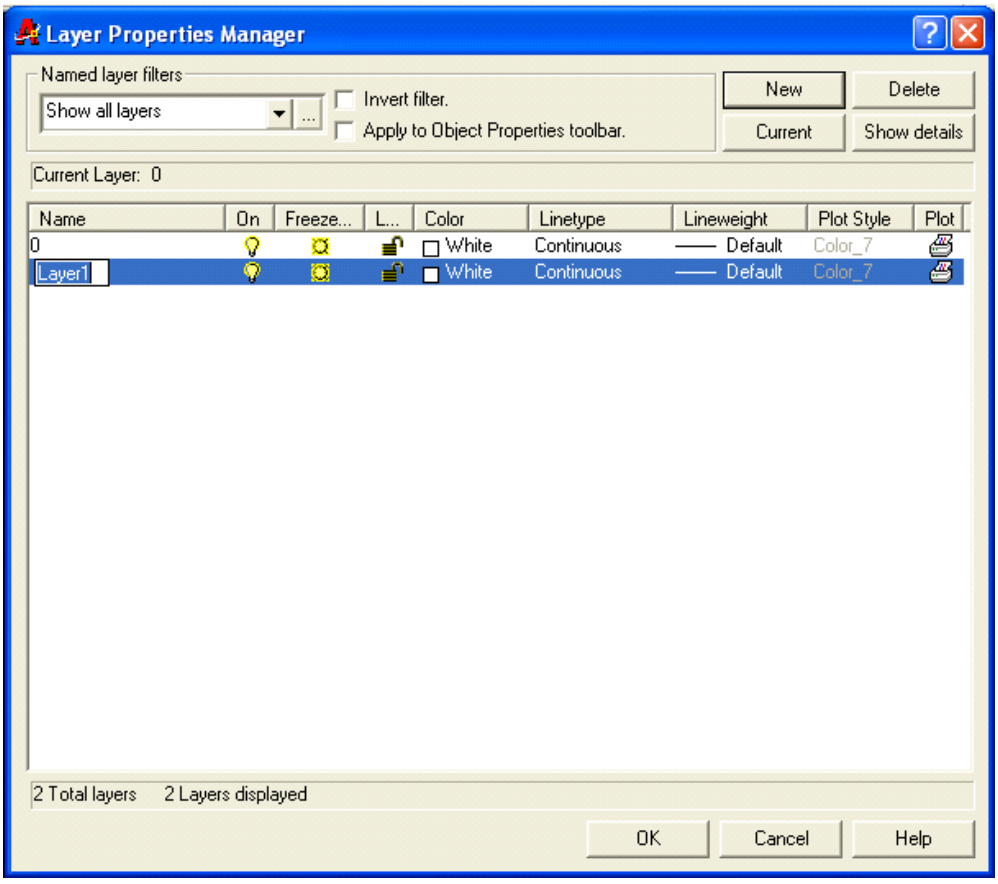
Let us suppose we wish to draw a simple rectangular profile with a cut in the middle. After we have started the program and opted for **New Job**, we click on the Layers button on the top left.



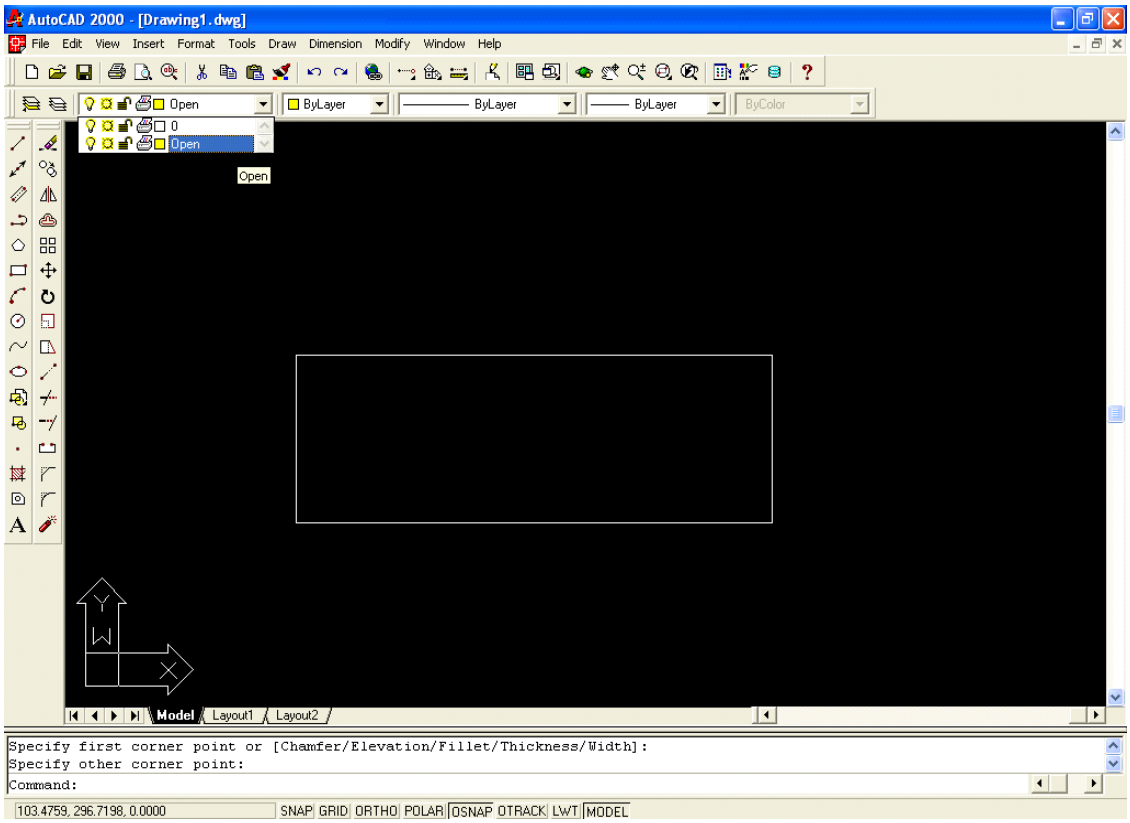
…and we are shown to the following form:



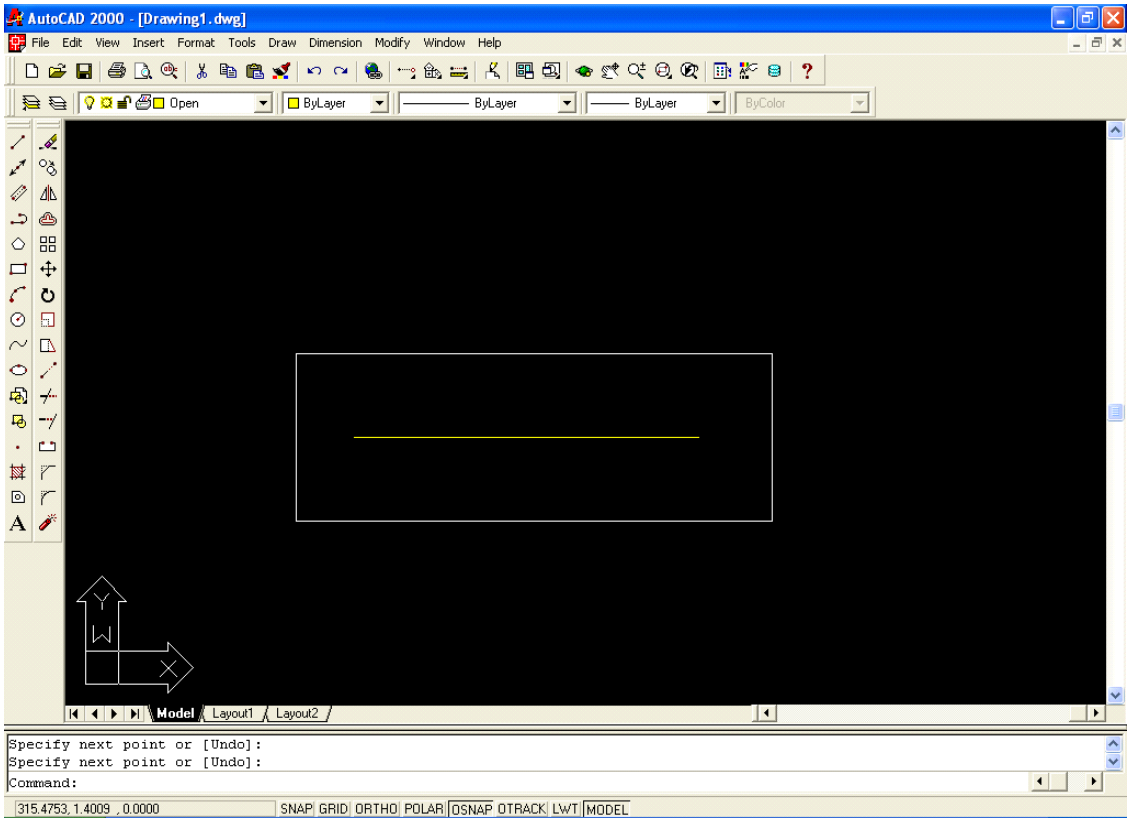
Here we can only see one layer, layer 0 (zero). This is the default layer in Autocad and it can be considered as our Default Cutting Layer. Now we must create a layer for the Open Drawings: We press the "New" button on the form to create a New Layer, which we name "Open" and give it a color, for example yellow. We use the same configuration in EUROPATH , paying special attention to giving the Layer the same name as before, thus providing EUROPATH with a criterion to recognize the named Layer. Colors are left to our discretion but it is advisable to use the same colors used in EUROPATH , for reasons of consistency. After we are done with this procedure we press **OK** to return to the Main Form.


Layer Properties Manager
Named layer filters
Show all layers
Invert filter.
Apply to Object Properties toolbar.
New
Delete
Current
Show details
Current Layer: 0
Name
On
Freeze...
L...
Color
Linetype
Lineweight
Plot Style
Plot
0
White
Continuous
Default
Color_7
Layer1
White
Continuous
Default
Color_7
2 Total layers
2 Layers displayed
OK
Cancel
Help

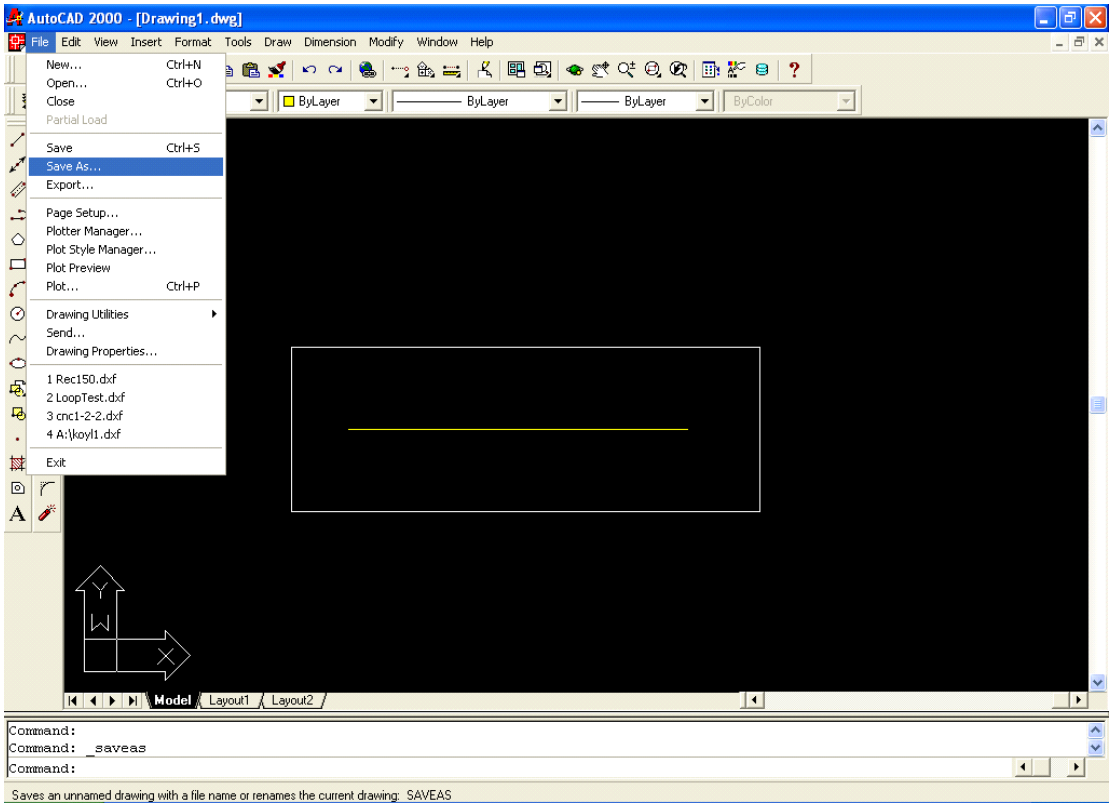
We can now start drawing our desired profile. First we draw a rectangular; our next move is to select Open Layer, for the program to show the drop down list of Layers…

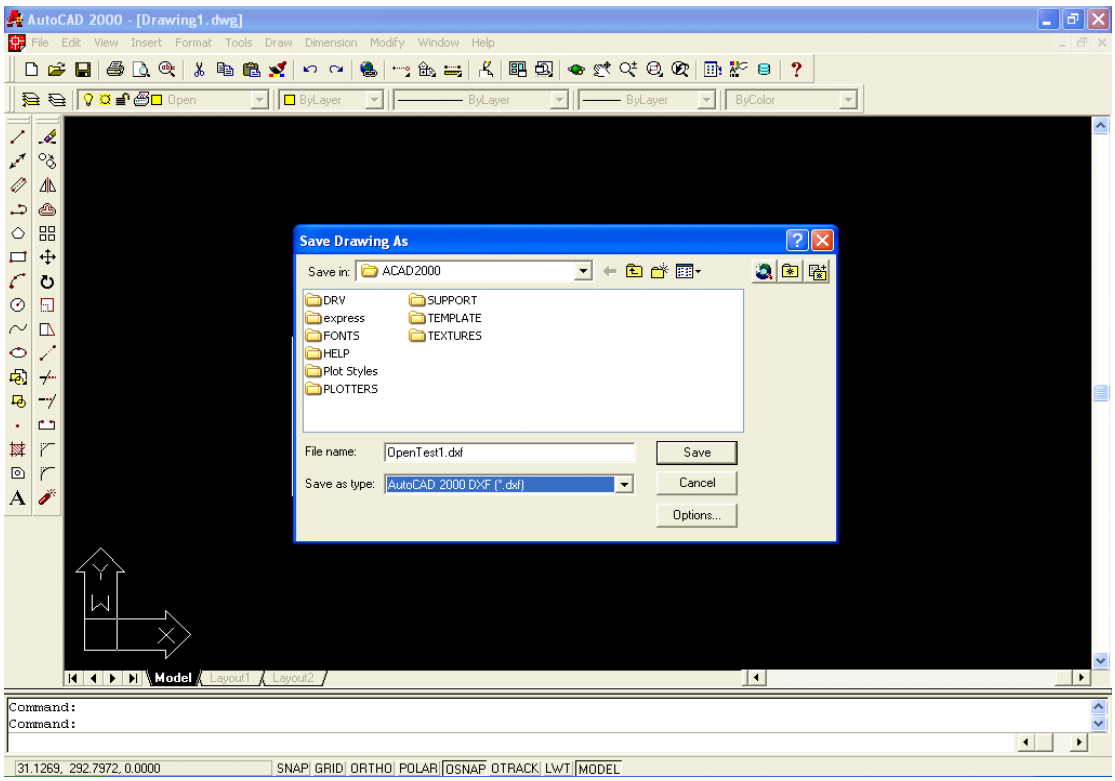


…and we draw a straight line in the center of the Drawing.



Now we save the file in DXF form.



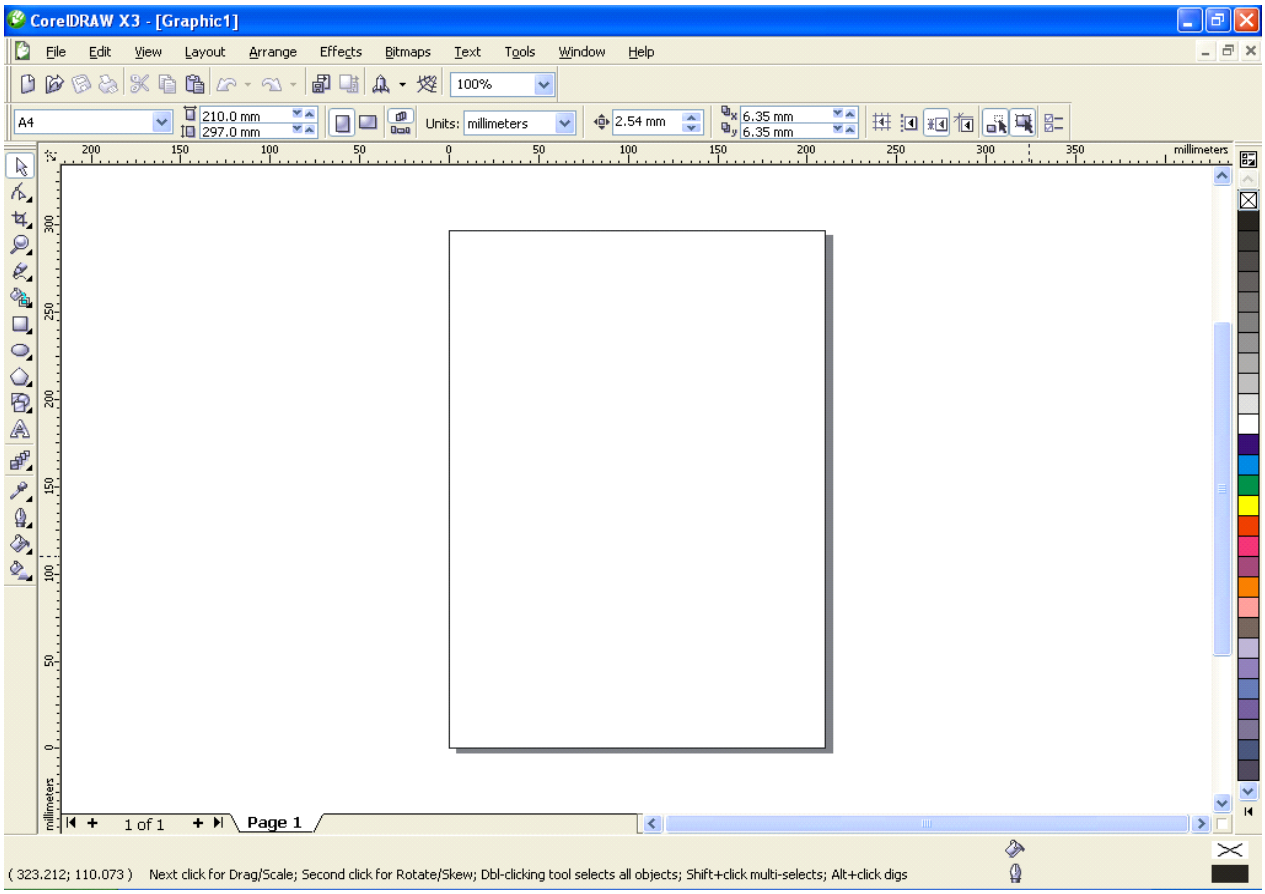


Our Part is ready to be imported to EUROPATH , having enabled the Layers Filter. When we cut it, we get the rectangle with the line in its middle.

PLT Layer Creation in CorelDraw X3 :

Now, using another simple example, we will explain how we can create various layers in Corel and save the final drawing as a PLT file.

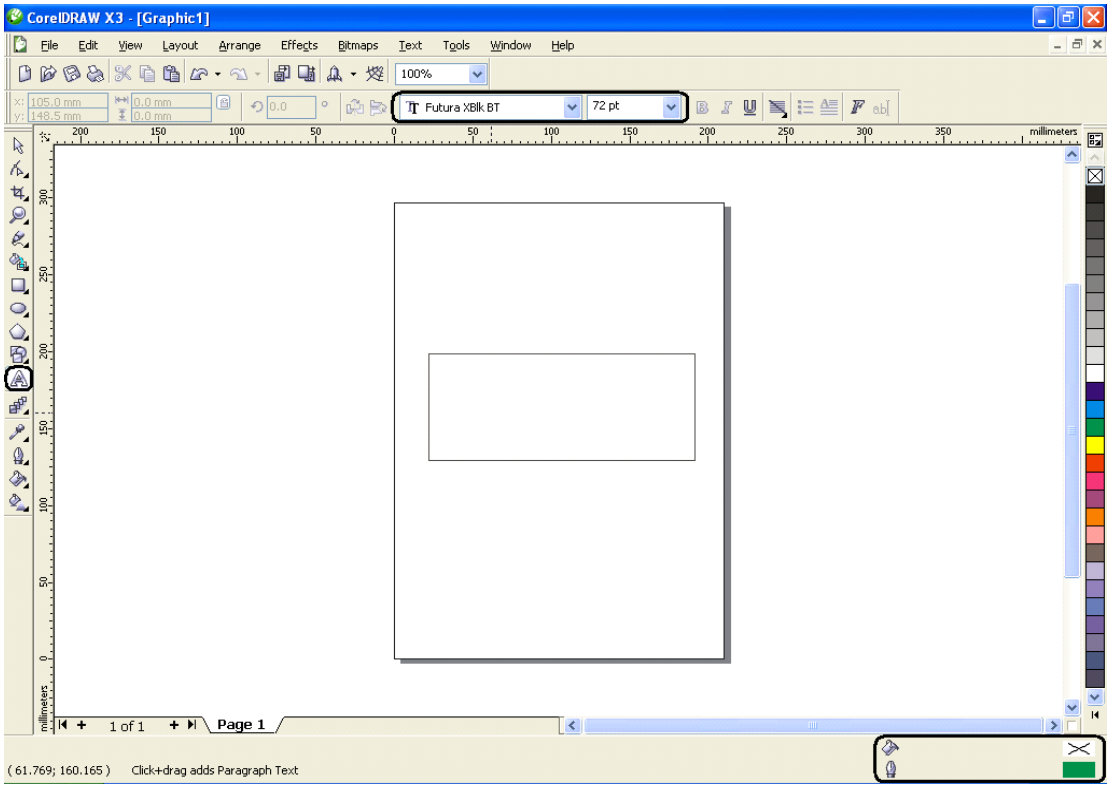
Let us suppose we wish to cut a small rectangular metal plate with our Logo marked on it. We first start the program and opt for **New Job**. Then, we create the rectangle in the shape of the plate we wish.

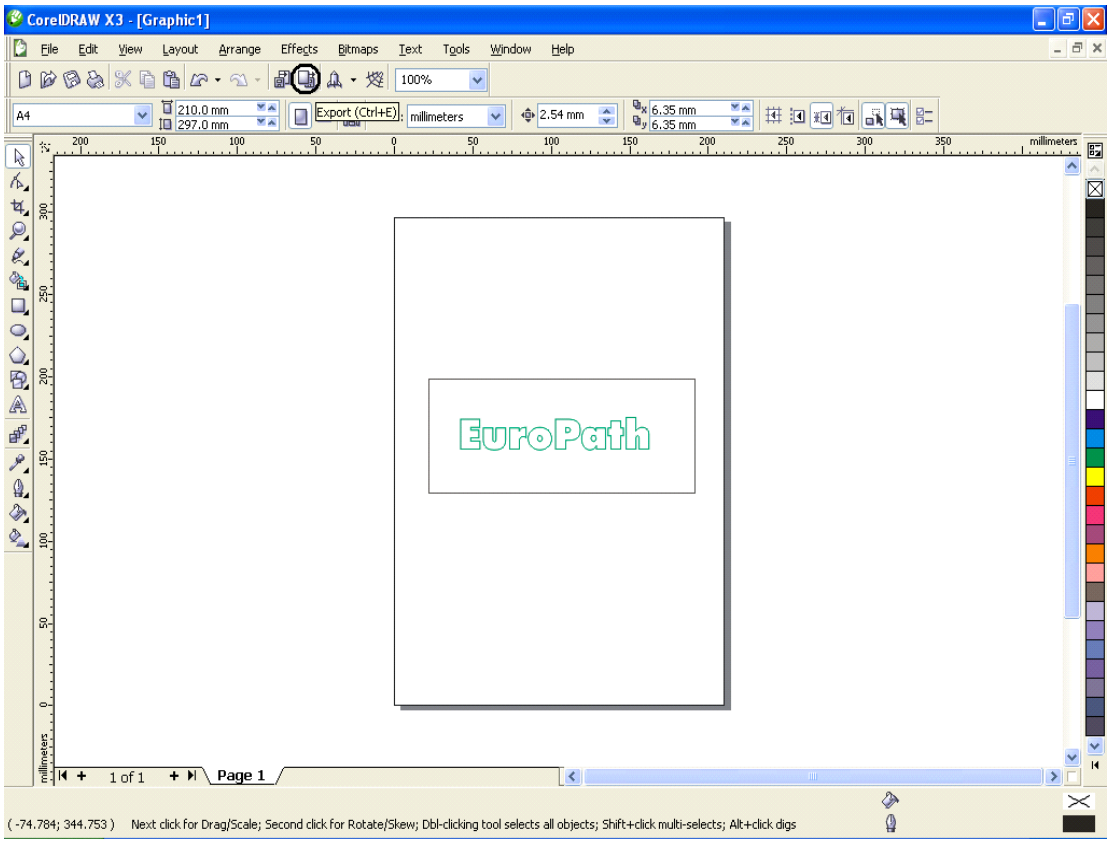


After drawing the rectangle, we click Escape, to deselect the drawing. We now select the Text tool in the toolbox to the left. We select the font and the font size we want, for example we select Futura XBlk BT and font size 72pt. We now select the green color for the Contour and No Fill-in Color. We have chosen the green color to declare that we want the layer to be a “Marking” one. Color selection is made in the color palette to the right. Right-clicking determines the color of the contour, left-clicking we pick the fill-in color

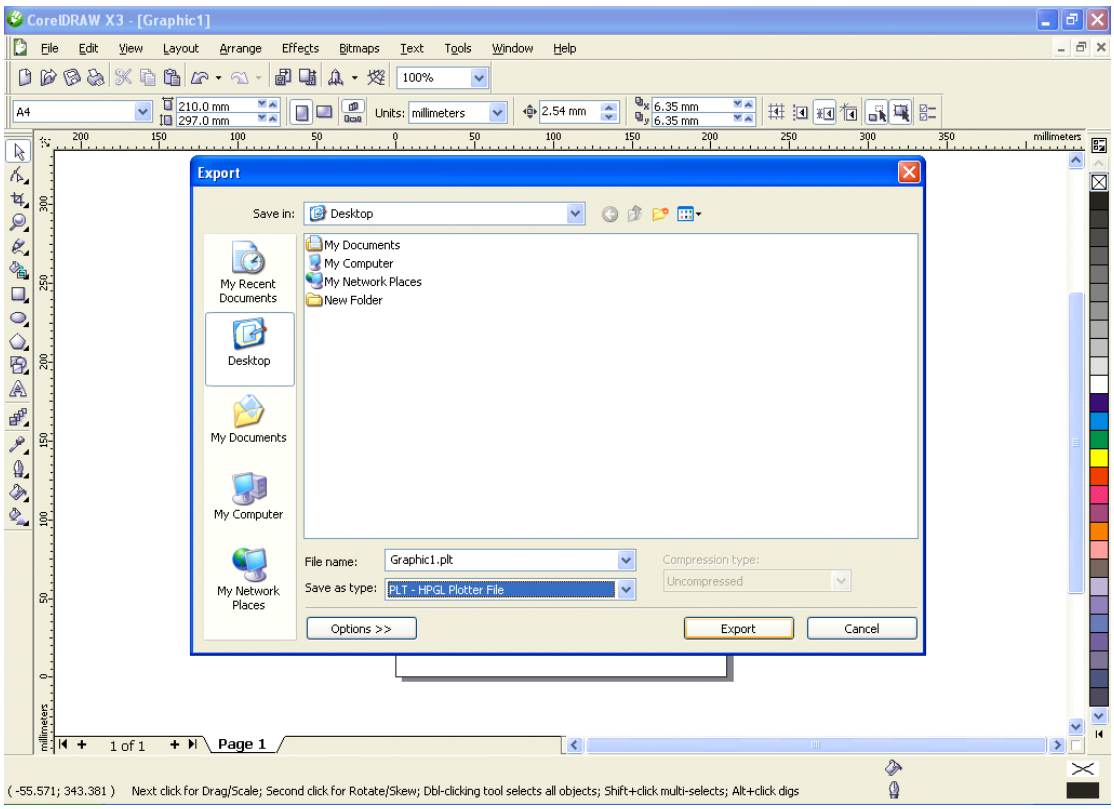
Everything is set for us to type in the word we wish to the rectangle. For example, we type in “EUROPATH ”. We click on the Select button in the toolbox (the arrow button) and press Escape, so that the word is deselected. This was all!

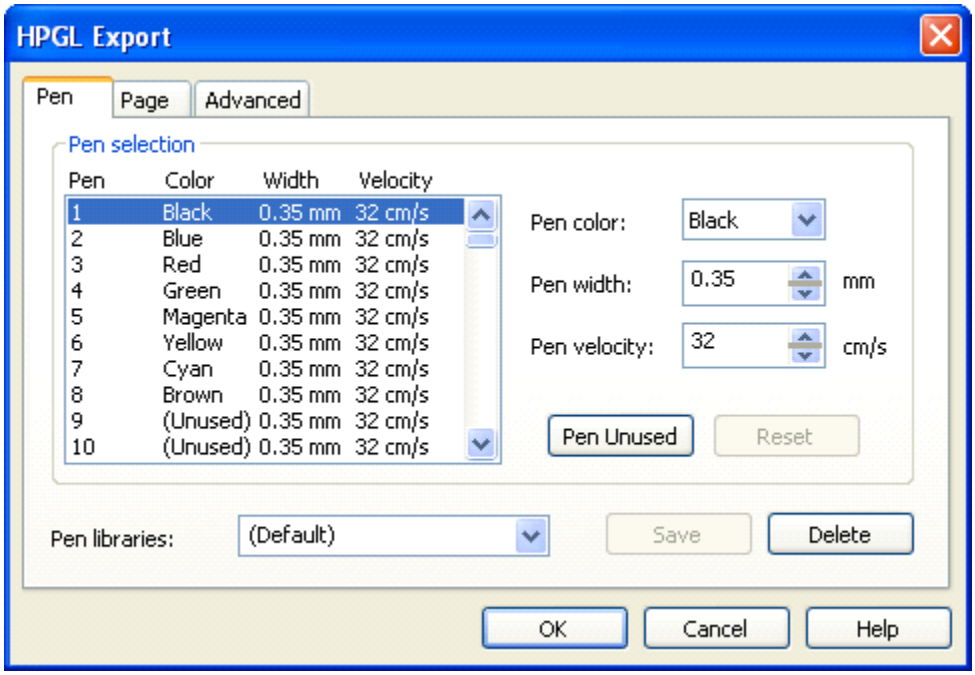
The following photos depict the previously mentioned steps.





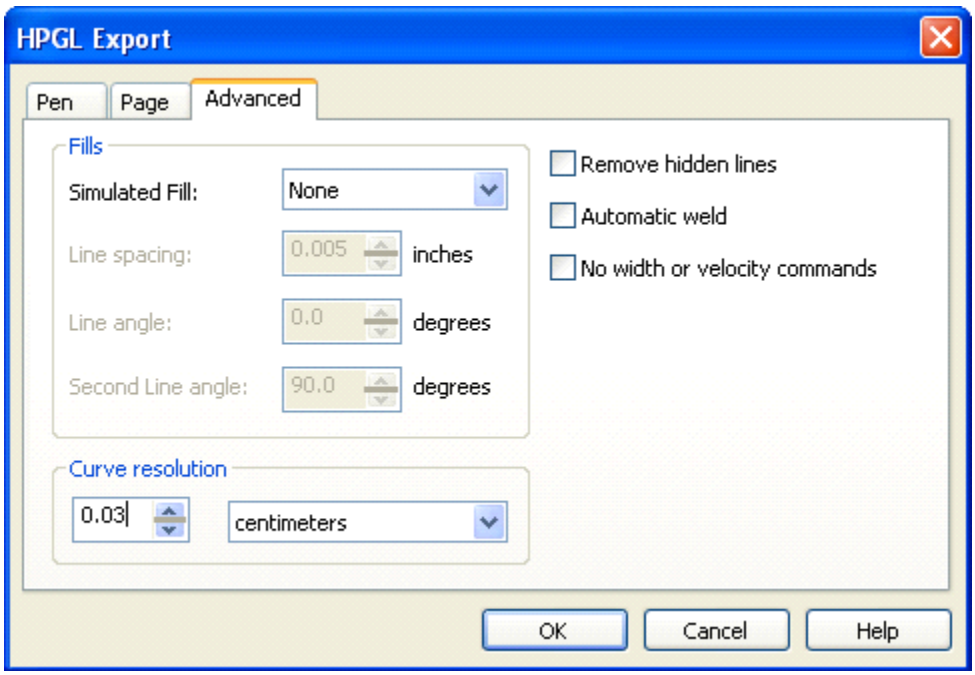
It only remains now to export the drawing to a PLT file. We click on the relevant button above and we are shown to a form, where we can select PLT file, give a name to it and click Export, as depicted in the following photos. The form we are shown to next is rather important.





Here we must make sure we pick the right Pen colors for the file to be properly recognizable by our program. Marking is recognized by the Green color, etc., in relevance to the EUROPATH Layer configuration.

Clicking the Page Tab, we can determine the plotter units: to achieve the highest accuracy possible, we select the highest number available. It is absolutely important that identical values be configured in EUROPATH as well; otherwise, the part will be imported with wrong dimensions.



The Advanced Tab shows us to the Curve Resolution, **a decisive parameter to drawing curves segmented in successive straight lines.** Curve resolution value 0.03 is satisfactory. If we pick a lower value, the straight lines will be of next to zero length and difficult to be recognized by the EUROPATH .

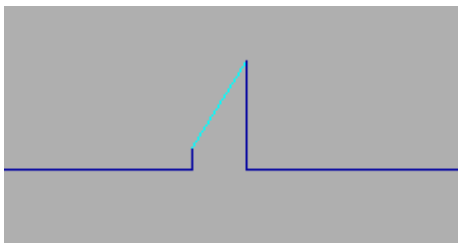
Now we press **OK** and we are through. In the same way we can produce any Layer we wish.

5.5. Other… Tab:

Here we can change the parameters configuring Tabs, Loops and Kerf Compensation.

Tabs are involved with cutting: a. very long profiles, b. very small ones.

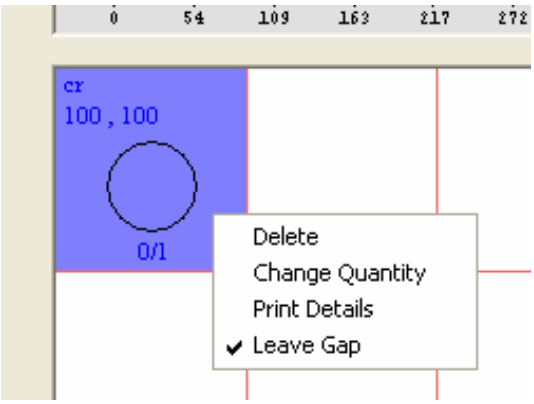
a. When we cut very long objects, we must leave Tabs while cutting the long sides, for the profiles to remain attached to the plate and their deformation be avoided. Every Tab must be equipped with Lead Out and Lead In connected to each other with a Non Cut line, so that the continuity of the Torch movement is not broken and cutting is interrupted to achieve our goal. The following Drawing is self-explanatory:



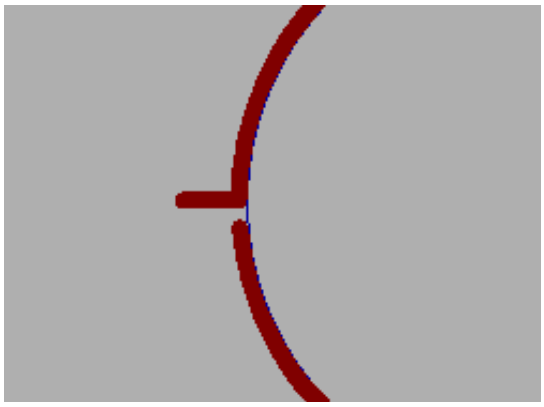
A Tab added to a long profile.

Cutting direction is from left to right.

b. Very small parts, when cut, usually fall in the pantopraph table and get lost. To solve this problem, we leave a tiny tab before their profile is completely cut; this way they remain safely attached to the plate. These tabs are not visible before the final CNC code is generated. The only way to check this in advance is by right-clicking the mouse on a selected part in the Main Form's Job List.

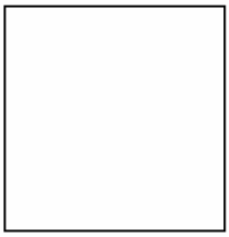


Leaving tab checked

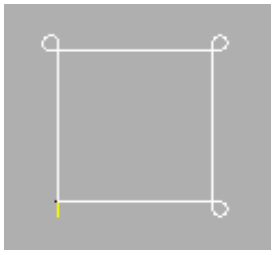


Cut simulation

Loops are used to maintain a constant feed rate (cut velocity) while cutting angles, to achieve an optimal cut quality. To do this, we run small circles around the corners of the parts as shown in the following drawing.



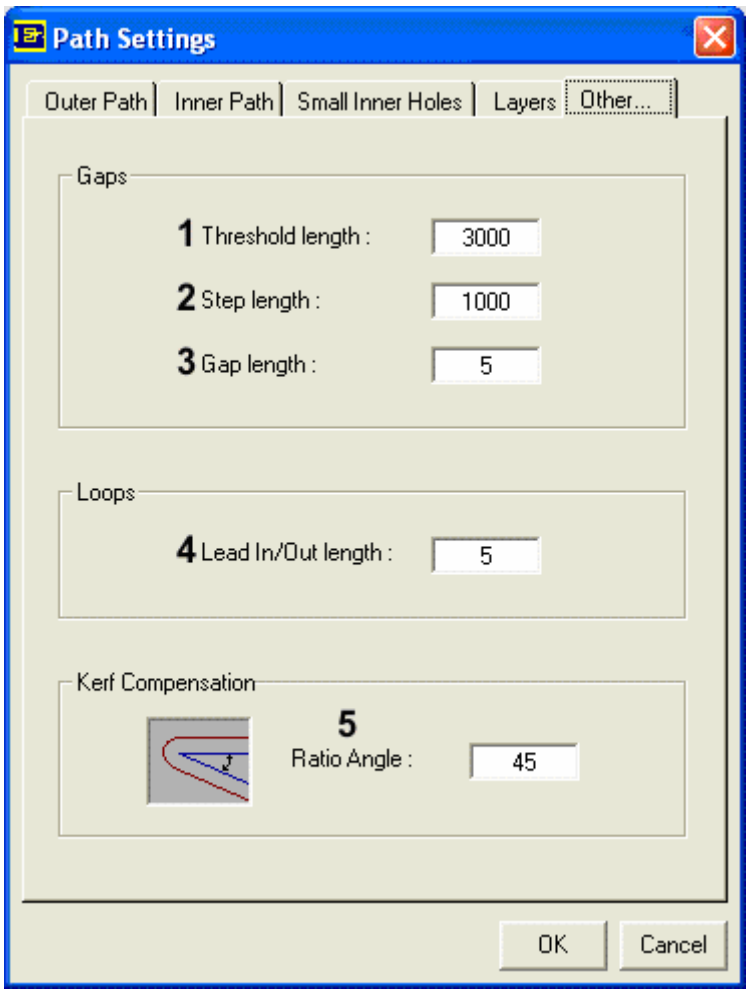
Initial Drawing



Drawing with Loops

Not all corners are cut with the help of Loops. Prerequisite conditions are determined by the program.

Kerf Compensation: This is an operator adjustable dimension, which can be altered at any time. It is the amount of cutting path offset required to compensate for the material removed by the cutting process. There is an issue with cutting acute angles of a few degrees, when the head may be obliged to proceed further away to accomplish a correct cut and, at the same time, have to change direction abruptly, a turn that can be as sharp as almost 180 degrees. To remedy this, we can configure the machine to cut around a corner following an arc-shaped path, instead of cutting all the way to the angle point.

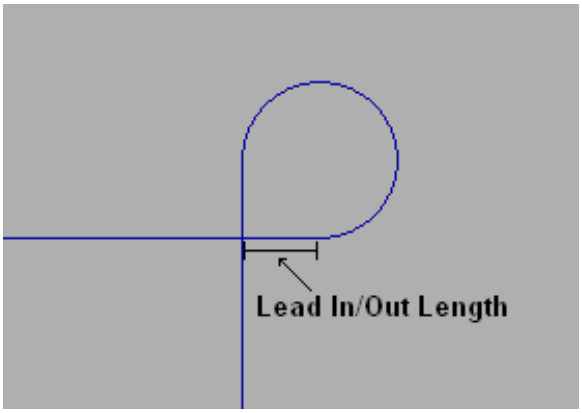


5.5.1 ***Threshold Length to add Tabs***. Only sides of the Profile with length equal or bigger than the one determined here will have Tabs added.

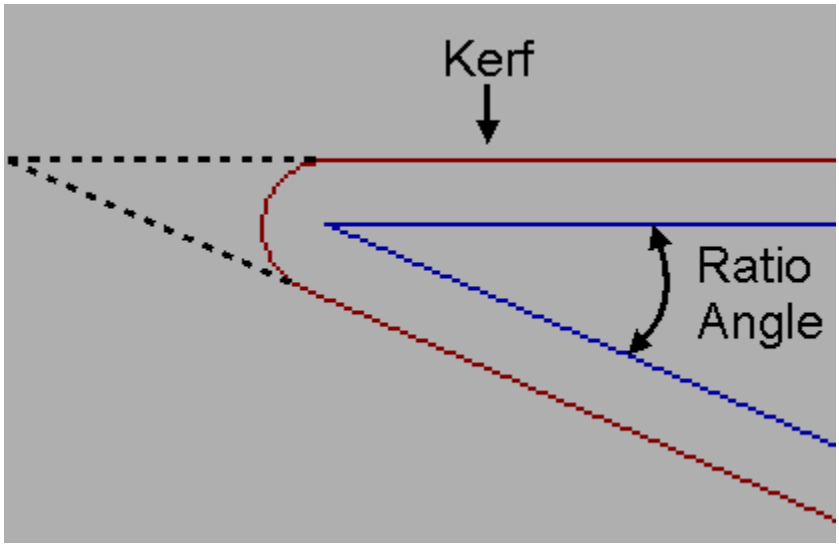
5.5.2 ***Step Length***. The sides into which the long ones will be segmented will have the chosen length.

5.5.3 ***Tab Length***. The Tab left will be this long.

5.5.4 ***Loop Lead In/Out Length***.

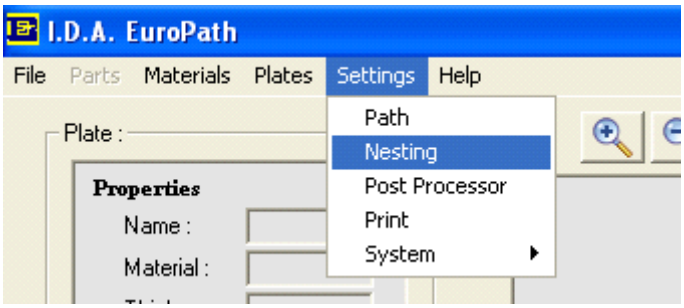


5.5.5 ***Angle threshold to transform an angle to an arc***. Angles of value equal or less than the one typed in here will be transformed into arcs, to avoid the problem mentioned before under Kerf Compensation.

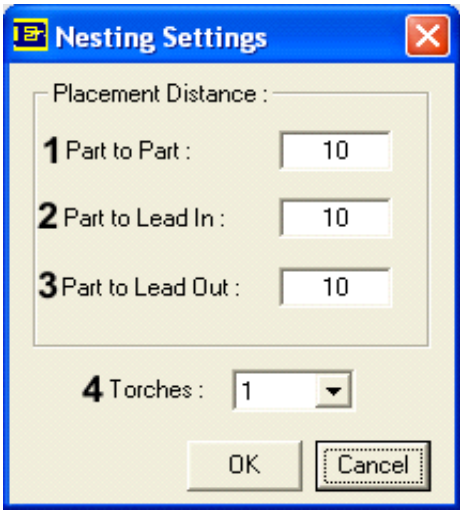


6. Nesting Settings:

To show Part Placement Settings we select Settings in the Main Menu and then Nesting.



We are shown to the following "Nesting Settings" form:



6.1 ***Minimum Part to Part distance***. This is the minimum distance between two Parts placed in the plate. This parameter is a dynamic one and can change during the execution of a Cutting Job, therefore users are advised to check it whenever we start a New Job. This value is not allowed to be twice as that of Kerf, because this would result in Part damage during cutting of the adjacent parts.

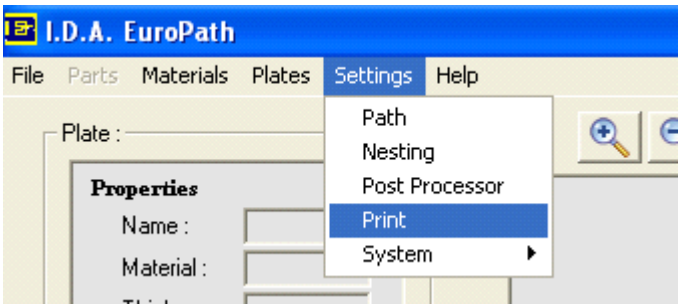
6.2 ***Minimum Part to Lead In Distance***. This is the minimum distance between a Part and another one with a Lead In.

6.3 ***Minimum Part to Lead Out Distance***. This is the minimum distance between a Part and another one with a Lead Out.

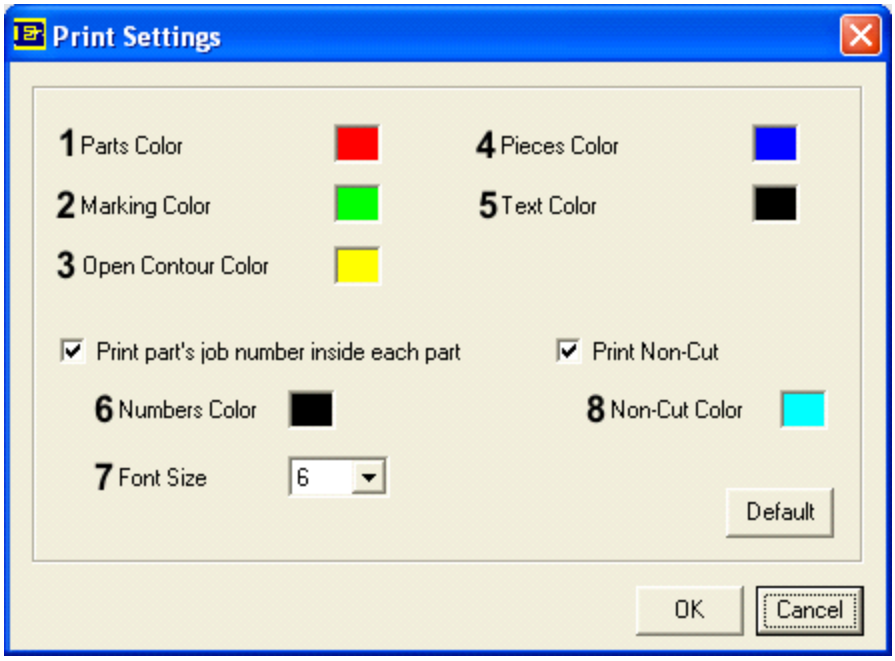
6.4 ***Number of Torches***. Here we select the number of torches the cutting machine is equipped with. When the torches are more than one, the program automatically divides the plate into a number of pieces equal to the one of the torches and uses only one. For example, if we have a 4000x4000 plate on a machine equipped with two torches, the program will automatically work with a 4000x2000 piece of plate.

7. Print Settings:

To show Print Settings we select Settings in the Main Menu and then Print



We are shown to the following "Print Settings" form:



7.1 ***Parts in the Plate color***. The color of the parts in the Plate as shown in a Printout of the Nesting.

7.2 ***Marking Color of all commands in Marking PrintOuts***.

7.3 ***Open Contour Color in all Printouts***.

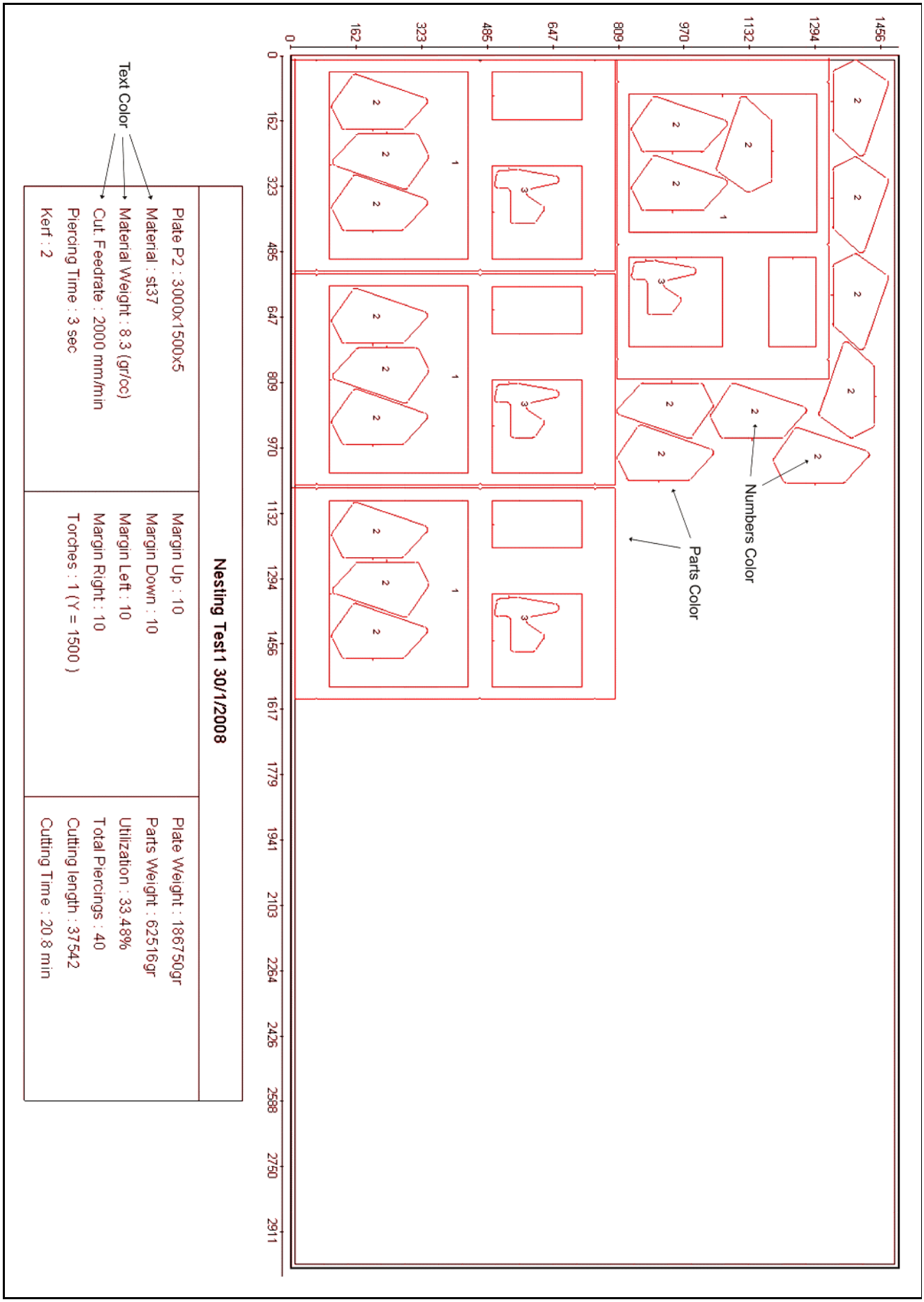
7.4 ***Parts Color when printed in detail***.

7.5 ***Text Color in all Printouts***.

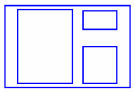
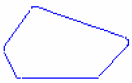
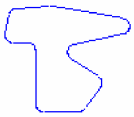
7.6 ***Font Size***. When we place a large number of Parts in the plate it is usually difficult to recognize the Parts; we are therefore allowed to print a number on the part, the number of any part in the Part Catalog so that the parts are more easily recognizable.

7.7 ***Font Size of the numbers in 7.6.***

7.8 ***The color of the commands that are not going to be cut.*** Here we can omit printing these commands.


Numbers Color
Parts Color
Text Color
Nesting Test1 30/1/2008
Plate P2 : 3000x1500x5
Material : st37
Material Weight : 8.3 (gr/cc)
Cut. Feedrate : 2000 mm/min
Piercing Time : 3 sec
Kerf : 2
Margin Up : 10
Margin Down : 10
Margin Left : 10
Margin Right : 10
Torches : 1 (Y = 1500)
Plate Weight : 186750gr
Parts Weight : 62516gr
Utilization : 33.48%
Total Piercings : 40
Cutting length : 37542
Cutting Time : 20.8 min

Nesting Test1 30/1/2008 Page 1/1

1  Name : cnc1-2-2 Pieces : 4 Size : 789.6x522 Area : 254113 mm² Weight : 10546 gr Total weight : 17103 gr Piercings : 4 Cut. length : 5831 Cut. Time : 3.1 min	2  Name : pa1 Pieces : 20 Size : 236.7x136.5 Area : 22214 mm² Weight : 922 gr Total weight : 922 gr Piercings : 1 Cut. length : 597 Cut. Time : 0.3 min
3  Name : rect3 Pieces : 4 Size : 158.2x134.1 Area : 11420 mm² Weight : 474 gr Total weight : 474 gr Piercings : 1 Cut. length : 570 Cut. Time : 0.3 min	

Pieces Color

Text Color

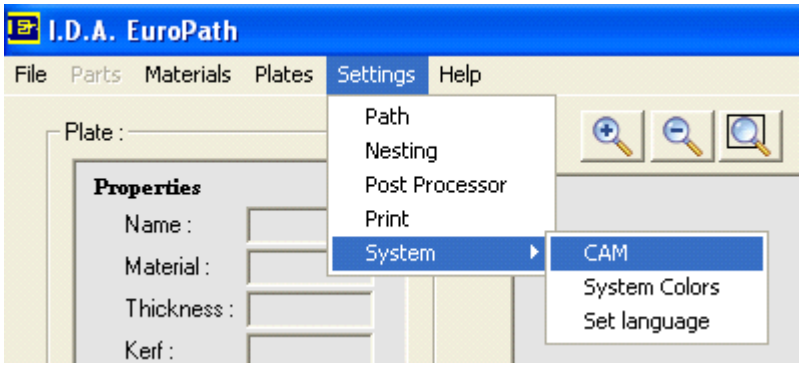
8. System Settings:

The System Settings dealt with here refer exclusively to EUROPATH.

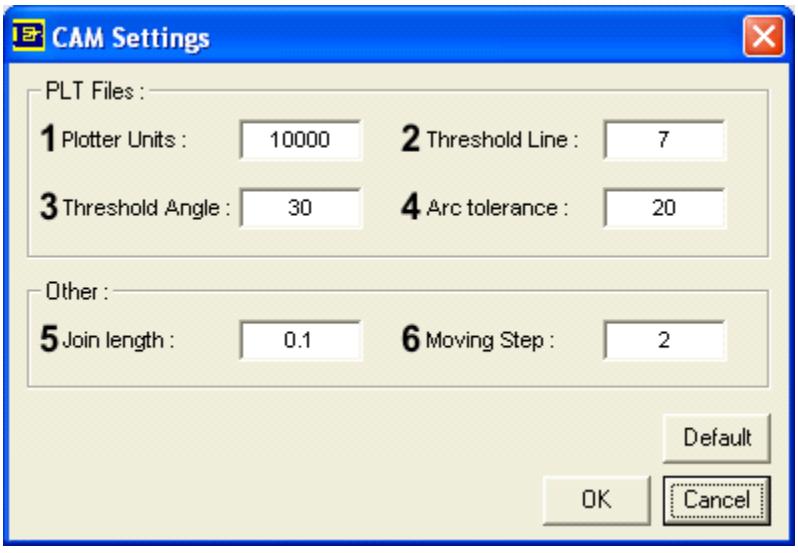
These are settings of three kinds; here follows a detailed reference to them:

8.1 CAM Settings:

To show these System Settings we select Settings in the Main Menu, then System and finally CAM.



We are shown to the following "CAM Settings" form:



8.1.1 ***Plotter Units for PLT files***. This value must be identical to the one on which the PLT file was created, so that we get the part in its correct dimensions. To achieve the highest accuracy possible, we always make sure to use the biggest number provided by the Design Program. Corel, for example, yields a number as high as 10000 (ten thousand).

8.1.2 + 8.1.3 + 8.1.4 ***Setting PLT file parameters*****.** These parameters are related exclusively to PLT files. These files comprise of straight lines only, this is why we have to convert any sequence of tiny straight lines to arcs.

8.1.2 ***Threshold Line (Maximum Length of straight lines [mm])***. Only sequences of straight lines with length equal or shorter than the one set here will be converted into Arcs.

8.1.3 ***Threshold Angle (Maximum angle formed by straight lines [degrees])***. Only pairs of straight lines forming an angle equal to or less than the value set here will be converted into Arcs.

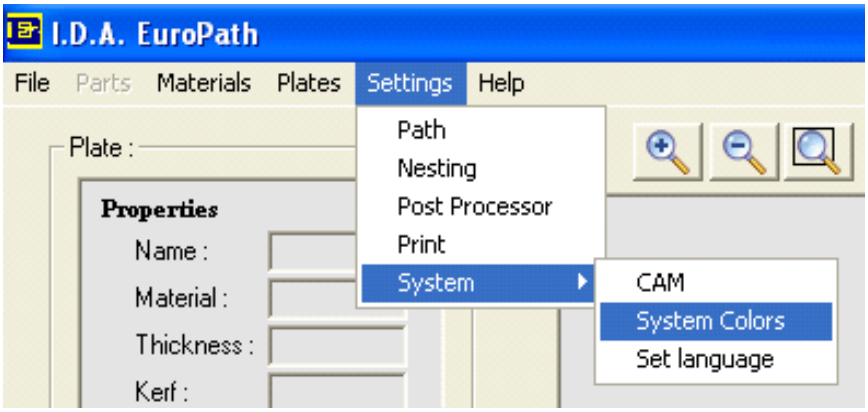
8.1.4 ***Arc Tolerance (Maximum distance between the centers of two consecutive similar arcs to be considered as one [mm])***. This is a value determining when two consecutive arcs having almost the same center and the same radius will be considered as one. This value denotes the distance between the two centers.

8.1.5 ***Join Length (Maximum Gap allowed between two continuous points [mm])***. This value denotes the maximum Gap allowed in a Drawing for the program to handle it as a closed one, in other words, not to consider it as being an Open Drawing. This parameter is only of importance at the stage of Part Import.

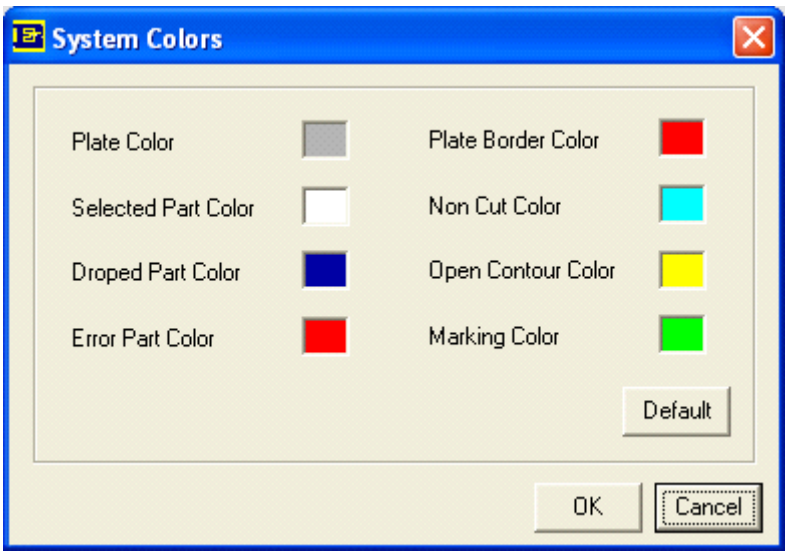
8.1.6 ***Moving Step (of any Part in the plate [mm])***. This value sets the step for the part transfer while moving the Parts in the plate using the arrows.

8.2 System Colors:

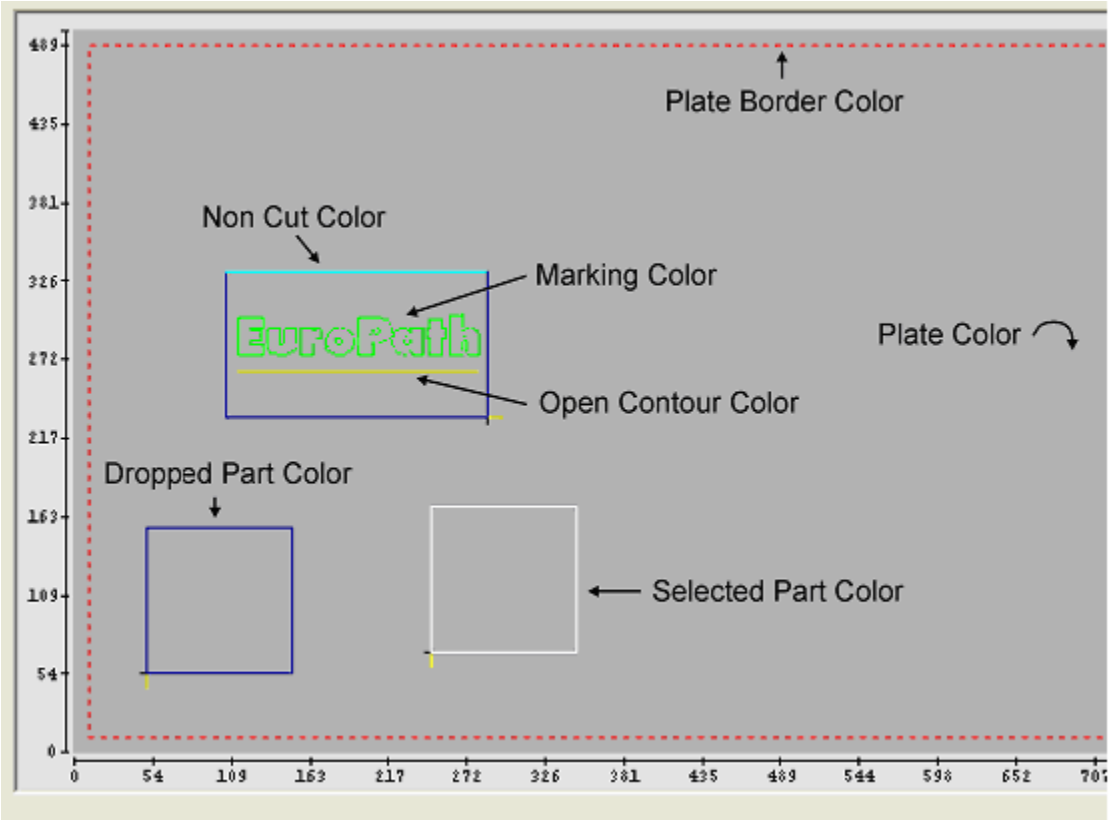
To show these System Colors we select Settings in the Main Menu, then System and finally System Colors.



We are shown to the following “System Colors” form:

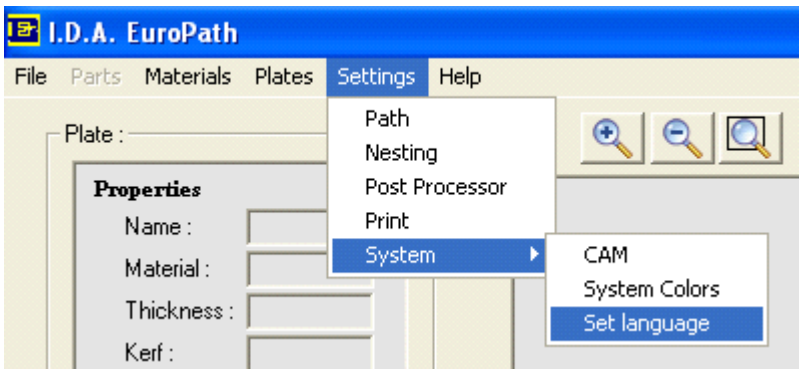


What every color represents is shown in the following photo. It must be noted that Lead In appears always in Yellow and Lead Out in Black

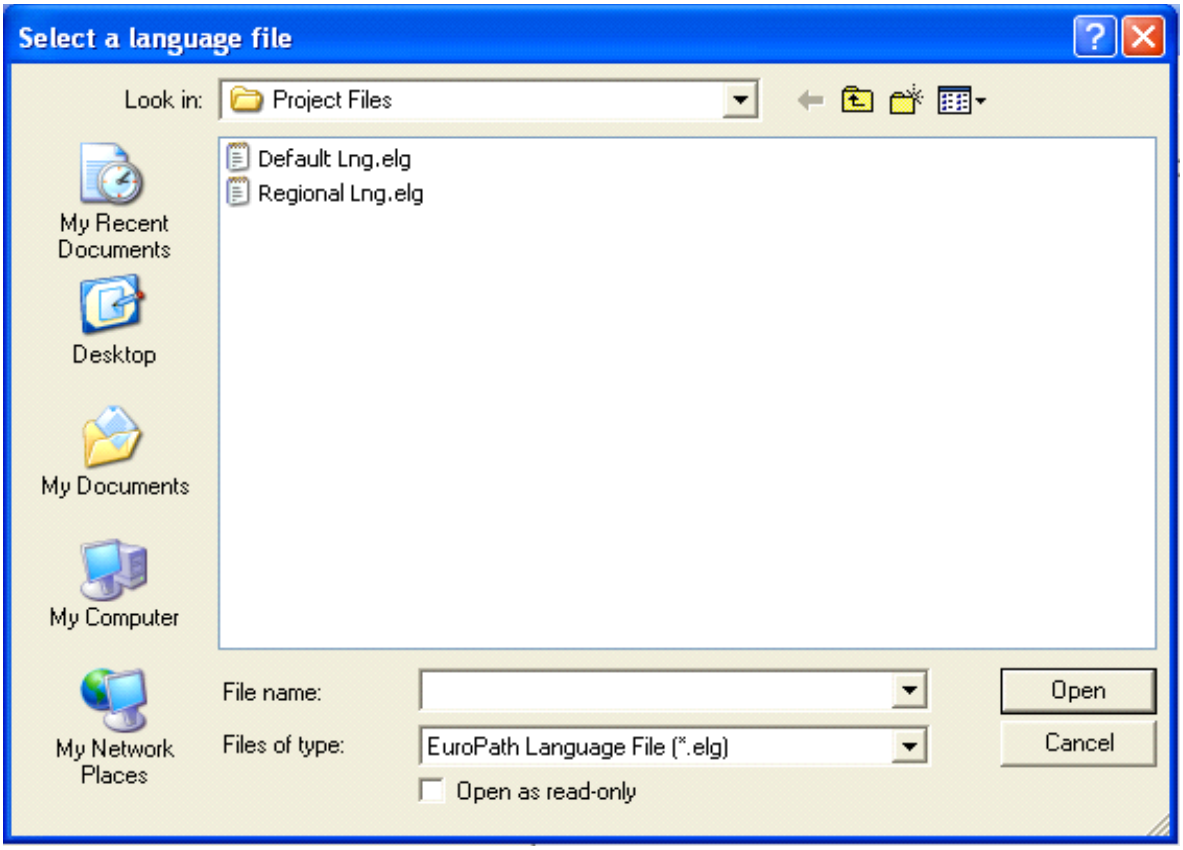


8.3 Set Language:

To show these System Language Settings we select Settings in the Main Menu, then System and finally Set Language. These settings determine the language in the Forms **and** the Printouts.



We are shown to the following "Select a language file" form:



Here we are asked to select one of the Language files. There may be various such files, English, German, Greek etc. We pick the desired file and the whole Menu of the program changes to the relevant language.