Nesting

3.7.24

Nesting

tPa

Tecnologie e Prodotti per l'Automazione

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1   Features

Nesting program is able to place a list of machinings inside a panel by minimizing material loss. The user is free to choose the parameters, such as the workpiece rotation and the mirror or to define a frame for the sheet, where the workings cannot be positioned. These last are defined in the TCN file and can include normal nesting profiles, profiles including scraps or other machinings, that are ignored by the nesting process. A profile including scraps, (we will call it *hole*), is a closed profile inside a nesting profile, within which other nesting profiles can be nested. For example, if a working consists of a frame, its external profile will be a nesting profile, while the internal profile will be a hole, in which the material can be used again for other workings and so for other nesting profiles. The same results can be saved in a TCN file, one for each panel.

Therefore, the list of the workings to be nested will be a set of TCN files. For each of them the operator is able to set the number of the workings to take into consideration, the rotation step and the mirror to carry out. As for the default rotation, an invalid angle is set: this means that no rotation is possible.
The option is disabled by default for the mirror, as well . Therefore, for each working the user can choose the following options:

- whether and with which step he can enable the rotation;
- whether the normal working should be nested, always in mirror or in mirror only, when necessary;
- whether half of the instances should be nested in mirror and half as normal ones.

Furthermore, each working can be disabled and therefore it cannot be taken into consideration for the nesting process.

If inside the same TCN file there are more workings, such as the nesting profiles, we are in front of a Cluster. These profiles now will be always nested together and their reciprocal position will always remain. The clusters can be useful in the event of complementary workings, which the user decides to compact in the more efficient way, so that the nesting process achieves the best sheet covering.

As for the panels on which to nest the workings, the user can choose between the single typology mode with infinite instances and a multi-sheet mode, where a multi-type sheet list can be defined. Each list contains a number of available sheets.

Finally, the user can set some parameters concerning the actual nesting process, such as, for example, the tool dimension, keeping in mind that the workings in the list refer to the path of the tool centre. The user can also set a forced distance between the profiles next to the starting angle of the nesting end next to its direction. Some practical examples of nesting parameter setting are described later.

The base licence only offers:

- Nesting of max. 150 workpieces;

- Rectangular nesting on the piece dimensions (unless the disabling cluster of the clusters

has been activated).

-    The rotation pitch can be 0° or 90° only.
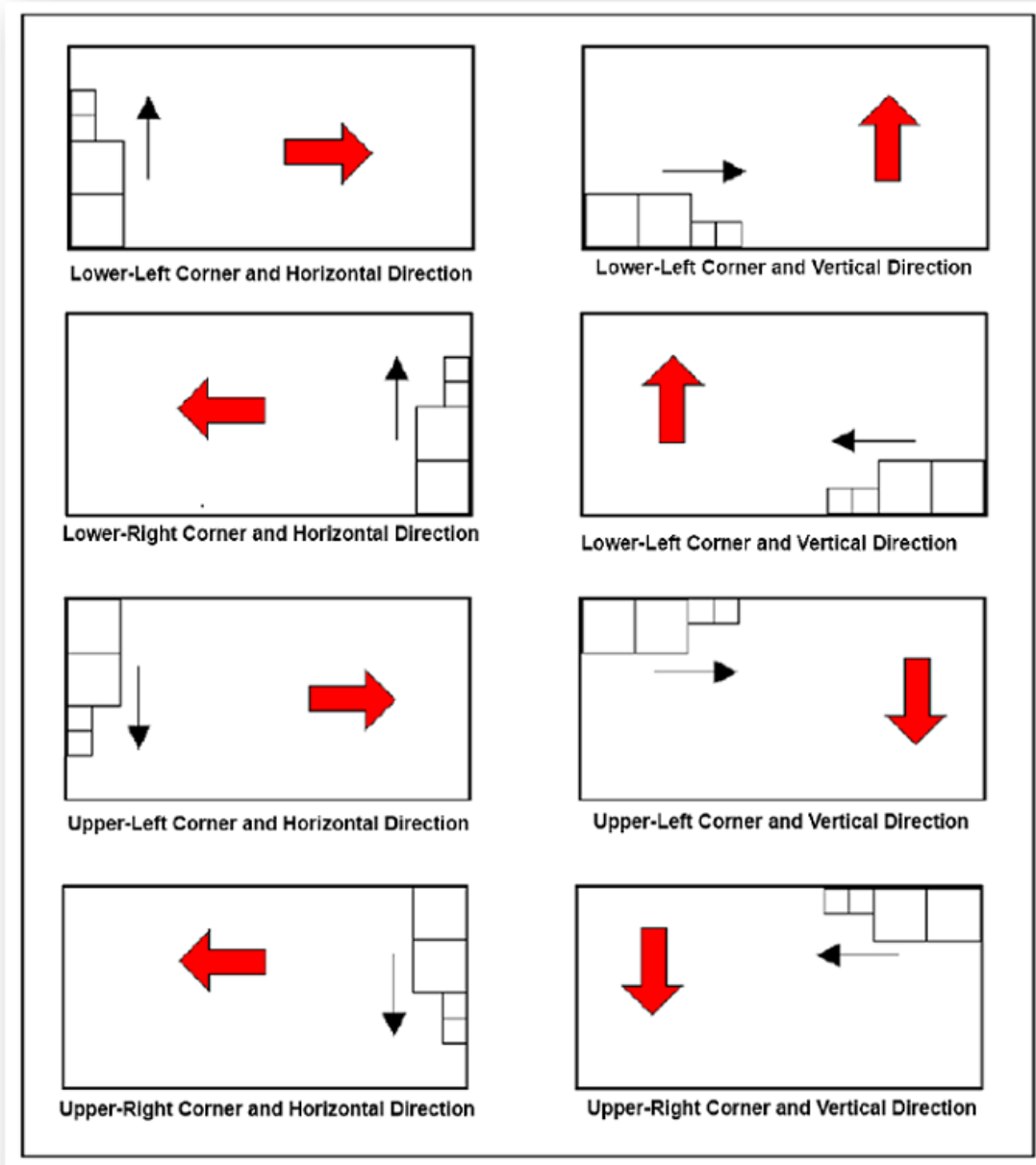
Start angle and Nesting direction

2   TCN File

TCN file must contain at least one Nesting closed profile that, on his turn, will contain one or more profiles containing some scraps that also are closed. Any other machining in the file will be ignored. A profile is considered as a Nesting one, when the "[P9511] Nesting Geometry" property is enabled; instead, it is considered as a hole containing some scraps, when its property "Enclose scraps" is enabled in the Setup.
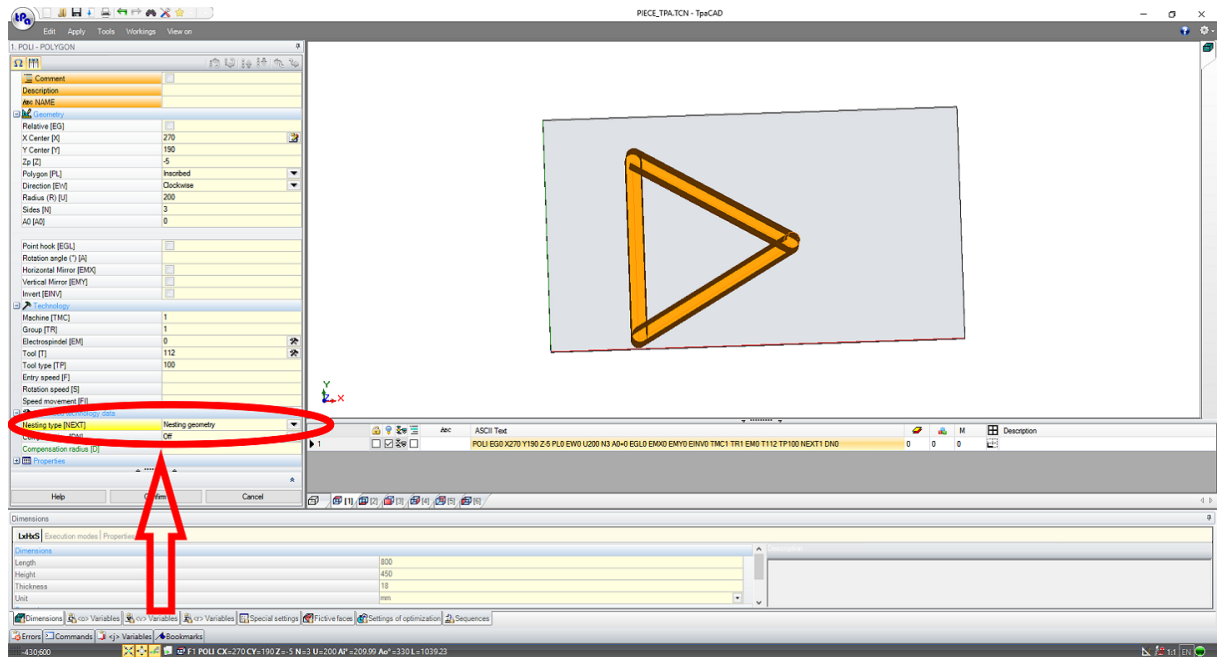
Property needed to nest the working

3   Nesting graphic interface

The graphic interface of the program is made of three main tabs placed on the top: **Nesting**, **Workings** and **Other**.

The **Other** tab contains the link to external programs such as TpaCad, WSC and TecnoManager.

Machinings shows different settings for the best management of the nesting optimisation (for details please see the chapter "Machinings").

Nesting is the main part of the program, made of a ribbon menu on the top, through which you can recall the commands to:

- open, save or create a list of the panels to be nested;
- edit the rows of the list;
- start and stop the nesting session;
- manage the preview, the options, the database and force the functionality of base licence of a professional licence;
- save the results and create a WSC list. These two commands allow the user respectively to save the created TCN files, one for each panel and to save the execution list of these latter in the directory required.

Besides this menu, the interface is divided into two sectors that can be selected by means of the tabs on the left : the list to define the programs to be nested and the management of the information concerning the resulting panel and any settings of nesting.

On the right, a settled part shows some general parameters and an area below is provided for the results and their Preview. In addition, a status bar showing the nesting process time frame is available.
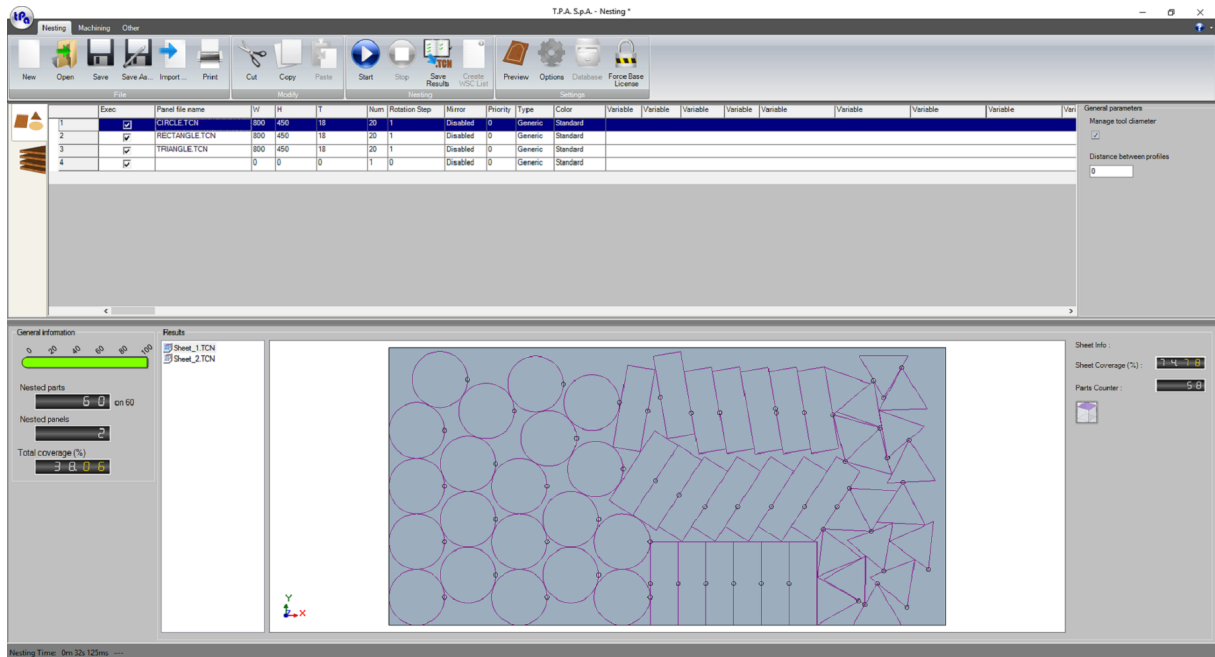
TPA Nesting program main screen page

The main screen page is equipped with a horizontal split, which allows the user to size the screen vertically into two areas: the upper one for the input to the nesting process and the lower one for the results.

3.1   Machining list

This list is defined in a table, where the user only needs to double-click in the **Name** column **Panel File** to enter a file of the machining and the other parameters into the related columns.

In the first column **Run** there is the activation of the machining. If it is not set, is ignored by the nesting process.

	Exec	Panel file name	W	H	T	Num	Rotation Step	Mirror	Priority	Type	Color
1	☑	CIRCLE.TCN	800	450	18	20	1	Disabled	0	Generic	Standard
2	☑	RECTANGLE.TCN	800	450	18	20	1	Disabled	0	Generic	Standard
3	☑	TRIANGLE.TCN	800	450	18	20	1	Disabled	0	Generic	Standard
4	☑		0	0	0	1	0	Disabled	0	Generic	Standard

List insertion area

3.2   DefNest.xml

In the header of the machining list the user can add some columns for the easy edition of any "r" variables located in the *tcn* reference file, of course if the external reassignment of the above variable is enabled.

To perform this configuration the user needs to edit the reference nesting configuration file located in the "C:\Albatros\System\NESTING" folder and whose name is "DefNest.xml".

As can be seen after opening the file through a text editor, the format is XML and it follows its

standards. The parent "Columns" node has an ListDimensions attribute that defines the dimension of the list. All the child nodes correspond to the single columns and just after the addition of one of more of these child nodes it is possible to add the columns for the edit of the "r" variables.

By adding the node that follows the EXEMPLE1 header, when the nesting software is opened, a column appears that allow the edit, as shown in the figure below. In this example we have selected a *tcn* file that has a "r" variable according to the name of the radius (the name is defined and represented in line of the name of the variable in the .tcn file and it cannot be selected as a constant within the node):

EXAMPLE1:

(The explication of the meaning of the single nodes is available within the "DefNest.xml" file)

```
<Column Name="VARIABLE1">
        <DataType>172</DataType>
        <Format>String</Format>
        <Heading>217</Heading>
        <StartMessage>0</StartMessage>
        <nItems>0</nItems>
        <Width>1200</Width>
        <Locked>0</Locked>
        <Protected>0</Protected>
        <Hidden>0</Hidden>
        <Decimals>3</Decimals>
        <MxListerColumn>0</MxListerColumn>
        <Default></Default>
        <SaveToFile>1</SaveToFile>
        <LoadFromFile>1</LoadFromFile>
</Column>
```

	Exec	Panel file name	W	H	T	Num	Rotation Step	Mirror	Priority	Type	Color	Radius
1	☑	CIRCLE.TCN	800	450	18	20	1	Disabled	0	Generic	Standard	1
2	☑		0	0	0	1	0	Disabled	0	Generic	Standard	

List insertion area

The list of the standard columns is:

- **Run**   Enable machining

- **Panel File Name**   Machining file

- **L**   Workpiece length

- **H**   Workpiece height

- **S**   Workpiece thickness

- **Num**   Number of machining to nest

- **Rotation step**   Rotation step allowed in the machining positioning

- **Mirror**   can take the following values :

  - *Disabled*

    All the workings are nested normally

  - *Half* [can be enabled only in the event of an even quantity]

    Half the instances are in mirror

  - *When necessary*

    Machinings are nested in mirror, only if the process cannot nest them in a normal way.

  - *Forced*

    All the workings are nested in mirror

- **Priority**   Priority of the machining to nest. Workings with higher priority value take precedence during the nesting   process; the default value is 0.

- **Tipology**   Tipe of the part to nest.

- **Colour**   Colour of the part to nest. Operation equivalent to that of **Typology** .

3.3   General parameters

General Parameters are grouped in the and they fixed right side fixed right part and they are:

- **Apply tool diameter**

  o   When this option is enabled, the nesting is performed, knowing that the profiles are the trajectories of the milling cutter centre.

- **Distance between profiles**

  o   It is the distance applied to all the nested profiles.
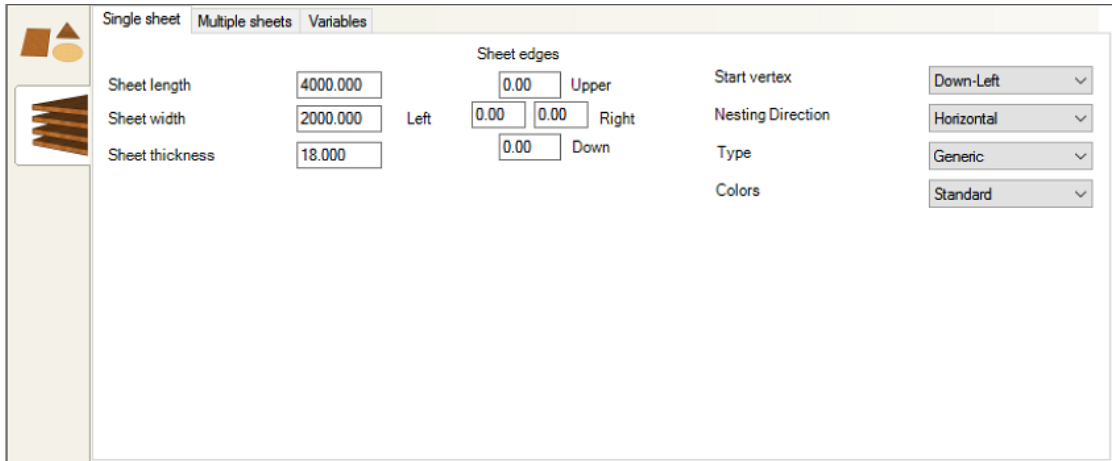
3.4   Piece parameters

Selecting the relating tab on the left, this program enables the control of both the "Single Panel" case, where there is only one kind of panel with infinite instances (infinite number of available

panels to nest the parts defined in the list), and the "Multi Panel" case, where the user enters in a table all the available types of panels with the relating instances and parameters. This last option is enabled by checking the box on "Multiple Panels" tab. The list of the parameters that can be set for each panel is the following:

- **Panel width**

- **Panel length**

- **Panel thickness**

- **Panel edges**

  - Edges of the piece in the four directions where the workings cannot be nested

- **Start vertex**

  - Starting angle of the nesting process (see chapter "Features")

- **Nesting direction**

  - Nesting process direction (see Chapter "Features").

- **Typology**

  - It is possible to assign a certain Type to the panel (a fixed one or a free field type). For example, only the "A" type shapes will be nested in a panel whose type is "A".

- **Colours**

  - It is possible to assign a certain Colour to the panel (a fixed one or a free field type). If operates in the same way as Typologies.

It is possible to manage the V Variables. This functionality allows the generation of TCN files, created at the end of a nesting process, assigning automatically the value of the above mentioned variables, that have been set through the section provided for that purpose. This last function must be enabled (see chapter "Options").

Parameter setting area in the event of "Single-Panel"

Parameter setting area in the event of "Multiple Panels"
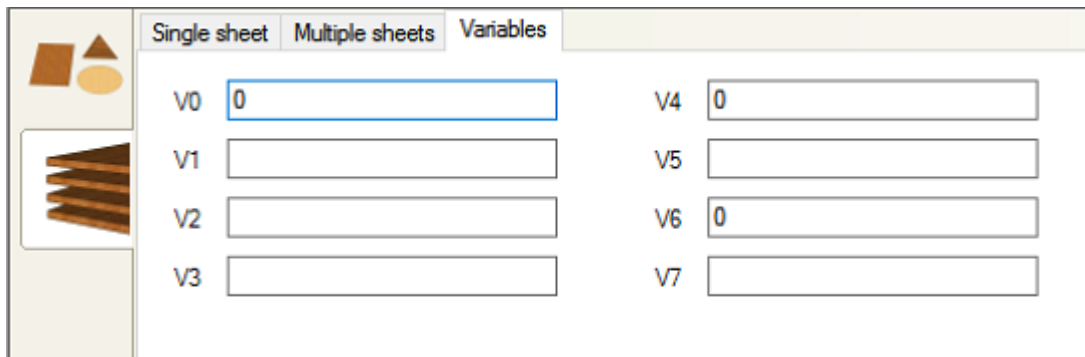
Figure 8 - Setting area of "V-Variables" for the generated TCN files

3.5   Results

The lower area of the program graphical interface is reserved for the nesting results. On the left side there is a status bar showing the progress status of the nesting process and underneath there are a counter of the nested machinings on the total amount of the machinings to nest, a counter for the necessary panels and a percentage of total coverage of the panels.

On the right side there is a ListBox where all the currently nested panels are listed and besides there is a preview of the selected panel. This preview allows the 2D view by default and the three-dimensional rotation of the panel and its zoom. Eventually, at the right of the preview there are some information on the selected panel, such as the coverage of the panel and the total

available machinings in the panels, besides a button to replace the display of the preview on face one.

By double-clicking on a single resulting file, the file in Editor will open directly for any modifications.

3.6   Options
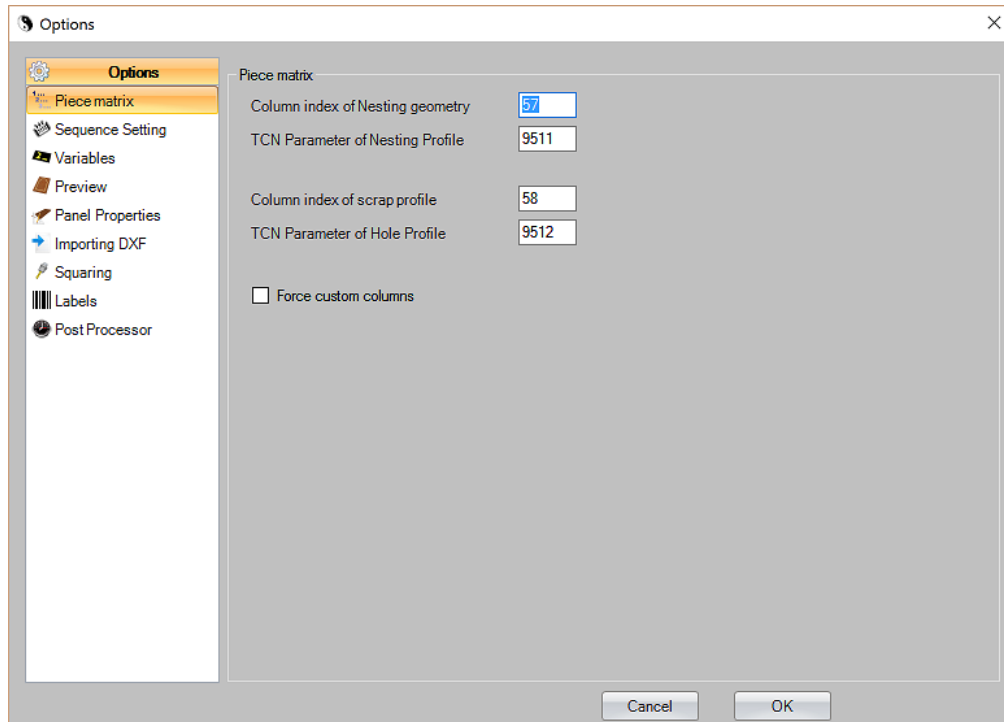
Option dialog box

The options that can be modified by the user are grouped in a window that can be reached from the Settings menu, where nine sections appear. One of these, by means of a password, allows you to modify the indices of the column of the Piece Matrix in which the information on the Nesting and Scraps profiles are stored. The other sections allow you respectively to:

- set the management for the sequence writing;

- enable the management of the V variables (see "Parameters" field);

- set the parameters relating to the preview available in the main window;

- manage the panel properties;

- enable the import of dxf files and define the number of a tool and z setup position to be applied to the above profiles;

- manage the squaring for the software in the base license;

- customise the representation of the labels;

• enable the creation of an output support file and any possible Post Processors.

Managing sequences

To manage the writing of sequences, check the relating box and set the number of subroutine call levels that can be managed.

If the number of the levels rises, the maximum number of nestable machining decreases for each level, as follows:

1. Managed level, no limits to workings

2. Managed levels, 9999 machinings for each level

3. Managed levels, 999 machinings for each level

4. Managed levels, 99 machinings for each level

Variables

To enable "V Variables", please check its box and click on OK . Then, restart the application.

Preview

Thanks to the control of Preview the application program displays also the panels with partial results, while the Nesting process is in progress on that panel. Once this option has been enabled, the user can also define after how many nested workings the Preview will be refreshed.

It is also possible to set a Starting orientation by default.

Panel properties

In this unit there are some settings to manage the workings that will be nested on the destination panel:

• **Check thickness:** If you enable this option, you can nest the pieces parts in connection with the original panel thickness, that is the profiles to be nested will be actually nested on the panels having the same thickness.

• **Close open profiles by [mm]:** This option of closing open profiles allows you to close the profiles drawn in connection with the selected tolerance in mm.

• **Ignore strokes shorter than (0.0001 – 0.01 mm):** the strokes whose length is less than the chosen value will be ignored. In the event that the stroke is used in a profile, it will deleted and the profile will be closed and will be connected to the following stroke.

Disable cluster: the clusters are enabled by default and if several profiles are programmed in the same TCN.file, they will be nested and they will hold the same relative position defined in the TCN.file. This configuration is called Cluster. If the Clusters are disabled, the different nesting

profiles of the TCN.file will be nested independently.

Typologies/Colours: In the application program the user can assign a typology and a colour for each panel and for each part to be nested. As a result, the profiles to be nested will be effectively nested on those panels only that have the same typology and/or colour. To define these typologies or colours the user should click on the "Typologies" or "Colours" buttons respectively.
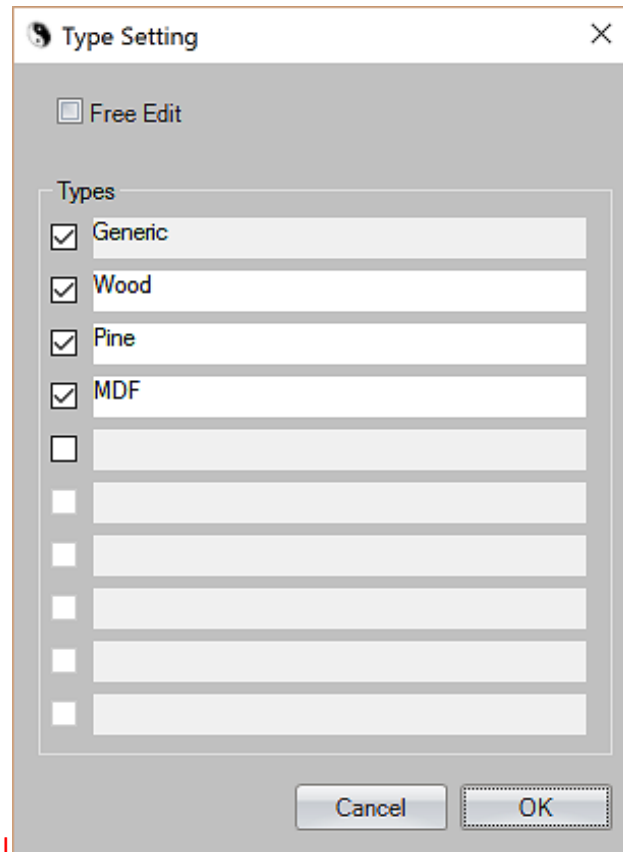
Managed typologies dialog box

Through this dialog box (see the picture) the user can manage the typologies that can be assigned to the panels. To define new typologies he only needs to enable the check-box and to define the name of the typology; it is possible to manage max. 10 typologies, of which the first one is set by default as a "general" typology.

If the user enables the *Free insertion* instead, the typologies will be defined as if they were strings and so through free insertion from the keyboard. Then, a check "one-by-one" will be made of the value entered in the machining list and the value entered in the panel definition. By Clicking on the button of Colours, a similar box with the same features opens. The "Free insertion" setting needs also a modification of the "DefNest.xml" file, described in its paragraph. To transform the "TYPE" node or the "COLORS" node from the fixed selection to the free insertion you need to modify both the reference nodes from the previous value to zero, as follows:

FIXED TYPE :   FREE INSERTION TYPE:

<Column Name="TYPE">   <Column Name="TYPE">

```
...                                             ...
<StartMessage>1011</StartMessage>               <StartMessage>0</StartMessage>
<nItems>10</nItems>                             <nItems>0</nItems>
...                                             ...
</Column>                                       </Column>
```

Importing DXF

This option allows you to enable the automatic setting option of the tool number and of the Z position, reading it directly in the layers of the imported DXF file. If disabled, a dialog box appears to enter those data for each profile available in the file .

Squaring

It allows the configuration of the options for the squaring profiles that are automatically inserted by the nesting in Nesting Base.

Options:

- if the inserted profiles has to be machined and then available in the matrix;

- if this profile has to be machined by a mill-radius machine, with which tool and at which depth;

- direction of the squaring profile.

Labels

This option enables the printout of the label values, when the nesting results are printed on paper. In addition, it allows to select the dimension of the character required and which tags have to be found in the comment of the file to be nested in the list. For example, if in the options the string value is "**trial%test**" , this means that there are two TAGS to be found in the comment of the file, that is "trial" and "test".

Once they have been found, the value of these tags will be printed. This is the example for a comment: "**Top program [test=123] [trial=Label_144]**"

In this case the value printed on the sheet and in the centre of the nested profile will be"**Label_144**" in the first row and "**123**" in the second one.

The order it that of the string describing the codes in the options.

Post Processor

It allows the automatic creation of the nesting results as XML format that can be used by external programs. Moreover, a BMP file with its own graphic representation is created for each file.

The files are stored in the [PRODUCT]\Nesting\Data folder.

3.7 Database

In order to permit the resulting panels being correctly "transformed" into a TCN.format file and then being optimised and executed, it is essential to configure for all operating code all the elements required for a proper creation of the TCN.file.

Inside this dialog box the user can define new machinings (setup, linear machinings, arcs, etc...), each of which can have a defined number of parameters, Each parameter is characterized by:

- **Element Code**

- **Column Index in the Matrix**

- **Data typology**

- **Description**

- **Range of invalid values**

- **Conditions (**see next paragraph**)**

Logic conditions

Inside the "Data type" field, that we have seen above, it is possible to select the CONDITIONAL entry. This selection allows the operator to enter logic conditions in order to modify or to assign some values in accordance to the criterion required.

It is crucial to the smooth operation of the application program that the proper formalism of the writing of the logic conditioning expressions is used.

The conditioning structure is: **CONDITION;IF_TRUE;IF_FALSE**

In writing the expressions, predefined constants must be used both in CONDITION and in IF_TRUE and IF_FALSE; the constants that can be used are the following:

- **QX** : X position of piece positioning [mm or inc]

- **QY** : Y position of piece positioning [mm or inc]

- **ROT** : Angle of rotation of piece rotation [degrees]

- **MIR** : (=1) piece in Mirror, (=0) piece in Normal

- **VAL** : current value of the field

N.B.: The constants above are Case Sensitive, so they must be written all with capital letters.

In the same way the operator can use the Condition operators, as follows:

- **=**

- **>**

- **<**

- **!=**

- **>=**

- **<=**

- **&**   (and logic)

- **|**   (or logic)

The conditions are structured as follows (see example), without condition limits, but all at the same level of parentheses:

"(SINGLECOND&SINGLECOND| SINGLECOND)&(SINGLECOND| SINGLECOND)".

I *IF_TRUE* and *IF_FALSE* can be absent. In that case the value is not modified and they are regular expressions in numeric constants, remarkable constants and operators.

Here below some examples:

VAL=100&ROT=90;VAL=200;VAL=101;

QX>300|QY<100;ROT=90;ROT=180;

## 3.8   **Importing a file of another format**

It is possible to import the DXF format files, that first are converted into the TCN format and then are automatically added to the list of the panels to be nested.

To use this functionality, click on the Import command in the ribbon menu.

Import command

A window appears where to select the DXF file to be imported. After the selection, an additional window appears where to assign the technological properties of the profiles to import. The whole procedure is more user-friendly thanks to the panel preview, where the reference profile is highlighted.
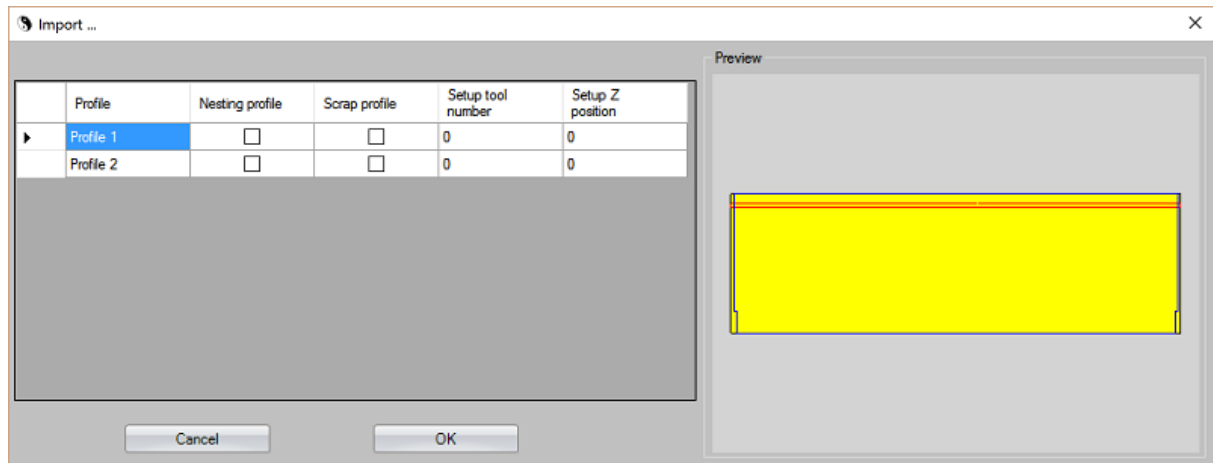
Window of Technological settings for DXF import.

After assigning the technological settings, by clicking on the OK button, the file is created as a TCN.format in the "DirProduct" folder, set in the "TPA.INI" file. Then, this file is automatically inserted in the list of the panels to be nested.
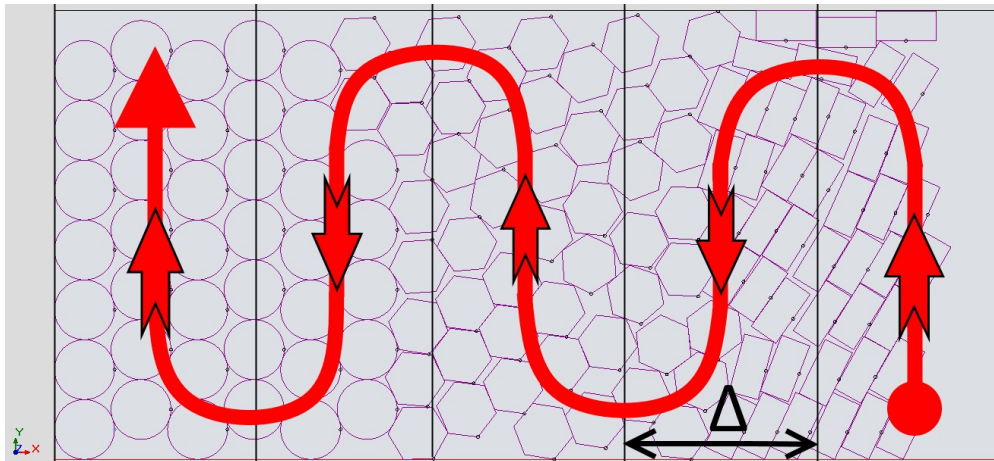
4   Machinings

The part of the program concerning the machining is also equipped with a ribbon menu on the top, through which the operator can recall the command to open the control of the sortings, the settings to split up the scraps, to manage the connections and a possible setting for the double pass in Z.

4.1   Sort orders
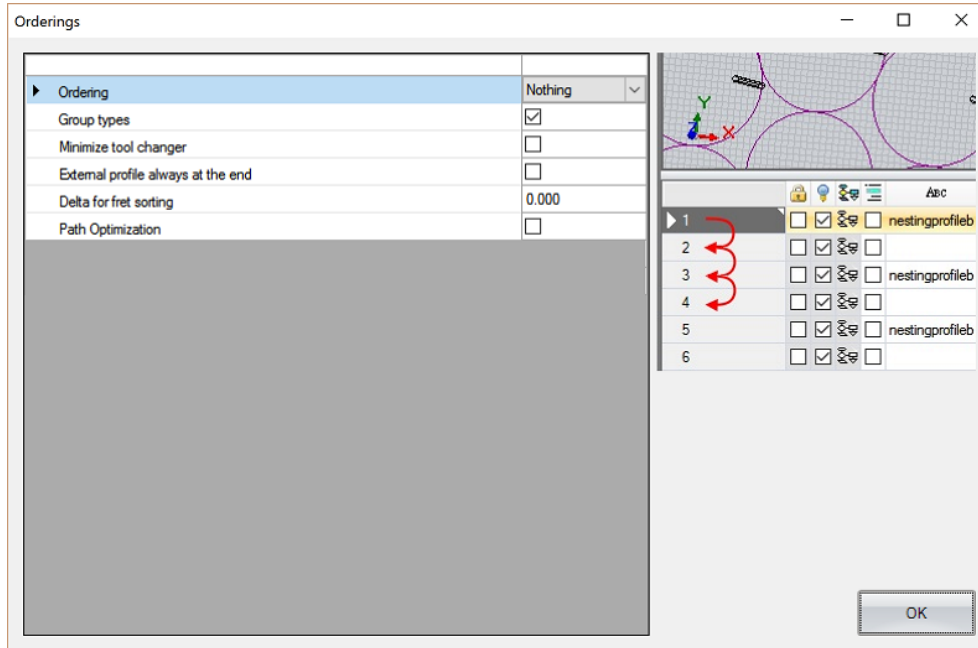
Sort orders

- **Sort order**: The sequences of the machinings can be modifying by applying the following optimisation logics:

  o **None**: The machinings is performed following the order of the lines available in the tcn.file.

  o **Descending X**: As already shown above, the order of the machinings follows the represented logic and operates from the greater X, cutting the panel in accordance with the requested "Delta for Greek fret in sort order". Ascending X sort order follows the same principle, but with an inverted **sort order** , while for Descending **Y** and **Ascending Y** the difference concerns the direction of the cut that follows the X axis instead of the Y axis. In the next picture there is an example of Descending Y sort order

  o **Frame**: The machinings will be performed from outside.

Sort logics
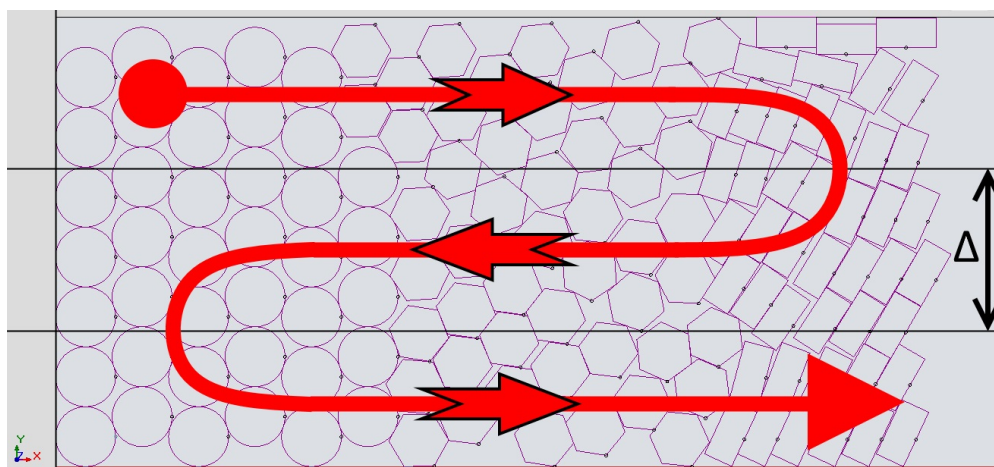
Descending Y sort order

- **Group Typologies:** Standard sort order. So, if this item is disabled, the sort order performed and used in the creation of the TCN.file for the nested machinings follows this logic:

  1. General drilling and milling works

  2. Sawing

  3. Nesting of Scraps profiles

  Since each panel to nest can have all these machining types, the results of a standard sort order without optimisations will be:

  1. drillings and general millings of the first shape to nest;

  2. sawings of the first shape to nest;

  3. Nesting or Scraps profiles of the first shape to nest;

 4. general drillings and millings of the second shape to nest;

5. sawings of the second shape to nest;

6. Nesting or Scraps profiles of the second shape to nest.

If this item is enabled, the sort order is grouped by typology, that is, the point 1 is performed first for each shape, then the point 2, and so forth.

- **Minimize tool changes:** this option enables the optimisation that minimise the changes of the tools; it is applied as last sequence optimisation.

- **External profiles always at the end:** the external profiles of the nested shapes are carried out always at the end in order to give priority to drillings and sawings.

- **Delta for Greek fret in sort order:** as in the figures, it represents the distance between the lines of the greek fret used for the sort order.

- **Path optimisation:** enables the optimisation of the paths to optimize the execution of the program in terms of time. There are three options available:

  o **None**: no optimisation performed. This functionality is disabled.

  o **Fastest:** performs a geometric optimisation having, as its purpose, the more rapid possible machining.

  o **Keep Directions:** like in the previous paragraph, but the directions of the machinings, compared to the original program, designed in the TpaCAD, are preserved.

- **Max length of the added lines:** used, if the Path optimisation option is enabled. It represents the maximum length of the segment that can be defined to join both the shapes, without the tool going out of the piece but continuing in the path.

- **Max. length of repeated line inside the piece:** used, if the Path optimisation option is enabled. It determines the maximum length of the segment that the program can go over, if it is required to obtain a return in terms of time.

- **Length of entry segment:** if = 0, entering the piece will take place without any kind of entry segment, if > 0, this one determines the length (mm) of the entry segment before performing a profile (and also, as a result, a segment going out of the piece at end of the profile). It can be used only, if the Path optimisation option is enabled.

4.2   Fragmenting scaps

This page allows the control of the cuts of the scraps, typically useful to the machine operator for easily extracting nested shapes.
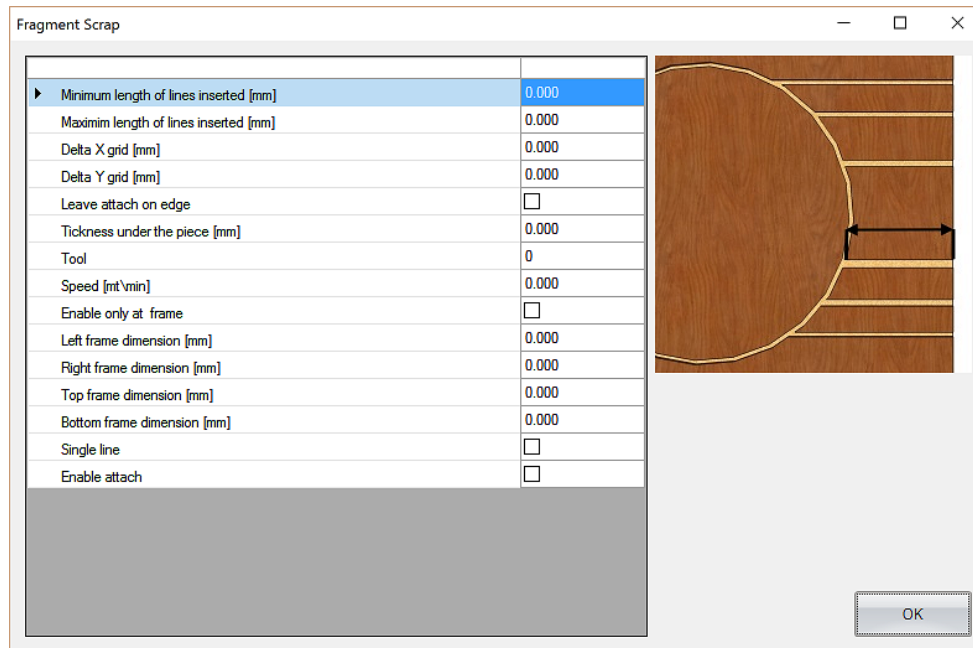
Fragment scraps

- **Minimum length of the generated stroke [mm]:** in the fragmentation of the scraps it corresponds to the minimum length of a single cut.

- **Maximum length of the generated stroke [mm]:** in the fragmentation of the scraps it corresponds to the maximum length of a single cut.

- **Grid X Delta [mm]:** delta of the oriented cuts in X.

- **Grid Y Delta [mm]:** delta of the oriented cuts in Y.

- **Leave residual piece on the edge:** if enabled, this options allows leaving some residual material between cut and edge of the panel.

- **Depth under the panel [mm]:** this option defines the measure of the depth in Z beyond the depth of the machining already planned in the program. It is possible to enter a positive value leaving any residue (residual thickness).

- **Tool:** number of the tool used to cut the fragments of the scraps.

- **Speed [mt/min]:** working speed of the fragmentation cuts of the scraps.

- **Enable on frame only:** this option allows the fragmentation cuts on a frame, whose dimensions have been defined by the following parameters: **left edge, right edge, upper edge, lower edge.** Each of these parameters can be set independently.

- **Single line:** prevents the fragmentation cuts of the scraps from continuing to work from the edge beyond the first nested shape. This means that the only cut of the scraps obtained is that starting from the edge and reaching the first nested shape (if enabled on the frame, if the edge is wide enough).

- **Enable connections:** this option enables the connections on the nested shapes. More specifically, this means to obtain some "bridges" between the nested shape and the surrounding scraps, just to allow some little pieces being properly held by the gap of the bench.

4.3   Managing connections

This page allows setting the connections available on the nested shapes:
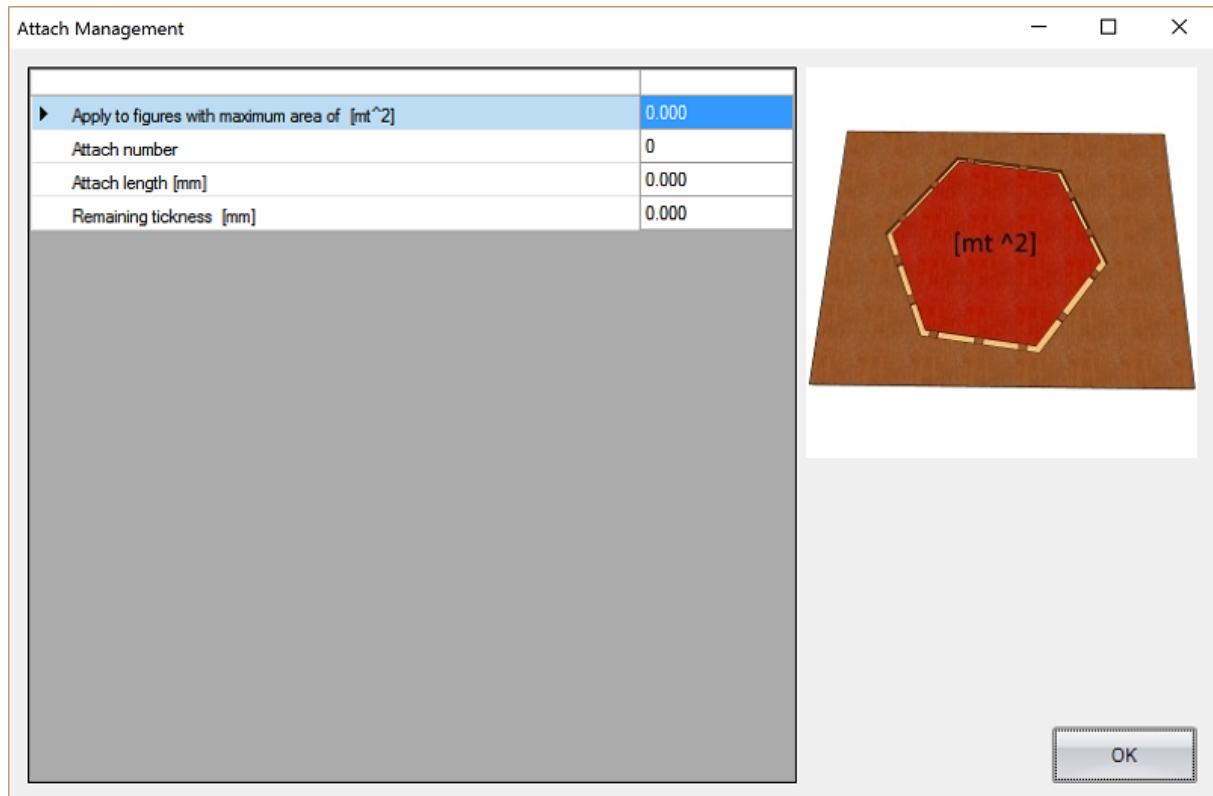
- **Apply to shapes whose max. overall dimension is [mt^2]:** this option allows applying automatically the connections to shapes whose max. overall dimension is defined by this parameter.

- **Number of connections:** this option allows the user to choose the number of the connections on each shape.

- **Length of connections [mm]:** this option allows the user to decide the length of the single connections.

- **Residual thickness [mm]:** absolute thickness of the single connections.

4.4   Double Z pass

This page manages a possible double pass in Z, if it is not possible to cut by means of a single machining.
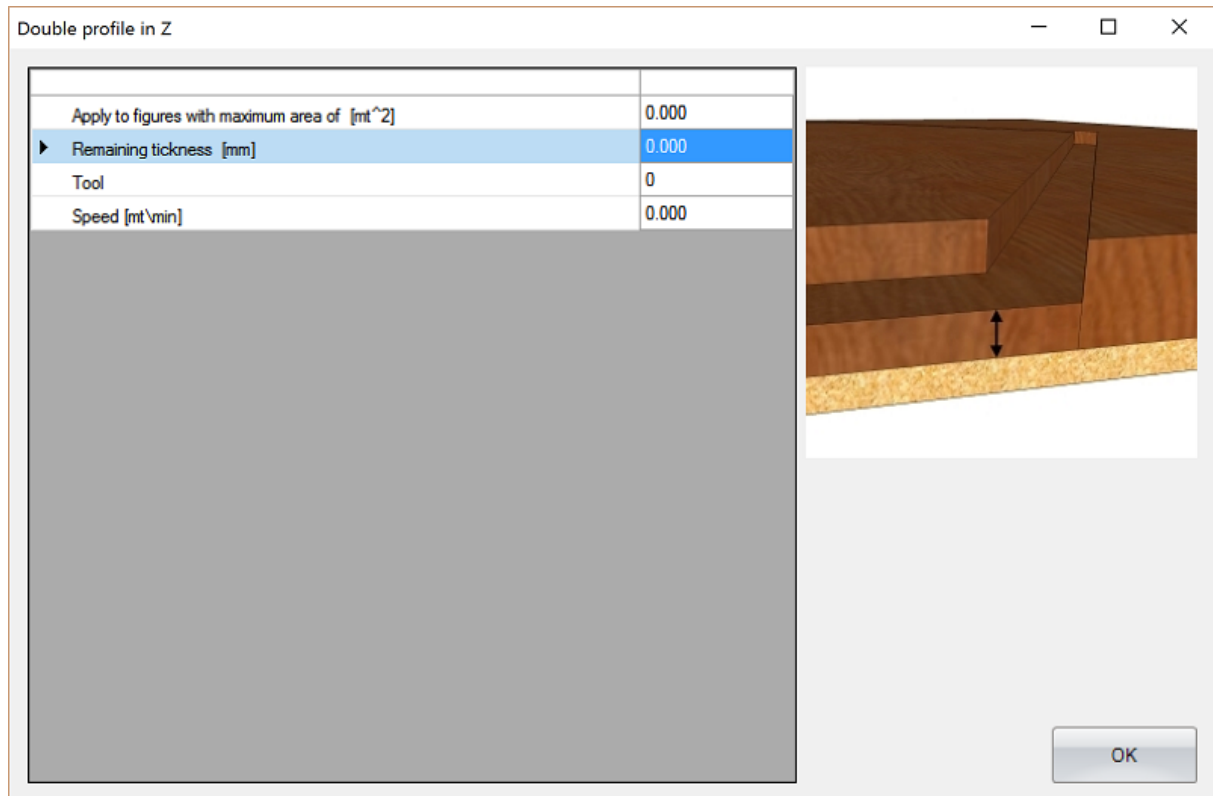

- **Apply to shapes whose max. overall dimension is [mt^2]:** this option allows applying automatically the double pass in Z to shapes, whose max. overall dimension is defined by this parameter. Double pass in Z means that, while cutting, the machining does not immediately move down to the defined position, but divides the machining in two passes.

- **Residual thickness [mm]:** thickness in mm that, starting from the zero position of the bench, defines the machining depth of the first pass. The depth of this first pass reaches the residual thickness as above. For example: 5 mm means that the machining will arrive 5 mm before the zero position of the bench.

- **Tool:** number of the tool used for the first pass.

- **Speed [mt/min]:** speed of the machining used for the first pass.

4.5   Labels

After selecting this Tab, the user can manage label printing.
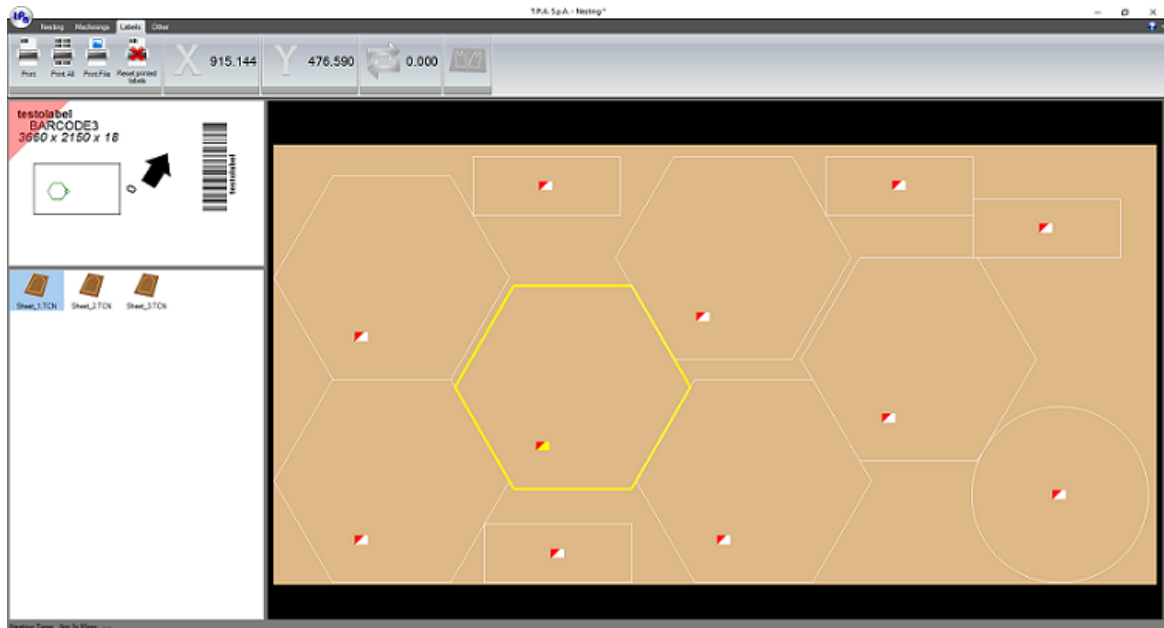
Label management window

By nesting from Tab Nesting some "Label" working figures (defined in the TpaCAD), in the Label Tab a print preview appears automatically. By clicking on the single nested figure, you can display a single label preview on the top left. The red corner allows an easy identification of the direction in which the label lies on the main panel.

In the main bar, in addition to the four buttons described below, there is the X-Y position of the label with respect to the main panel, the rotation of the label and the notification whether the piece has been nested in Mirror.

- **Print:** prints the selected label. The representation of the label inside the figure will change its colour from red/white to red/black to highlight that that particular label has been already printed.

- **Print All:** prints all the labels.

- **Print File:** prints any image file chosen by the user.

- **Reset print labels:** resets the status of the representation of the labels inside the figures from red/black (label already printed) to red/white (label never printed). See the command "Print".

The Layout file of the label is defined within the working "Label" in TpaCAD and lies in the folder "…\Product\Sub\xxxx.xml". Its syntax shows following rules:

Hereunder an example of XML file to configure the labels:

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
```

```
<Label Length="100" Height="60">
  <TextElement LocationX="3" LocationY="3" Length="60" Height="10" ASCII="TAGM2" FontName="Arial"
FontDim="14"
          FontMode="Bold" TextValue="DefaultText" />
  <TextElement LocationX="8" LocationY="8" Length="60" Height="10" ASCII="NAME" FontName="Arial"
FontDim="16"
                  FontMode="Regular" TextValue="Part Name" />
  <TextElement LocationX="3" LocationY="13" Length="60" Height="10" ASCII="DIMENSION" FontName="Arial"
                  FontDim="16" FontMode="Italic" TextValue="0x0x0" />
  <BarcodeElement LocationX="85" LocationY="10" Length="45" Height="15" ASCII="TAGM2"
Encoding="CODE128"
              Rotation="Rotate270FlipNone" Alignment="RIGHT" TextValue="DefaultText"
          EnableText="true" PositionText="BOTTOMCENTER" />
  <PieceElement LocationX="10" LocationY="20" Length="40" Height="38" ASCII="NONE" />
  <ImageElement LocationX="10" LocationY="20" Length="40" Height="38"
                  PathFile="C:\Albatros\grf\ute\tree\TREE_01.bmp" />
  <ArrowElement LocationX="55" LocationY="20" Length="20" Height="20" ASCII="NONE" Fixed="false"
StartAngle="45.0" />
  <TextElement LocationX="3" LocationY="36" Length="60" Height="10" ASCII="1010" FontName="Arial"
FontDim="16"
          FontMode="Italic" TextValue="Blue" VisibleASCII="TAGI2" Vertical="true" />
  <TextElement LocationX="50" LocationY="36" Length="60" Height="10" ASCII="1020" FontName="Arial"
FontDim="16"
                  FontMode="Italic" TextValue="Wood" Vertical="true" />
  <TextElement LocationX="50" LocationY="36" Length="60" Height="10" ASCII="INDEX" FontName="Arial"
FontDim="16"
                  FontMode="Italic" TextValue="Wood" Vertical="true" />
</Label>
```

The elements which may be present more than once in a label are:

- Text   (node "TextElement")

    [Attributes: *FontName, FontDim, FontMode, TextValue, VisibleASCII,*

    Vertical]

- Barcode   (node "BarcodeElement")

    [Attributes: *Encoding, Rotation, Alignment, EnableText, PositionText,*

    TextValue]

- Preview   (node "PieceElement")

    [Attributes:]

- Image   (node "ImageElement")

    [Attributes: *Pathfile*]

- Arrow   (node "ArrowElement")

[Attributes: *Fixed, StartAngle*]

All elements have the default attributes (*LocationX, LocationY, Length, Height, ASCII*).

Each of these elements can be repeated more than once in the same label. The attributes for each element are:

Attribute:	LocationX	Element X position inside the label (Left reference).
Value	[Integer]	X Position
Example	**<…… LocationX="5" >**	

Attribute:	LocationY	Element X position inside the label (Top reference).
Value	[Integer]	Y position
Example	**<…… LocationY="5" >**	

Attribute:	Length	Element length in X
Value	[Integer]	Length
Example	**<…… Length="50" >**	

Attribute:	Height	Element height in Y
Value	[Integer]	Height
Example	**<…… Height="30" >**	

Attribute:	ASCII	identifies the meaning of the single element
Value	TAGM,TAGI,TAGD	Identifier of the field in the TpaCAD Barcode working
	[integer]	Column type in the Nesting list
	NAME	Nested piece name
	DIMENSION	Nested piece dimensions
	INDEX	List index row of the nested piece
Example	**<…… ASCII="TAGM3" >**	

Attribute:	FontName	Font Name
Value	[string]	Name

Example	<...... **FontName="Arial" >**	

Attribute:	FontDim	Font Dimension
Value	[Integer]	Dimension
Example	<...... **FontDim="14" >**	

Attribute:	TextValue	Text to show in case it is fixed (it doesn't come from Barcode working)
Value	[string]	Text
Example	<...... **TextValue="TPA Label" >**	

Attribute:	VisibleASCII	If the integer value associated to the field identifier inside the Barcode working in TpaCAD is > 0, the element is visible; if the value is =0, the element is hidden (> 0 show, = 0 hide).
Value	TAGI2 ... TAGI5	Field identifier
Example	<...... **VisibleASCII="TAGI3 " >**	

Attribute:	Pathfile	Image File Path
Value	[string]	Image File Path
Example	<...... **PathFile="C:\Albatros\grf\ute\tree\TREE_01.bmp" >**	

Attribute:	StartAngle	sets starting arrow orientation
Value	[double]	Angle in degrees
Example	<...... **StartAngle ="15.0" >**	

Attribute:	Encoding	Encoding type for Barcode generation
Value	[string]	Possible values: UNSPECIFIED, UPCA, UPCE, UPC_SUPPLEMENTAL_2DIGIT, UPC_SUPPLEMENTAL_5DIGIT, EAN13, EAN8, Interleaved2of5, Standard2of5, Industrial2of5, CODE39, CODE39Extended, CODE39_Mod43, Codabar, PostNet, BOOKLAND, ISBN, JAN13, MSI_Mod10, MSI_2Mod10, MSI_Mod11, MSI_Mod11_Mod10, Modified_Plessey, CODE11, USD8, UCC12, UCC13, LOGMARS, CODE128, CODE128A, CODE128B, CODE128C, ITF14, CODE93, TELEPEN, FIM, PHARMACODE.
Example	<...... **Encoding="CODE128" >**	

Attribute:	Rotation	Barcode orientation
Value	[string]	Possible values: Rotate180FlipXY, RotateNoneFlipNone, Rotate270FlipXY, Rotate90FlipNone, Rotate180FlipNone, RotateNoneFlipXY, Rotate270FlipNone, Rotate90FlipXY, Rotate180FlipY, RotateNoneFlipX, Rotate90FlipX, Rotate270FlipY, RotateNoneFlipY, Rotate180FlipX, Rotate90FlipY, Rotate270FlipX,
Example	**<…… Rotation="Rotate270FlipNone" >**

Attribute:	Alignment	Barcode Alignment
Value	CENTER|LEFT| RIGHT	Alignment value
Example	**<…… Alignment="RIGHT" >**

Attribute:	EnableText	if it is necessary to insert the text in the Barcode
Value	true | false	enables text
Example	**<…… EnableText="true" >**

Attribute:	PositionText	Text position with respect to Barcode
Value	[string]	Possible values: TOPLEFT, TOPCENTER, TOPRIGHT, BOTTOMLEFT, BOTTOMCENTER, BOTTOMRIGHT.
Example	**<…… EnableText="true" >**

Attribute:	TextValue	Default text value to be coded in Barcode
Value	[string]	Text
Example	**<…… TextValue="DefaultText" >**

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