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User manual for machining center

DUBUS ALUFLEX / PVCFLEX

LN 11/06/12

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Warning

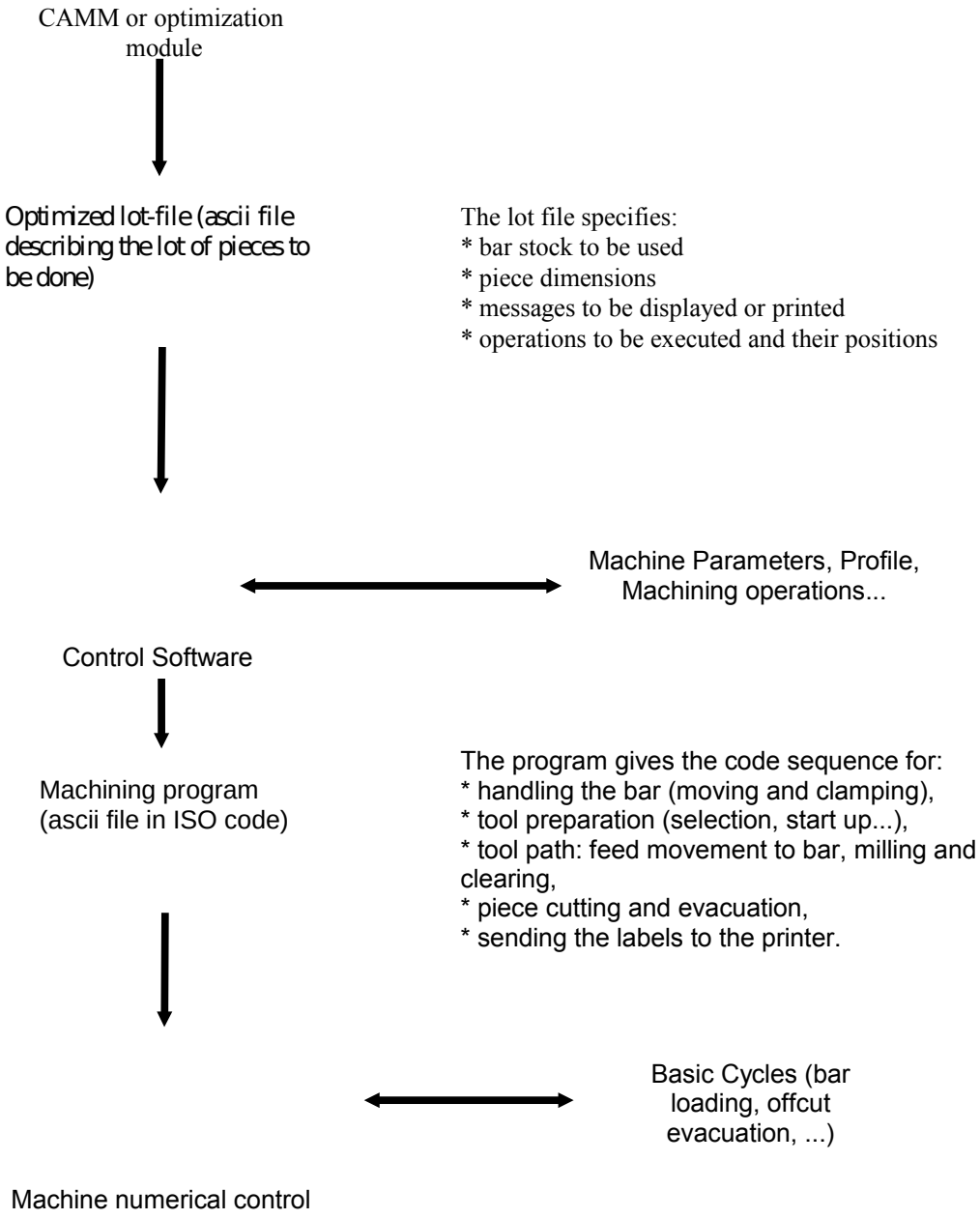
Depending on the configuration of the machine, certain functions covered in this manual could be modified or invalid.

This program and its documentation are referenced at the « Agence pour la Protection des Programmes » under the number IDDN FR 001 190036 000 R P 2007 000 30600,

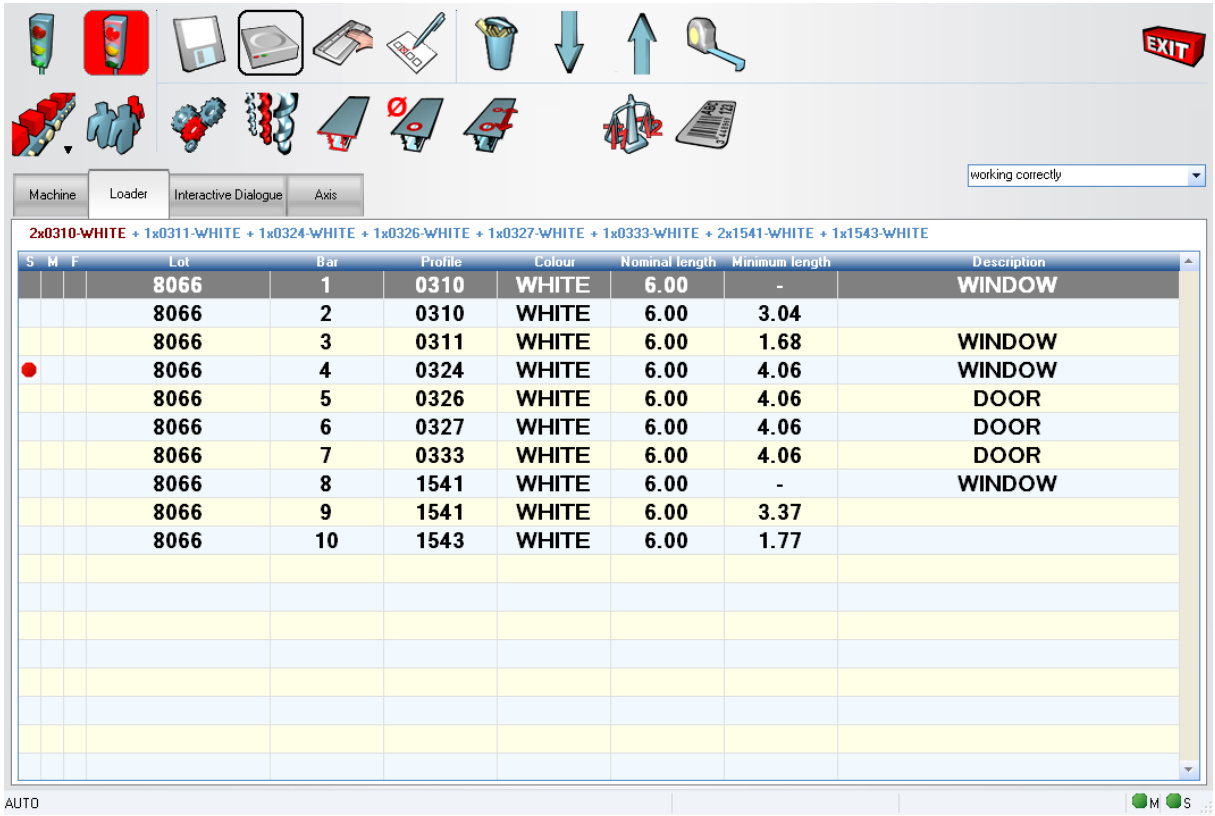
Date	***Author***	***Modifications***
29/06/06	LN	LN New types of spindles(annexe 6.3.2); Setting extension parameters (chap 4.4) ; Maximum label field size (annexe 6.1)
03/07/06	LN	Page layout
05/10/06	LN	Modification of file format: Adding of colour field and J cut (annexe 6.1) ; New types of spindles (annexe 6.3.2)
25/10/06	LN	Modification of file format: : Adding of offcut label field (annexe 6.1) ; New presentation of the lot editor (chap 3.1.3)
05/03/07	DL	New procedure for declaring the spindles and tools (annexe 6.4)
01/06/07	LN	Setting parameters for logos (chap 4.6.1)

1 Présentation of the control software

The CAM prepares a « lot-file » which describes the bars and pieces to be machined.
The control software converts this lot-file into ISO programs which can be interpreted by the numerical controls of the machine.
In production mode it allows the operator to create the list of pieces to be machined and then gives information about how the production is progressing.
In maintenance mode it allows the operator to set the parameters for the machining cycles.



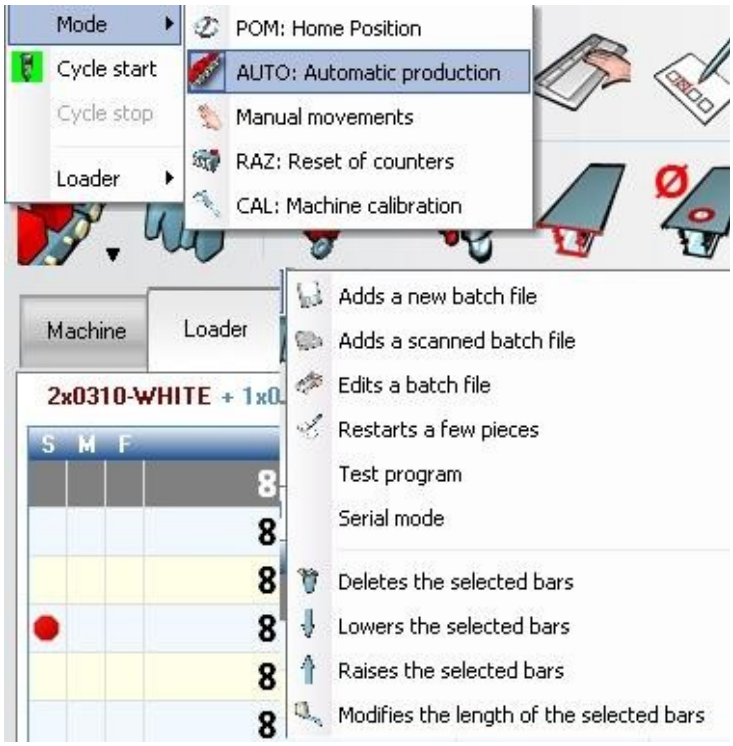
2 Main Window:



The main dialog window is composed of (starting from the top)

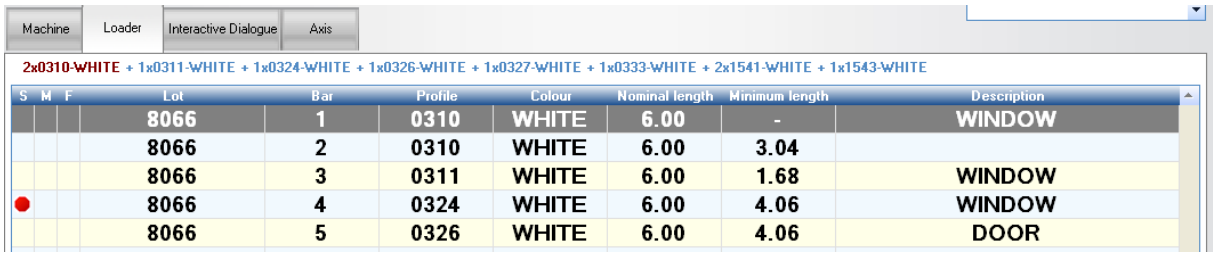
- A title bar indicating the device driver name and its version number.
- A pull-down menu allowing the user to access the driver functions. These are divided into two groups: ”production” and “maintenance”
- A tool box allowing the user to directly access the most used functions: start cycle and stop cycle, add a lot, modify the bar sequence, mode choice, machine parameters, tools, profile, machining operation …
- A central zone in which is displayed a block diagram of the machine (machine tab), the list of bars to load (loader tab), the machine messages (dialog tab).
- A status bar which displays information on the operation being processed, the status of both the counters and the communication with the numerical control.

3 Production Mode :



3.1 Creation of the list of bars to be machined:

The list of bars to be machined is displayed on the loader tab in the central part of the main screen.



The line of text above the table summarises the list of pieces to be loaded (quantity x profile name). The table itemises each piece. It is read starting from the top : the machine will work on the piece described in the first line of the table, then the second, and so on…..

Each line has the following information :

(column S): stop indicator. Added or taken away by the operator by double-clicking on the line. The machine stops to load when it arrives at the bar so marked.

(column M) : manual loading indicator.

(column F) : indicator of pieces which have already been machined.

Lot : name of the lot it originally comes from.

Bar : number of the bar in the lot of origin, If the bar has been divided up, the number is indexed for example 12.1, 12.2… etc

Profile : profile name
Colour : Bar colour
Nominal length : bar length read in the lot file
Minimum length : minimum length of the bar to be loaded.
If this length is close to the nominal length it isn't indicated (sign « - »).
If the minimum lengths loaded automatically or manually are different then the minimum length that can be loaded by hand is in parenthesis, For example « 2.00 (1.55) » signals that you can load a 2m bar automatically or only a 1.55m bar manually.
If the minimum length is greater than the nominal length (optimisation program error), the fault is highlighted by asterisks around the nominal length.
For example: nominal length= 6500, minimum length=****6576****.
Literal : operator message read in the file lot (optional indication).

3.1.1 Adds a new lot

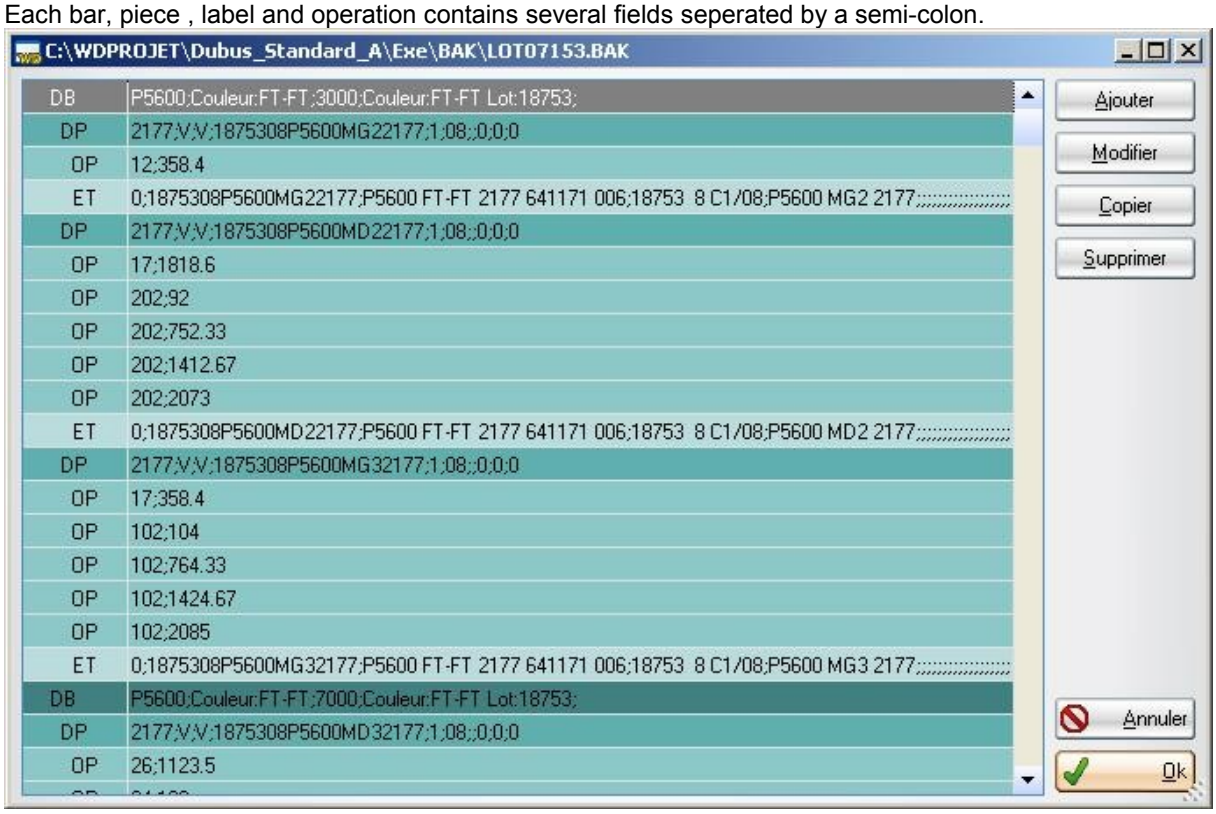
The operator selects a lot file in the available lots directory (remote directory).
The software makes a copy in the directory of archived lots (local directory) then reads it and adds its contents to the list of pieces to be machined.
The original file can be renamed or deleted (see machine-parameter n°10).
The work directories are chosen in the maintenance mode.

3.1.2 Adds a lot which has already been read

The operator selects a lot-file in the archived lots directory.
The software reads it and adds its contents to the list of pieces to be machined.

3.1.3 Edit the lot

This function allows you to create or modify a lot file.
The contents of the file are displayed in tree form :
The lot is made up of bars (DB).
The bars are made up of pieces(DP)
The pieces are made up of a label(ET) and of operations(OP).
Each bar, piece , label and operation contains several fields seperated by a semi-colon.

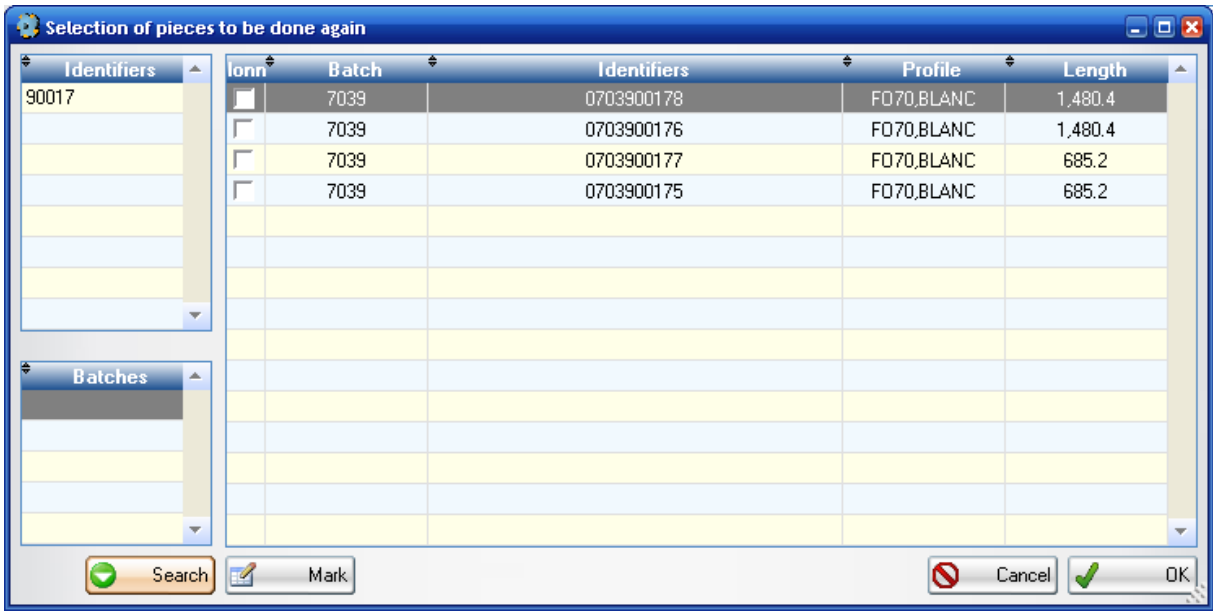


The bars are defined by a profile name, a colour, a length and a literal.
The pieces are defined by a length, a front cut, a rear cut, an identifier, a reinforcement,
The labels are defined by N fields (N depends on the type of printer).
The operations are defined by a name and a position.

3.1.4 Reworks a few pieces

This function allows the user to create a lot of pieces to be reworked : After having indicated the information that is known about the piece (lot name(s) and/or identifier(s)), the operator starts the search. All the pieces which correspond to the search criteria in the archived lots are displayed, and the operator can mark the one(s) to be redone.

It is not necessary to give the identifier in its entirety. In the example below each piece whose identifier has « 90017 » contained in it is displayed.



Comment : The search can be long if there are a lot of files. It is better to specify the name of the lot if it is known and to regularly purge the finished lots.

3.1.5 Deletes the selected pieces

Deletes the piece(s) selected in the list.

3.1.6 Moves down the selected pieces

Moves the piece(s) selected to the bottom of the list (piece to be machined later, unavailable profile …).

3.1.7 Moves up the selected pieces

Moves the piece(s) selected to the top of the list (piece to be machined first).

3.1.8 Modifies the length of the selected bar

Allows you to enter the length of the loaded bar
This length is necessary for bars loaded by hand, Bars loaded in automatic are measured by the machine.

3.1.9 Divides the selected bar

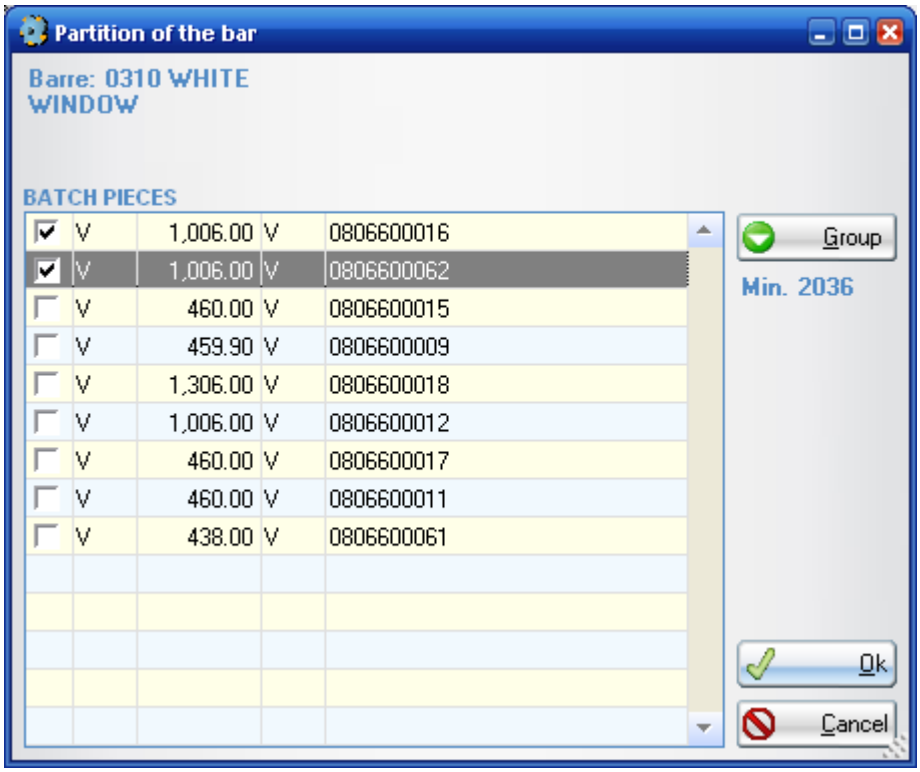
To access this function right-click on the bar to be divided up, This allows you to distribute the pieces of the selected bar in several offcuts.

The contents of the bar are displayed: profile, colour and literal of the bar, front cut, length, rear cut and each piece identifier.

The user ticks the pieces to be grouped in the first offcut then clicks on [Group]
The un-ticked pieces stay on screen. The user then ticks the pieces to be grouped in the next offcut, then clicks on [Group].

By clicking on [OK], the pieces left over are grouped in a last offcut.

In the example below, by clicking on [OK], the 2 first pieces are extracted from the bar and sent to be incorperated in an offcut. This offcut must not be more than 2336mm long.



3.2 Mode choice and start up of the cycle

The active mode is displayed. The different modes are :


HOME : locating/moving to the machine's zero reference position.


AUTO : Automated production.


MANU : Manual movements.


RESET : Re-set of all the piece counters.


CALIB : Machine Calibration.

This mode is selected in the main menu (production/mode menu) or by clicking the « mode » button : in this case the different modes possible are proposed sequentially.
Once the mode is selected the green light starts the cycle and the red light stops it.

The background colour of the button indicates the state in process :

Figure 1: Software running

Figure 2 : Software stopped

3.3 Locating Home position

A return to the machine's zero reference position is necessary each time the machine is powered up. It allows the spindles to position themselves with reference to the cams of the HOME position.

- Switch on the machine to live (green light) and power up (white push button).
- In the program select HOME mode and click on the green light.
- Wait a few seconds. A message « waiting for SCY » appears.
- Click on the start-cycle button (green button).
- The axes move slowly into position until they reach their respective HOME reference cam.
- When all axes have reached their HOME reference cam, the cycle ends and the program stops (red light).

3.4 Production

The machine needs to be connected/live, powered up and have done HOME position.
The list of bars to be machined needs to be loaded (see chapter 3.1).

- Select AUTO mode in the program and click on the green light.
- Wait a few seconds. After checking the parameters, a message appears« awaiting SCY ».
- Press cycle-start (green button).
- In response to the request of the numerical control, the program prepares the machining program for the first bar of the loader (at the top of the list) and transfers it to the NC.

3.5 Manual

The machine needs to be connected/live, powered up and have carried out HOME position.
Select the program MANU mode and click on the green light.
The NC goes into mode MDI. The user can than directly enter an elementary ISO code in the dialogue tab.
For example: to open the gripper, key in M71, [Send] and [Cycle Start].
The machine manual lists the recognised codes.

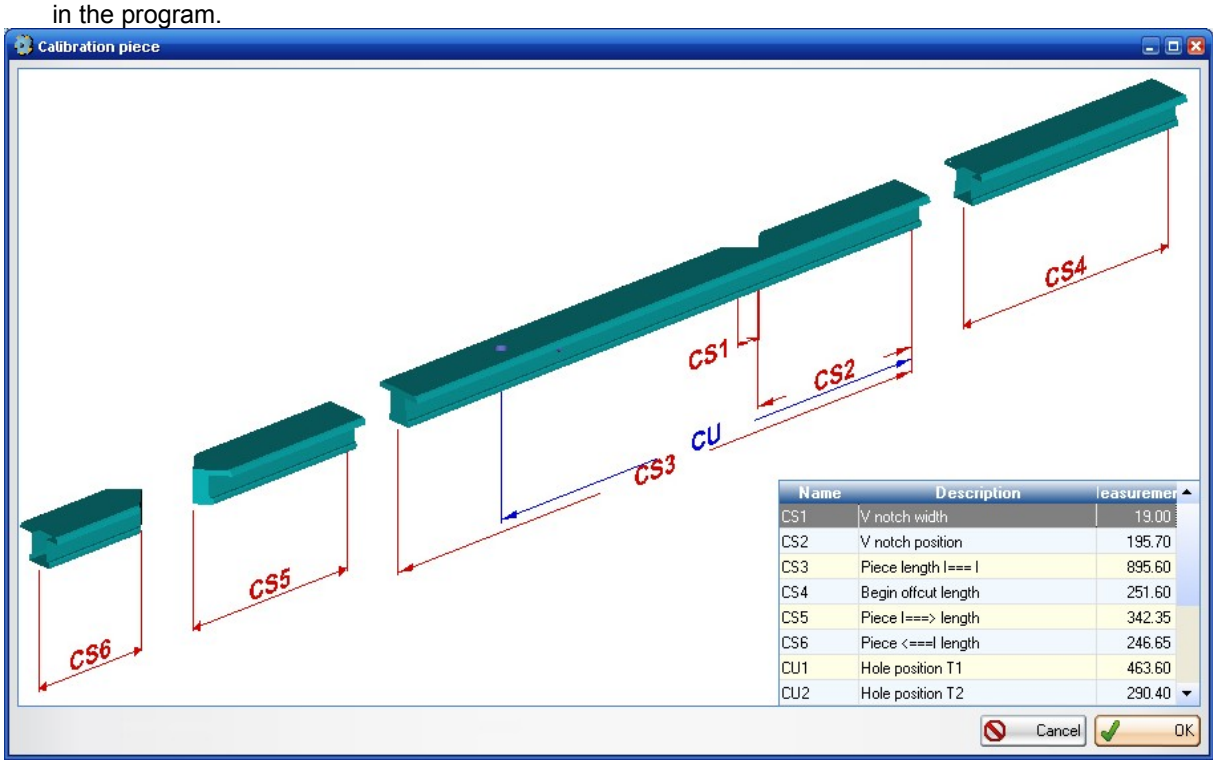
3.6 Reset to zero of the counters

The machine needs to be connected/live.
Select the RESET mode in the program and click on the green light.
The piece and bar daily counters are reset to zero.

3.7 Calibration

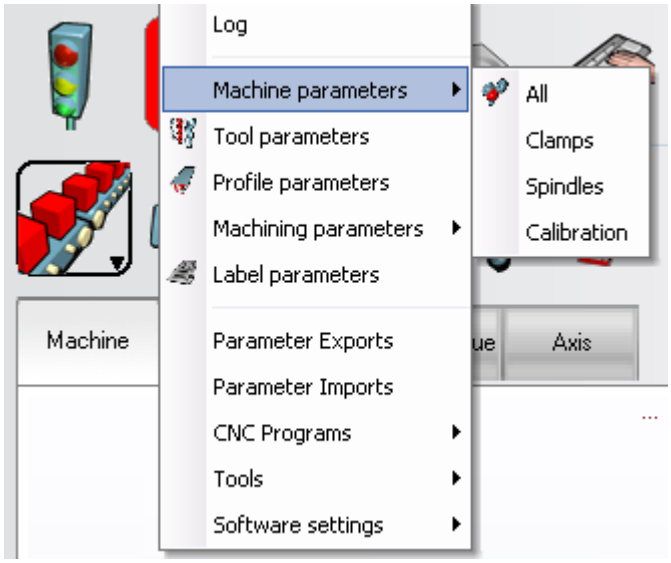
The machine needs to be switched on, powered up, and machine origin operations done.
In the software select the CALIB mode and click on the green light.
The machine will then execute program %20 :

- Load the bar requested.
- Program %20 does a test piece which all the tools will mark. The measurement of this piece allows you to calculate the real position of the tools on the machine.
- On the piece, for each mark, note the number of the corresponding tool.
- Measure the distance between the end of the piece and the centre point of each mark, Enter that value in the program.



4 Maintenance mode:

The « maintenance » menu allows the user to configure the software program.

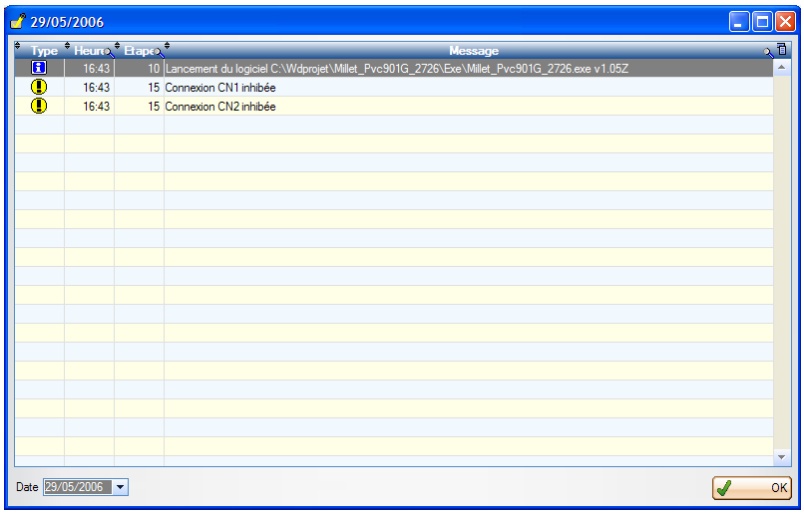


This menu is accessible when the program is stopped and the maintenance mode is selected (see pageErreur : source de la référence non trouvée). Access can be proteced by a pass-word (see page 38).

4.1 Log

The program memorises certain events. They are classified by day, hour and type :

Info : start, stop, saving and restoring of parameters…
Warning
Error : parameters are incoherent



The log lists these events. It offers help with troubleshooting when there is a malfunction.

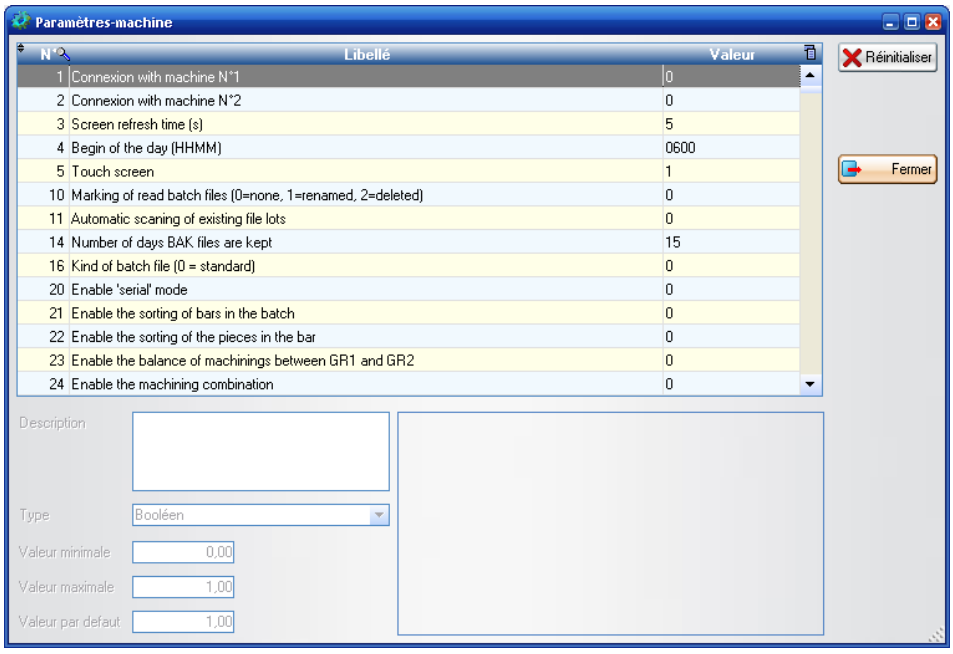
4.2 Machine parameters

The machine parameters allow the program to be adapted to the machine and to the needs of the users.

4.2.1 All parameters

Each parameter is defined by

- A unique number.
- A literal.
- A type : Boolean, complete, real or string.
- An interval and a default value (for the digital parameters).
- A value chosen by the user.
- An optional description entered by the user. This description can be used to specify the literal or to give a history of the modifications.
- An associated image. This normally should be found in the drawings directory. It has the name « CMxxxx.JPG », xxxx being the number of the parameter.

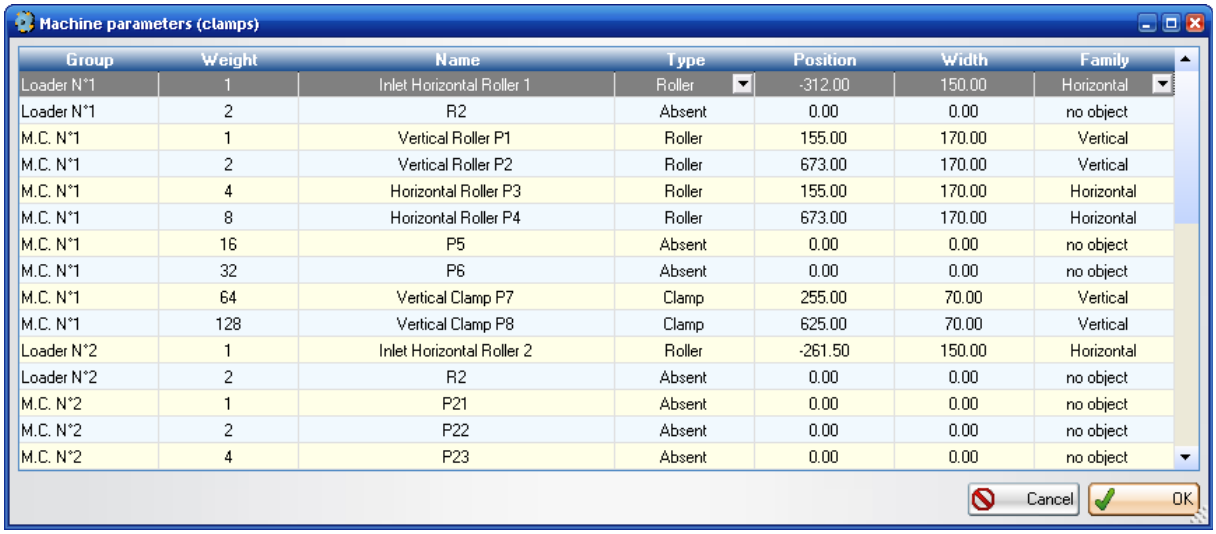


The parameters are classified in families :

N°0 to 99	Software parameters
N°100 to 199	General machine parameters
N°200 to 299	CU1 machine parameters
N°300 to 399	CU2 machine parameters
N°400 to 499	Saw machine parameters
N°500 to 599	Printer machine parameters
N°600 to 699	Storage robot machine parameters
N°1000 to 2999	Spindle machine parameters
N°3000 to 3999	Clamp machine parameters

4.2.2 Clamp parameters

This window groups the machine parameters linked to the flanging/clamping systems (clamps and rollers).

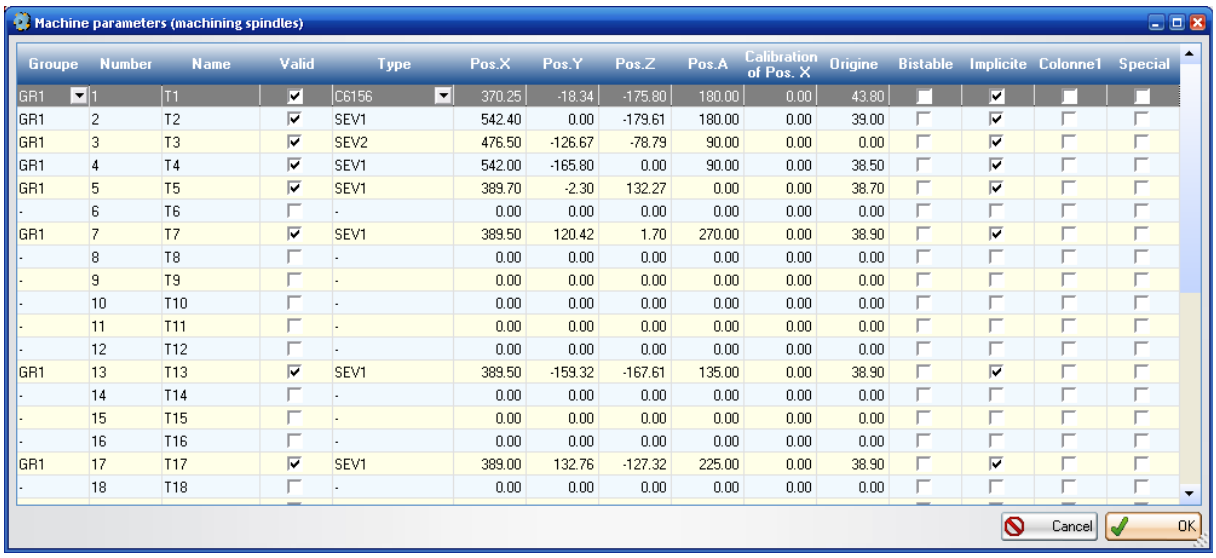


Each clamp is defined by :

- A group : machine zone in which is located the clamp (loader n°1, MC1, loader n°2, MC2, Auxiliary or saw). Each zone is addressed by a different plc variable.
- A weight : Binary weight of the clamp in the group, from 1 for clamp N°1 to128 for clamp N°8.
- A name : free text.
- A type : roller or clamp. A press roller is tightened when the front end of the bar passes the clamp (position + ½ width), untightened when the end of the bar arrives at the clamp (position – ½ width). A clamp is tightened when the bar is stopped under the clamp.
- Position : distance between machine zero (measuring sensor cell) and the clamp axis.
- Width : overall width of clamp A, clamp is tightened when its whole width is positioned on the bar.
- Family : Family : layout of the clamps. Clamps of the same family are driven simultaneously, The parameters for the clamping order of the clamps of the different families can be set for each profile :priority given to horizontal or vertical…

4.2.3 Heads

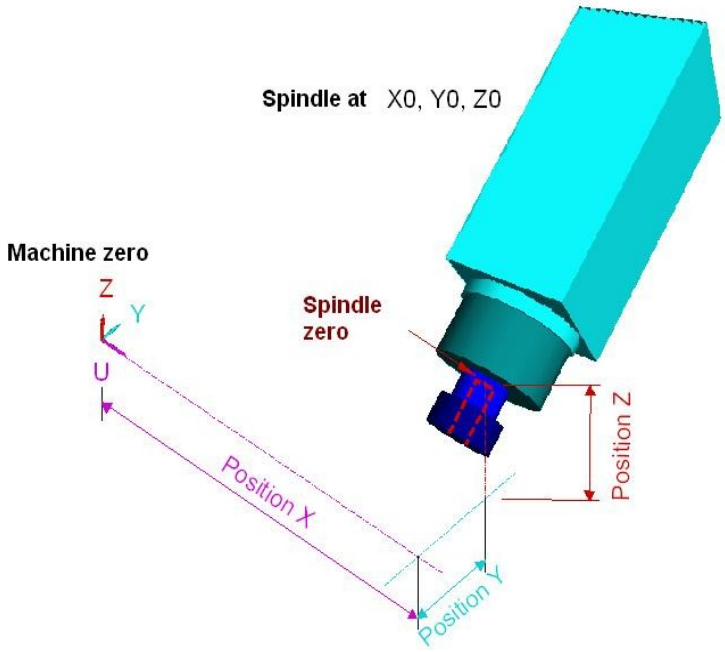
This window groups all the machine parameters linked to the machining spindles.



Groupe	Number	Name	Valid	Type	Pos.X	Pos.Y	Pos.Z	Pos.A	Calibration of Pos. X	Origine	Bistable	Implicite	Colonne1	Special
GR1	1	T1	☑	C6156	370.25	-18.34	-175.80	180.00	0.00	43.80	☐	☑	☐	☐
GR1	2	T2	☑	SEV1	542.40	0.00	-179.61	180.00	0.00	39.00	☐	☑	☐	☐
GR1	3	T3	☑	SEV2	476.50	-126.67	-78.79	90.00	0.00	0.00	☐	☑	☐	☐
GR1	4	T4	☑	SEV1	542.00	-165.80	0.00	90.00	0.00	38.50	☐	☑	☐	☐
GR1	5	T5	☑	SEV1	389.70	-2.30	132.27	0.00	0.00	38.70	☐	☑	☐	☐
-	6	T6	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
GR1	7	T7	☑	SEV1	389.50	120.42	1.70	270.00	0.00	38.90	☐	☑	☐	☐
-	8	T8	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
-	9	T9	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
-	10	T10	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
-	11	T11	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
-	12	T12	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
GR1	13	T13	☑	SEV1	389.50	-159.32	-167.61	135.00	0.00	38.90	☐	☑	☐	☐
-	14	T14	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
-	15	T15	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
-	16	T16	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐
GR1	17	T17	☑	SEV1	389.00	132.76	-127.32	225.00	0.00	38.90	☐	☑	☐	☐
-	18	T18	☐	-	0.00	0.00	0.00	0.00	0.00	0.00	☐	☐	☐	☐

Each head is defined by :

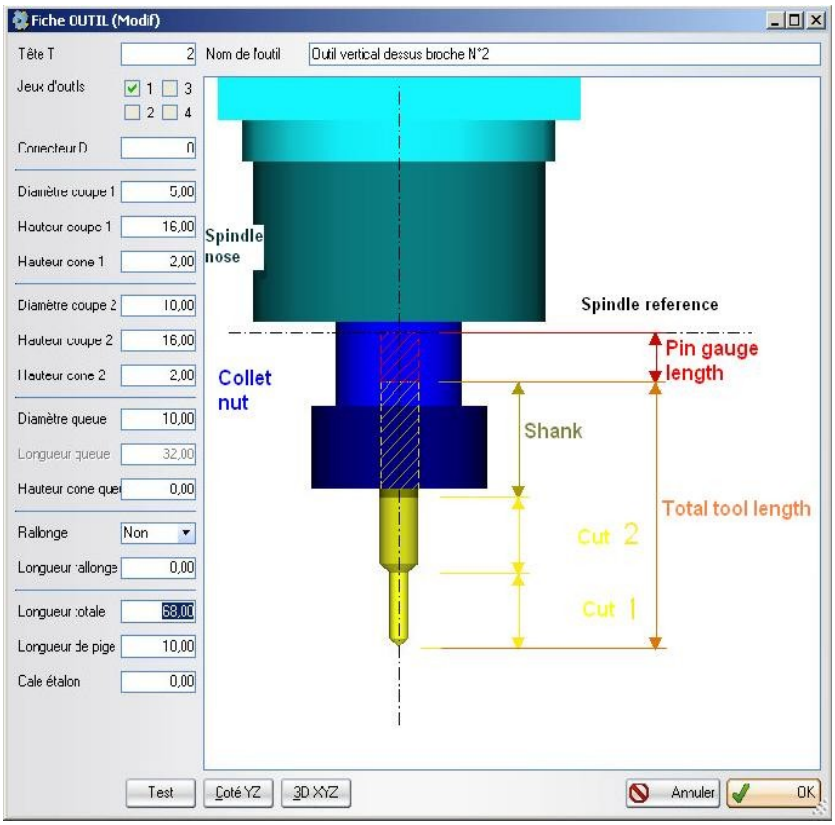
- A group : GR1 for the MC1, GR2 for the MC2.
- A unique number.
- A name : free text.
- A « valid » switch : operations assigned to an un-ticked head will be ignored.
- A type : spindle model, used for graphical representations. The different types of spindles managed are described in appendix 6.3.
- A position on X, Y and Z : position of the bottom of the grip (extremity of the pin gauge), slide rest at zero.
- An A position : angular position: 0°=on top, 90°=front, 180°=under, 270°=rear.
- A calibration position : to be given if the calibrated piece is not done at X0.
- A « bistable » switch : to be ticked if the head has 2 stable positions. RESET does not make the head retract in.
- An « implicit » switch : to be ticked if the head is mounted on a cylinder which allows it to be retracted when it is not in use.
- A « fixed » switch : to be ticked if the head is fixed directly on the frame : it is not mounted on a digital slide rest.
- A « special » switch : is dependant on the machine (heads mounted on an H saw,…)



4.2.4 Standard

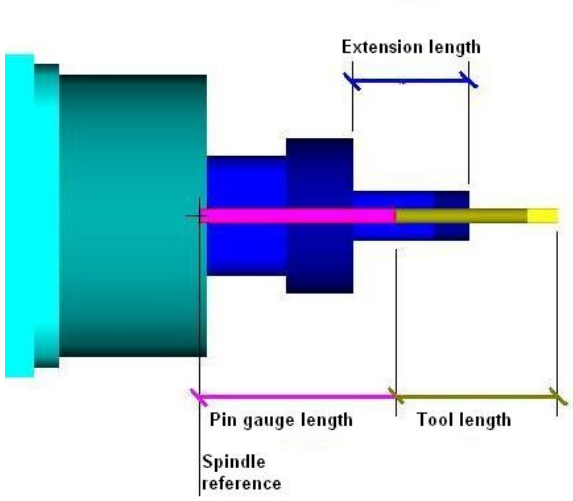
Allows direct access to the input of the dimensions of the standard piece without launching its machining program on the machine.

4.3 Tool parameters



Each tool is defined by :

- The head n° on which it is mounted.
- The set(s) to which it belongs. The tool sets are associated with the profiles.
- The type of extension and its length. The length is measured from the end of the spindle nut to the end of the extension nut (see the diagram below)



- The total length of the tool, made up of : cone 1 height + cut 1 length + height cone 2 + length cut 2 + height cone shank + shank length.

- The length of the pin gauge (distance between the spindle reference point and the tool shank). The use of an extension has no effect on this parameter. It is always the spindles' reference point.
- The height of the standard block/wedge, used to check the gauge ([test] button).

Each tool is linked to a spindle.
Several tools can be linked to the same spindle.
For a given set of tools, the tool linked to the spindle needs to be unique.

In the example below, the parameterization of spindle 1 is correct but spindle 2's is not (For set N°1, two tools are allocated to the same spindle).

Spindle N°	**Set N°1**	**N°2**	**N°3**	**N°4**	**Tool**
1	X				Tool 1A
1		X			Tool 1B
1			X	X	Tool 1C
2	**X**				Tool 2A
2		X			Tool 2B
2	**X**		X		Tool 2C
…/…					

4.4 Profile parameters

The profile parameters groups the settings linked to the type of machined bar.
These settings are classified in families displayed in different tabs :

- General parameters : name, literal and invalidation.
- Geometry : dimensions, origins/datum points…
- Loading : operator message, loading options…
- Machining operations : clamping options, tools…
- Output: length corrections, cutting cycles…
- Printing : label positionning.
- Finish-machining : finish-machining machine settings (reinforcing screwing, notching machine, hardware inserter…).

General parameters

Name :
This name is used in the lot file to designate the profil. It 's made of uppercase digits and letters.

Literal :
Profile description. This description appears in the list when the user has to choose a profile.

Disable :
The disabled profiles are ignored by the machine.

Geometry tab :

Profile drawing :
If a DXF file with the name of the profile is found in the drawings directory, it is read and displayed. This drawing should represent a sectional view of the profile to scale 1. It should be made up of lines, arcs and simple « polylines ». It should not have any «blocks», or any «dressing» elements (dimensioning, hatching, title block…) even hidden.

 When declaring a new profile this button is active. It allows the user to select a drawing, and to initialise the Profile and Envelope fields using this drawing.

 Turns drawing 90°.

 Creates horizontal symmetry.

 Simplifies the drawing. The quality of the drawing is downgraded but the image uploads faster. This operation is irreversible. Verify that you have a saved copy of the drawing before compressing it.

 Warning, the DXF file is modified during the rotations, symmetry or compression of the drawing. Writing in this file should be permitted.

Envelope :
Overall height and width of the profile.

Counter block :
Position of the lower left corner of the envelope with reference to the machine zero.

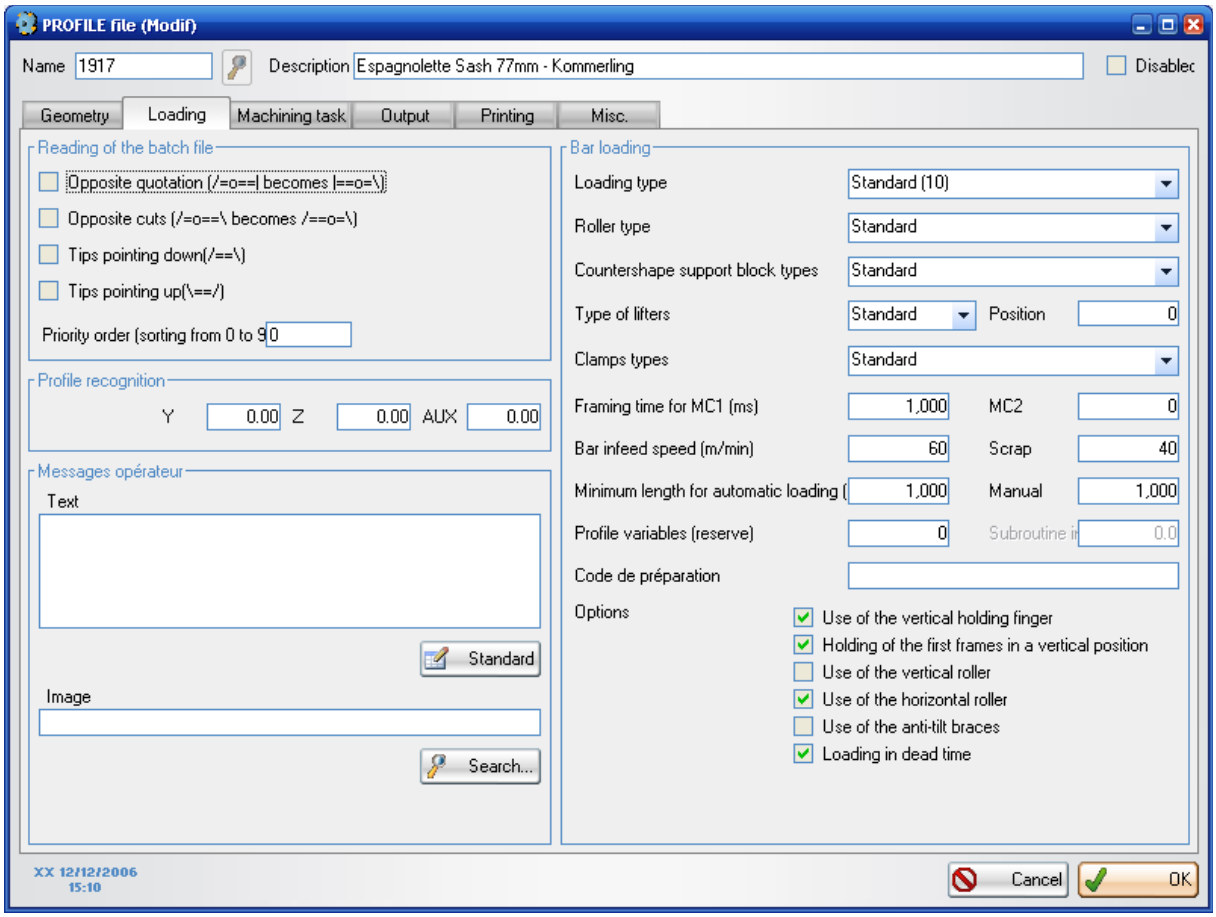
Dimensioning Origin :
Position of the origin point with reference to the lower left corner of the enveloppe. This point is used for defining the length of the piece and position X of the operations.

Gripper :
Position of the arm when the profile is picked up by the gripper.
The parameters for the offset between the position of the arm and that of the drawn gripper is set according to the type of gripper (machine parameters).

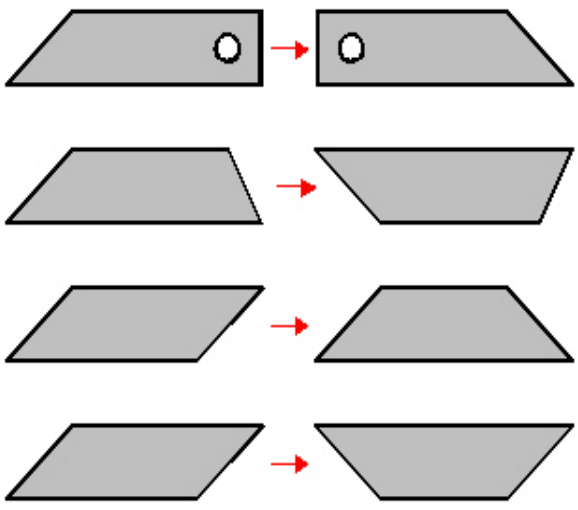
Program zero point of operations :
Program zero positions with reference to the lower left corner of the envelope.
Each machining operation is linked to a program zero position, the adjustment of these reference points according to the measured extrusion dimensions allows the user to position the machining operations with great accuracy.

Example : On a given profile, some operations are measured along Y starting from the facing side in reference, others from the opposite side.
2 machining operation program zero positions are declared : one based on the reference position (Y0), the other based on the theoretical width of the profile.
Operations measured from the reference point will be connected to the first program zero position, the others to the second.

Loading tab



Reading of the lot file
These options explain how to interpret the lot file prepared by the CAMM :



Reverse dimensioning : positions the operations from the end of the piece; reverses the front and rear cuts.
*Ex :**DP;1000;45;90 becomes DP;1000;90;135***

Cuts reversed (barrel saw) : Changes the cutting angles read from Alpha to 180-Alpha.
*Ex :**DP;1000;45;120** becomes **DP;1000;135;60***

Points pointing downwards (drum saw) : The front cut is kept, the rear cut is changed from Alpha to 180-Alpha.
*Ex :**DP;1000;45;45** becomes **DP;1000;45;135***

Points pointing upwards(barrel saw) : The rear a cut is changed from Alpha to 180-Alpha ; the front cut is kept.
*Ex : **DP;1000;45;45** becomes **DP;1000;135;45***

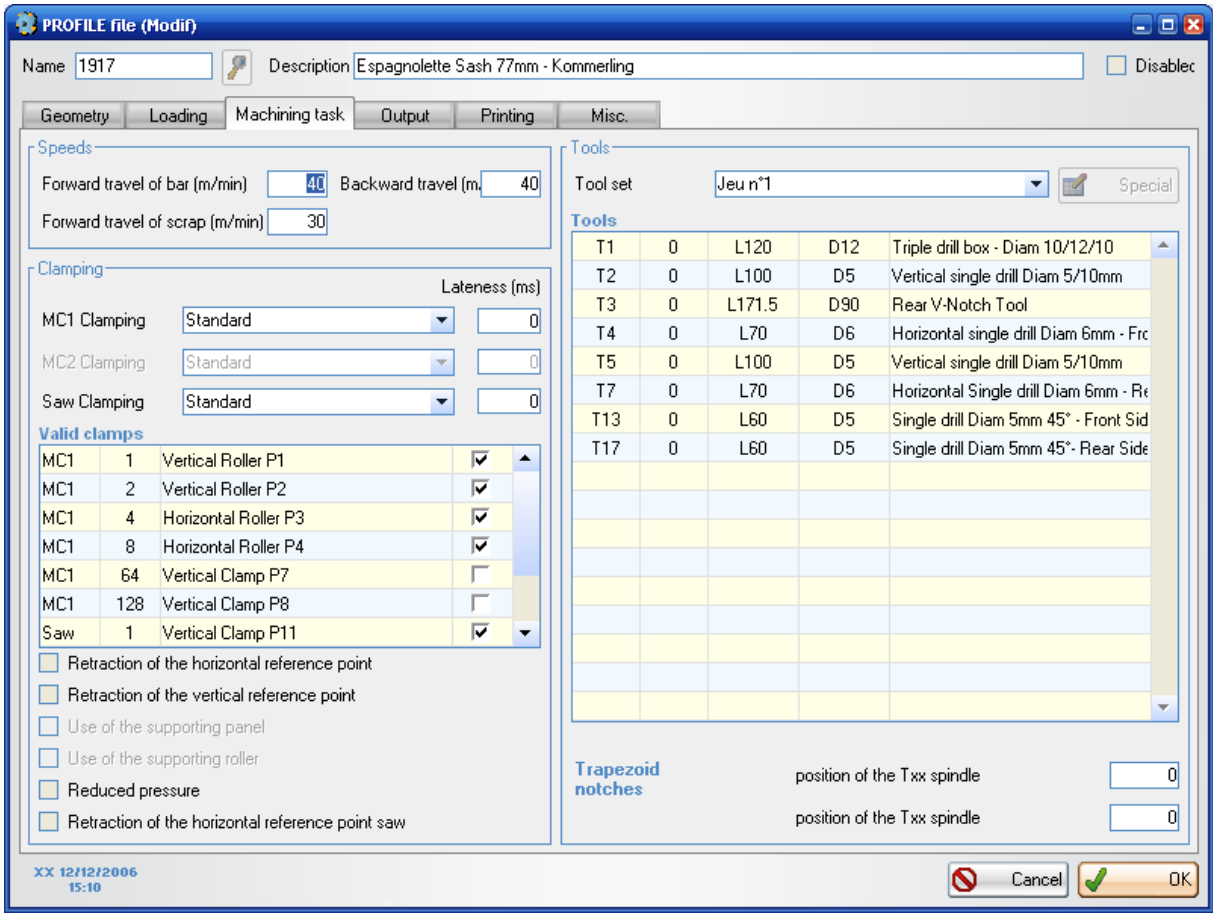
The order of priority defines the sorting order of the bars of a lot.

Profile recognition
Values tested by the profile recognition device.

Loading

- Type of load: loading cycle used. The machine documentation describes the different cycles possible.
- Types of rollers, counter-blocks, lifters : only as info. These accessories are changed manually by the operator.
- Lifter positions : to be indicated when the lifters are positioned pneumatically.
- Positioning time : length of time during which the horiontal positioning devices (« dogs ») are activated.
- Speed of introduction : speed at which the bar or offcut moves during the measurement operation. The classification as bar or offcut depends on the minimum length to be loaded and the limit declared in the machine parameters.
- Minimum length for loading : lengths of the smallest bars that can be loaded automatically or manually
- Variable associated with the profile : value initialised in the PLC (in reserve, for special development).
- Initialisation sub-program : ISO sub-program launched after the loading of a bar.
- Operator message: message displayed during the loading of a bar. It is for indicating to the operator how to prepare the machine to machine the bar (list of manual settings). During the cycle, if the message applies to several bars, it will only be displayed once.
- Options : validates the use of optional devices mounted on the loader.

Machining tab :



Speeds :
Speeds at which the bar moves between two operations.
The feed speeds of the different bar lengths are independantly adjusted : the feed speed of a long bar, the feed speed of a short bar (this speed is slower because the offcuts are less well guided than the bars) and reverse speed (this speed is reduced because there is a risk that the bar may slip in the gripper).

Clamping :
The clamping cycles describe the order of clamping of the clamp groups.
The possible cycles are :

- Standard : simultaneous clamping of all the clamps
- Priority to horizontal clamping : clamping of the horizontal clamps, pause (delay time can be set), clamping of the vertical clamps.
- Priority to vertical clamping : clamping of the vertical clamps, pause, clamping of the horizontal clamps.

The validated clamps will be used for clamping the profile. Only the clamps present on the machine are proposed.

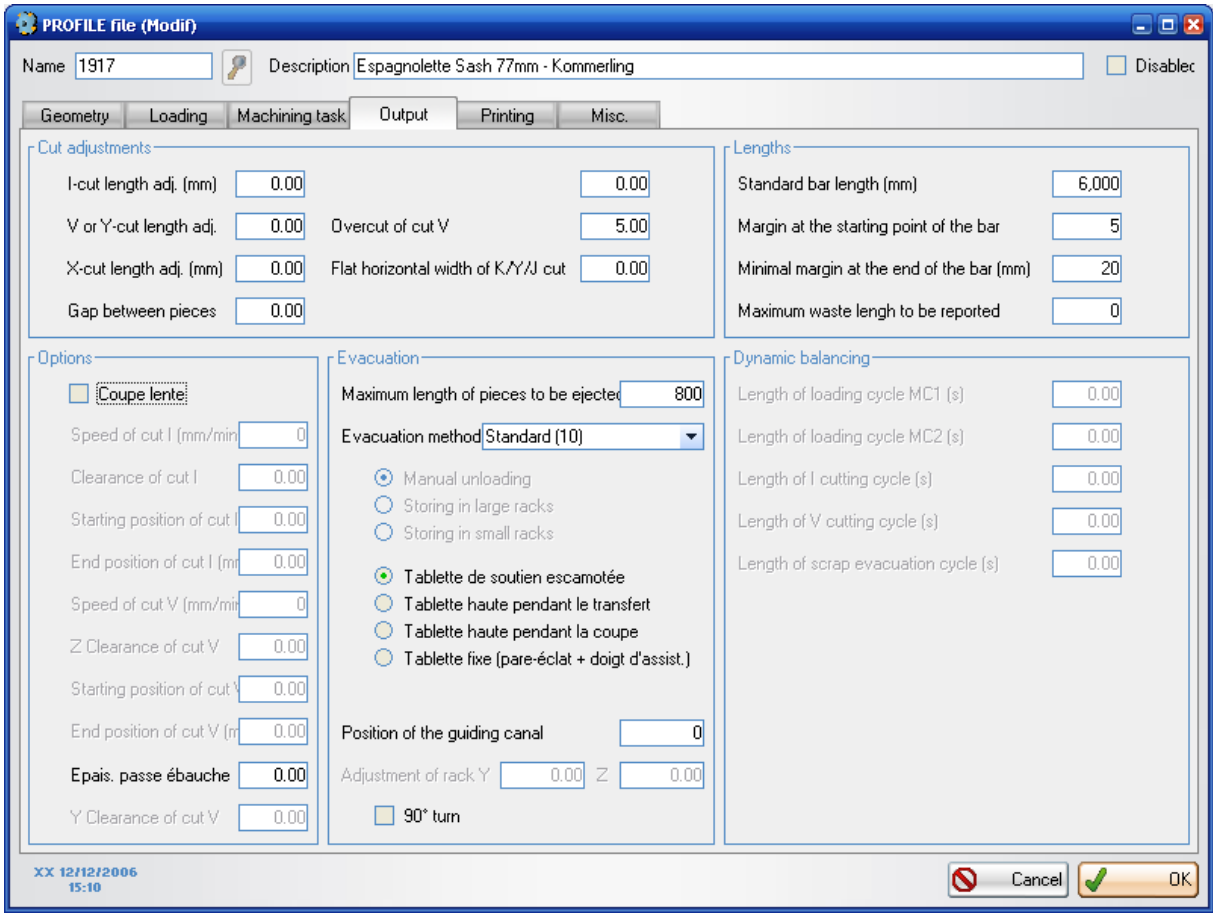
Options : validates the use of optional devices for clamping and guiding :
Retractable reference locators : tables opposite the clamps of the MC (Aluflex).
The clamp parameters specify to which family, horizontal or vertical, each clamp belongs.

Support tablet : movable tablet, installed manually between the vices for supporting flexible profiles (Aluflex).
Support rollers : rollers carried by the MC carriage, used for facilitating the passage of the downstream vice (Aluflex).

Reduced pressure : specifies the compressed air circuit to use.

Tools :
A set of tools is allocated to a profile.
This can be either one of the 4 standard tool sets defined when setting the tool parameters or a special set of tools put together specifically for this profile.

Output tab :

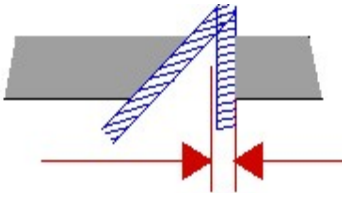


Cut adjustments :

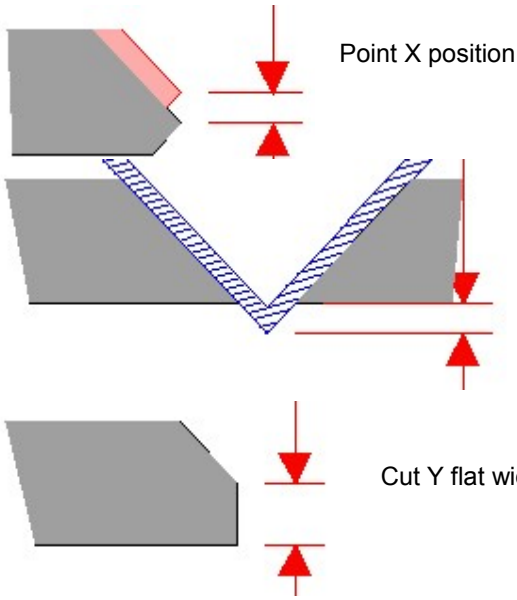
Cut length adjustment : Corrective length modification for straight cuts.

V Cut length adjustment : Corrective length modification for miter cuts (45° for 3 blade saws, or difference of 90° for a barrel saw).

X Cut length adjustment : Corrective length modification for mullion cuts (pneumatic 3 blade saws).



Space between pieces : Refresh between 2 different cuts (barrel saw).



Point X position adjustment (pneumatic 3 blade saws).

Cut V overrun (3 blade saws).

Cut Y flat width (3 blade saws).

Lengths :
Nominal length of a new bar. This length measurement is used when creating a lot (manual entry, reworks…).
Margins at the start and end of the bar. Bar minimum refresh,
Offcut carried forward : some offcuts are difficult to clamp and/or evacuate at the end of a bar. A part of the rear offcut can be carried forward to the front of the bar [1].

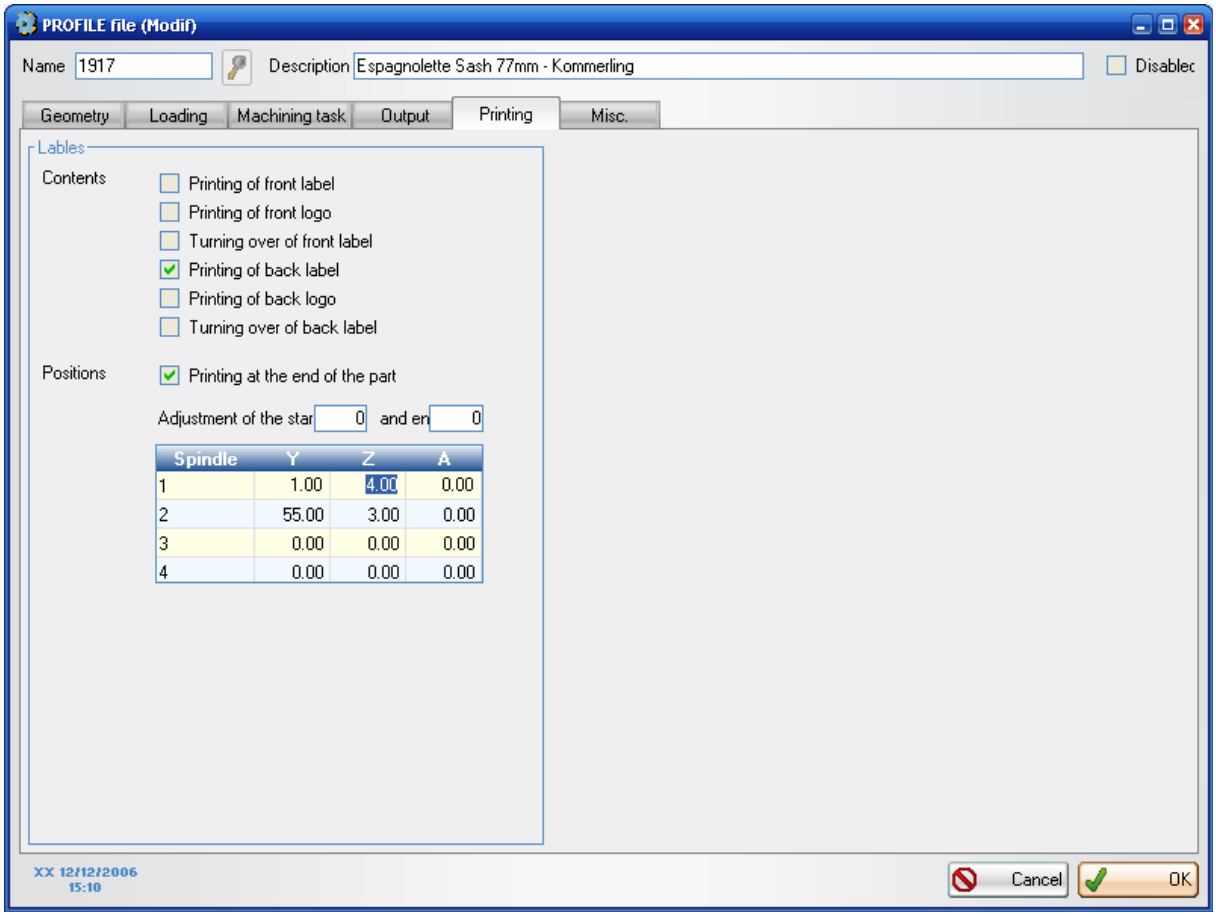
Options :
Cut position and speeds.
The parameters used depend on the saw type (barrel/3 blade, pneumatic/digital). The others are greyed.

Evacuation :
Maximum length of pieces to be ejected : the shorter pieces will be pushed by the ejector, the others will be carried by the conveyor belt.
Evacuation type : evacuation cycle used. The machine documentation describes the different cycles possible.
Manual put away, in small or large racks : to be specified if the machine automatically puts away the pieces at the output end.
Support tablet : set up of a retractable tablet for supporting the bar during the passage of the saw.
Guide channel : position of the guiding device for pieces at the output end of the machine
Rack adjustment : to be specified if the machine automatically puts away the pieces at the output end..

Dynamic balancing :
Length of loading, cutting and evacuation cycles used for calculating the theoretical machining time required for the bar and for balancing the load of the MCs.

[1] The cycles are adjusted on each machine. They vary in particular depending on the type of saw and the direction in which the machine goes.

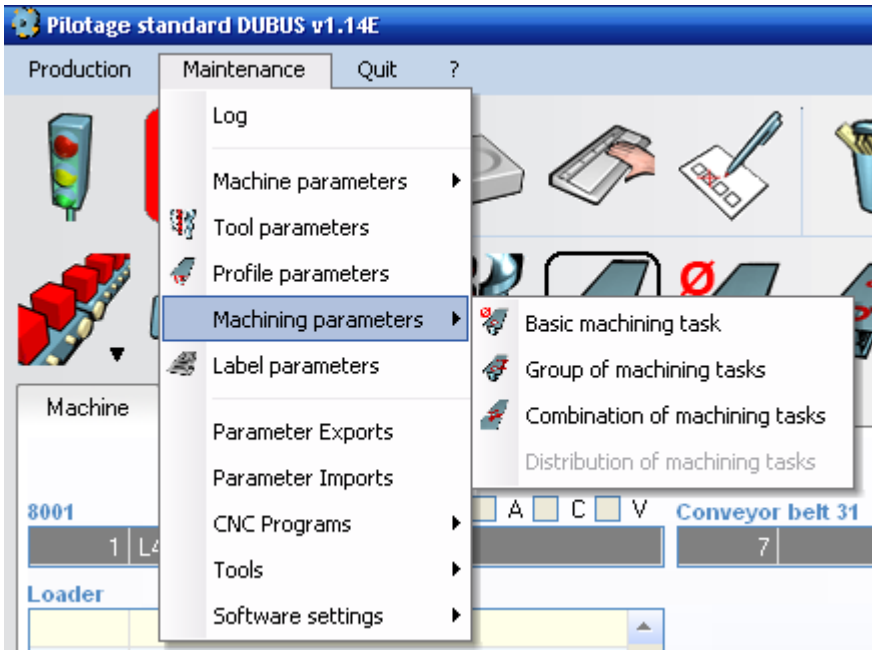
Print tab :



Content :
On the 2 headed « Imaje » printer : contents of the label sent to each head.
On the other printers : validation of printing on the bar. The format of the label is independant of the profile.

Position :
Specifies the position of the label on the piece (for printer with automatic applicator « Sato » or direct printing « Imaje »).
Adjustment X : time out between the cue given by the sensor cell and the start of the printing cycle
Position XYA : head position.

4.5 Machining parameters



A standard machining operation is an elementary cycle done by a tool to a profile (drilling of a hole or cutting of a mortise for example).

A group of machining operations is made up of several standard machining operations of which the centre distance is fixed (for example a lock made up of 3 holes drilled and a mortise).

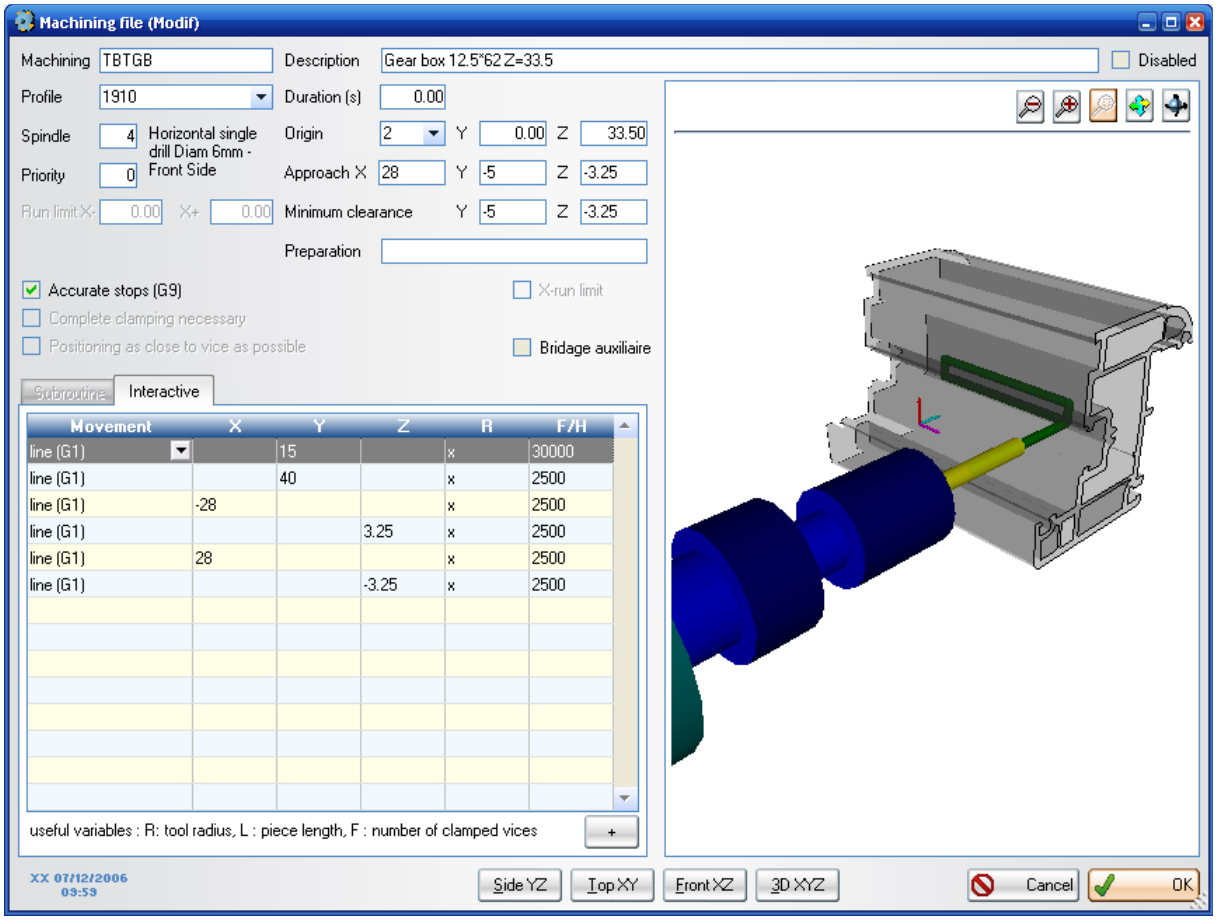
An association of machining operations is a single machining operation which replaces two machining operations done on two different bar pieces (for example 2 end notchings replaced by an oblong machined before the cut).

Distribution of the machining operations associates a machining operation with a standard machining operation done on MC1 or another standard machining operation done on MC2. This balances the work load of the 2 machining centres [2].

[2] This distribution facility only exists on machines equiped with 2 machining centres (Pvcflex or Aluflex 9001).

4.5.1 Standard machining operations

A standard machining operation cycle is defined for a Profile/Machining pair. It specifies the tool to be used and its tool path.



Usinage : nom de l'usinage. Ce nom est utilisé dans le fichier lot pour désigner l'opération d'usinage. Il est constitué de chiffres et lettres majuscules.

Description : libellé associé à l'usinage. Cette description apparaît dans les listes, lorsqu'il faut choisir un usinage.

Invalidation : les usinages invalidés sont ignorés par la machine.

Profil : nom du profil, choisi parmi les profils déclarés.

Durée : durée du cycle d'usinage, utilisée lors de la répartition dynamique des usinages entre 2 CU.

Overlength : extra gap between pieces added when this machining operation is found. The overlength is used when a tool « bites into » the neighbouring piece.

Head : n° of spindle used. The tool chosen will belong to the profile's tool set and be associated with this head.

HOME : The home position of the operation is defined by the home position of the profile (N° from 1 to 3) + an offset on X and Y. The feed movement, the trajectory and the clearance will be measured with reference to this program zero or home position.

Priority : allows the user to define the order of execution of the operations. The machining operations are sorted by order of decreasing importance then U position increasing [3].

Preparation : ISO code sent during the approach feed movement of the bar (for example selection of a limit block for a pneumatic tool). If several codes are necessary then separate them with a semi-colon (for example « E30042=2 M93; E30043=1 M94 »).

Feed : feed position. of the tool, before machining.

Clearance: clearance position of the tool, after machining. The tool is then entered pneumatically, when the carriage is brought back to the YZ feed position.

Options :
• Precise stop : a G9 code (readjustment for tracking error) is inserted between each movement.
• Total clamping : If piece sorting is authorised (machine parameters), the pieces with operations requiring total clamping are positioned in the middle of the bar.
- • Positioning as close as possible to the vice (Aluflex) : at the end of a bar the operation is executed as close as possible to the tightened vice if this operation is validated.

Tool path : The tool path can either be programmed in ISO (Aluflex) or conversational language (Aluflex et Pvcflex).
In conversational language, the tool path is described based on elementary movements (lines, angles, time out…). It is represented in the drawing on the right.
In ISO language all the machine codes can be used. In particular, parameterized sub-programs can be created. The same parameterized program could be called by several operations.
When the main program calls the sub-program, the head is selected, the program zero point is positioned and the tool is approached.
When the sub-program « hands over » (when it is finished), the tool will need to have been extracted from the material.

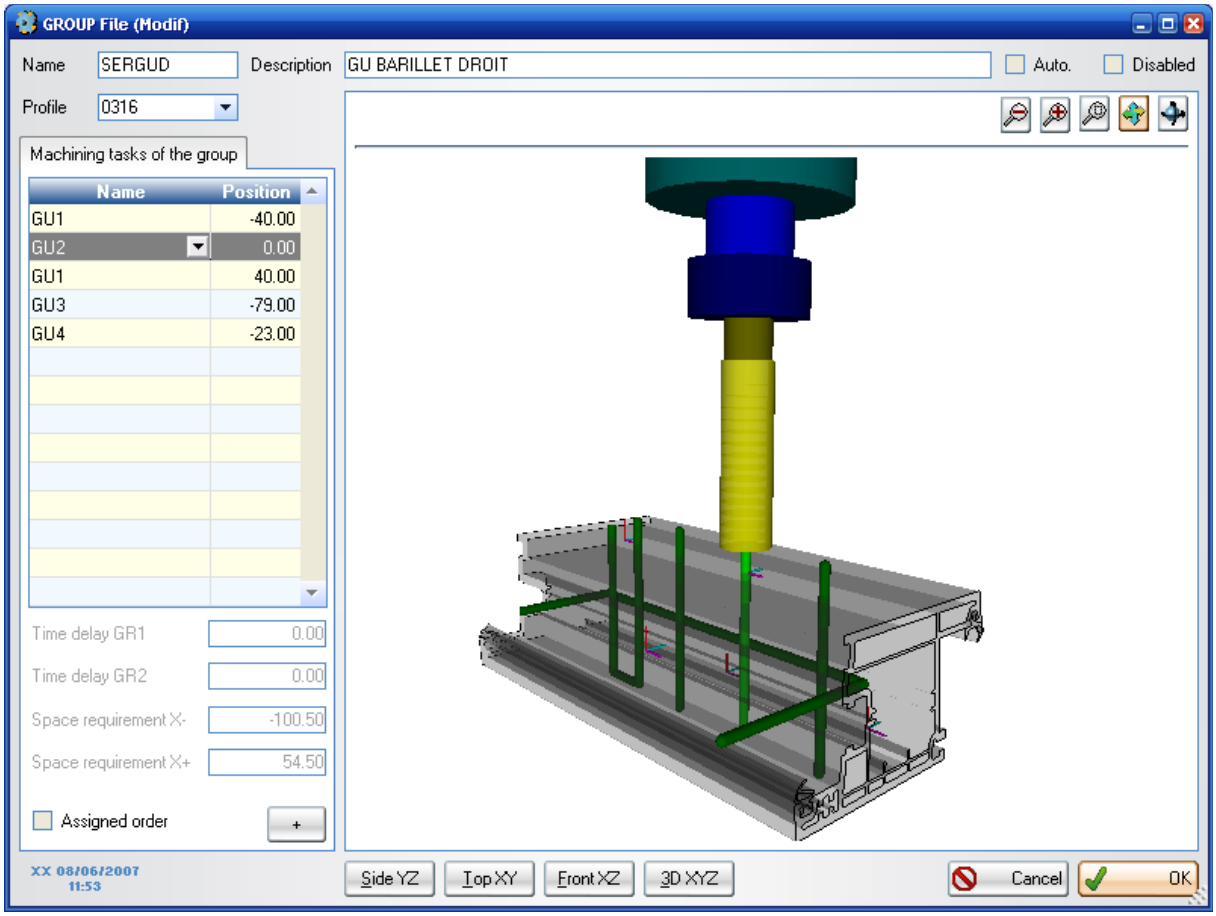
 If the modal codes have been used (memorised codes, for example G91 to change to incremental programming), they need to be cancelled at the end of the sub-program. The status of the NC needs to be same as before the call.

In ISO programming, the space required along X needs to be defined.
In conversational programming, it is automatically calculated.

[3] The level of priority is seldom used. In general the order imposed by the groups is enough to respond to the constraints imposed by the machining operations (for example, preform pass before finishing).

4.5.2 Machining groups

A machining group is a set of standard machining operations whose relative positions are fixed.
This helps simplify the lot-file describing the pieces to be machined : a lock is programmed in one line (name of the group + lever-handle position), rather than in 3 (name and position of the mortise, name and position of the lever-handle, name and position of the lock cylinder).



Name : name of the group. This name is used in the lot file to designate the group. It is made up of digits and capital letters.

Literal: this description appears on the lists when a machining group is to be chosen.

Disable : Disabled groups are ignored by the machine.

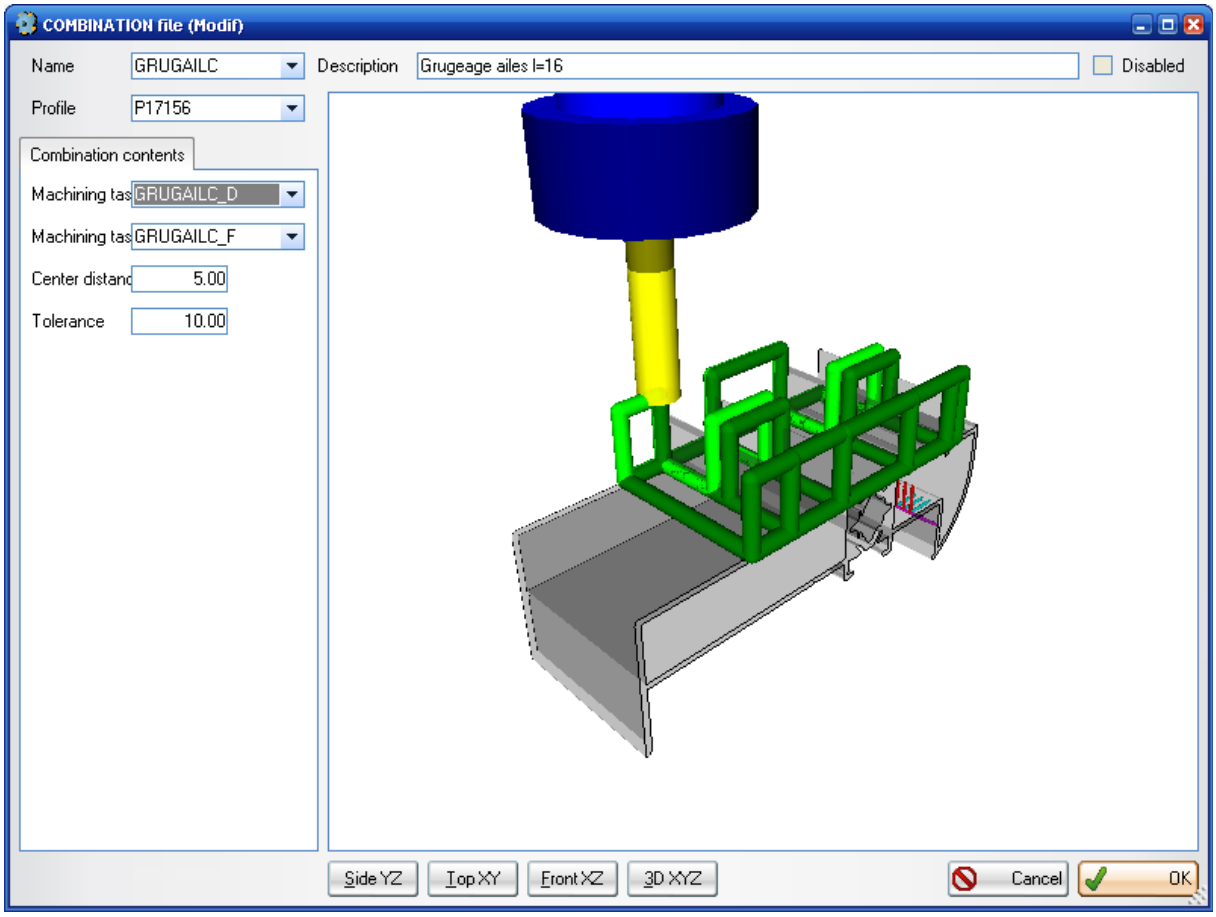
Profile : profile name, chosen among the declared profiles.

Group machining operations: list of basic machining operations with their relative positions in terms of the group. The [+] button allows the user to add operations. The cleared space required is calculated automatically.

Order imposed: This option allows the user to lock the order of execution of the group operations.

4.5.3 Associations d'usinages

Machining operation associations allow you to replace 2 standard operations by a third.
For example, 2 U shaped notchings at the ends of 2 consecutive pieces could be replaced by a mortice centred on the cut. This economises one tool clearance and one feed movement.



Name : name of the complete standard machining operation. It needs to have been previously declared.

Literal: this description appears in the lists when you choose an association.

Disable : the disabled associations are ignored.

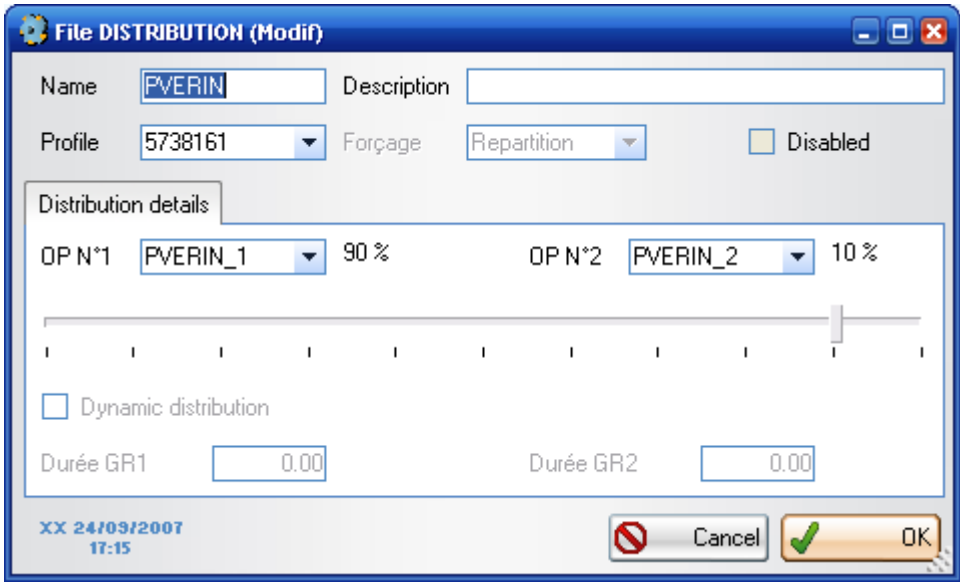
Profile : profile name, chosen among the declared profiles.

Contents of the association :

- Machining operation N°1 : standard machining operation executed at the end of piece N.
- Machining operation N°2 : standard machining operation executed at the begining of piece N+1.
- Centre-distance : distance between the reference points of machining operations 1 and 2, measured on the bar.
- Tolerance : centre distance interval authorised. For machining operations n°1 and n°2 to be replaced by an association, their centre-distance must be inferior to centre-distance +/- tolerance.

4.5.4 Distribution of the machining operations

When the tools are doubled certain standard operations can be done by one unit (machining cabin N°1) or the other (milling and cutting cabin N°2). Operation distribution allows you to define the proportion assigned to each group. The objective is to balance the load of the 2 units.



Name : standard machining operation name called in the lot file. In general, this name is the same as that of the operation done by MC1

Literal: this description appears in the lists.

Disable : The disabled distributions are ignored.

Profile : profile name, chosen among the declared profiles.

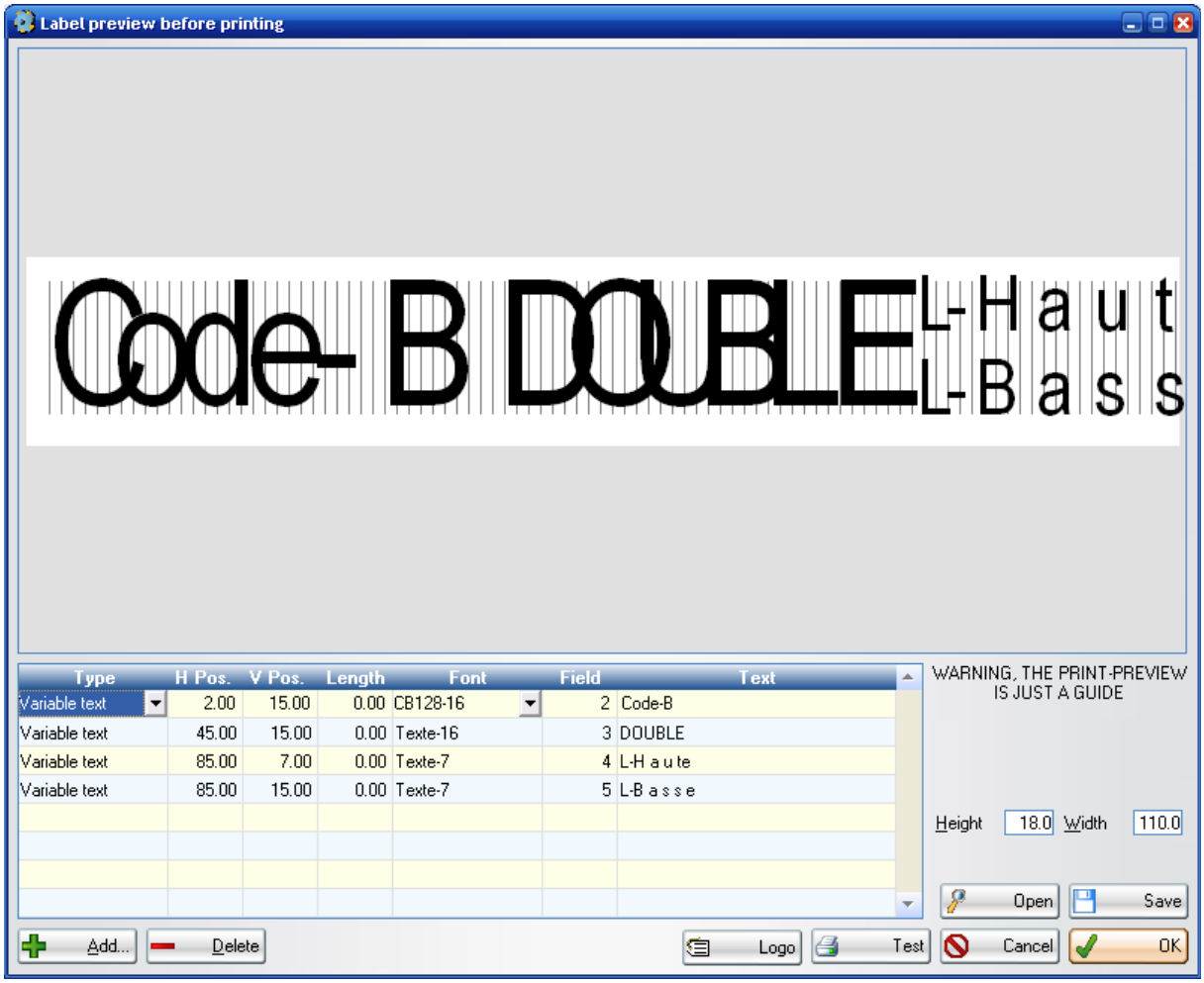
Distribution details :

- OP N°1 : Name of operation programed in MC1
- OP N°2 : Name of operation programed in MC2
- Curseur : Distribution between MC1 or MC2 (the percentage is indicated beside the OP names)
- Dynamic distribution : to be ticked so as to let the program achieve a balance based on the theoretical times and the number of bars waiting between MC1 and MC2 [4].

[4]Dynamic distribution is offered as an option.

4.6 Label parameters

Setting label parameters allows you to define the « page layout » of the piece labels.
The user has access to it on the SATO, ZEBRA, and WINDOWS printers.
It is fixed on the IMAJE printers.



A label is made up of :

- Variable texts, read in the LOT file (ET type recording)
- Static texts, read in the « Text » column of the label parameters. These texts are, for example, used for specifying the field literals.
- Standard texts, which come from the LOT file (DB and DP type recording) or from the computer clock: date, hour, lot name, profile, colour, piece length…
- Horizontal and vertical lines.
- Images[5]. The name of the image file is read either in the ET line of the lot file (if one of the field n° is specified), or in the « Text » column of the label parameters. The image file directory is parameterizable (maintenance menu, software setting, directory and language). Type of files recognised are BMP and JPG.

[5] The image fields are only usable on printers controlled by the Windows driver.

Font used for printing texts can have its parameters changed. The list of fonts available depend on the type of printer. There are plain fonts and bar code fonts.
Each field can be positioned horizontally or vertically.
Length is used by the line and image fields.

4.6.1 Logos

The logo concept only exists on the Imaje printer .

Logos are static graphical labels, which correspond either to CSTB certification labels or to a symbol representing an accessory to be manually fixed by the operator (for example a strike plate).
These graphical labels are composed of a sequence of characters stocked in the printer memory. Each character is defined by a font number and an ASCII number. It is possible to use standard fonts (for example character n°33 in font n°56 is an exclamation mark drawn on a 16 point high screen) or customized fonts (for example, character n°33 of font n°200 could be the NF symbol).

The name of the logo to be printed is specified in the first field of the ET type recording.

The printer head to be used is defined by the profile (« print » tab of the profile file).

4.7 Parameter export and import

Exporting allows the user to save the parameterization of the software (machine parameters, profiles, operations…) in a single file.
This file is called : NameMachine_Date_Time.ZIP
The directory in which it is written is chosen by the user.

Importing helps to restore the parameters using a backup file chosen by the user.

It is important to regularly make backups (exports) and to keep the files in a secure location.

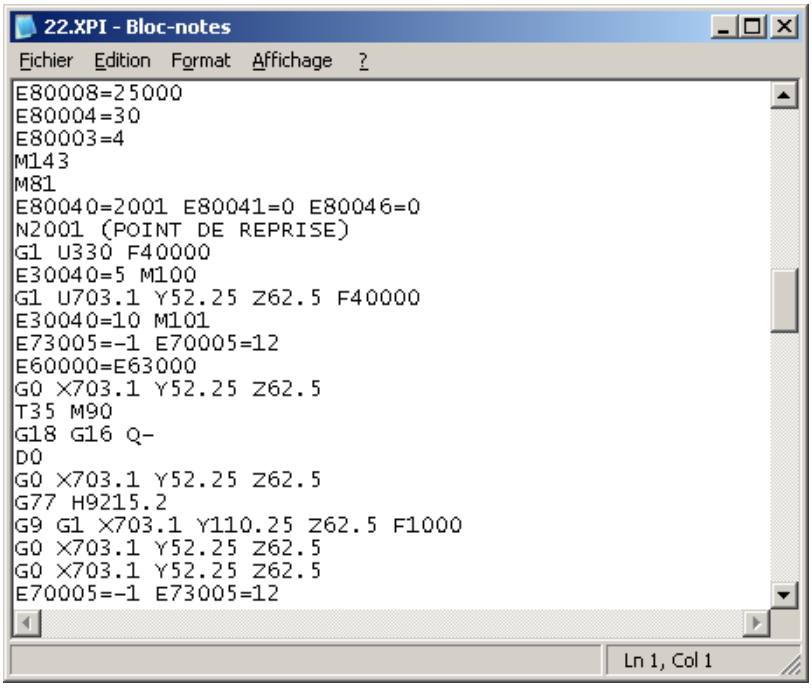
4.8 NC Programs

The NC programs are the ISO programs resident in the numerical control.
They are the elementary machine cycles : Machine initialisation, Loading of a bar, Cut, Zone checking, Off-cut evacuation …

The ISO programs have an extension : .XPI
Their name is made up of the program number followed by the group number.

For example 10.XPI (PC) ⇔ %1 (NUM), 99983.XPI (PC) ⇔ %9998 .3 (NUM).

The software allows them to be transferred from the NC to the PC, individually or all together, to edit them on the PC (opened using Windows Notepad), and to send them back from the PC to the NC.



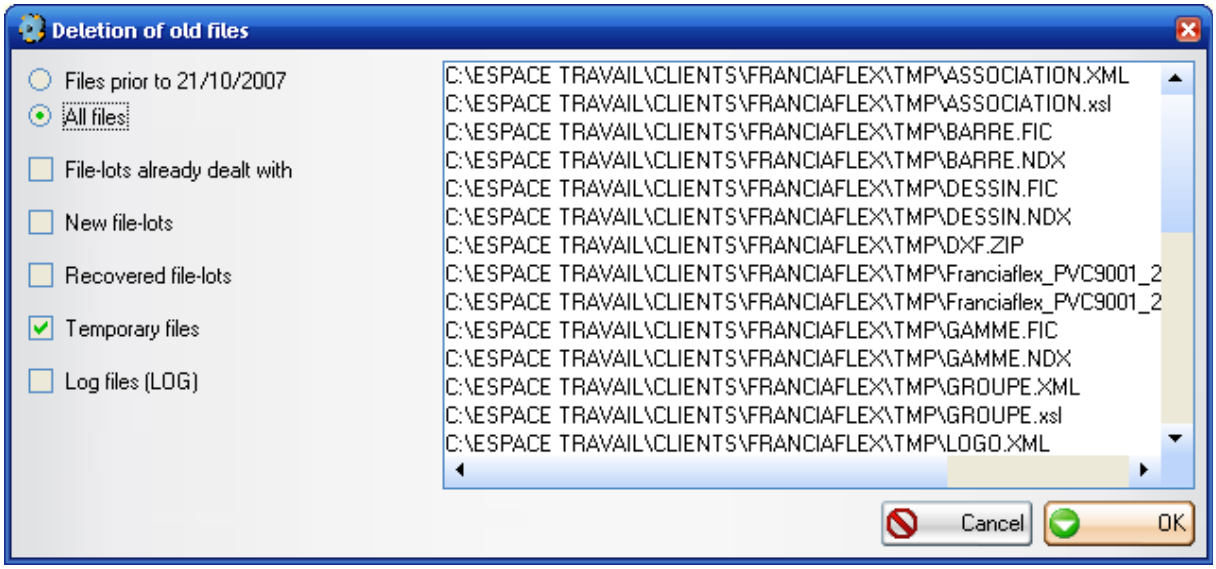
Example of an ISO program

Modification of NC programs requires a good working knowledge of machine and ISO language. It is reserved for maintenance technicians.

4.9 Tools

4.9.1 Purging of old files

This function allows the user to delete obsolete files.



The files are selected by type and date (all or D-N, N being defined by a machine parameter).
The list of files concerned is displayed.
The OK button deletes the files.

4.9.2 Repair of the data bases

The parameters of the control software are held in data bases made up of a data file (extension FIC), an index (extension NDX) and sometimes a memo (extension MMO).

After an incident, for example the PC suffers a power cut during the writing of a file; there can be incoherencies with these files : The index no longer corresponds to the data file.

The « repair action » reconstructs the index based on the readable data and deletes the unreadable data.

This tool is a last resort. It is better to regularly make backups (export), and to start again if necessary with a complete set of the most recent parameters (import).

4.9.3 Contact technical support

This tool helps to send an email request to the technical support team.
The work station needs to have Internet access.

4.9.4 Windows Explorer

Allows direct access to the installation directory of the software.

4.10 Réglages logiciel

4.10.1 Mot de passe

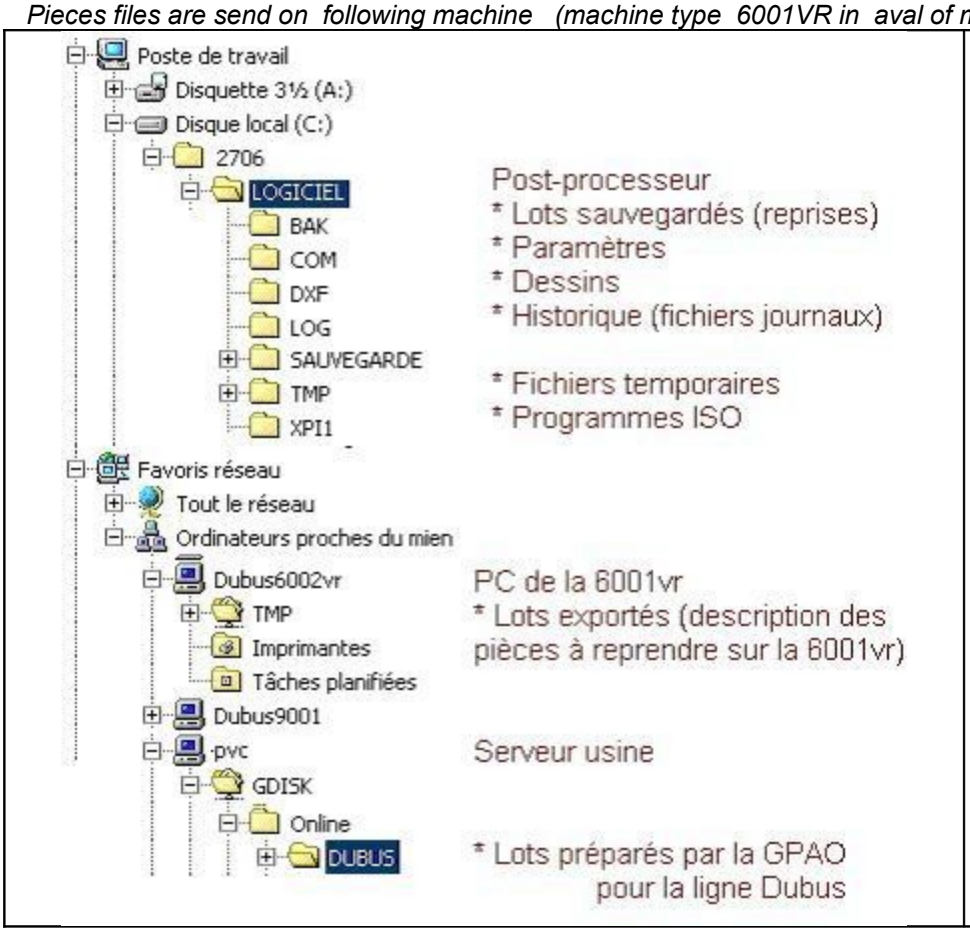
Le mot de passe permet de protéger l'accès au mode maintenance.
Quand un mot de passe est déclaré, le logiciel démarre en mode production.
Quand aucun mot de passe n'est déclaré, le logiciel démarre en mode maintenance.

4.10.2 Directories and languages

This is where the different directories used by the software are chosen.

The software searches for the lots prepared by the CAMM in the available lots directory. This directory is usually remote (drive mapping).
It copies them locally (hard disk) in the directory of archived lots.
If the machine is inserted in a line, the postprocessor uses the directory of the exported lots to communicate with the next machine.
The ISO programs are held in the program directories (one directory per NC).
The log files are held in the events log directory.
The drawings (DXF profile files) are found in the drawings directory.
The data files are held in the shared directory. In this way several stations can access the Profile parameters, Machining parameters …
The temporary files are held separately in a local directory.

Example:
The optimised lots are made available on the factory server by the CAMM.
Pieces files are send on following machine (machine type 6001VR in aval of machining center).



Legend

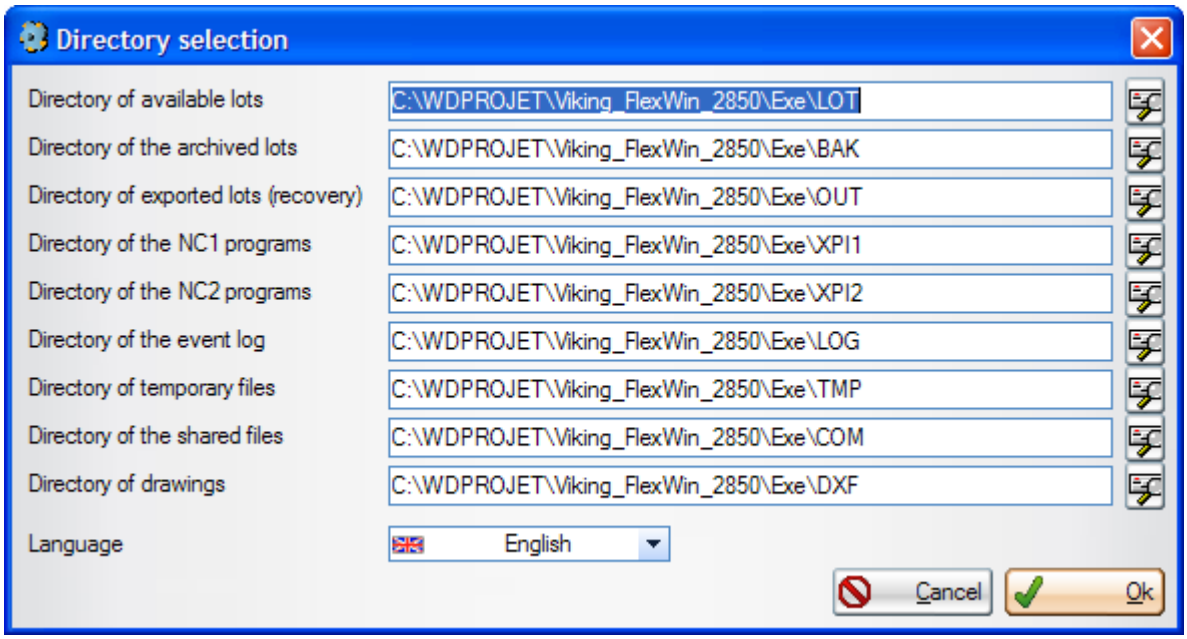
Postprocessor
Saved lots (reworks)
Parameters
Drawings
History (log files)

Temporary files
ISO programs

6001vr PC
lots exported (description of pieces to be reworked on the 6001vr

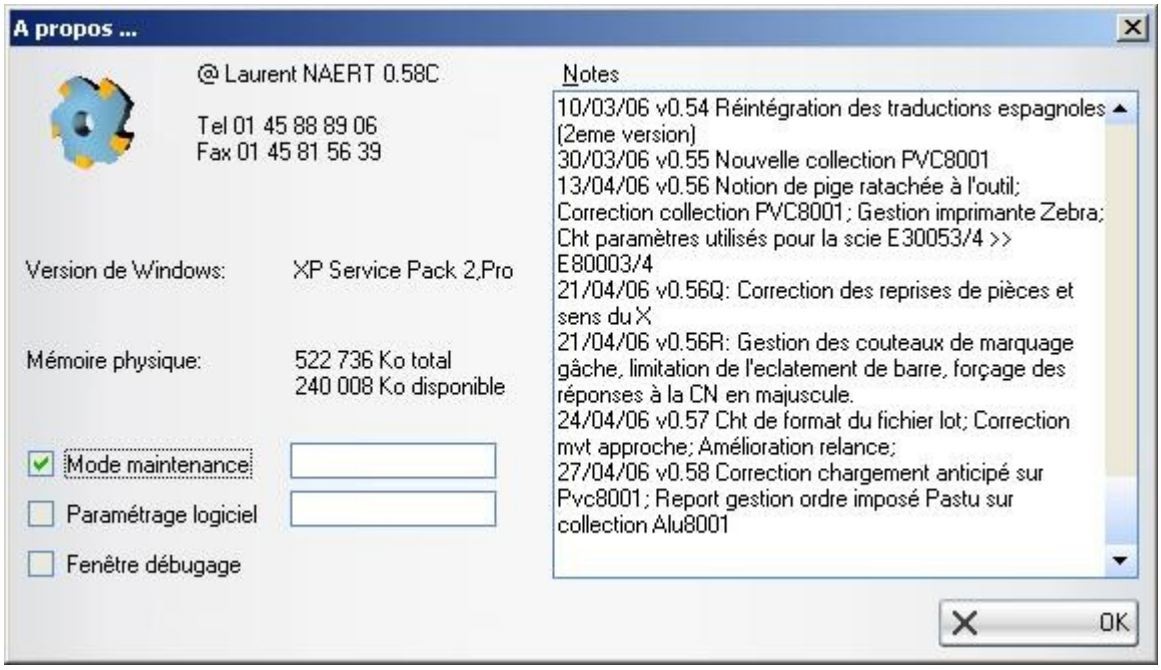
Factory server

Lots prepared by the CAMM for the Dubus machining line



5 About Window

The « About » window indicates the software version n°, a history of the modifications, and allows the user to access the « maintenance » and « parameterization » modes.



The « maintenance » mode unblocks the access to the maintenance menu. It can be protected by a password chosen by the user.
The « parameterization » mode allows the user to modify the min/max limits of the machine parameters. This mode is always protected by a password.
The « debugger » mode opens a « trace » window listing all the calculations done by the program. This window can be useful when trouble shooting.

6 Appendices

6.1 Lot file format

ASCII file
Name : lot name (8 characters)
Extension : .LOT
The recordings are separated by a change of lines (characters CR+LF)
The fields are separated by a parameterizable separator (default is semi-colon)

Types of recordings:

Start of bar
DB ; Profile ; Colour ; Nominal_length ; Operator_instruction ; Offcut_label

- Profile: Max of 20 alphanumeric characters, without spaces
- Colour: Max of 20 alphanumeric characters, without spaces
- Nominal_length: bar length in millimetres (minimal length required is calculated according to the machine parameters and the list of pieces to be done in the bar).
- Operator_instruction: Max of 100 charaters, text displayed on the bar loader
- Offcut_label : Max of 20 charaters, text printed on the offcut label

New piece
DP ; Length ; Front_cut ; Rear_cut ; Identifier ; Reinforcement ; Rack_N° ; Box_N°

- Length: in millimetres, measured on the profile reference. This reference point is defined profile by profile. Decimal points are taken into account (example 1234.5).
- Front_cut and Rear_cut : cutting angles in degrees (from 30.0 to 150.0) for a barrel saw or symbol (V=mitre cut, I=straight cut, X=mullion cut, Y=bevel « becquet » cut, K=trapezoid cut, J=reversed bevel « becquet » cut) for a pendulum saw.
- Identifier: unique piece identifier, made up, for example, of a serial number, a rack number, and the piece position in the joinery work. This identifier is used for the rework or finishing of pieces.
- Reinforcement : « R » if the piece is reinforced, if not this is left empty. This information is needed if the machining unit has to diferentiate the reinforced pieces (for example offset on the output table). Only relevant to the PVC centres.
- Rack and box N° : only required if the machining unit controls a put-away robot.
- Machining operations

Machining operations
OP ; Machining operation ; Position_in_the_pièce

- Machining operations: a maximum of 20 alphanumeric charaters without spaces. Machining parameters (tool(s)
  used, feed measurements, origin/home position(s), machining cycle(s) ...) are defined for each machining operation on each profile. One name can therefore refer to 2 different operations on 2 different profiles. However symetrical machining operations (for example locks on left or right mullion) need to be differentiated.
- Position: distance in millimetres between the begining of the piece and the machining reference measured on the profile reference. Decimal points are included (example 1234.5).

Label
ET ; logo n° ; bar code ; Text_1 ; Text_2 ; Text_3 ; Text_4 ; … ;Text_10

Empty fields are not printed.

On an ink jet printer (IMAJE), the label will be as following :

The « bar code » and « text_1 » fields are limited to 20 characters. It is better if they are as short as possible : the longer the bar code is the greater the chance of a mistake when it is read.

Fields Text_2 and Text_3 are limited to 100 characters.

The width of a tall character (text_1) is about 4mm

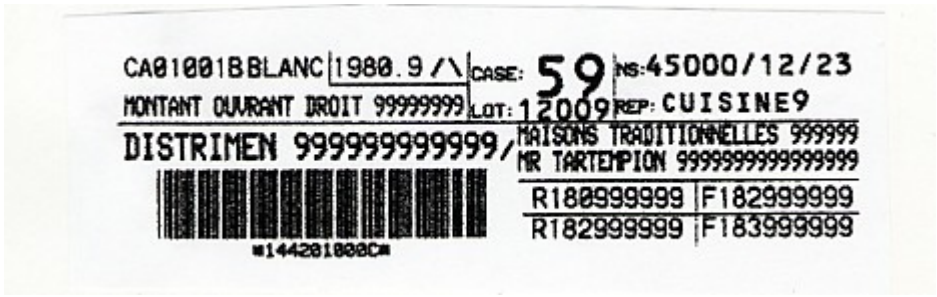
The width of a short character (text_2 or texte_3) is about 1.6mm

Fields Text_4 and those following are ignored.
Each logo is made up of 0 to 20 characters resident in the printer.

On a label printer (ZEBRA or SATO), the parameters of each field can be set in terms of height and position.

Logos are not managed.

One can achieve a personalised presentation with horizontal and vertical lines and fixed characters using a mask.



Each text_n is limited to 50 characters.

6.2 Installation of the software

6.2.1 Hardware configuration

Required software :
- OS Windows 2000 or XP
- Open GL library
- pcToolKit library

Minimum hardware configuration:
1. Pentium II,
2. RAM 64 MB,
3. 20 MB of free disk space

Recommended hardware configuration :
1 Pentium IV,
2 RAM 128 MB,
3 40 MB of free disk space,
4 network connection,
5 Internet connection.

6.2.2 Files used

The software is made up of :
- An executable program made for the machine named CLIENT_MACHINE_NUMBER.EXE.
  CLIENT is the name of the company which has bought the machine from Dubus
  MACHINE is the type of machine, for example ALU8001 or PVC9001
  NUMERO is the machine reference number (ARC n°)
- A Windev library of procedures. This library is held in the files named WD90????.DLL
- The software adjustment parameters held in a parameter file named DUBUS.INI and databases named????????.FIC and ????????.NDX

6.2.3 Software installation

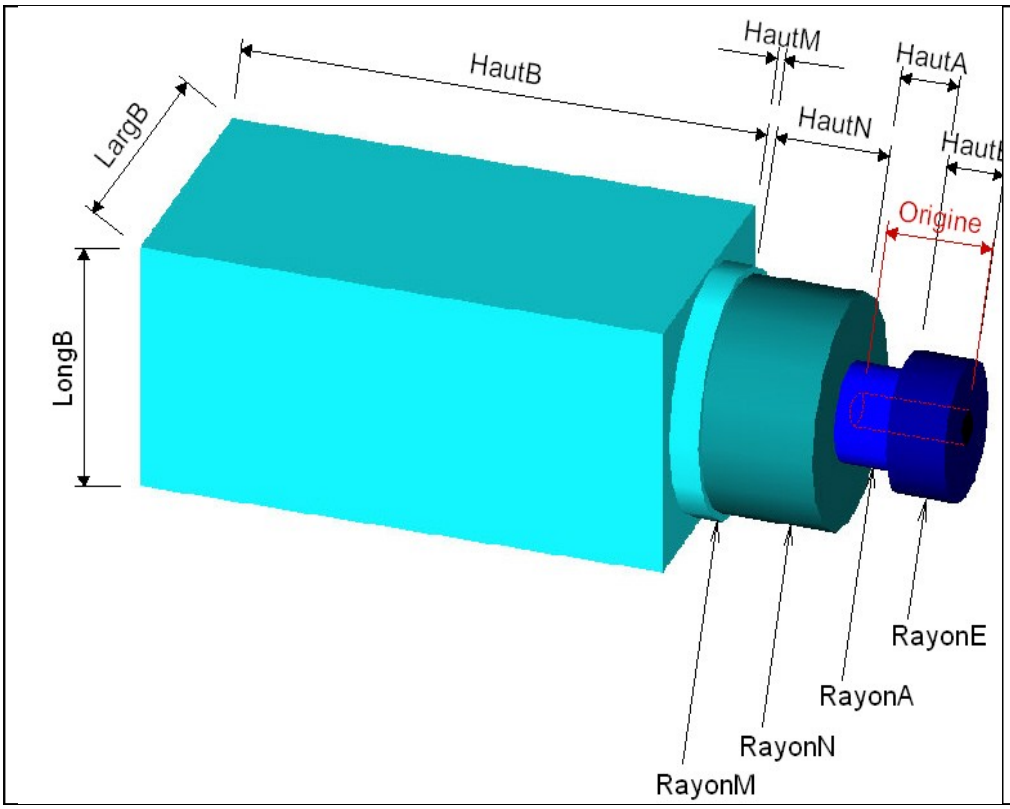
- Verify the hardware configuration. Make sure in particular that the pcToolKit library has been installed and that it works (a test function is supplied in the Schneider driver manager in the control panel).
- Create an installation directory, named, for example C:\DUBUS\CONTROL.
- Copy the executable file in the installation directory. The executable file is found on the backup CDROM (EXE or Executable file directory), or, if one or more updates have been sent by email after the installation of the machine, the last update as an attachment.
- Copy the Windev library in the installation directory. The library files are on the backup CDROM (WINDEV\WD90-32 directory). If the PC has a broadband internet connection, they can be downloaded automatically during the first activation of the executable file.
- Activate the executable file. With the help of the maintenance menu, set the work directories then import the software parameters from the most recent backup available.


It is very important to regularly make some backups (parameter export) and to keep them in a safe location.

6.3 Graphical representation of the spindles

6.3.1 Modelling

Simple spindle



Legend :

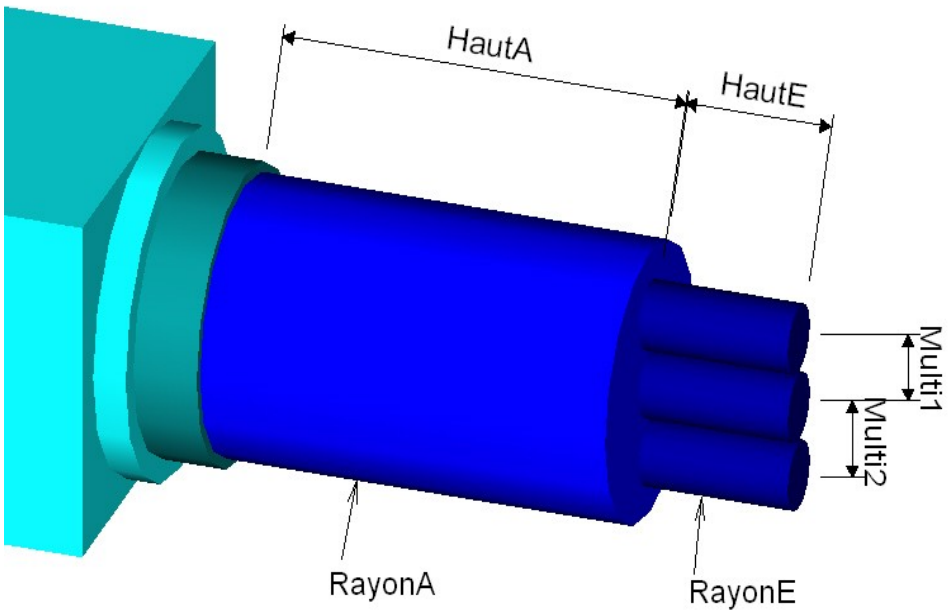
Long. = length
Larg. = width
Haut. = height

Origine = Home/zero

Rayon = radius

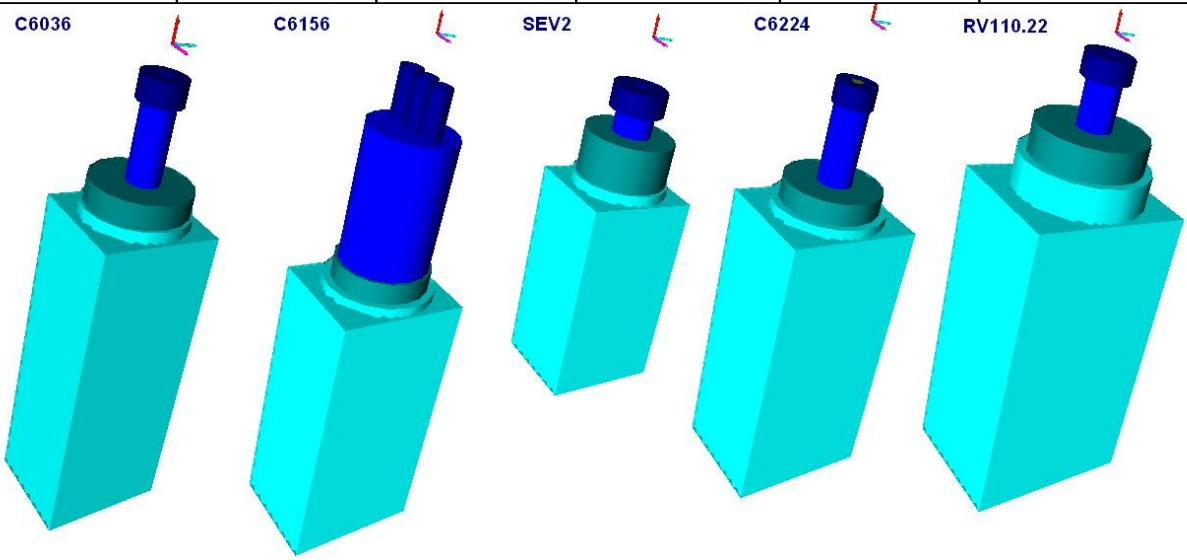
Multi = spindle with multiple tools

Spindle with multiple tools



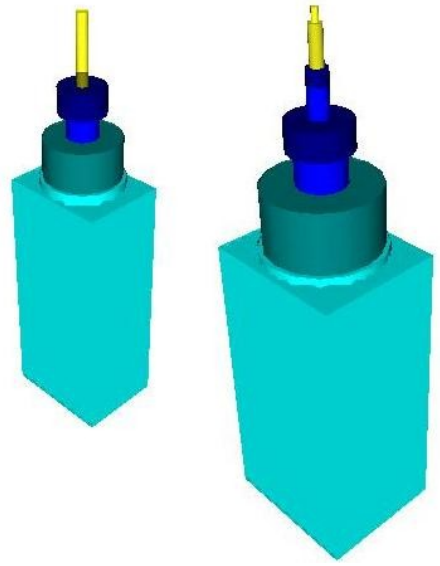
6.3.2 Spindles graphically represented by the software

Spindle	C6036	C6156	SEV2	C6224	RV110.22
	RV73	RV90 + box 3 tools, pitch 21.5)			RV110 2.2 kW
Home zero	79	46	40	0	63
HeightE	19	46	20	20	20
RadiusE	17	10	22.5	17.5	21
HeightA	60	125	20	70	43
RadiusA	12.5	40	16	15	15
HeightN	19	19.5	38.5	20	28
RadiusN	37.5	43	37.5	43	49
HeightM	10	10	10	10	32
RadiusM	40	50	40	50	57
LengthB	83	101.5	82	101.5	118
WidthB	90	119.5	92.5	119.5	142
HeightB	252	259	144.5+35.5	265	284
Mult0	-	5	-	-	-
Mult1	-	0	-	-	-
Mult2	-	21	-	-	-
Mult3	-	-21	-	-	-

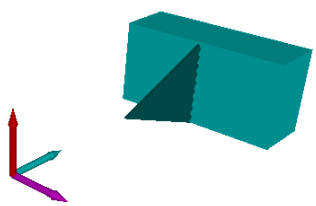


Spindle	C10325	C9832			
	HSD 1055-90	HSD 1090-100			
Home zero	33	43,24			
HeightE	19	22			
RadiusE	17	25			
HeightA	17,5	26			
RadiusA	11,5	19,25			
HeightN	29,5	48,5			
RadiusN	28	45			
HeightM	8	8			
RadiusM	30,5	48,5			
LengthB	80	119,5			
WidthB	62,5	103			
HeightB	182,5	239			
Multi0					
Multi1					
Multi2					
Multi3					

C10325 C9232 (avec rallonge D16)

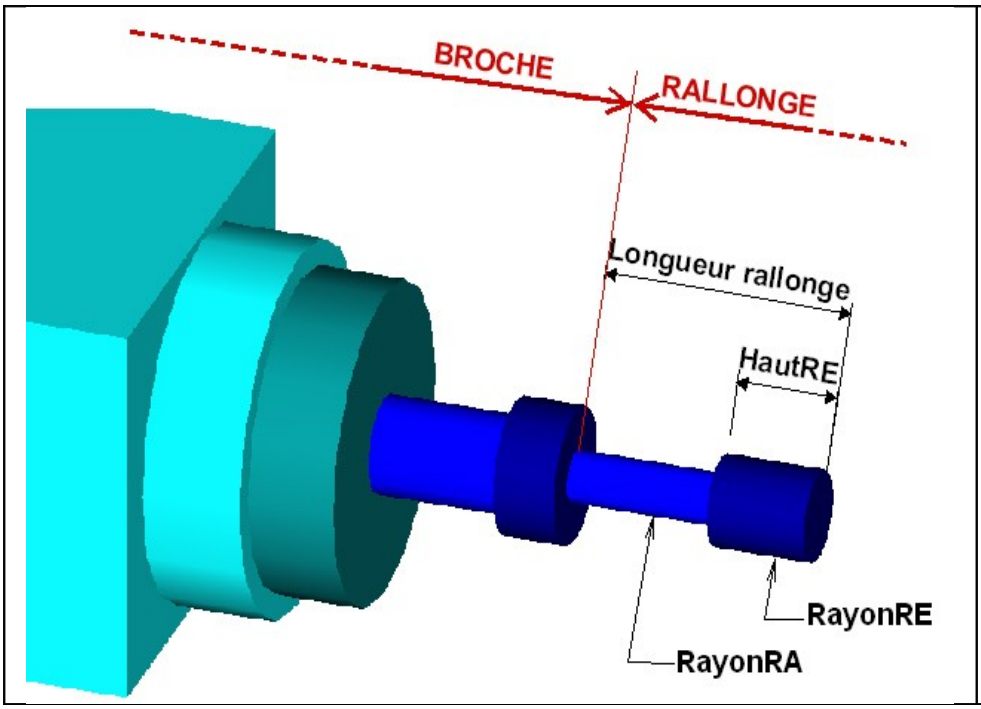


6.3.3 Special tools



Couteau

6.3.4 Extensions



Legend

Broche = spindle

Rallonge = extension

Longeur ralonge = extension length

HautRE = extension end height

RayonRE = extension end radius

6.3.5 Extensions graphically represented by the software

Extension	D16	D28
RadiusRE	8	14
HeightRE	12	32
RadiusRA	8	8

6.4 Procedure for declaring spindles and tools

This procedure is for defining the spindle origin points, to calibrate the heads on the Y, Z and A axes, and to enter the tool geometry.
At the end of this procedure you get, on the one hand a graphical image which truly represents reality and on the other hand a tool gauge which is accurate and simple to update when, for example, changing a tool.

Stage 1 : Measure the length of the tool using a slide caliper

Stage 2 : Place the carriage in position Y0 Z0 and mount the tools

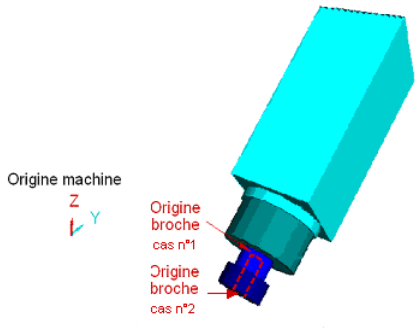
Stage 3 : Enter information in the spindle parameters table

Choose from the menu Maintenance => Machine parameters=> Heads

Groupe	Numero	Pos.X	Pos.Y	Pos.Z	Pos.A	Pos. X Etalonage	Origine	Bistabl
GR1	50	420,00	26,01	244,50	0,00	0,00	40,00	☐
GR1	51	425,00	44,66	152,54	270,00	0,00	0,00	☐
GR1	52	425,00	-36,38	153,33	90,00	0,00	0,00	☐
-	53	0,00	0,00	0,00	0,00	0,00	0,00	☐
-	54	0,00	0,00	0,00	0,00	0,00	0,00	☐

Enter the spindle origin co-ordinates :

The « Origin » column positions the spindle origin in relation to the nut face.
There are two cases which need to be differentiated for defining a spindle origin.



Case n°1 :
The tool hits the bottom of the collet. The useful length of the tool is completely outside the collet.
The spindle origin is placed on the stop.

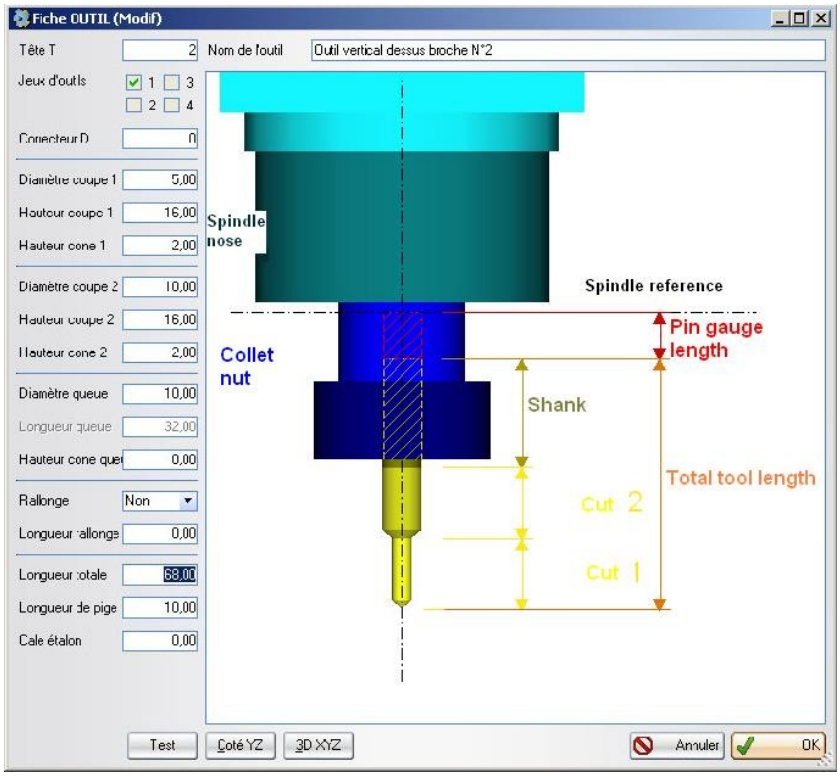
Measure approximately (standard value accurate to the millimetre which only affects the graphical image) the tool length which is outside of the collet.
Origin= Tool length– outside length

Case n°2 :
The tool is too short to hit the bottom of the collet.
The spindle origin is placed on the collet.
Origin=0

Enter positions Y, Z and A :

Enter positions Y and Z (Pos.Y and Pos.Z columns) by measuring the distance between the machine origin and the spindle origin using a ruler. This measurement is approximate (accurate to the centimetre). It will be modified by the program when the head is calibrated.
Enter the exact tilt angle of the head (Pos.A column) in degrees.

Stage 4 : Define the tool geometry



Enter the different dimensional parameters of the tool.

The fields concerned here are « Total length », « Shank length », and « Outside length ».
Total length, outside length and shank length:

These are based on the origin defined at stage 3. To define them the 2 cases described in stage 3 need to be taken into account.

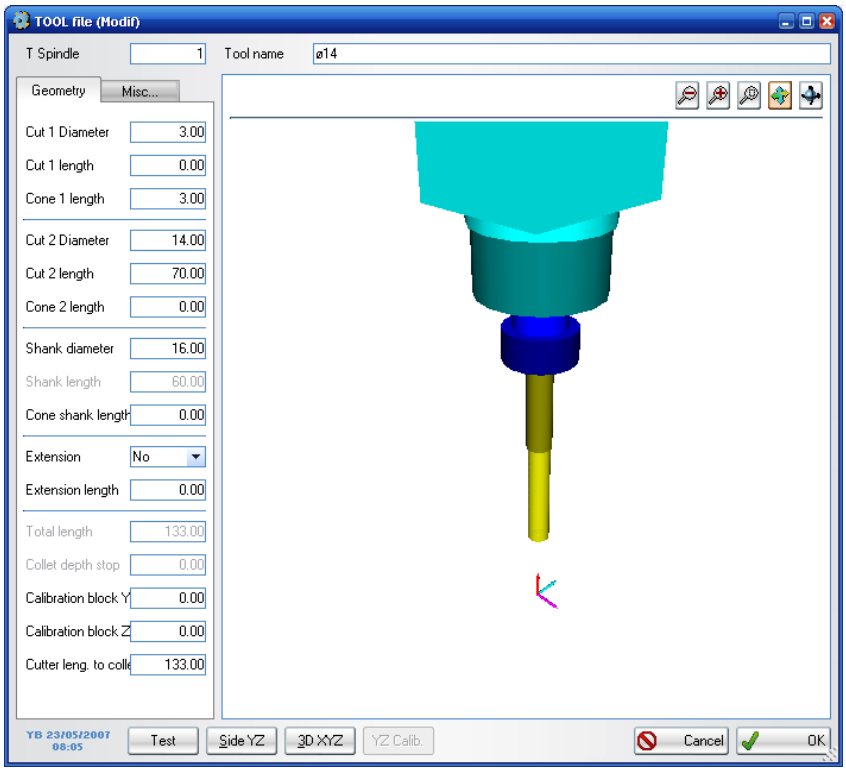
Case n°1 :
Total length = overall tool length measured with the slide caliper.
Outside length = field is inaccessible (greyed) as it is automatically calculated by the program.
Shank length = when there is no shank (general case) enter 0, when there is one enter the length measured with the slide caliper.
The shank is used for helping short tools to rest against the stop.

Case n°2 :
Total length = field is inaccessible (greyed).
Outside length = measure the length of the tool located outside the collet using a slide caliper (between the nose of the collet and the tool tip).
Shank length = field is inaccessible (greyed).

Stage 5 : Head calibration

This is where positions Y and Z, which were defined aproximately in stage 3, are updated in a more accurate way.

Open the tool file of the head to be calibrated.



Check that the tool is properly inserted in the collet .

In « IMD » mode on the NUM, move out the head.

In « Manu » mode, bring the point of the tool to reference points Y and Z.

If the stroke is is insufficient you need to use a spacer and enter its Y and Z dimensions in the fields « standard Y spacer » and « standard Z spacer » of the tool file.

Draw a tangent with the references or the spacer.

Press the « Head calibration » button.

The program up dates, if needed, the spindle Y and Z positions. The old and new values are displayed.

How to interpret these values

If the new values are relatively close (in the range of a centimetre) to the old values, then the data entered at the different stages are correct.

If the difference is too great then do a visual check to see if there are no errors in the values entered at the different stages. If you do not find the origin of the error then repeat the procedure from the start.

Stage 6 : Verification of the tool gauges

To finalize the procedure, there is a test which validates the tool gauge and by the same token the whole of the procedure.

To do this move the head away from its Y and Z references.

In the tool file, press the « Tool gauge test » button.

The head should position itself correctly along its Y and Z references.