User manual

Sawing line with rotating cross cut saw

HM-Z/4

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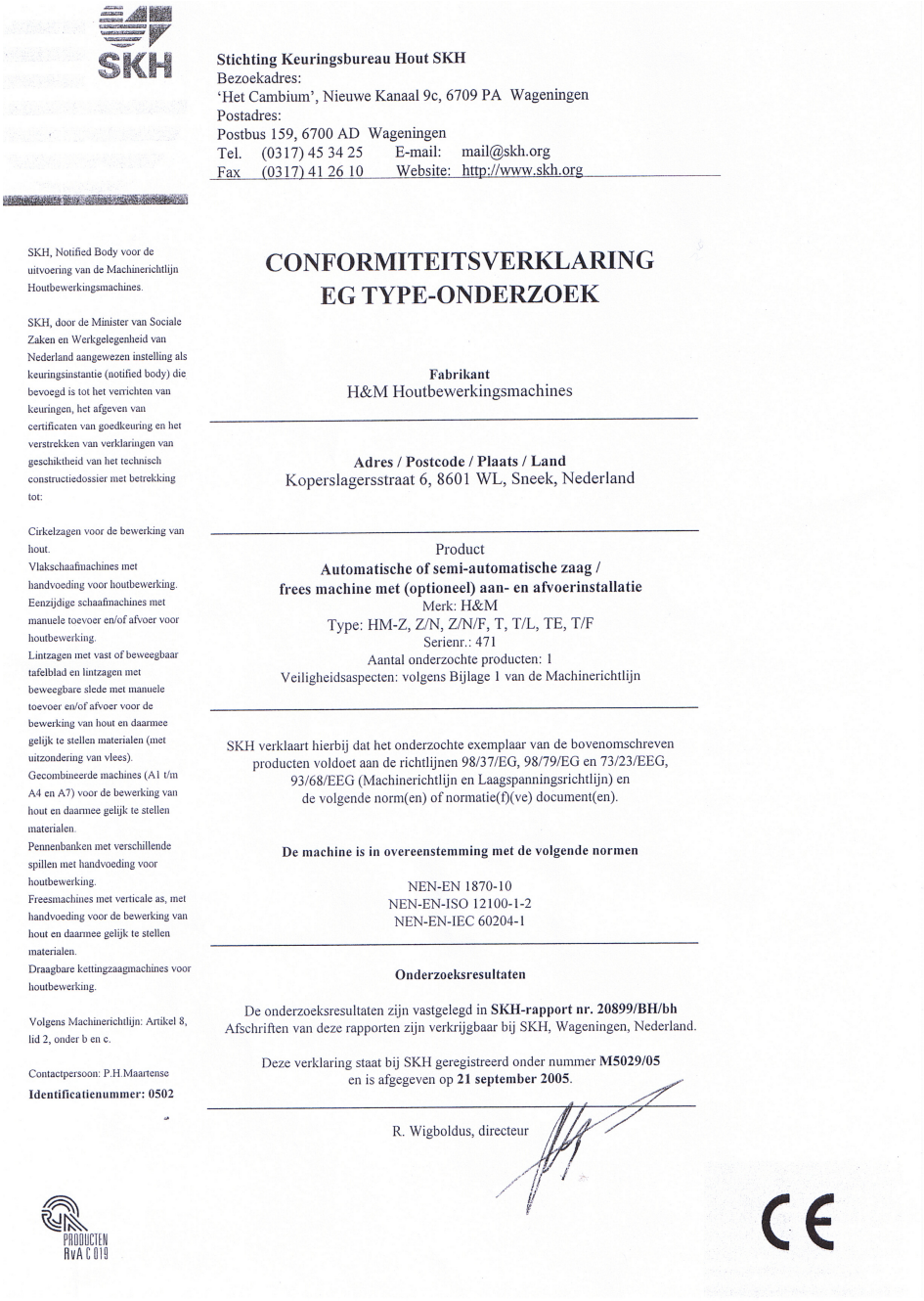
EC declaration of conformity



SKH

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SKH, Notified Body voor de uitvoering van de Machinerichtlijn Houtbewerkingsmachines.

SKH, door de Minister van Sociale Zaken en Werkgelegenheid van Nederland aangewezen instelling als keuringsinstantie (notified body) die bevoegd is tot het verrichten van keuringen, het afgeven van certificaten van goedkeuring en het verstrekken van verklaringen van geschiktheid van het technisch constructiedossier met betrekking tot:

Cirkelzagen voor de bewerking van hout.
Vlakschaafmachines met handvoeding voor houtbewerking.
Enzijdige schaafmachines met manuele toevoer en/of afvoer voor houtbewerking.
Lintzagen met vast of beweegbaar tafelblad en lintzagen met beweegbare slede met manuele toevoer en/of afvoer voor de bewerking van hout en daarmee gelijk te stellen materialen (met uitzondering van vlees).
Gecombineerde machines (A1 t/m A4 en A7) voor de bewerking van hout en daarmee gelijk te stellen materialen.
Pennenbanken met verschillende spillen met handvoeding voor houtbewerking.
Freesmachines met verticale as, met handvoeding voor de bewerking van hout en daarmee gelijk te stellen materialen.
Draagbare kettingzaagmachines voor houtbewerking.

Volgens Machinerichtlijn: Artikel 8, lid 2, onder b en c.

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CONFORMITEITSVERKLARING
EG TYPE-ONDERZOEK

Fabrikant
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Product
Automatische of semi-automatische zaag / frees machine met (optioneel) aan- en afvoerinstallatie
Merk: H&M
Type: HM-Z, Z/N, Z/N/F, T, T/L, TE, T/F
Serienr.: 471
Aantal onderzochte producten: 1
Veiligheidsaspecten: volgens Bijlage 1 van de Machinerichtlijn

SKH verklaart hierbij dat het onderzochte exemplaar van de bovenomschreven producten voldoet aan de richtlijnen 98/37/EG, 98/79/EG en 73/23/EEG, 93/68/EEG (Machinerichtlijn en Laagspanningsrichtlijn) en de volgende norm(en) of normatie(f)(ve) document(en).

De machine is in overeenstemming met de volgende normen

NEN-EN 1870-10
NEN-EN-ISO 12100-1-2
NEN-EN-IEC 60204-1

Onderzoeksresultaten

De onderzoeksresultaten zijn vastgelegd in **SKH-rapport nr. 20899/BH/bh**
Afschriften van deze rapporten zijn verkrijgbaar bij SKH, Wageningen, Nederland.

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R. Wigboldus, directeur

PRODUCTEN
RvA C 019

CE

Figure I.1: EC declaration of conformity

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Safety

- Avoid working alone.
- Never place your hands in the machine to remove (stuck) material,when the machine is in use. Immediately press the emergency stop button in situations where there is a threat for injuries or machine/ material damages. Only when the machine is disconnected from the power and air supply, the stuck material may be removed.
- Do not stand or sit on the infeed and outfeed tables.
- Do not modify the machine.
- Wear hearing protection and safety goggles when operating the machine.

Introduction

The HM-Z/4is an automatic cross cut machine consisting of a sawing machine with an infeed and outfeed table and a control unit with a display (HM-MC).
The sawing machine is fitted with a pusher, rotable and linear adjustable saw table, a tiltable saw and pneumatic wood clamps.

With the rotable saw table and tiltable saw the saw angle can be adjusted. The saw table can be adjusted linear, to compensate the offset without moving the wood, which occurs due to rotating and tilting the saw. The wood clamps push the wood against the saw machine so the wood cannot move during the cutting.

The beams to be cut can be placed on the infeed table. The pusher is used to push wood. Te pusher is also used to measure the wood. wood is pushed to the cutting position by the pusher. The sawing machine cuts the beam at the required position.
During the pushing the cut piece is being pushed on the outfeed table.

Depending on the options of the machine, the cut lengths can be removed by the operator, or be further transported by a transport mechanism. The machine is being controlled by the HM-MC.

On the front of the saw the electrical cabinet is installed.

In the electrical cabinet the fuses are stored. The main switch, the emergency stop and specific control units for the saw are placed on the electrical cabinet.

The saw can be controlled manually and automatically. The way of controlling can be determined with a selector switch on the front of the electrical cabinet. In the position [**MANUAL**] the saw can be controlled with the 2 control keys of the keyboard. In the position [**AUTO**] the saw is controlled automatically by the HM-MC.

With the HM-MC the sawing line can be controlled. The HM-MC controls amongst others the positioning of the length pusher and controls the saw during automatic cutting. In the HM-MC also data as parameters and sawing specifications can be entered, saved and read in. With parameters properties of the machine can be set. The parameters are subdivided in axis parameters and machine parameters. With axis parameters the properties of a specific positioning unit can be entered. With machine parameters properties can be entered which apply for the whole machine.
In a cutting list the saw specifications can be made. A saw specification states how a beam has to be divided.

1.1 Specifications

1.2 Installation

The automatic saw machine is not meant for use in the open air. The machine should only be used by qualified personnel.

Max. Speed of the pusher	1.4 m/s
Max. Speed of the saw table angle adjustment	25°/s
Max. Speed of the saw movement	3 cm/s
Max. Speed of the tilt angle adjustment	25°/s
Movement of the pusher	Dependent on the length of the rollway
Angle adjustment of the saw table	0 - 270°
Movement in Z-direction	0 - 200 mm
Angle adjustment of the tilt angle	60°- 90°
Saw blade	
diameter	ø700 mm
bore	ø30 mm
Electrical connection	400 V 3 Phases + N, 50 Hz, 7,7 kW
Pneumatic connection	min. 7 bar, max. 10 bar
Extraction	2x ø100 mm, v $\geq$ 25 m/s
Noise level	80.4dB(A)

The machine can be moved by means of a fork-lift truck.

Weight of a 4m infeed table	320 kg
Weight of an extra meter worklength	65 kg
Weight of the saw machine	840 kg

1.3 Commissioning

The saw machine and the pusher are being delivered separately. The machine has to be placed level by means of the adjustable legs.

The machine has two extraction outlets. Recommended airspeed at the outlet : $\geq$ 25 m/s

Tip for anchoring at the floor, the supplied clamps can be used.

Before operation, the cutting machine must be calibrated first, see the chapter on Calibration.

1.4 Use and maintenance

Only the wood that is to be cut may be placed on the rollers. Do not store any material under the infeed table, to avoid the cables snagging.

After each setting of the machine, the current position and angle are stored to disk. After switching on the machine, the last position and angle are read, to avoid constant calibration of the machine.

Although the machine doesn't require much maintenance, it is recommended to keep the machine clean, to ensure proper and safe functioning.

If the pusher suffers from backlash, the motor can be tightened by means of the adjustment bolts. The pinion will be moved closer to the rack. This needs to be very done very accurately. A wrong adjustment can lead to damage. Therefore the adjustment needs to be done by qualified personnel.

There needs to be sufficient air pressure on the saw machine (see 1.1). This working pressure can be adjusted by the lowest pressure reduction valve. This reduction valve is provided with a moisture discharging. This needs to be checked frequently and, if necessary, be emptied.

Note Regularly check moisture discharging on moisture.

1.5 Unsuitable use

The machine is not suitable for use in damp area's (outdoor) or places with explosion hazard.

The sawing machine is built for shortening of wood and may *never* be used for ripping.

The machine should not be used by unqualified personnel.

The machine is not suitable for cutting metals or metal containing materials.

1.6 Changing the saw blade

For changing the saw blade, the following instructions need to be followed:

- ≫ Stop the machine.
- ≫ Set the main switch to OFF.
- ≫ The cabinet can now be opened from the side, using the turning knob. The axis can be blocked with a special wrench in the front flange. The required tool is supplied.
- ≫ Loosen the blade by turning the special wrench in the rotation direction of the blade.
- ≫ Change the blade.
- ≫ Do not forget to remove the blocking at the axis after fixing the saw blade.

≫ When using a saw blade with another thickness, also the 'Saw thickness' at common settings has to be changed.

Note Make sure that the saw flanges and the saw blade are cleaned well when you want to assemble.

Common control

Controlling the machine can be divided into two parts. The first part concerns the control of the saw. The required controls are located on the front panel of the machine. The second part concerns the control of the program. This chapter describes the basic operation and the buttons on the machine.

2.1 Switching on

The control unit has to be powered on and off by means of the main switch of the machine.
Make sure the machine is provided with the proper voltage.
After switching on the machine, the control unit executes a starting procedure, this may take a few minutes. At the end of the startup sequence, the machine control program is loaded.

Note The machine only works when the control unit has been started up!

2.2 Controlling the saw machine

2.2.1 Resetting the saw machine

After switching on the saw machine, the use of the emergency stop or opening the cover or door, the saw machine

needs to be reset. This is done by pressing the blue [**RESET**] key. The machine can only be reset when the cover is closed, the door is closed and the emergency stop button is released.

Note Check whether the emergency stop is released before resetting the machine!

2.2.2 Starting the saw

The saw is started automatic as soon as it is needed.

2.2.3 Manual/Auto

With the selection switch [**MANUAL/AUTO**], can be selected whether cutting is to be done manually or automatically. When manual cutting is selected, the switch is to be set in the position 'Manual'. See chapter 3 for more information. When cutting automatically, the saw is controlled by the control unit. The switch has to be in the position 'Auto' for that. See chapter 4 for more information.

2.2.4 Stopping the saw

The saw is stopped with pressing the *Stop* button or **<F9>** . The saw will also stop when an emergency stop is activated.

2.2.5 Thermal protection

The machine has a red indicator. This indicator lights up when a thermal distortion has occurred. A thermal distortion occurs when the saw motor is overloaded. When a thermal distortion occurs, the motor is switched off. A thermal distortion can be released by opening the door of the electric cabinet and reset the motor protector switch.

This switch is reset by first pressing the red button and then the green button on the switch. It takes a few minutes before the thermal protector can be reset. The red indicator no longer has to be lit now. If this happens frequently, please contact your dealer.

2.2.6 Saw speed

The saw speed is the speed at which the saw goes up. To be controlled by the black rotating knob, located at the right of the machine, above the reduction valve. By turning to the right, the saw speed will be slower, by turning to the left, the saw speed will be faster.

2.2.7 Pressure roller/sledges

The two pressure rollers/sledges are controlled separately. They have switches on the cabinet so they can manually be disabled for certain jobs.

2.2.8 Other cabinet buttons

Start
The [**Start**] button acts as **<Enter>** key. It can be used to press the OK button in dialogs on the main screen.

Continue
While cutting in automatic, the machine waits after every saw cut so little was can be removed. The [**Continue**] button is pressed to continue. Use the switch to continue directly after a cut.
Manual buttons
The two green buttons on the side can be pressed simultaneously to operate the saw manually.

2.2.9 Infeed buttons

Switch inlet chain
The [**Inlet chain**] switch lets you disable running of the infeed chains by the machine. For example when a user is stacking beams it is not desired that the machine runs the chains.

Switch inlet loading
The [**Inlet loading**] switch tell the machine that chains must be kept running even if wood is already present on the inlet or against optional stops.

Switch wood short/long
The [**Wood short/long**] switch lets the user choose tell the machine if the wood is long enough to cover both short and long wood detectors on the infeed. If the wood is not covering both sensor it could be because it is not lying straight.

2.3 Controlling the program

After starting the control program, the main screen of the application appears. The figure 2.1 shows the main screen of the control application. The actual image can differ depending on the configuration of the machine.

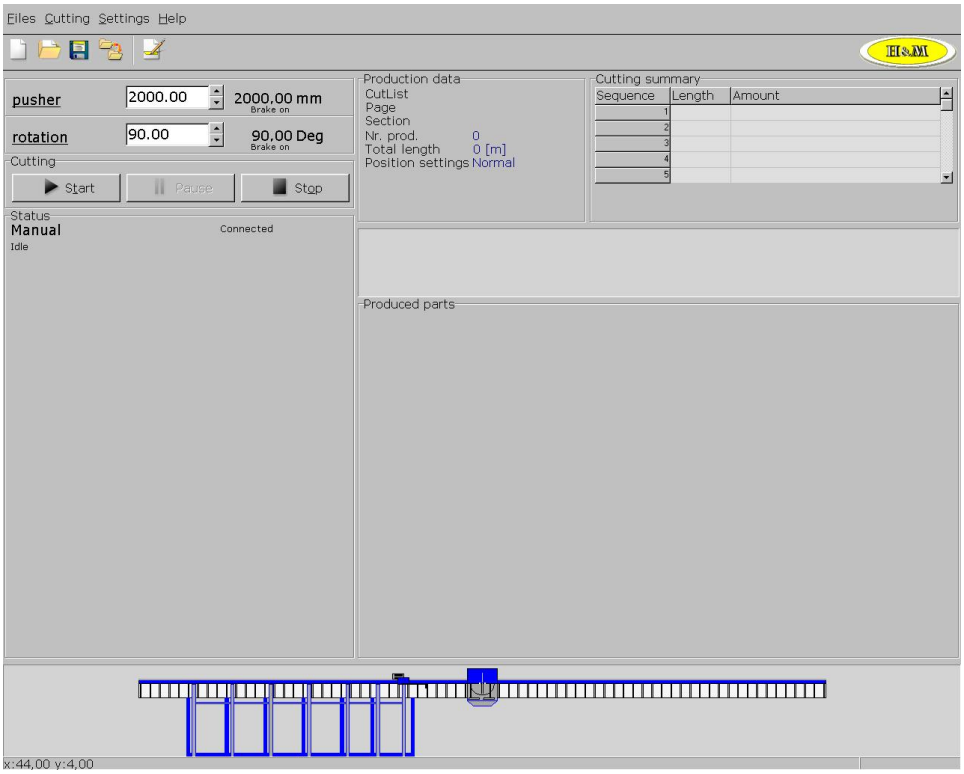


Figure 2.1: Hoofdscherm

In the positioning display the absolute position of the pusher is indicated in millimeter's. In the white field, in which also a value is indicated, a positioning command can be entered. This applies to all axes. The unit used by an axis is displayed behind it.

2.3.1 Positioning

The axis can be positioned manually, by entering a positioning commando. Absolute positions an relative positions can be entered. This matter will be further examined in chapter 3.

2.3.2 Automatic cutting

To do automatic cutting you need to make or have a cuttinglist. Which is then started with the *Start* button on the screen. The *Files* menu gives access to the function to create, open, edit and save cuttinglists. See chapter 4 for more information.

2.3.3 Settings

The properties of the machine can be set in the *Settings* menu. The properties consist of settings, that are sometimes changed for certain jobs, and parameters that are set one time normally at the H&Mfactory. See for further information appendix A.2.

2.3.4 Machine monitor

Using *setting* menu, submenu *Machine monitor* or with **<Alt-F9>** the Machine monitor will be opened. Here you can view the status of all digital inputs. You can also control all digital outputs here. See chapter 6.

2.3.5 Closing the program

With **<Alt-F4>** you can terminate the program. After pressing **<Alt-F4>** the saw program will close.

Warning Before switching off the machine, first close off the saw program with **<Alt-F4>**

2.4 Switching the machine off

Before the machine can be switched off, the control unit has to be terminated. This terminating concerns both terminating the control program and shutting down Windows XP.
For terminating the control program, see paragraph 2.3.5.

After terminating the control program, the operating system Windows has to be shut down. Windows can be shut down through the Start menu. The start menu can be called by pressing the "Windows" key (between Ctrl and Alt) or by pressing **<Ctrl-Esc>** . Via the touch screen or the arrow keys the machine can be shut down, by pressing or clicking Shut down. After that press or click again on Shut down. After a few seconds the message 'NO INPUT' should appear. The machine can now be switched off by means of the main switch.

Warning Do not switch the machine off while positioning or while entering data.

Manual control

3.1 Manual cutting

When the switch [**MANUAL/AUTO**] is set to 'Manual', manual sawing can be performed. This is done by pressing the two control **<Ctrl>** buttons on the keyboard simultaneously or the two green buttons on the side of the machine when available.
After pressing the two buttons, the wood clamps will go down and the saw will go up. When the object is cut, the two buttons have to be released. When the buttons are kept pressed, the saw will go up again, after reaching the inactive position.

3.2 Manual commands

An axis can be controlled by typing a command in the white entry field of the concerning axis in the main screen. There are also extra commands beside position commands. The following commands are available:

3.2.1 Move absolute (M)

Move the axis to an absolute position. Syntax:

<position> **<Enter>**

or

M<position> **<Enter>**

Examples:

2500 **<Enter>**

The pusher moves to the position of 2500mm

M2500 **<Enter>**

The pusher moves to the position of 2000mm

Instead of entering a position an expression can also be a entered.

Example:

2500+200/5 **<Enter>**

The pusher moves to the position of 2540mm

3.2.2 Move Relative (R)

Move the axis relative to current position. Syntax:

R<position> **<Enter>**

Example:

R500 **<Enter>**

The pusher moves 500mm further. When the pusher was positioned at 1000 mm, the pusher would move to the ab-

solute position of 1500 mm.

R-500 **<Enter>**

The pusher moves 500 mm back. When the pusher was positioned at 1700 mm, the pusher would move to the absolute position of 1200 mm.

Instead of entering a position an expression can also be a entered.

3.2.3 Move to end (E)

Move the axis to the maximum position. Syntax:

E <Enter>

3.2.4 Move to begin (B)

Move the axis to the minimum position. Syntax:

B <Enter>

3.2.5 Positioning with a fixed step size

With the arrows keys, a fixed step size can be positioned. With the **<arrow up>** key you can move to a larger size. With **<arrow down>** key, you can move to a smaller size.

The step size by which is being moved, can be entered in the Axis parameters. See section A.3.

3.2.6 Set Zeropoint (Z)

This is a command that must be used with care because it can damage the machine. For calibration it is possible to tell the machine at which position it currently is. For when to use it see the chapter 5. Syntax:

Z<physical axis position> **<Enter>**

Example:

Z500 **<Enter>**

The machine now sets it current position to 500.

3.2.7 Homing (H)

Starts homing axis. See chapter 5 for more information.
To home one axis:

H <Enter>

To home all axis:

HA <Enter>

3.2.8 Cut piece(s) from a beam (C)

Cuts 1 or more pieces with a certain length from the beam, the length of the beam is assumed to be the same as the current pusher position. The saw thickness is taken into account. Syntax:

C<Length of the product> **<Enter>**

or

C<Length of the product> <Quantity> **<Enter>**

Examples:

C500 **<Enter>**

A piece of 500mm will be produced.

C500 3 **<Enter>**

3 piece of 500mm will be produced.

3.2.9 Cut beam to length (K)

Cut the beam so it will have a certain length. Syntax:

K<length> **<Enter>**

Example:
K2500 **<Enter>**

The pusher will move to 2500, then the saw will cut the

beam. The length against the pusher will thus be 2500.

3.2.10 Push to outlet (U)

Pushes beam in front of the pusher to the outlet and if kickers are available kick in to the outfeed table. Syntax:

U <Enter>

Automatic cutting

For all automatic cutting modes, cuttinglist are used. A cutting list can be entered on the machine but can also be loaded from a USB-Disk or from a network. Cutting lists can be saved to a USB-disk with a certain name and be loaded in a later stage. A cutlist contains pages. Each page contain parts with same material and headsize. During automatic cutting, the pages are processed, starting at the first page. Default, the starting page is the first page, but the operator can change this into any other page by selecting it in the cutlist editor.

When cutting stops for instance when the end of a working day is reached, but the total list is not yet fully processed, the program can be closed in the normal way. By starting the program, the last processed cutting list is being read in. In this list is stored which pages are processed and which not.

The operator can interrupt automatic cutting and e.g. temporary cut another list, and then return to the original list and continue that list.

Cutting lists can be made on at the office an office version, via an optimization program such as *Optimaster* or exported from a CAD program.

Data present in the cutlist data, such as order number or part numbers, can be showed during the automatic cutting

and, if the machine is equipped with a label printer, printed on a label.

The *produced parts* control on the main screen indicates which products are cut so far.

The *production data* control on the main screen indicates some key information about the cutting progress. It indicates the total length still to cut and the number of products still to cut.

The *division box* show the current the division. Brown colored pieces in the drawing are waste, waste which is shorter than a configurable length, can be cut in small pieces. Purple colored pieces in the division are remainder lengths that can be reused. A red colored piece at head or tail of the division signifies a problem with the division. In this case not all parts can be cut from the beam. A pink part signifies a problem with the part itself, it can not be produced as intended.

4.1 Reading a cutting list

Pressing **<F2>** in the main screen, using the *Files\Open cutting list ...* menu item or its corresponding toolbar button will open then open dialog. A list of the available cutting list is shown. With the **<Tab>** and **<Arrow keys>** or touchscreen you can select the desired cutting list. Optional this open dialog is preceded by a a window in which you can indicate the directory to use. Earlier saved or read files can be reopened by clicking the file name at the end of *Files* menu.

4.2 Saving a cutting list

Pressing **<F3>** in the main screen, using the *Files\Save cutting list ...* menu item or its corresponding toolbar button, will open the save dialog. Here a file name for the cutting list an be entered. **<Enter>** will save the cutting list under the entered name, extended with the extension .LST. Optional this open dialog is preceded by a window in which you can indicate the directory to use. Earlier saved or read files can be reopened by clicking the file name at the end of *Files* menu.

4.3 Entering a cutting list

To view, edit, or change the current page for cutting the cutlist editor must be opened. Pressing **<F4>** , using the *Files\Edit cutting list ...* menu or its corresponding toolbar button, will open it.

To start with a new empty list press **<Shift+Ctrl+F4>** , use the *Files\New cutting list ...* menu or its corresponding toolbar button.

To start with a new type of list use the *Files\New type cutting list ....* This will show a selection dialog where different cuttinglist types are shown. The predivided cuttinglist types are used for making manual divisions. The user decides which products are cut from which supply length. Non predivided cuttinglists are used in length measuring or for optimizing on the machine. Cuttinglist types also differ in the part types they contain.

The cutlist editor has different field and buttons for different cutlist types but following holds for all cutlist. An example is shown in figure 4.1.

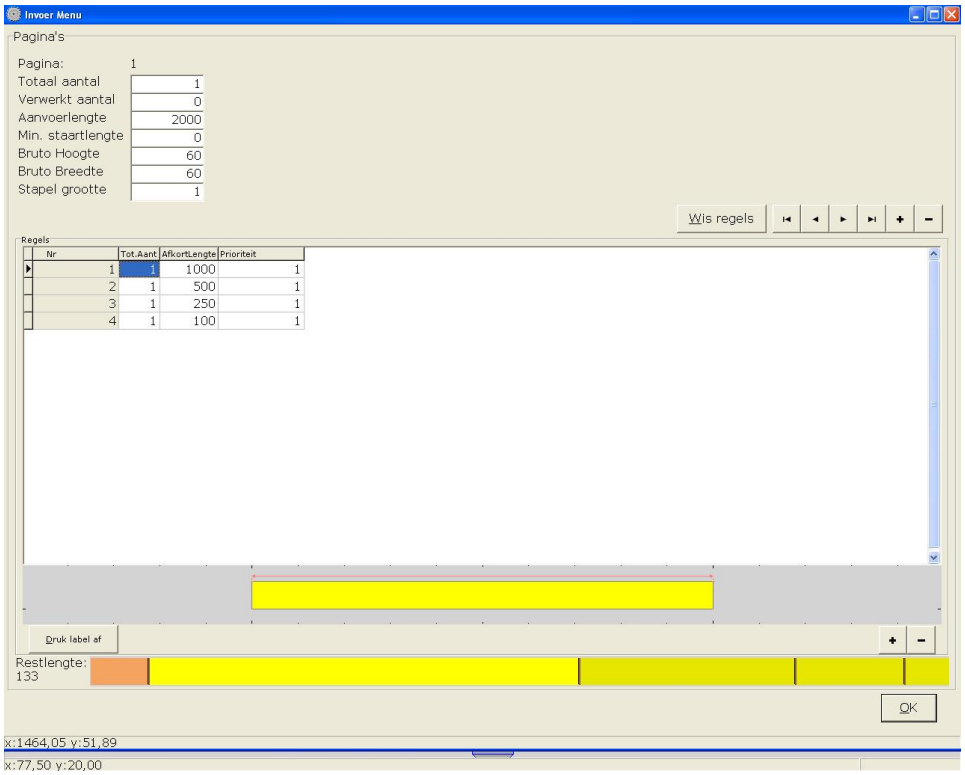


Figure 4.1: Input Menu

At the very top of the list cutlist wide fields are shown:

Left-Right Rotating
Specifies if it is allowed for the program to rotate the part around center point, making left side the right side, to get a better division.

Up-Down Rotating
Specifies if it is allowed for the program to roll the part around its length axis, making the top the bottom, to get

a better division.

At the top all fields concerning pages are shown:

Page
Shows the current page and the total number of pages separated by a /.

Min. Trim Tl.
Minimum tail waste that must be cut.

Min. headwaste
Minimum head waste that must be cut.

Section Height
Height of the parts and the beam to supply.

Section Width
Width of the parts and the beam to supply.

Stack Size
Number of beams that can be stacked on top of each other. The program will tell the user how much beams he actually must stack during supplying.

Stack in width
Number of beams that can be pushed beside each other through the machine. The program will tell the user how much beams he actually must put beside each other during supplying.

In the items list the parts are defined. The current selected item is also draw under the items list. The text fields for

a part such as *Wood*, *Post processing* are only used to be show on the screen or labels. They do not influence the hbehavior of the program. The standard fields in this list are:

Produceable
Contains a red cross if a part is not produceable.

Print
Can be used to suppress printing of labels for a certain part.

With the arrow keys and the Tab-key you go step by step through the fields and buttons. All buttons can also be pressed using a key combination. The following keys and buttons can be pressed in the cutlist editor.

Function:	Key:
Enter a numerical value	**<0..9 , .>**
Step through the fields	**<Tab>** + **<Arrow keys>**
Move to the next page	**<Alt+PageDown>**
Move to the previous page	**<Alt+PageUp>**
Move to first page	**<Alt+Home>**
Move to last (empty) page	**<Alt+End>**
Insert a page	**<Alt+Ins>**
Delete a page	**<Alt+Del>**
Insert a line in the items list	**<Shift+Ctrl+Ins>**
Remove a line from the items list	**<Ctrl+Del>**
Clear the cuttinglist	**<Alt+C>**
Close the input menu	**<Alt+F4>**
Search page or part	**<Alt+r>**
Extra operations on part	**<Alt+E>**
Print label for part	**<Alt+P>**

Changing the page also changes the page to cut next.

4.3.1 Entering a predivided cutting list

Open the cutlist editor. Every page in a predivided cutting list specifying a beam length and the parts to cut from it. The division is drawn at the bottom of the cutlist editor. See for the meaning of the colors the beginning of this chapter. It also shows the remaining space left in the beam. The number of beams to cut with this division can be specified. Extra page fields in this cuttinglist are:

Total amount
Number of beams to cut with this division.

Amount cut
Number of beams cut with this division.

Infeed length
The length of the beam to cut the parts from.

See for the part definitions and possible extra operations 4.3.4 and further.

4.3.2 Entering a cutting list with optimizing

Open the cutlist editor. Every page contains a list of parts to cut. Before the machine can start cutting, the parts must be mapped into beams. Optimizing does this. The editor shows some extra fields and buttons for optimizing:

Quantity
Specifies the number of beams that are available, stock, for optimizing.

Length

Specifies the length of the stock beams for optimizing.

Optimize result
Show the result summary of the last optimization of the current page.

<Make division>
Start optimizing the parts in the current page. It first throws away the previous optimization for this page. The optimizing method used can be specified in the settings. After optimizing the result summary is shown in the *Optimize result* field.

<Show division ...>
Shows the now predivided list made by the optimizer. All the beams and the parts to cut from them are shown. The division for a page is drawn at the bottom of the editor. Select the page to cut first in this editor.

<Merge ...>
Lets you merge pages into 1 page. Can be used if parts that can be cut from same beams, are on different pages. For optimizing its is better to optimize them together, giving a better yield. To optimize them together they must be on the same page.

The parts have extra fields used in optimizing:
Tot.Amnt
Is the total number of this part that must be cut.

Amount Cut
Is the total number of this part that has been cut so far.

Priority
Specifies the priority in optimizing. Priority 0 means do not use this part. 1 is the highest priority. While optimizing the beam is first optimized to highest yield with priority 1 parts. The remainder is then optimized to highest yield with priority 2 parts and so on.

See for the part definitions and possible extra operations 4.3.4 and further.

4.3.3 Entering a measurement cutting list

Open the cutlist editor. Every page contains a list of parts to cut. During length measuring the program first measures the beam and then tries to cut parts from the current page in the list from it. This is the optimizing phase.

The **<Merge ...>** button lets you merge pages into 1 page. Can be used if parts that can be cut from same beams, are on different pages. For optimizing its is better to optimize them together, giving a better yield. To optimize them together they must be on the same page.
The parts have extra fields used in length measuring:
Tot.Amnt
Is the total number of this part that must be cut.

Amount Cut
Is the total number of this part that has been cut so far.

Priority
Specifies the priority in optimizing. Priority 0 means do not use this part. 1 is the highest priority. While optimizing

the beam is first optimized to highest yield with priority 1 parts. The remainder is then optimized to highest yield with priority 2 parts and so on.

See for the part definitions and possible extra operations 4.3.4 and further.

4.3.4 Entering a straight part

A straight part its only parameter is its length:

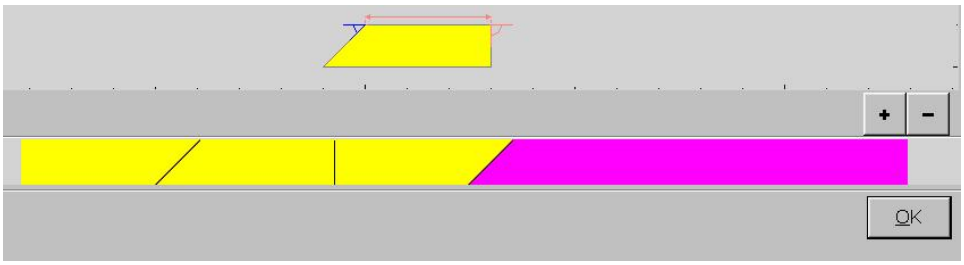
Cut.Length
Length to cut.

4.3.5 Entering a single angle part

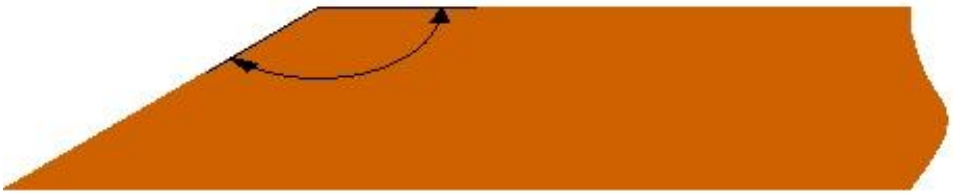
The angle of a saw cut can be indicated with an angle itself, but also with another angle or with lengths. The input can thus be adapted to the way in which the saw data are being delivered. The way of input is reflected graphically. An angle is indicated with an arc, a length by a grade mark. The way of input can be changed in the input menu with the **<Space bar>** at the option *side*. After changing the way of input, this is directly displayed graphically. The position of input can also be changed. An angle can be indicated on the upperside of the board, but also at the lower side, the location of input in the input menu can be changed with the **<Space bar>** with the option *type*.

Entering the direct angle

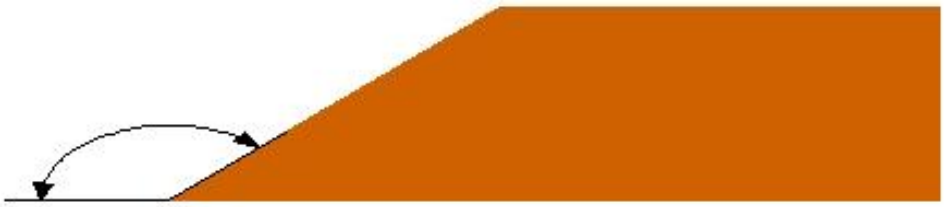
A corner can be specified by entering the cutting angle. The cutting angle is the angle at which the machine cuts



and which is also displayed for Axis 2.
Figure 4.3.5 shows the reproduction of the input of the direct angle.



The same corner can also be indicated at the lower side of the board. By clicking on *type* of the angle and then press on **<Space bar>** , the arc is displayed at the bottom side, as indicated in figure 4.3.5.



In principle the size of the angle is the same. It does not matter where the angle is being entered, but for the operator it can be more easy to place the size indication on the same position as indicated in the supplied saw data.

Entering the opposite angle

The corner can also be specified by entering the opposite angle of the cutting angle. This is graphically displayed in figure 4.3.5.

The corner can also be specified at the bottom side of the board.

Entering the direct length

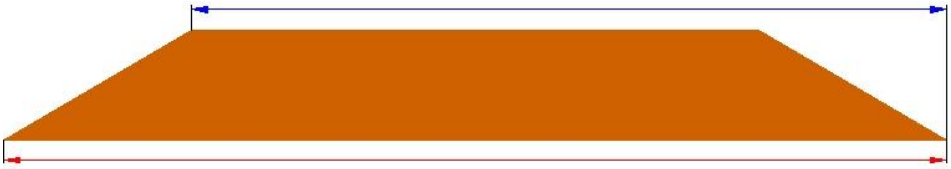
By entering the direct length, the corner is being specified by entering the length, as shown in figure 4.3.5.

When the position of the input is changed with **<Space bar>** at the function type, at the bottom side of the board, then the form of the board changes as displayed in figure 4.3.5.

Entering the opposite length

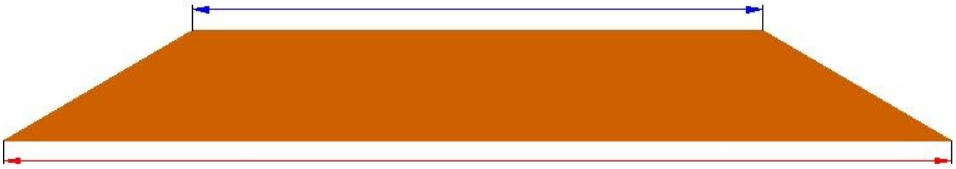
The direct length can also be determined with the total length and the length from the beginning point of the board

to the position of the saw cut. This is displayed in figure 4.3.5.



Entering the in-between length

The direct length can also be determined from the total length, the length between the two corners and the direct length of the opposite corner of the board. This is shown in figure 4.3.5.



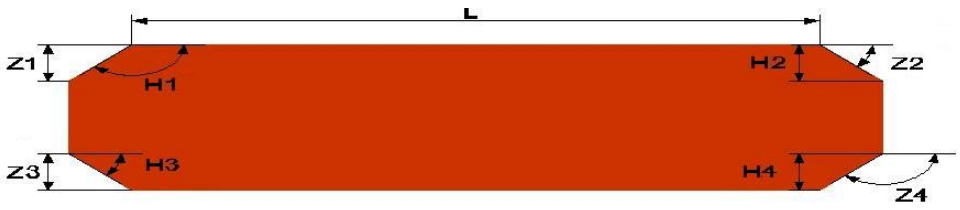
4.3.6 Entering a double angle part

In figure 4.3.6 a beam with two point shaped sides is shown. In this figure all quantities, in which the cut lengths can be

entered, are indicated. And they can be clicked to edit the corresponding field.

The length of the part can be specified in the *Cut length* field. The *Si.* field beside it can be toggled with the **<Space bar>** . It indicates how the part is measured, from point to point or along a side. The drawing of part shows how the length is measured.

On both ends of a beam, maximal two angles can be entered. Per angled side, the angle, *Hn Angle*, the roll angle, *Nn Roll* and the vertical distance, *Zn*, can be entered. These values determine the shape of the beam. The *n* stands for the angle number as indicated in figure 4.3.6. The angles can be entered in degrees and or in distance along the side. The *Point measure* can be toggled with the **<Space bar>** to toggle between the 2 modes.



H1 Angle is always kept larger or the same as *H2 Angle* by the program. And *H2 Angle* is always kept smaller or the same as *H4 Angle*. The sum of *Z1* and *Z3* is always kept smaller or the same as the width of the beam. So is the sum of *Z2* and *Z4*.

When a Z value of 0 is entered, that angle is not cut. When at a certain side of the board an angle of 90°is entered, the corresponding Z distance is set to the width minus the op-

posite Z.

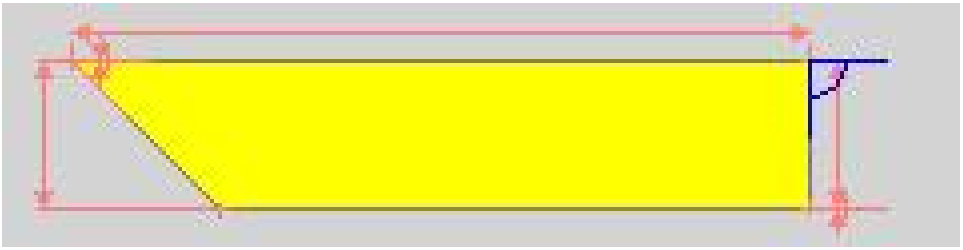
In the examples below, the left side of the board is assumed. Entering the right side occurs in the same way.

Entering a single angle of 90°

At a square side, 90°has to be filled in fields *H1 Angle*, *N1 Roll*, *H2 Angle* and *N2 Roll*. *Z1 Dist* and *Z2 Dist* must be set to the width of the beam.

Entering a single angle

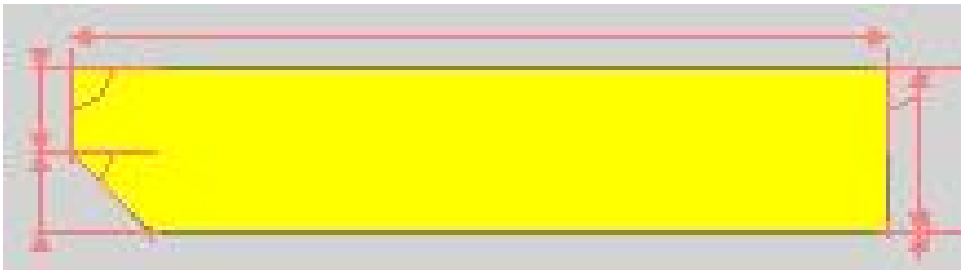
In this example, at the left side of the board, an angle of 45°has to be cut. Set this angle in *H3 Angle*. Then set *Z3 Dist* to the width of the beam. The whole side is being cut anglewise. The side then looks like as shown in figure 4.3.6.



In this example, at the left side of the board, an angle of 45°has to be cut. Set this angle in *H3 Angle*. Set angle in *H1 Angle* to 90°. Then set *Z3 Dist* to the width of the beam. The whole side is being cut anglewise. The side then looks like as shown in figure 4.3.6.

When *Z3 Dist* is set to smaller value then the width of the beam , the distance indicated by Z3 is cut anglewise, and the remaining width squared. The side of the beam then

looks like it is shown in figure 4.3.6. The side is then cut in two times.



Entering point shapes

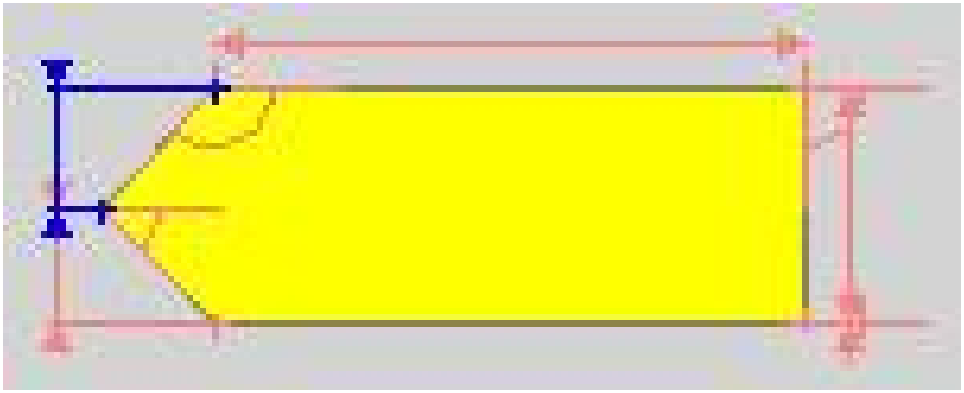
By point shaped sides, a value needs to be entered by ANG1, Z1, ANG3 and Z3. When the collective width, indicated by Z1 and Z3, equals the beam width, the side has a sharp point. The side is then cut in two times. When the collective width, indicated by Z1 and Z3, is smaller than the beam width, the side has a blunt point. The side is then cut in 3 times.

In the example below the following values are being entered:
H3 Angle is 45°
Z3 Dist. is 100 mm
H1 Angle is 135°
Z1 Dist. is 100 mm

The side of the beam is indicated in figure 4.3.6.

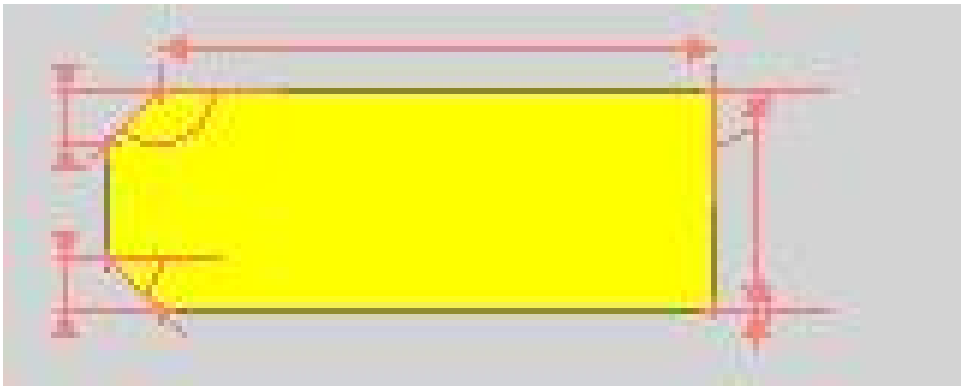
Z1 and Z3 have a collective width of 200 mm. This also is the beam width. The side has a sharp point.

In the example below the following values are being en-



tered:
H3 Angle is 45°
Z3 Dist. is 50 mm
H1 Angle is 135°
Z1 Dist. is 50 mm

The side of the beam is shown in figure 4.3.6.



Z1 and Z3 have a collective width of 100 mm. This is less than the beam width. These therefore has a blunt point.

4.3.7 Entering a notch operation

After pressing the **<Extra ...>** button a new dialog is opened, with a list of notches; see figure 4.2.

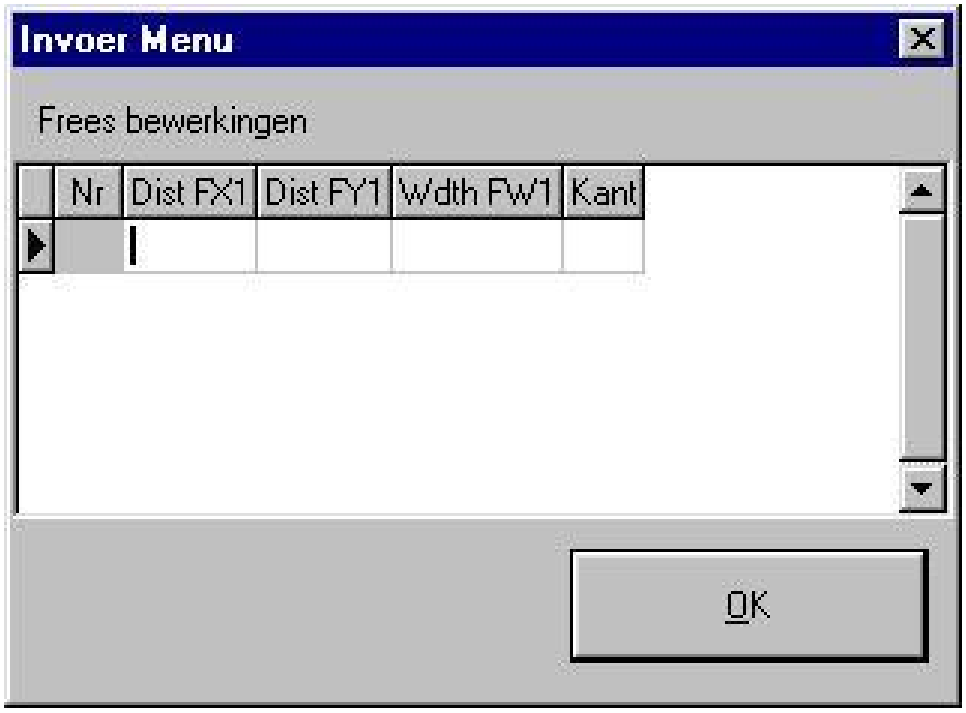


Figure 4.2: Input Menu Notch Operations

Fields used in notches list:

X
This is the position of the notch operation.

X Si.
Specifies from which side or end of the part X is measured.

Depth
Is the depth of the notch operation measured from the side.

Width

Is the width of the notch operation.

Side
Is the side of part the notch operation must be done on.

4.3.8 Entering a studmark operation

Studmark operation specifies where a mark is printed on the product.
Fields used in marks list:

Stud pos
Is the position where to print the mark.

Mark
Is the text that can be printed, the actual text can be configured.

Side
Is the side where the mark is intended for printed.

4.4 Executing a cutting list

When a cutting list is entered or read in, the cutting can be started automatically, by pressing on **<F8>** . Another possibility is by pressing in the main screen, via the touchscreen, on **<Start>** .

The cutting can be aborted by pressing on **<F9>** . Another possibility is by pressing in the main screen, via the touchscreen, on **<Stop>** .

Pausing the cutting can be done by pressing on **<F10>** or by pressing the **<Pause>** button in the main screen. This does not disrupt the cutting process. Continue by pressing start or pause again.

Automatic cutting stops when all pages are processed.

4.4.1 Executing a predivided cutting list

If the optimized cutting list consists of more pages, the start page can be selected, by going to the cutlist editor and going to the page that must be cut next. If the right page is found, the editor can be closed. After which the cutting can be started in the before mentioned way.

The pusher moves back and asks for a beam with the length, headsize and woodtype as specified in the cuttinglist page. If the machine has an automatic infeed the machine just starts the chains to pull the next beam on the infeed. The *Supply* overview in the main screen show what to put on the infeed chains.

4.4.2 Executing a optimized cutting list

If the cuttinglist has been optimized, the cutlist can be executed as a predivided list see 4.4.1. See 4.3.2 for how to optimize the list if not already done.
If the optimized cutting list consists of more pages, the start page can be selected, by opening the cutlist editor. In the editor press the **<Show division ...>** button. This shown the predivided list made during optimizing. In

this editor go to the page that must be cut next. If the right page is found, the editors can be closed. After which the cutting can be started in the before mentioned way.

The cutting proceeds the same way as in 4.4.1. When all optimized parts are cut, the cutting will stop. If there are still part to cut because they where not included in the optimization, the machine will give a warning.

4.4.3 Executing a measurement cutting list

A saw cycle consists of loading a beam, scanning a beam for the length and chalks marks , optimizing the measured lengths, and cutting the beam. Optional, see option *Extra Headcutting* in section A.1.4, the head can be examined for cracks and an extra headcutting can be made.

How the beam is going to be cut is displayed in the division box in the main screen. Also is shown where the chalk lines are seen.

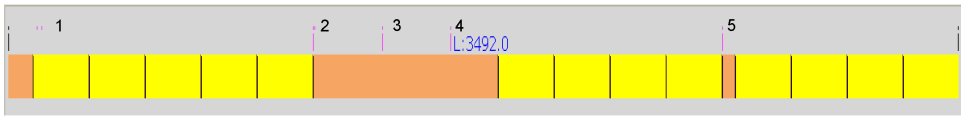
Chalk marking

With chalk lines, unusable material, bends and a material bend class can be marked. No part are cut from unusable material. Parts do not overlap bends. For every material bend class a maximum part length can be specified, part that are longer are not cut from a beam with that class. This enables you to cut short parts only from a bend beam, an even shorter part from a more bended beam.

The distance between chalk lines determine how they are

interpreted by the machine:

- Very close lines are interpreted as 1 line (see 2 in 4.4.3).
- Close lines are interpreted as class indicator 2 lines is class 1, 3 lines is class 2. See 1 in 4.4.3 this beam is classified as class 1.
- Other lines are interpreted as bends.



Calibration

After the sawing program has been started in automatic cutting, the machine will start homing all its axis once. Make sure that the machine is empty and that there is no wood on the infeed or outfeed.

Homing of an axis can also be started manual by giving the following command in an axis edit box:

H <Enter>

To home all axis enter:

HA <Enter>

Recalibration is often needed when a saw blade has been changed or when an transmission has been loose. For the calibration you have to cut several times.

5.1 Rotation table

Before calibrating the rotation table, firstly a piece of wood under has to be cut. Move the rotation axis manually (see chapter 3) until its is physically approximately at 90°.
Also put the roll axis at 90°. If the roll axis is not yet calibrated set it physically approximately at 90°.
Then cut the wood.
After that, the cut angle has to be measured exactly. The value then has to be entered in the rotation axis edit box with the following command:

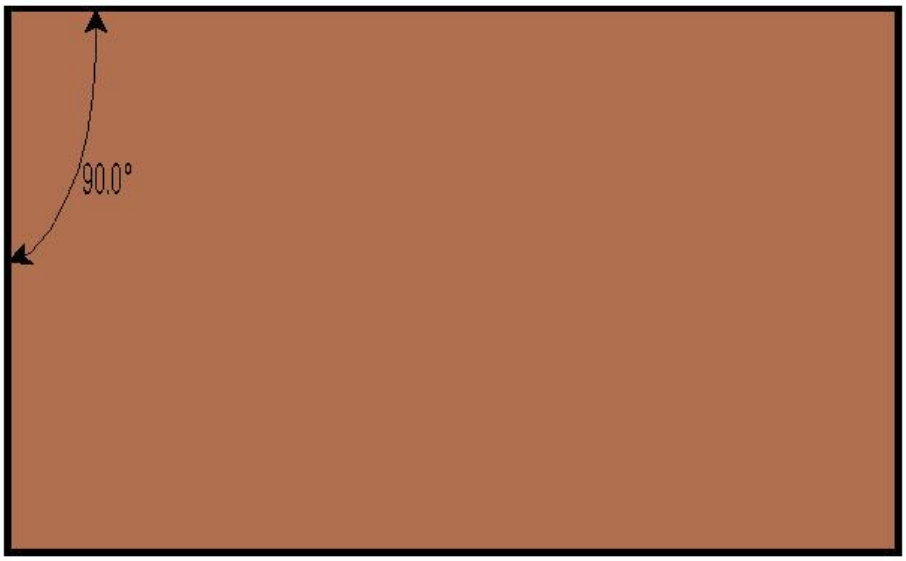


Figure 5.1:

Z<Measured angle in degrees> **<Enter>**

5.2 Roll axis

Set the rotation axis on 90°. If the rotation axis is not yet calibrated, do that first.
Put the roll axis visually approximately at 90°. Then cut the wood.

After that, the cut angle has to be measured exactly. The value then has to be entered in the roll axis edit box with the following command:

Z<Measured angle in degrees> **<Enter>**

5.3 Pusher

For this, a certain length should be entered on the sawing machine. Put the rotation axis on 90°. If the rotation axis is not yet calibrated, do that first. Put the roll axis on 90°. If the roll axis is not yet calibrated, do that first. Then a piece of wood needs to be cut.

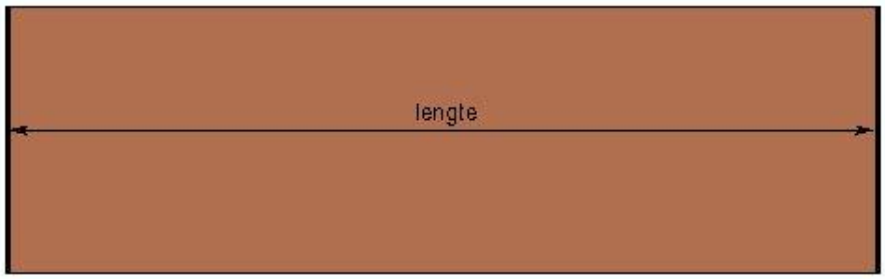


Figure 5.2:

After the cutting, the exact length of the cut piece of wood should be measured. The value then has to be entered in the pusher axis edit box with the following command:

Z<Measured value in mm> **<Enter>**

5.4 Z-movement

Now the size of the Z-movement has to be calibrated. For this, the saw rotation angle has to be placed on 180°. If the rotation axis is not yet calibrated, do that first. Put the roll axis on 90°. If the roll axis is not yet calibrated, do that first. Then set the Z-distance on a certain value, for instance physically at approximately 100 mm from the backfense. After this, a saw-cut has to be made in the wood.

Now the distance of the side of the wood to the inside of the saw-cut has to be measured exactly. Half a saw width must the be added to this value. The resulting value is distance from the back fence to the center of the saw. The value then has to be entered in the Z axis edit box with the following command:

Z<Measured value in mm> **<Enter>**

Machine monitor

In the Machine monitor, the condition of the digital inputs can be viewed. You can activate the digital outputs by placing a check mark before them. When you remove the check, the output is off. The status of the digital in and outputs is displayed in a menu. Figure 6.1 shows the Machine monitor. The actual image can differ depending on the configuration of the machine.

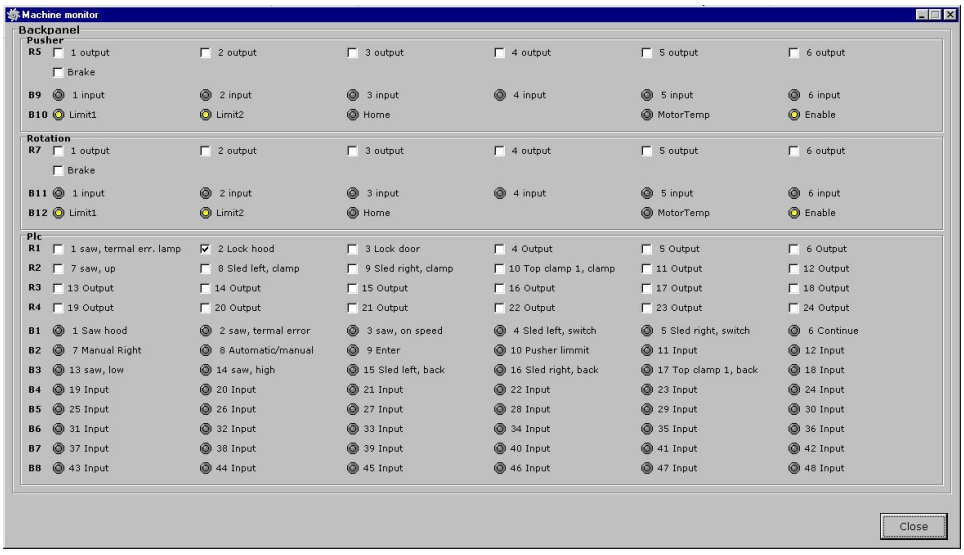


Figure 6.1: Machine monitor

6.1 Digital inputs

The digital inputs can be recognized by its lights, which are in front of the name, when a light is on, the input is high.

6.2 Digital outputs

The digital outputs are indicated with white boxes in front of it, by pressing on the name, via the touchscreen, you can switch on/off a selected output. Some basic safety code stays active. So switching on an output to lift the running saw will fail. Outputs are only powered when the emergency stop is cleared.

Settings

The settings of the machine are divided into 3 groups:

1. General settings
2. General parameters
3. Axis Parameters

To change settings a password is sometimes needed. Every access level has its own password that can set in the settings.

With general Settings the operator can adapt the machine to the type of supply length, and type of work. These settings depend on the supply lengths, and then the production lengths to be cut. Settings can be modified at operator level.

With general parameters, the configuration of the machine can be set. These parameters are dependent on the machine and normally have to be adjusted once only. Changing position parameters can damage the machine. Parameters can be changed at engineer level.

With Axis Parameters the properties of every axis can be set. These can be changed at engineer level.

There are a lot of options not all options are useful for all machines or available on all machines. Settings can be modified by an operator for a certain job. All parameters

and settings can be hidden by logging in **<Shift-F12>** as engineer or higher and using the right mouse button to set the access level. A settings or parameter is hidden if you have a lower access level. This gives the opportunity to simply the settings dialog for the operator by hiding all not used setting. The setting or parameter is green when the level attached to it is not the default.

All distances and positions are in millimeter's. All delays are in milliseconds.

Some positions are in pusher positions and some position are in machine coordinates.

The pusher origin is against the saw. When pusher is passed the saw, its position is negative.

The machine coordinates origin lies in point defined by the center of the saw crossing the back fence. Positive X is to right when standing in front of the machine. Positive Y is pointed towards you when standing in front of the machine. Z is pointing upward.

A.1 General settings

By general settings you can find the parameters that might be used by the user to set up the machine. These parameters are dependent on the job that needs to be cut, the supply material or the tools that are in use on the machine.

A.1.1 Tools

The parameters which can be changed in the tab Tools, relate to tools.

Saw Thickness
By this parameter, the width of the saw can be entered. This parameter is used to compensate the saw width when cutting automatically.

Saw Radius
Radius of the saw. Used in cut calculations for number of cuts needed. And to calculate how high the saw must be lifted.

A.1.2 Cutting general

The parameters that can be changed in the tab Cutting in General, concern the general shortening and apply for all cutting methods.

Retraction length
This parameter summed to the beam length determines the position to which the pusher will move backwards when new material is needed.

Usable offcut length
With *usable offcut length* can be indicated from which length, a offcut length remains usable. Offcut lengths which are shorter than the indicated length by this parameter, are being classified as waste. Rest waste can be combined with other waste, and then be divided into smaller pieces, so it will be filtered from the production process. Usable offcut

lengths will not be combined with the waste. If the system is equipped with a printer, a label can be printed for the remainder of the rest length.

Interm. Sawclearance
When there is small piece of waste between 2 part, make it at least the length of this parameter. This prevents that the piece is sucked in the back fence saw slit or that the point of the previous part is touched by the saw.

Extend double waste
When there are more then 2 cuts between to parts, you can get a lot of small wast pieces. These small pieces can cause problems. This parameter extends the waste between the parts by this amount, so waste pieces are not so small anymore.

Balance head and tail
Determines how offcut is divided between head and tail of the beam.

- *None* Fixed division head or tail size depending on *Move offcut to tail side*.

- *Minimize cuts* When waste is scrapped, chooses head/tail size so that at most 1 cut less is made.

- *Split evenly* Divide offcut evenly between head and tail. Useful to minimize the risk that either the first or last part is not usable because of beam head/tail cracks.

Low speed distance

Lets the pusher move slowly for a certain distance after material has been supplied. Eliminated a collision of pusher and material at high speed when material is not supplied against the pusher.

Prod. Tolerance
When allowing produced part to be longer then the length specified in the cuttinglist, fewer cuts are sometimes needed. This increases the speed of the machine. The value specifies how much longer a product can be made. Typically used for products which head needs to be milled afterwards on another machine.

Longest on tail area
Cut longest part in cuttinglist page from tail of beam until the sum of the lengths of these longest parts exceeds this parameter. Useful so small parts are cut from the head of a beam which can be better in combination with side clamps because side clamps do not need to open for the pusher.

Notch with saw width
If a notch is longer then his value, the machine tries to make part of the notch width the saw at 0 degrees.

Push wood
With this parameter, can be adjusted whether after the last cut of a beam, the resulting wood has to pushed trough the saw. When the tail waste is set to zero, at both sides of the saw kerf a saw length is located. If the length of the last part is too long, this may hinder placing a new beam. By pushing the cut wood, the infeed table is cleared so a new beam can be placed.

Saw scrap
Waste can, if the length of it is too long, be cut in smaller pieces. Small pieces of waste can then fall through the waste hatch, so this waste is filtered out of the production process. This can be used if the system is equipped with a waste hatch. Pieces of waste which are longer than the maximum waste length, will be divided. When *Saw scrap* is off, the waste will not be cut.

Move offcut to tail side
When this options is on, the rest length of the last division of a supply length, is positioned to the tail of the beam. Helpful to reduce the chance that the last production length is rejected due to a head crack. the remainder can be situated at the tail of the beam.

Clean restlengths
When enabled cuts head or tail waste from remainder. Useful to cut head or tail paint off a remainder.

No tail cut
When enabled last cut is not made. Typically used for products which tail needs to be milled afterwards on another machine. See also *Prod. Tolerance*.

No head cut
When enabled first cut is not made. Typically used for products which head needs to be milled afterwards on another machine. See also *Prod. Tolerance*.

Minimize beam rotation
When a cut can be made with the rotation axis and without using the roll axis, this is normally done even if it means

that beam must be rolled. Normally better when pushing the parts afterwards. To prevent this behavior check this option. The roll axis is then used.

Keep Z on 0
When checked, trys not to use the Z axis when cutting angles. So the back fence doors can stay closed.

Notch to head
When checked, tries to rotate parts so an open notch is at the head side of the part. Result in less waste because part nearer the head is already transported away. So saw or mill can cut into the head of the part without the need for extra waste to prevent cutting into neighbouring part.

A.1.3 Pre dividing

In this tab you have settings for pre divided pages, pages with a beam length and the parts to cut from it.

Optimal dividing
The cutting sequence and orientation of parts is chosen in such away to minimize the waste and the number of cuts. When not checked the parts are cut in same sequence as in the page.

Select page
When enabled, machine asks before every cut cycle which page it must cut.

Ask action between pages
When enabled machine only asks which page you want to

cut if the page is completed.

A.1.4 Optimizing / measuring

In the this tab you can find the parameters concerning the cutting methods in which a certain optimization method is used to make a division.

Def. head cut length
Default minimal head waste used in the cuttinglist when an imported cuttinglist does not contain this information.

Def. tail cut length
Default minimal tail waste used in the cuttinglist when an imported cuttinglist does not contain this information.

Optimization method
For dividing lengths the following optimization methods are available:

≫ *Standard* The strategy of this optimization method is to repeatedly fit the longest appropriate beam, until no beam can be fitted in.

≫ *Optimal* This method tries all combinations of part, only possible with a limited number of parts because number of combinations grow exponential.

≫ *Dividing1* This method random picks parts from the cuttinglist.

≫ *In list sequence* This method fits the part in the beam

in the same order as they are in the cuttinglist.

≫ *Angle optimizer* This method can optimize angled parts or parts efficiently, it calculates the waste between parts and tries to optimize for minimum waste.

Lengths to use
This parameter specifies how the machine determines the length of the beams to optimize. Methods:

≫ *Length, quantity per page* For optimizing the supply length and the quantity is specified in the cutting list. Optimizing is then done by pressing an optimize button.

≫ *Length measuring* The supplied beam is measured by sensors and then optimized.

Auto optimize
Optimize a cuttinglist directly after opening.

Prefer near head
If a beam consist of 2 or more usable sections, part are preferred to be cut from first section seen from the head when this option is enabled. But only if they are the last parts to be cut from the cuttinglist. This used when extra headcutting is used to cut the head clean. This options is not available for all optimization methods.

Always add longest
When enabled the longest fitting part in the cuttinglist is

always added to the division first. Otherwise it can happen that long parts are cut only at the end when there are no more small parts. Small parts normally optimize better. This options is not available for all optimization methods.

Level
Puts a limit on the number of calculations done by the optimizer. If optimizing takes too long reduce this value. This options is not available for all optimization methods.

Extend rest length
Remainder smaller than this value is allowed in a division, it is considered as waste. If it longer then it is at least extended to the length of parameter *Make rest at least*. It is not used when 0. Can be used to reduce the overall waste. For example when a remainder of 700 mm is not usable for door frame, it is better to force the remainder to be at least 1100 mm because this length can be used for a doorframe.

Make rest at least
Rest lengths gets at least this length so it is really reusable. See also *Extend rest length*.

Single mark margin
When one chalk line is put on a bend in the beam, no part overlaps this chalk line. This can reduce efficiency. This value lets a part overlap the chalk line by as much as the value specifies.

Max. rest length
If remainder is longer than this, it is cut in even pieces. Useful when remainders go to a finger-jointing machine.

Extra Headcutting
Besides the standard front trim, an extra front trim can be cut, for instance when the wood contains cracks.

Join Waste
With *Join Waste* can be indicated if pieces of waste which lie next to each other, should be combined to one piece of waste. This saves cut time.

Intermed. Eff Lim
When checked all straight optimize methods try spread efficiency over all beams. Depends on distribution of part lengths if this option leads to better overall efficiency.

Longest near head
When checked, longest part is put near the beam head.

Ignore chalk lines
When checked, chalk lines are ignored. Used when chalk reader gives false readings. For example because of glue traces.

Process any beam
When checked, a beam that cannot be used is pushed to the outlet. Otherwise the machine will ask the user to remove the beam from the outlet, which can be difficult.

A.1.5 Outlet /Inlet

These parameters concern the outfeed table and the infeed table.

Rollers on after cut
When this option is checked, the outfeed rollers will be controlled per cut part.

Rollers on during the return stroke of the pusher
When this option is checked, the outfeed rollers will be controlled during the return stroke of the pusher or after last cut part. Used when all produced part are transported/ kicked off at once. Or when machine supplies an other machine for example a planer.

Kicker enabled
When checked outlet kicker is used.

Kick restlengths only
When checked and *Kicker enabled* is checked, only remainders are kicked from the outlet.

Kick on outlet full
Kick parts together when sum of their lengths on the outlet exceed the parameter *Output collect length*.

Pause for waste drop
When checked, pusher pauses when waste is above waste hatch so it can drop. On some machines dropping is helped by blowing the waste down. On machines with automatic waste hatch, the hatch is also opened. Use waste hatch must also be checked
Use waste hatch
When checked, waste hatch is opened or in case of a manual waste hatch, is assumed to be open.

Use outlet top clamp

When checked and there is a top clamp above the outfeed rollers are powered when outlet runs and there is wood on the outlet.

Long waste to end
Long waste, not fitting through waste hatch, is transported to end of the outlet. Smaller is when smaller then *Maximum waste length.*

Roll during supply
Always roll the wood during supply.

Enable separator always
Always separate beams when checked.

Supply during back run
When checked, the material is supplied under the back moving pusher.

Roll for cuts
The roll unit is also used to orientate the beam for the first cut.

Check wood against pusher
When checked the machine will ask if all material is correctly against pusher. This is used only in the case of material is stacked.

Check supplied wood pos.
When checked, the machine asks before starting to push the material in to the machine for an extra acknowledge. Used for cases where profiled material could have the wrong orientation on the infeed.

Reset inlet
Resets state of inlet.

Stackingstops use
Use stacking stops on infeed.

A.1.6 Printing/Terminal

Printing
When the check mark *printing* is on, a label is printed after cutting a production length.

Print Rest label
When the check mark *Print Rest label* is on, also after cutting a rest length a label will be printed.

1 label per stack
When checked, prints only 1 label for a stack of parts instead of a sticker for each part.

Terminal full screen
Sets the terminal window to full screen on the monitor it is currently located. To move the screen to other monitor, uncheck this option, move the terminal window and check it again.

Terminal format
When this button is pressed, you can edit the format of the part data that is displayed on terminal. After pressing button the format editor will be shown. See section A.4.

A.1.7 Material classes

When measuring lengths and using chalk lines you can give material a bend class. 2 chalk lines close together indicates class 1, 3 lines class 2 etc. For every class a maximum part length can be specified, part that are longer are not cut from a beam with that class. This enables you to cut short parts only from a bend beam, an even shorter part from a more bended beam.

A.1.8 Extra Trim Length

With the tab 'Extra Trim Lengths', 5 extra head trims can be entered. When cutting according to a saw method with length measuring, a crack is detected, an extra head trim can be executed. Used when option *Extra headcutting* is checked.

A.1.9 Passwords

Here you can define passwords for different access levels. You can only change passwords of your own level or lower.

A.1.10 General

The parameters which can be changed in the tab 'general', concern the general functioning of the machine.

Language
By 'language', the language of the software can be entered. The software will restart.

Logposdata
When enabled, makes a separate file for measured lengths and chalk lines. *Legacy reports* must also be checked in the parameters.

Pos. Settings
The machine can position with 6 different positioning settings. With Pos. Settings can be indicated which settings are used. The actual parameters can be set in Axis parameters dialog.

Screen
When the check mark *draw machine* is on, the machine will be displayed graphically at the bottom of the screen.

Display summary
When the check mark is on, a summary of the products that have to be produced is displayed in the main screen.

Draw division
When the check mark is on, the divided beam that has to be cut will be displayed graphically.

Show next division
When the checked, the next divided beam that has to be cut after the current will be displayed graphically. Often used by operators to lay the next beam ready with the curve of the beam in the right direction.

full screen
When checked, the cutting program will run on a full screen.

Show supply
When checked, shows a list of supply lengths and the stacked high needed by the machine based on the pre-divided cut-list. It is shown on the main screen.

Produced format ...
Here you can specify the text format which will be displayed in the produced parts list on the main screen.
After pressing button the format editor will be shown. See section A.4.

A.1.11 Clamps

No headwaste clamping
When checked, clamp after saw is released after first cut so user can take waste away manually to check if the head is clean.

Position with sleds out
When checked, the pusher pushes the beam head inside the side sleds, waits until sleds are on the material and then pushes the material to the right cut position. Used to prevent problems with sliding material or inaccuracies due to material wood gone awry during pushing.

Clamp before back run
When checked, the wood is clamped before moving the pusher away for the back run. This can increase accuracy on some machines.

A.2 general parameters

With general parameters, the configuration of the machine can be entered. In general, these parameters are dependent on the implementation of the machine.

A.2.1 Tools

With these parameters the physical variables of the tools can be entered.

Saw Offset roll suspension
Offset of saw roll axis under saw table.

Saw Min. usage pos 90 deg.
Specifies the minimum position in machine coordinates at which the saw is able to cut with and 90 degrees angle without cutting in the pusher. When pusher is passed this position the pusher will be retracted before operating the tool. When cutting with an angle of 90 degrees the pusher can stay closer to the saw.

Saw Min. usage position
Specifies the minimum position in machine coordinates at which the saw is able to cut without cutting in the pusher. When pusher is passed this position the pusher will be retracted before operating the tool.

Saw Axis under table
The distance the saw motor axis stays under the saw table when it is lifted. For example this parameter should be 100 when saw radius is 350 and at maximum lift 250 is visible

above saw table. It is used in calculating the number of cuts needed and if a certain cut can be made.

Mill Min. usage position
Specifies the minimum position in machine coordinates at which the mill is able to cut without cutting in the pusher. When pusher is passed this position the pusher will be retracted before operating the tool.

Overlap
When making wide notches, the mill is used multiple times. To prevent little ridges between consecutive mill operations the mill operations are overlapped by this parameters.

Brake time
The time it takes before the mill is not rotating anymore. Used to determine if it is save to put in mill change position.

A.2.2 Length measuring

The parameters in this tab concern the length measuring system.

Max. class mark length
The maximum distance between the class marks. When the distance between the marks is larger, than these marks are being seen as error mark.

Minimal mark length
The minimum distance between the marks. When the distance between the marks is smaller than the minimum distance, the marks are being seen as one mark.

Maximum error mark length
The maximum length of the error mark. A measured length which is longer than the indicated length, is being seen as usable.

Maximum measure tolerance
The maximum tolerance which can occur in determining the measured length.

Pusher-Det distance
The distance between the pusher plate and the length measuring sensor. The parameter indicates the distance between the pusher and the wood detector on the positioning unit.

Det-det distance
The distance between the length measuring sensor and the chalk line reader.

The light beam radius of the length measuring sensor
The light beam radius of the length measuring sensor.

Measure start position
The position where the pusher starts scanning the supply length.

Clearance
Distance the pusher moves beyond the wood after length measuring.

A.2.3 Inlet

The parameters in this tab, concern the infeed table and possible inlet chains of the machine.

Inlet det. delay
The time, which is waited after detection of the supply length against infeed or against a stop before chains are stopped.

Wood on infeed delay
The time the infeed chains keep moving, before stopping after wood detection.

Pusher down delay
The time it takes to drop the pusher if it is liftable. Used when no down sensor is placed on the liftable pusher.

Pusher up time
The time it takes to lift the pusher if it down. Used when no up sensor is placed on the liftable pusher.

Pusher width
Width of the pusher, if beam width is bigger than this value, the sleds do not need to open for the pusher. See also *Clamps Pusher fits between claps* that also needs to be checked.

Min. Pusher Up Pos.
The minimum height at which the pusher can be lifted.

Inlet reverse time
Time the chains are run in reversed direction to separate

the beams.

Max. back run w. height
Maximum wood height that fits under liftable pusher during supplying. If wood is higher, the pusher first moves back before wood is supplied.

Last roll pos
The last pusher position where a beam can be rolled by the roll unit.

Roll on height >width
Roll the wood on this condition.

Stackingstops Down time
The time the beam stackingstops stay down when stackingstop down button is pressed. In this time the chains can transport the stacked beams passed the stops.

A.2.4 Outlet

The parameters in this tab concern the outfeed table of the machine.

Kicker delay
The product is pushed of the outlet after detecting the end of the product and after this time is elapsed.

Maximum waste length
When waste is scrapped this is the length of the waste parts. A remainder can of course be smaller.

Scrap threshold
Waste which is longer than the length indicated with this parameter, is not being cut in pieces if setting *Saw scrap* is checked. Normally used in combination with *Long waste to end*. If 0 then it is not used, then all longer waste is scrapped when *Saw scrap* is checked and longer then *Maximum waste length*.

Waste hatch dist.
Distance between saw and edge of waste hatch. Used when dropping waste through the hatch.

Outlet grip position
Head of part must be at this position before outfeed gets a grip on the part and can transport it. If *Tail to outlet grip position* is checked the tail must at this position.

Outlet run time
The time the outlet runs for a part.

Outlet empty time
The time the outlet must run before it is sure that everything is transported passed the kickers. Is used when only kicking remainder lengths.

Output collect length
All part on output are kicked together when the sum of part lengths on the outfeed exceeds this value and settings *Kick on outlet full* is checked. Not used when 0.

Minimum grip length
Beam length that must be in front of the saw to get a grip on the beam with the clamps. Used when outfeed is

used as buffer for next machine. Machine clamps the beam when it detects with sensors that the outfeed is completely filled and that it already has the beam partly on the outlet.

Kick on longer
Only kick part longer than this. Parts shorter that this should not be kicked off. They are taken off by hand.

Max. kick length
Parts longer then this will not be kicked, user is asked to remove them by hand. Used when machine has a short kicker.

Waste hatch pause time
The time the pusher waits to let the waste drop through the waste hatch.

Avoid small scrap waste
Small waste, say 5 mm can cause problems in the machine because it can drop in to the saw slit. When waste is scrapped in lengths of *Maximum waste length* then the remainder can become very small. When this option is checked, the last piece of waste is scrapped in 2 same sized pieces to prevent this from happening.

Start outlet on saw high
To increase the cutting speed the outlet rollers/belt can be starter when saw is in the high position. The clamping must be suitable for this to work.

Tail to outlet grip position
Move tail of parts to *Outlet grip position* before starting the outlet rollers/ belt when this option is checked.

A.2.5 Infeed arms

The parameters in this tab concern the infeed arms of the machine.

Width
With this parameter the width of the infeed arms can be entered.

Pusher length
The length of the pusher. For example used to calculate a save position for the pusher to lift the infeed chains.

Pusher space
Extra space needed in front of the pusher to open for example a gripper.

Positions
With these parameters the positions of the infeed arms can be indicated. Of each arm, the center position has to measured from the saw slot.

A.2.6 Printing/Terminal

The parameters in this tab relate to the printer and output screen (if delivered with the machine).

Printer
Here you can select the printer(s) that are used. This list contains Windows printers and directly controlled printers.

Printer position
For printer that can print directly on the beam a position

must be configured using this parameter.

Minimum print length
Parts smaller then this can not be printed on.

Printer Port
The serial port used for a directly controlled printer.

Printer settings ...
For a directly controlled printer shows the COM port settings which can be edited. For a Windows printer shows printer settings such as paper size.

Labels
Specifies the label definitions for different usages or different printers.

Column *printer* is only shown when using multiple printers.

Column *Usage* can contain the following values:

- *Part label* Definition is for a produced part.
- *Rest label* Definition is for a remainder.
- *Mark label* Definition is for printing of marks on a part.
- *Page label* Definition is for printing a label per completed page.
- *System* Definition is for printing a label on a system

depended moment.

Column *Label type* contains different hard coded label layouts and the flexible *RichText* type.

Label format ...
Only used for the *RichText* label type. It shows the format editor see section A.4.

Test print
Prints a label of the currently selected row with data from the first part in the current cutting list.

Preview...
Shows a preview of the label of the currently selected row with data from the first part in the current cutting list.

A.2.7 General

Machine Constant1
A roll axis suspension parameter.

Machine Constant2
A roll axis suspension parameter.

Offset Angle1
A roll axis suspension parameter.

Offset Angle2
A roll axis suspension parameter.

Min. Z distance to side

Distance the saw center must be kept from the front side of the beam. Otherwise the beam can not be clamped anymore.

Toolbox width z=0
Maximum width that can pass into the machine. With the Z-axis on 0.

Machine direction
The direction is from right to left when the check mark is on, when it is not on, then the working direction is from left to right.

Head/tail length is cut included
When checked the head and tail length includes the saw width. For example setting the tail waste to 1 mm will skim the tail of the beam and will produce only sawdust instead of producing a slice of waste with a thickness of 1mm.

Camera settings ...
Shows a settings dialog to select the used head camera, frame rate and the image format.

A.2.8 Directories

These parameters relate to the directories where lists are read from and where list are written to. File opening and saving is not restricted to these directories.

New cutting lists
With this parameter can be indicated in which directory

the new cutting lists are.

Work cutting lists
With this parameter can be indicated in which directory the cutting lists are placed which have to be saved by the operator.

Import lists
With this parameter can be indicated in which directory the import list are.

Log files
If production log file are generated they are placed in this directory.

Archivated lists
If option *Archive cutlist* is enabled, cutlist are moved to this directory after completion.

Copy from
With this parameter you can indicate which station character the removable disk has. For instance USB-Stick. Used in the *Copy cuttinglist...* menu item.

Copy from archive
Extra directory where a copy of the files copied with *Copy cuttinglist...* is placed for reference purposes.

File filter
The file-selection dialog includes a drop-down list of file types under the edit box. When the user picks a file type from the list, only files of the selected type are displayed in the dialog. This option lets you configure this list. The

format for this option is a description and a mask separated by a vertical bar/pipe (—) character followed by optional more descriptions mask pairs. A mask can contain more then 1 'regular expression' separated by dot comma (;).

Example:

Cuttinglists (*.csv *.lst)—*.csv;*.lst—All(*.*)—*.*

Show select dialog
If this function is on, the user will first get a directory selection dialog before the open or save cutlist dialog is shown.

Restore current directory
Normally the open or save cutlist dialog opens in the last used directory (when not using *Show select dialog*). This option forces the directory to be always one of the standard/default paths.

Archive cutlist
If this option is enabled, cutlist are moved to the *Archivated lists* directory after completion.

A.2.9 Clamps

This section contains option to with clamping the wood. There are different types of clamps, but they share much of the same options. Position and size parameters are very important. A wrong value can result in the saw or other tool cutting into the clamp, sled or back fence door.

R. door close ang.min

When Z is on 0 and rotation angle is lower then this value the right back fence door is opened while cutting because the saw otherwise cuts into the door. This values is also used to determine the angle for which the left door opens.

R. door close ang.max
When rotation angle is bigger then this value the right back fence door is opened while cutting because the saw otherwise cuts into the door. This values is also used to determine the angle for which the left door opens.

Sleds / rollers open time
Time it takes to open the clamps. Used in calculating at what moment the clamps must be opened to let the pusher pass.

Pusher fits between clamps
Sleds are not opened for the pusher when this option is checked.

Clamp close time
Time it takes to get a clamp on the beam.

Top clamp X Position
X position in machine coordinated of center of the top clamp.

Top clamp Y Position
Y position in machine coordinated of center of the top clamp.

Top clamp diameter
Diameter of top clamp.

Top clamp clamp without wood
When checked the top clamp comes down even when there is probably no wood to clamp under the clamp. Can be used to keep waste on its place.

Sled X Position
X position of side of the clamp. If pusher comes from left its the left side otherwise the right side. Used in collision prevention.

Sled Clamping begins
If the head of beam is passed this machine coordinate, the sled can come in and starts clamping / guiding the beam.

Sled Clamping ends
If the tail of the beam is passed this machine coordinate, the sled goes out and stops clamping / guiding the beam. Needed because putting a sled or roll at the tail edge of a beam could push it a little bit further.

Sled FrontZLimmit
There are sensors on the sled cylinders to detect if they are at a position that top clamps could land on them. If the Z saw axis position is larger then this value, then no top clamp can not land on the sled and the sensors can be ignored.

A.2.10 Interfaces

This tab shows settings for interfaces with other software and machines.

Import file type
There are several CAD programs that produce comma separated files with the .csv extension. So the file type can not be determined based on the file extension. This parameter tells the machine what filetype to expect. When using multiple file types there is an *Autodetect* that can distinguish a lot of file types based on file contents.

Profile overdimensioning
Used for *MTX2* and *MTX3* file format. Matrix puts raw beam dimension in the cuttinglist. For label printing for postprocessing net dimensions are sometimes needed. In this table for every profile type, the difference between raw and net dimensions can be specified. Not used often.

Convert measure type
When importing a cuttinglist, the parts are converted to an internal cuttinglist. Default the length of the part in this internal format is measured along the back fence and the table. Check this option to set the length to be measured from left point to right point.

Check cutlist produceable
When this option is checked, all parts are checked if they can be produced on this machine when the cutlist is opened. When a part is not produceable a warning is given. The part will have pink color in the cutting list, to indicate that there is a problem with it.

Force cutlist produceable
When this option is checked, that parts that can not be produced are modified in such away that they can be pro-

duced and can be manually adjusted afterwards.

Generate reports
When checked, generates cutting reports. Currently machine specific.

Enable legacy reports
When checked generate a line per cut item in a log file.

Planer link port
The serial port where the current width and height of wood is send to.

Planer link settings
Shows the COM port settings which can be edited.

Planer link enabled
When checked, the current width and height of wood is send to the COM port everytime the current width or height of the wood changes.

A.2.11 Test functions

Contains function not used in normal operation. Only for factory testing.

Test continues
Simulates that user presses OK on every dialog. This makes unattended duration testing possible.

Skip saw up
Skips the actual cutting, this makes testing of clamping

easier because you do not run the risk to cut into them.

A.2.12 Machine type

The MC software supports all machines base on the MC DSP controller. This tabsheet is used to tell the software which machine it must control and what type of options the machine has. Not all machine modes support all options. Some options require a license code. Most of these option describe themselves. Some need a little bit of explanation and are therefore listed below.

Machine mode
The machine mode can selected here. It gives a description of the machine and if it is a 'special' or a more general machine. It also contains the machine number of the first machine with this mode. Never change this without consulting H&M.

Double Angle
Lets you cut double angled cuttinglist.

Width measure
Obsolete.

Outlet filled sensors
Along full length of outlet sensors are placed in parallel. If all see material the outlet is considered full.

Can optimize
Enables the length optimizing feature.

BTL Import
Enables the BTL file format to be imported.

A.3 Axis parameters

Parameters per axis
Minimum position
With this parameter the minimum mechanical position of the system is set.

Maximum position
With this parameter the maximum mechanical position of the system is set.

Step size down
With this parameter you can determine the step size to a smaller position, when you press on the arrow key down.

Step size up
With this parameter you can determine the step size to a larger position, when you press on the arrow key up.

Number of decimals
With this parameter you can enter the number of decimals after the comma, by which the position is displayed.

Tol. Comp. Length
With this parameter you can indicate the required override distance for the tolerance compensation.

Calibration min.
With this parameter the minimum position by which the

input of the calibration sensor should be high, is entered. Set to 0 if no used.

Calibration max.
With this parameter the maximum position by which the input of the calibration sensors should be high, is entered. Set to 0 if no used.

Accuracy
The accuracy that the software expects from the drives to reach.

Position encoder
Number of drive increments per unit.

Speed
With this you can indicated the maximum speed of the axis.

Acceleration
The acceleration of the axis can be entered with this parameter.

Deceleration
With this parameter, the deceleration of the axis unit can be entered.

Low speed
The pusher axis has a low speed that is used to move slowly towards the supplied beam.

Unloaded speed
The pusher axis has an unloaded speed that is used to move fast when it is not a beam.

Unloaded acc. dec.
The pusher axis has an unloaded acceleration and deceleration that is used when it is not pushing a beam.

Drive settings
Drive specific settings, to fine tune the drive.

A.4 The format editor

The format editor is used to change the format used on labels, inkjet prints, outfeed monitor and the produced parts list on the main screen. The top part contains the format, the bottom part will show a preview and error messages.

All information from a part or its page can be displayed by typing in $<name of the part or page variable>. Predefined formats can be imported using file-import menuExample.rtf contains almost all $ variable names that can be used.

Formating can be done with tabs and changing the font, font size and color using the toolbar controls. Barcodes and QR codes on labels can be printed using the special fonts supplied by the printer driver. The fonts must often be defined in the printer setting in windows. These fonts can then be selected in the font dropdown box.

All text that is not prefixed with $ is printed as is. When using $<name> make sure that all characters of the name text have the same style, otherwise the name will not be recognized. If not sure, type the name again.

Some variables are arrays of objects that can be indexed. For example $Parts[2] returns the second part of the current page. Fields of th

String variables which contain data in '/' separated form like /text1/text3/text3/ can be treated as array and be indexed. For example when $PostProcessing containing 'text1/text2/text3/', $PostProcessing[2] returns 'text3'.

Functions can also be used in the format text. A function has the $<name>(<arguments>) form. In the function arguments other expression can be used, the $ is then not needed anymore for variabels and functions.

Example:

$DrawText(10 , 100 , MidStr(postprocessing, 2 , 5))

There function to manipulate strings, do calculations and drawing. Drawing coordinates are in millimeter on a printer and in pixels on the screen. The origin is in both cases bottom left.

Supported functions are:

MidStr(<string> , <start> , <count>)
Returns <count> characters starting at <start> where first character has index 1.

Example:

$MidStr("test123",4,2)

Results:

t1

Set(<var name quoted> , <value>)
Make a new variable with name <var name(double quoted)> and value <value>.

Example:

$Set("A","test123")

$A

Result:

test123

ScriptOnly()
Add at start of format to only use functions to draw on the output. Makes it possible to add comments instead of static text in the format description.

DrawImage(<x> , <y> , <imagefilename> , [<bottomx> , <righty>])
Draws a bitmap image at a position or stretched inside a rectangle.

DrawText(<x> , <y> , <text> [, "C"])
Draws text at a position. "C" is option to center the text.

MoveTo(<x> , <y>)
Move the pen to a position without drawing.

LineTo(<x> , <y>)
Draw a line from last point to next point.

SetPenWidth(<Width>)
Set the width of the pen.

SetFontName(<FontName>)
Set the current font name.

SetFontSize(<FontSize>])
Sets the current fontsize. On a printer this is in millimeter's, on screen it is in 'points'.

Translate(<x> , <y>)
Translates the origin to a new position. Can be usefully if the layout is OK but the position of the total layout is off by a fraction. You then translate the origin a bit at the beginning of your format definition.

Scale(<scale> [, <yscale>])
Scale the x an y axis. Can be used to shrink the design a bit.

Example:

$Scale(0.9)

Result:

Everything is 10% closer together.

SaveTransform( )
Saves the state before any transformations, like *Scale()* and

Translate are done.

RestoreTransform( )
Restores the state as before the last call to *SaveTransform()*.

Sum(<value> [, value [, value2...]])
Sums values.

Example:

$Sum(-100,1000,5.1)

Result:

905.1

Subtract(<value> [, value [, value2...]])
Subtracts values from first value.

Example:

$Subtract(100,1000,50)

Result:

-950

Some format examples.

Groeneveld example:

Profile: $ProfileType

Daylength: $DayLength
MachFileNr: $MachFileNr
MachFileLineNr: $MachFileLineNr
Barcode: $Barcode
Colour: $Color
ProjectNr: $ProjectNr
ProjectDescr.: $ProjectDescr
Opt1: $Opt1
Opt2: $Opt2
Opt3: $Opt3
Date: $date
Time: $time

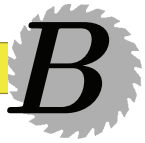
Matrix example

Length: $Length
Width: $Width
Height: $Height
Orderno: $OrderNoVal
Sequence: $SeqNrVal
Code: $Code
Profile: $Profile
Type of wood: $WoodType
Date: $date
Time: $time

The example below could possibly be on a rest label:

Restlength: $Length

Technical specifications controller



B.1 Hardware DSP board

Common

Recommended environment temperature	15 - 25 °C
Relative humidity (no condensation)	10 - 90 %
Mains power DSP board	230 V AC 50Hz

Digital outputs general

Number of outputs	24
Output voltage	24 V DC
Output current	100 mA

Digital inputs general

Number of inputs	48
Type	Active high
Open voltage	24 V DC

B.2 Software

Positioning	absolute/relative
cutting modes	Cut to length with Cut to length lists Angle cutting

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