Nesting Optimiser – Datasheet NE

A powerful tool for nested based manufacturing

Where parts are cut (and machined) at a Machining centre Nesting based optimisation is required. This handles both rectangular and shaped parts.

Nesting typically deals with bespoke or 'one off' jobs and small run quantities.

Data can be transferred to Homag Weeke WoodWOP or 2D DXF.

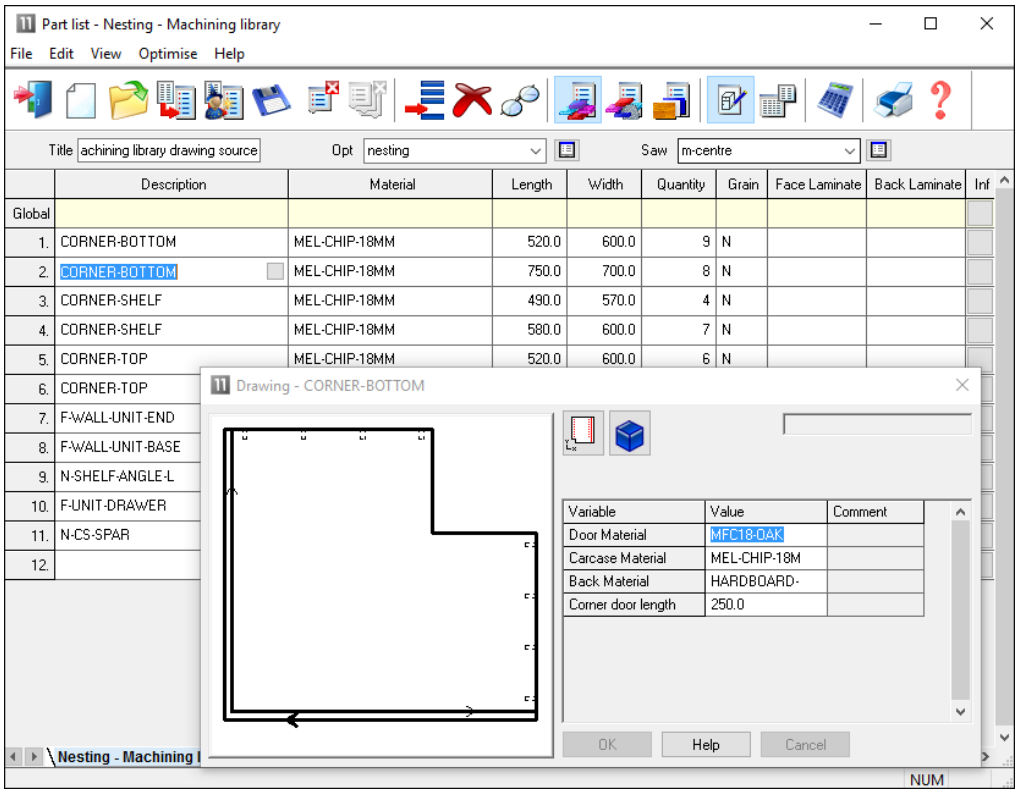
- **Enter part sizes**
- **Optimise**
- **Send cutting data to machining centre**

Part sizes

The starting point of optimisation is a list of part sizes and/or drawings. This can be produced in a variety of ways

- Use external part files (MPR(X))
- Enter rectangular parts in the Part list grid
- Use parts from the Machining library

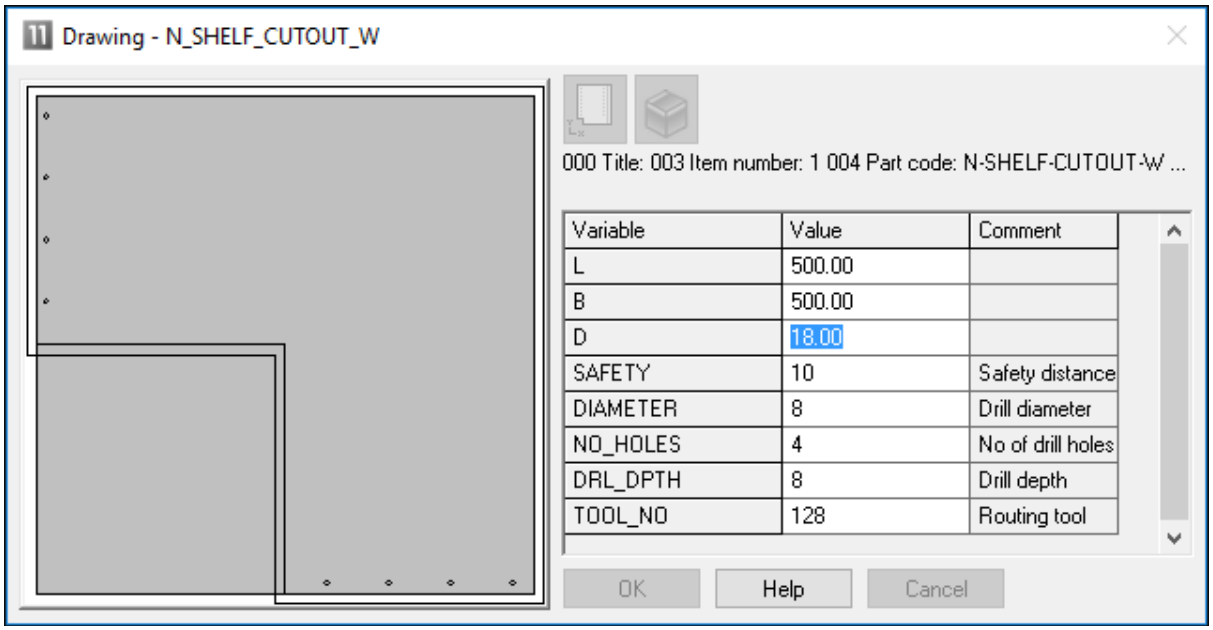
The result is a list of part sizes with attached drawings (where required).



Nesting - part list entry

In this example the drawings for parts are stored in the machining library.

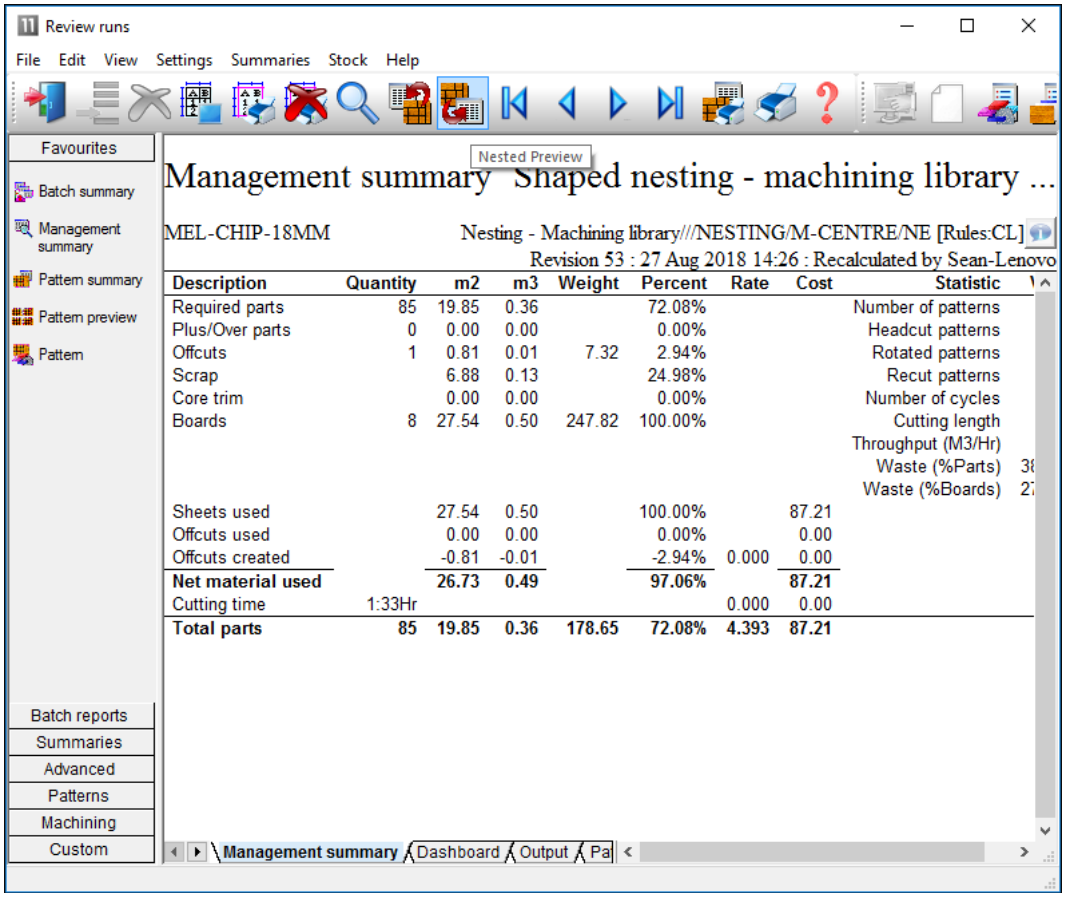
Where MPR based parts are used these can be used in a part list and the MPR drawing and details viewed on screen



The drawings are created in Homag Weeke WoodWop and the Nesting optimiser is fully integrated with WoodWop.

Nested Optimising

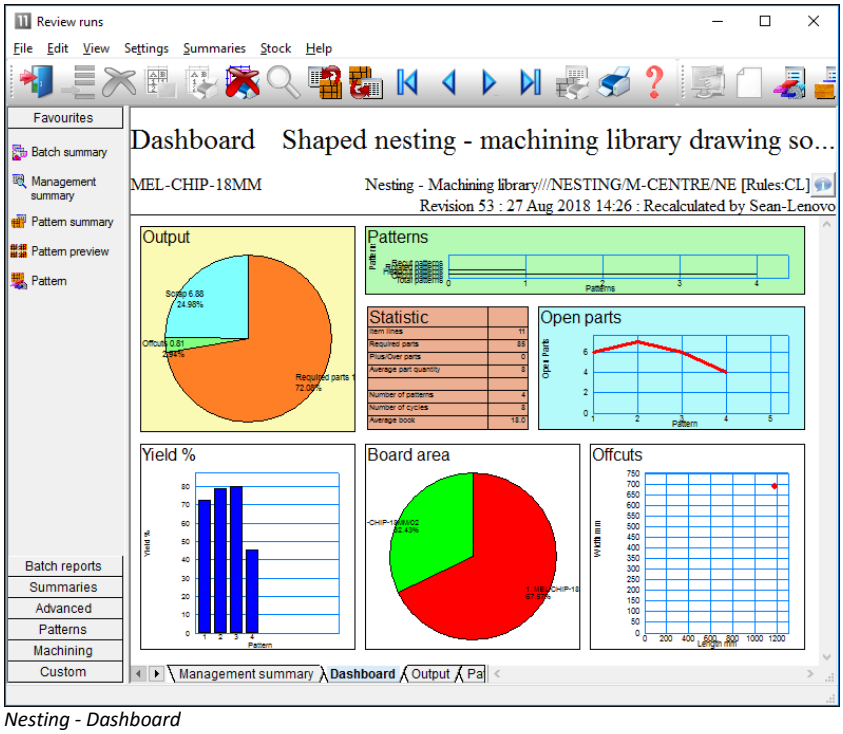
Part sizes are optimised to produce a set of patterns for machining. Part lists can be optimised singluarly or in a batch. The first summary shown for each job is an overview of cutting and costs.



Nesting - Management summary

The summary shows the overall yield, costs and other details.

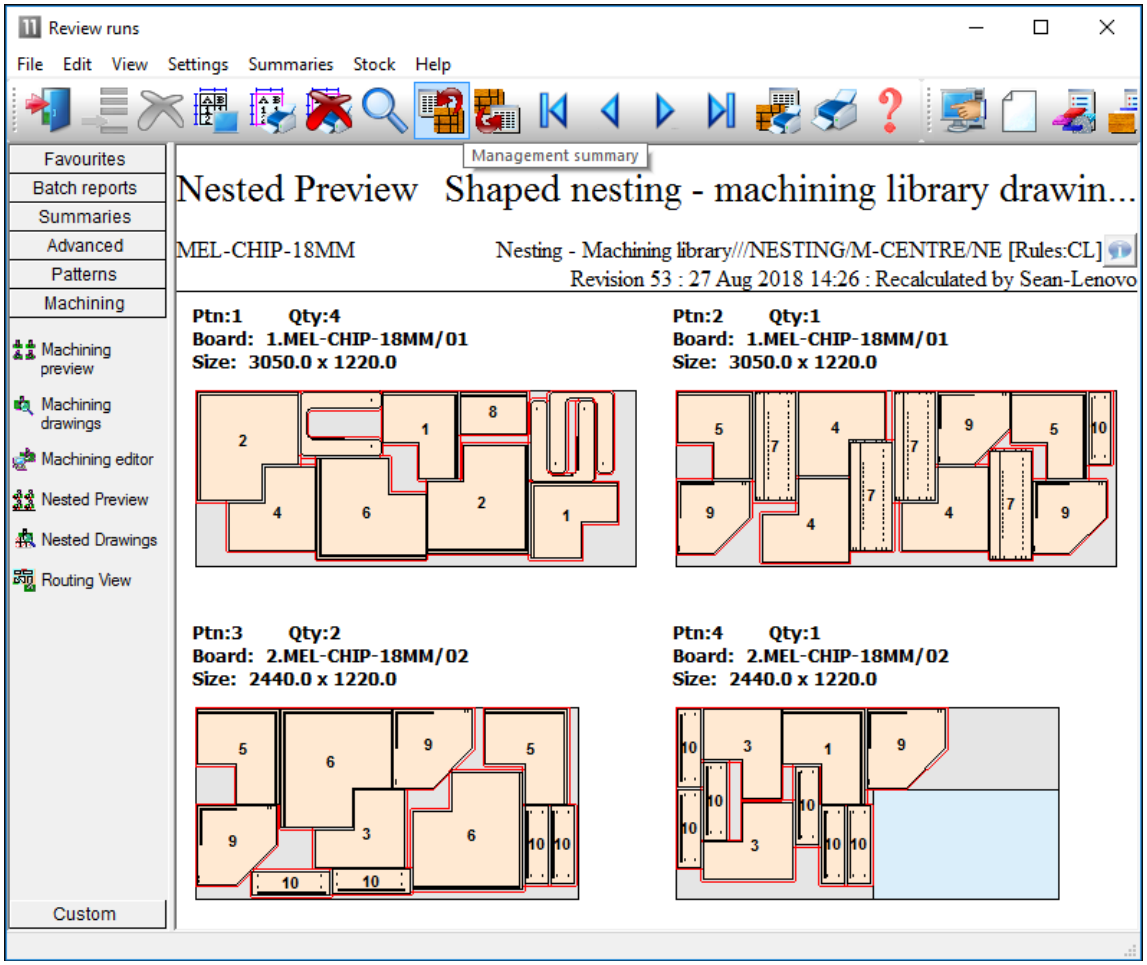
The management summary includes a Dashboard option which displays charts and snapshots of the data.



Nesting - Dashboard

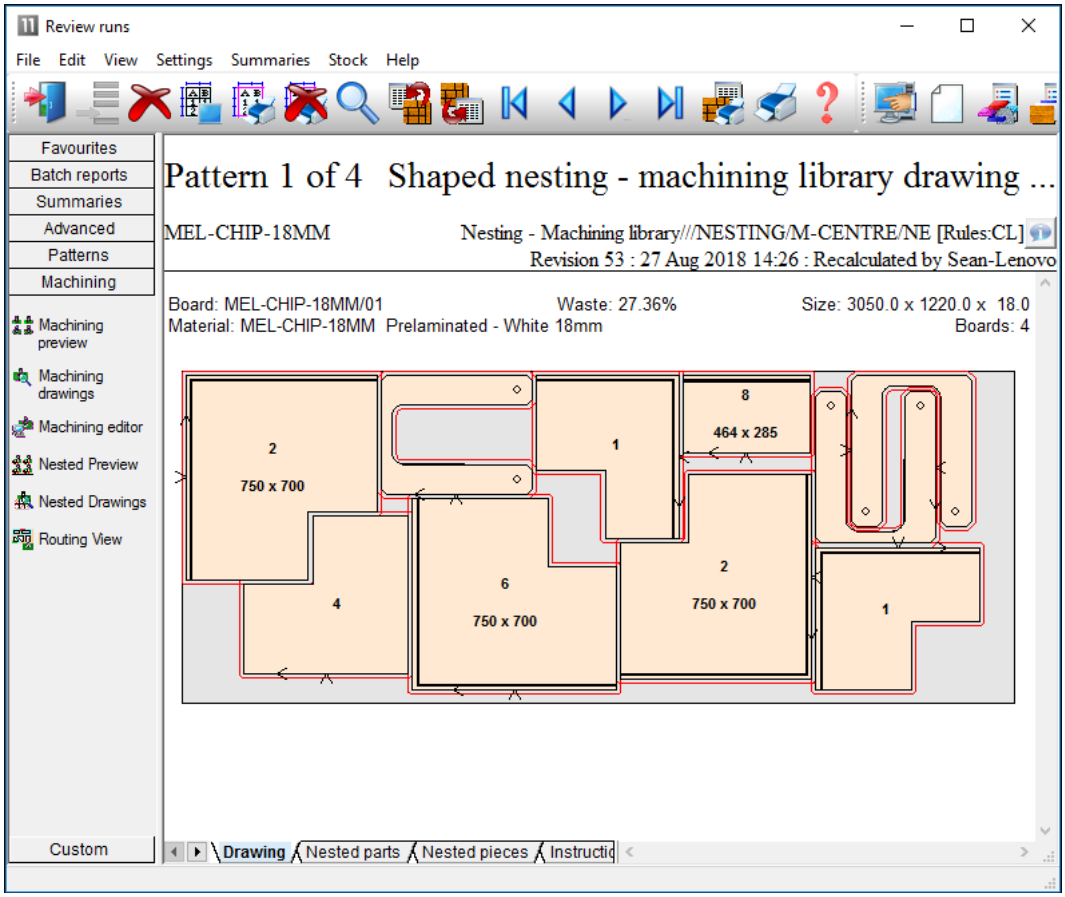
The Dashboard can include charts from other summaries – so the critical data can be set up and viewed at a glance.

The cutting patterns are shown in a thumbnail view.



Nesting - pattern preview

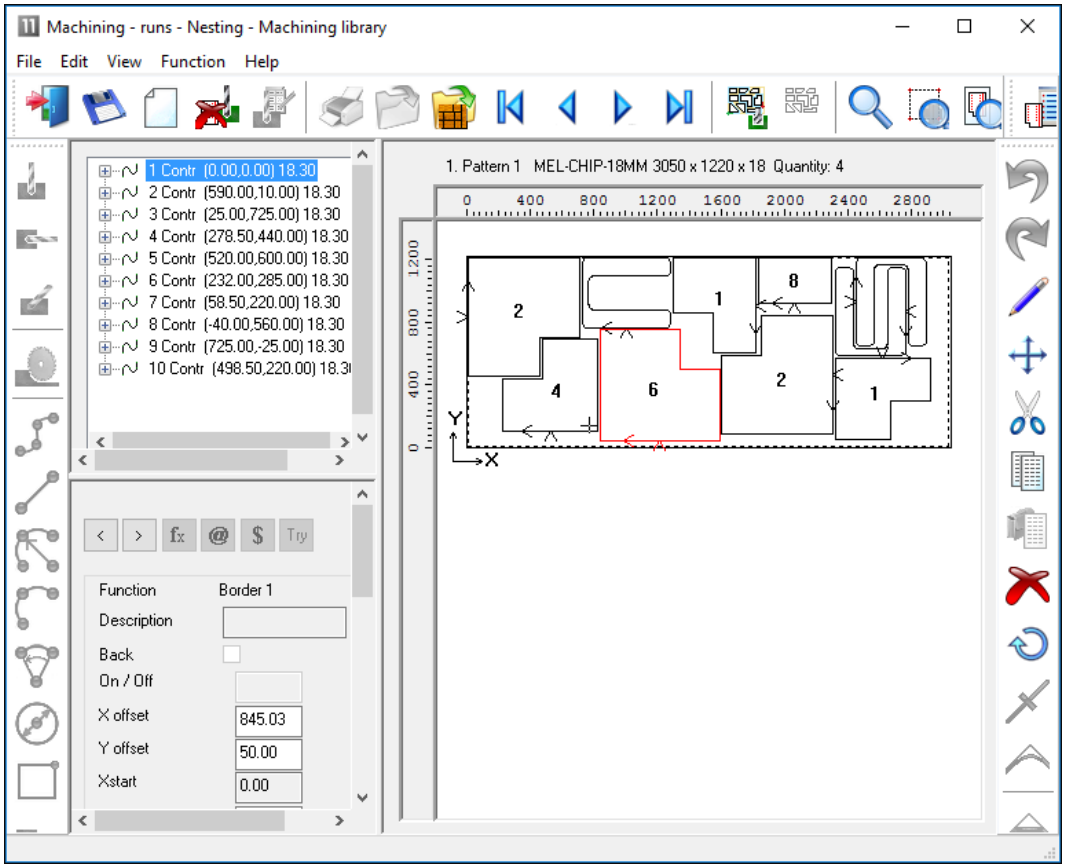
Click on a thumbnail to see the pattern in full screen view.



Nesting - pattern

Further information about the cutting pattern is on the tabs at the foot of the drawing.

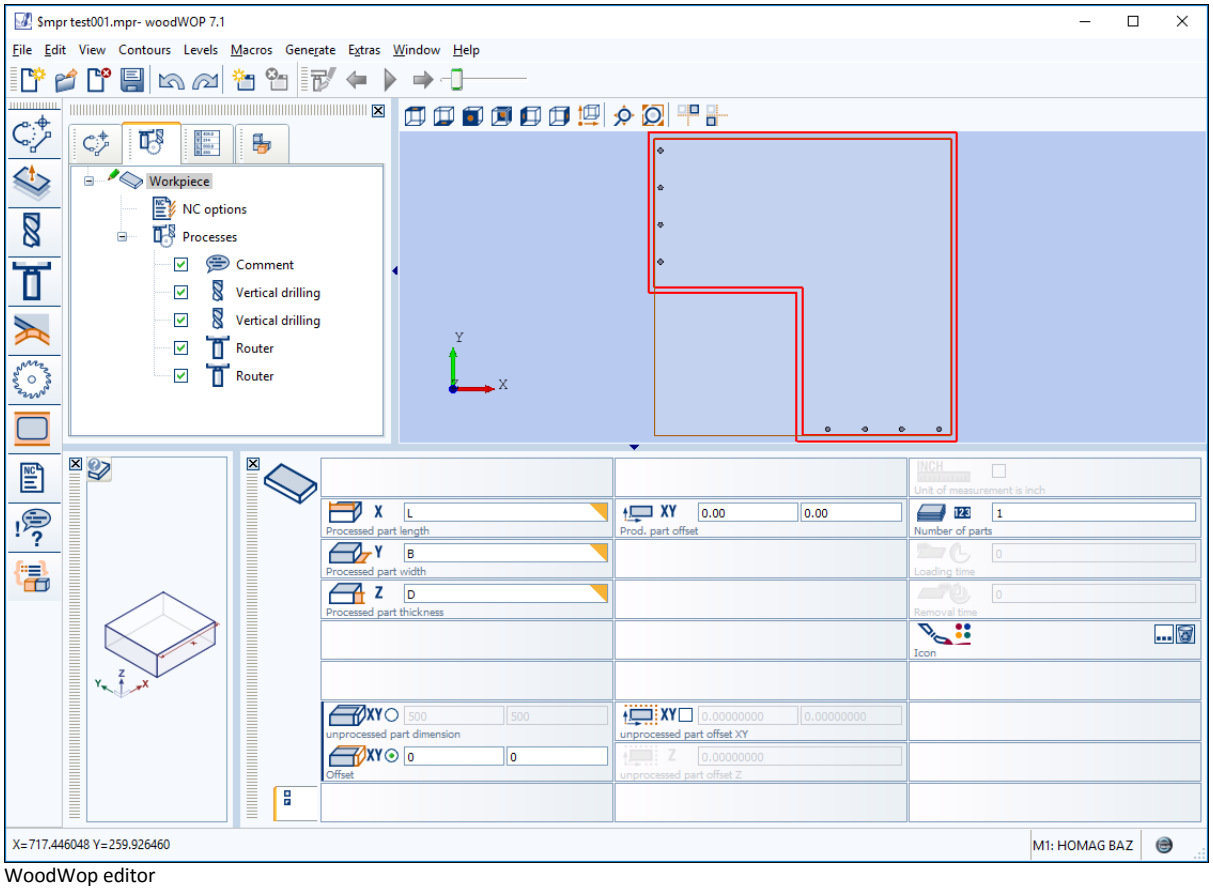
Use the machining editor to check the details and make any last minute changes to the cutting plan.



Nesting - edit pattern

Parts can be moved or deleted and minor changes can be made to the borders. The machining instructions for each part (drilling, routing …) can also be viewed at each part drawing.

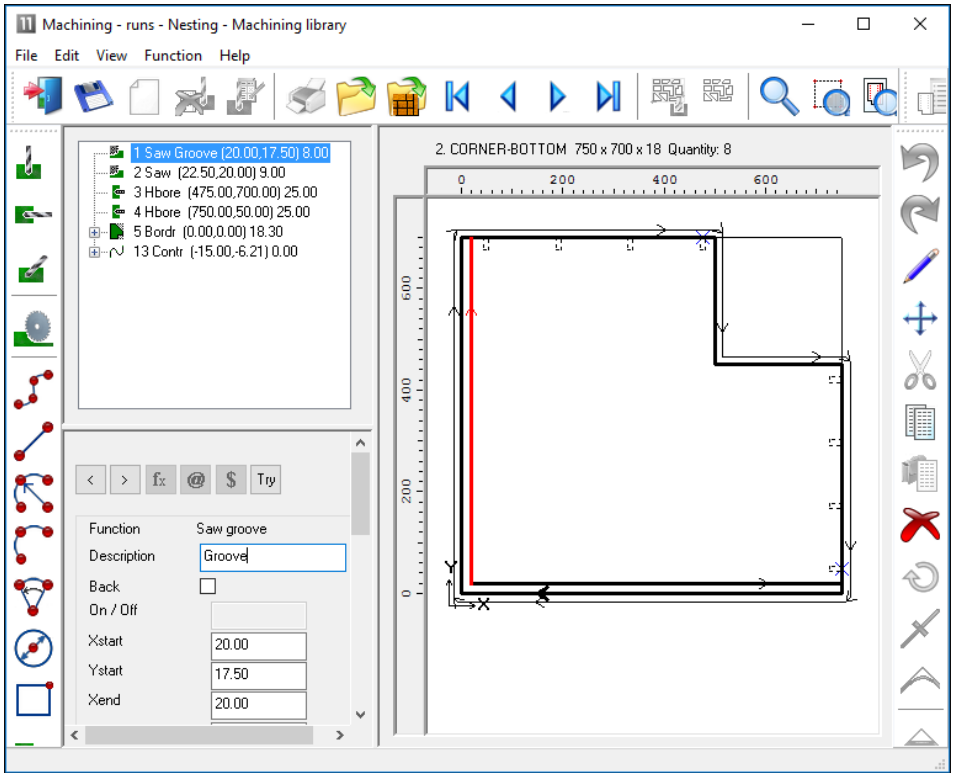
Where the NE module is used with Homag/Weeke WoodWop the program automatically moves to the WoodWop editor when editing individual MPR(X) parts.



WoodWop editor

Each MPR(X) part is stored in a single file.

The Machining library editor can also be used for part drawings.

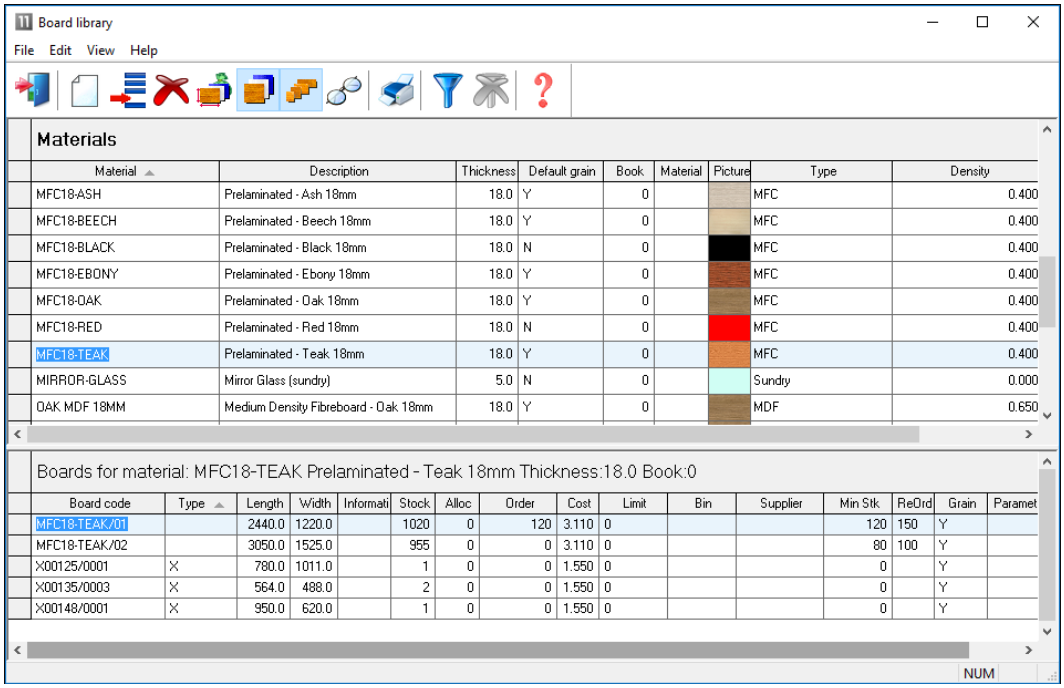


Shaped nesting edit

The editors should only be used for minor or last minute changes, if there are substantial changes then it is better to re-optimise the job as the balance of waste and cost may have changed significantly.

Materials

All materials are stored in the Board library. This is a database of all sheet material and includes quantities and costs. The Board library stores a record for each material and a record for each board size (including any offcuts) for each material type.



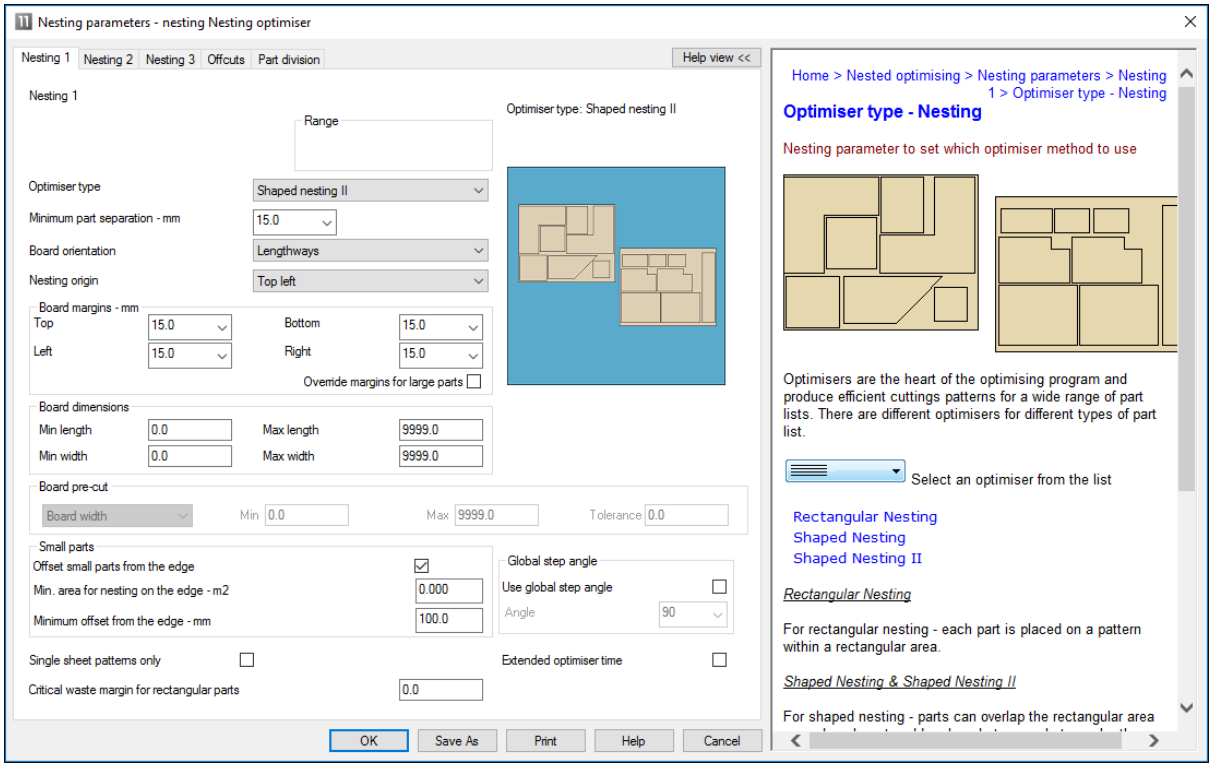
Nesting - Board library

In this example the material MFC18-TEAK has two available board sizes 3050.0 x 1525.0 and 2440.0 x 1220.0 and several offcuts.

The Material column in the Part list associates each part with the correct material to use and the optimiser selects the optimum board sizes to use for each job.

The power of Nesting optimising

Cutting parts on a machining centre requires control of the pattern layout. The nesting parameter gives full control of the cutting process.



Nesting parameters

The parameters cover a wide range of options and choices to match each machining situation.

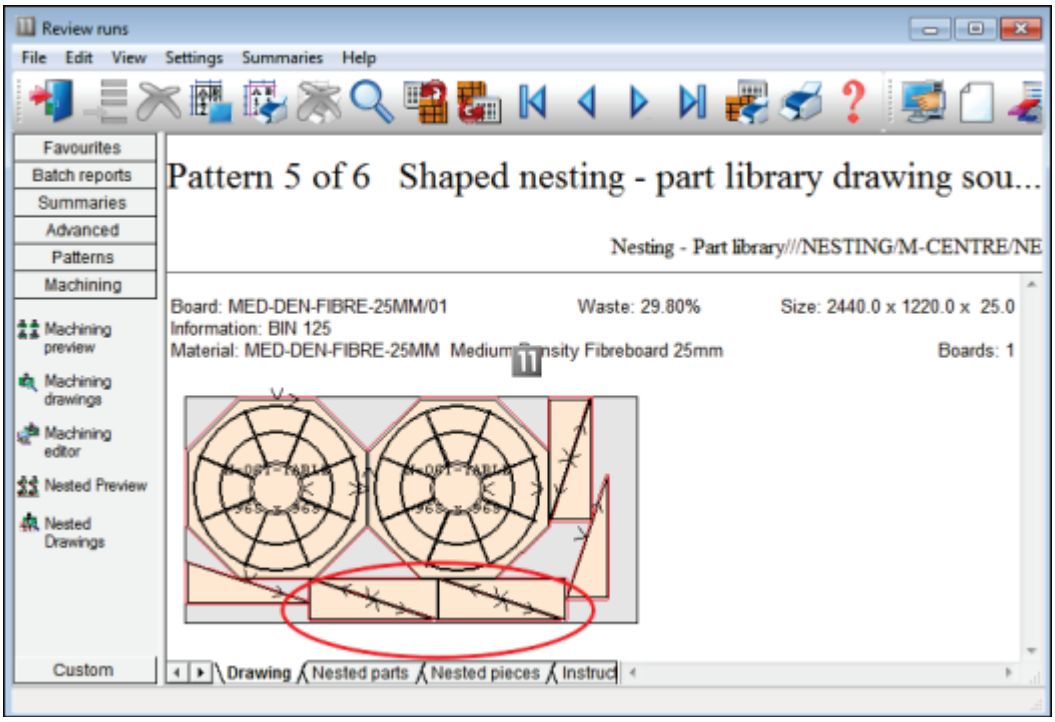
The nesting parameters deal with features such as:

- Board margins.
- Safety margins.
- Part separation.
- Placement of offcuts.
- Placement of waste.
- Rules for placing small parts near the board edge.

The nesting optimiser includes options for: Shaped parts, Rectangular parts only, calculation of the best position for pre-cutting jumbo boards, Piece by Piece routing, Staydown routing and Common edge routing.

Grain Matching

Nesting optimising ofter involves the visible parts of a product so grain matching can be important. Grain matched parts can be set as a template in the machining editor.



The template is used by the optimiser to ensure parts stay together and are cut together from adjacent areas of the board.

Summary of Nesting optimiser

	Nesting Optimiser
Part list no. of lines (part sizes)	20,000
Total pieces	99,999
Maximum jobs in batch	250
Transfer to Homag/Weeke WoodWop	•
Transfer to 2D DXF	•
Stay down routing	•
Common edge routing	•
Piece by Piece routing	•
Full integration with Homag/Weeke WoodWop	•
Drawing database	•
External MPR(X) / DXF files	•
Batch operation	•
Shaped Parts	•
Optimise pre-cut	•
Grain matching	•
Full control of cutting	•
File Management	•
System maintenance	•
Drawing editor	•
Reports and summaries (configurable)	•
Custom reports	•
Customised part list	•
Board library	•
Form and Label design	•
Integrated local help	•
Links to website	•
Machining drawing editor – parts	WoodWop
	Machining editor
Machining drawing editor – patterns	Machining editor

The following features come as standard with the Nesting Optimiser

Machining interface

For fast set up of CNC machinery

Where parts contain additional machining such as grooves, routs, drilling and cut-outs the Machining interface module is used to create and store the part drawings (via the Machining library) and also send the correct machining instructions for each part to the CNC machining centres.

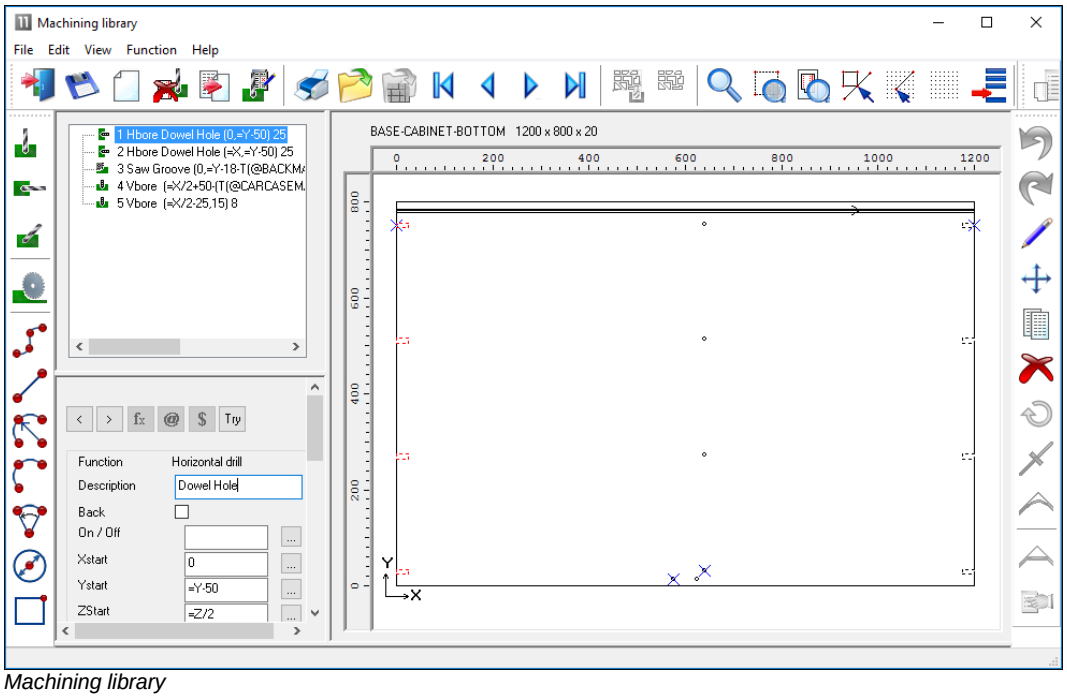
Most machining centre formats are supported including DXF, Homag/Weeke WoodWop, and other proprietary formats.

The MI module requires one of the Optimiser modules SO, PO or the Nesting optimiser (NE) fro shaped parts.

The machining editor provides full facilities for creating machining drawings. A wide variety of machining functions are provided:-

```
Saw groove
Horizontal drilling
Vertical drillings
Cut-outs
Arc router
Circle router
Pockets
Contours
Vacuum pods
...
```

The machining library contains the part drawing and instructions.



Machining library

The panes at the left show the details of each instruction and the full part is shown in the diagram at the right.

Drawings can be set up with formulae so they are fully parametric and automatically adjust if the part size changes. Common machining patterns can be dealt with by one drawing assigned to many different parts.

The above example shows a set of drilling and routing instructions for a part.

Machining Instructions **-** At the left of the screen is the FUNCTION toolbar to select the type of machining operation (such as drilling or routing).

Enter the details of each operation in the boxes to the right of the toolbar. The part drawing illustrating the machining is shown in the area to the far right of the screen. The drawing is built up as you enter machining operations.

For example, for a vertical drill operation enter the co-ordinates of the first hole - depth and diameter of the hole and the number, separation and direction of the repeated holes.

You can also enter the tool number and other machine specific details.

To move directly to a machine operation (for example to edit the details) click on the relevant part of the drawing. The current instruction is highlighted.

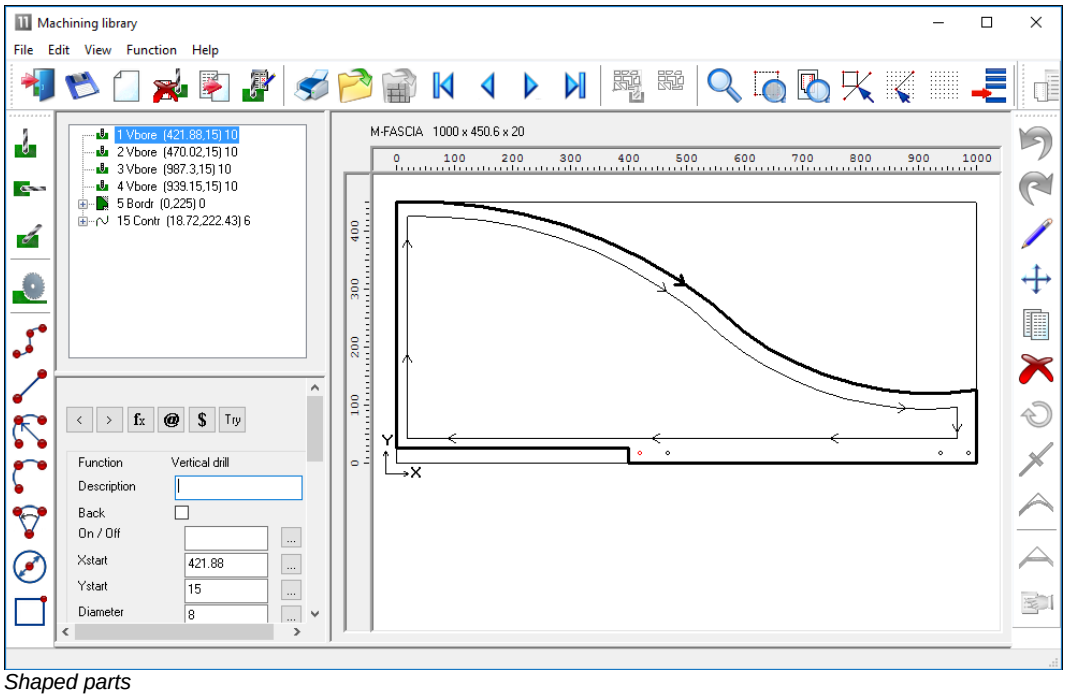
You can also use the mouse to enter instructions, for example, to specify the start and end of a groove.

External drawings – where the drawings are external files such as DXF or Homag/Weeke MPR(X) the Machining editor can still be used to view and adjust drawings and the drawing information is sent to a machining centre via the Machining Interface.

DXF drawings suitably layered can also be imported to the Machining library.

Shaped parts

The drawing editor allows for contours to define shaped parts.



Shaped parts

Each machining instruction can include extra tooling information to allow for tool speeds, tool path compensation etc.

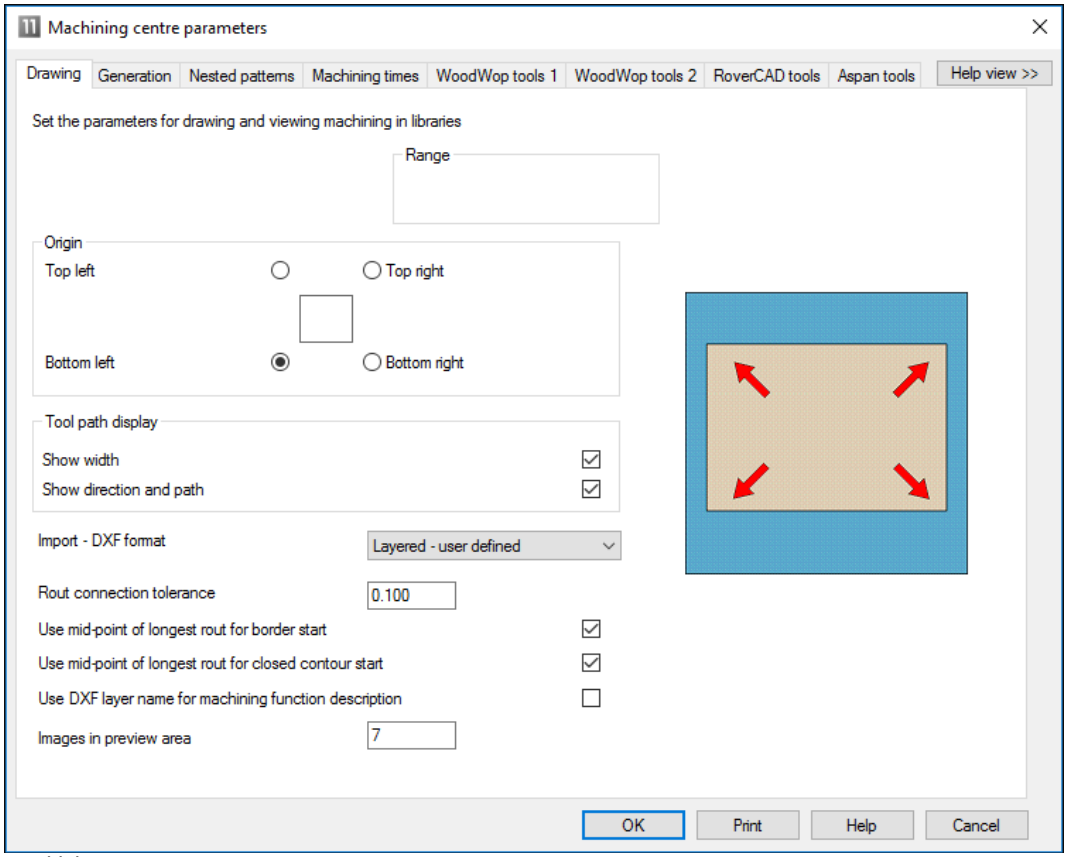
Use the mouse to quickly draw the function and use the boxes at the left to add the detailed measurements where required.

Machining parameters

The transfer of machining data to CNC machines is set up via the following parameters:-

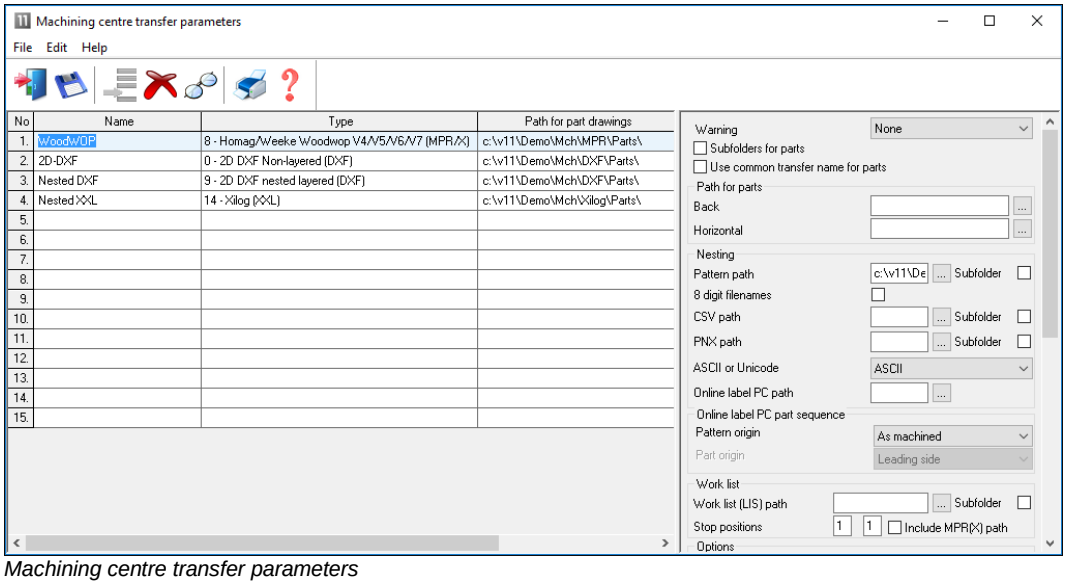
```
Machining centre parameters
Machining centre transfer parameters
```

The machining centre parameters set up the general features for the machining drawings/instructions such as the Drawing origin, and specific features for proprietary machines such as the ‘Park mode’ for Homag/Weeke WoodWop.



Machining centre parameters

The Machining centre transfer parameters control the transfer of data to the machining centre. File format, where files are located and whether there are separate files for Front and Back instructions.



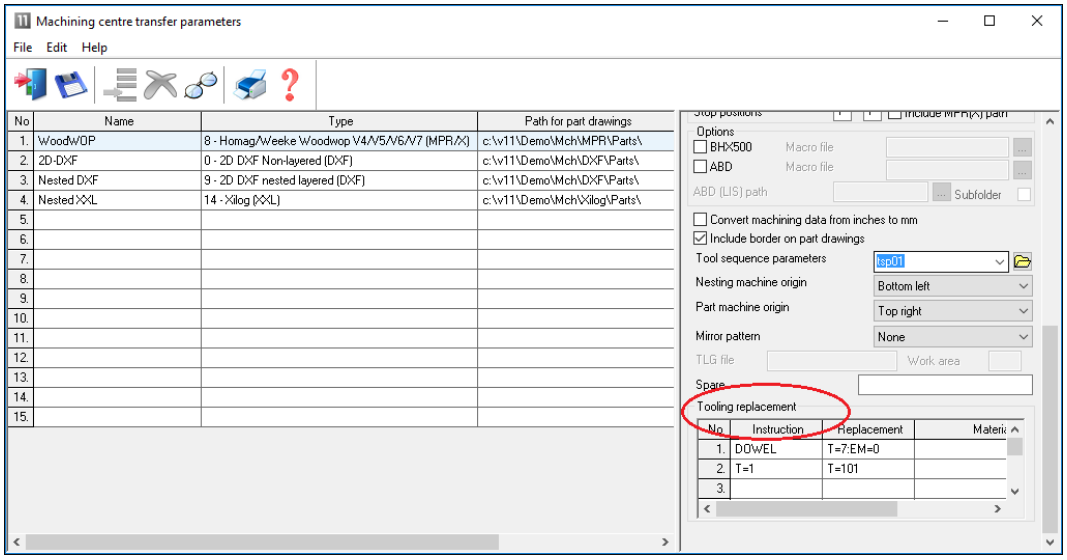
Machining centre transfer parameters

A wide range of transfer formats are supported:-

```
Homag/Weeke WoodWop V4/V5/V6/V7 (MPR(X))
Homag Weeke WoodWop V2.5 (MPR)
2D DXF non layered
2D DXF layered
D DXF layered
```

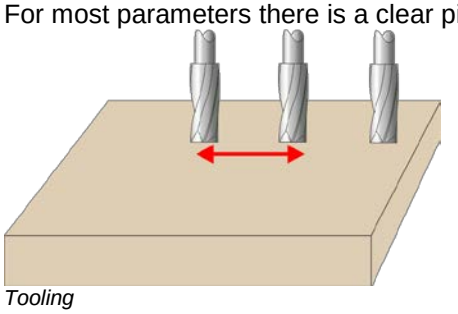
```
Biesse RoverCad (CID)
Morbidelli Aspan V3.2 (ASC)
Morbidelli Aspan V4.0 (ASC)
Busellato Autolink (DXF)
ASCII/Unicode PTX
MDB  PTX
```

The machining centre transfer parameters also include a 'Tooling replacement table', so that tooling instructions can be translated to a specific format for a machine. This allows for a single set of drawings which can then be interpreted for different CNC machines.



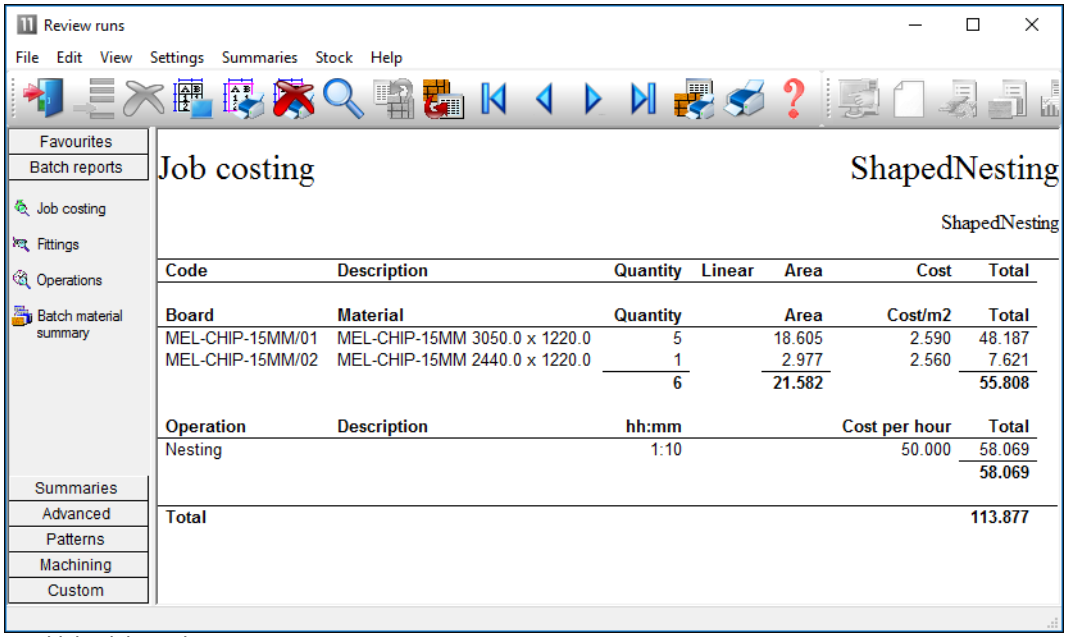
Machining centre transfer parameters Tooling

For most parameters there is a clear picture of the setting involved and examples of the set up.


Tooling

Machining summary and costs

The summary reports in Review runs, for examplee, Job costing, include the details for machining where these are relevant.

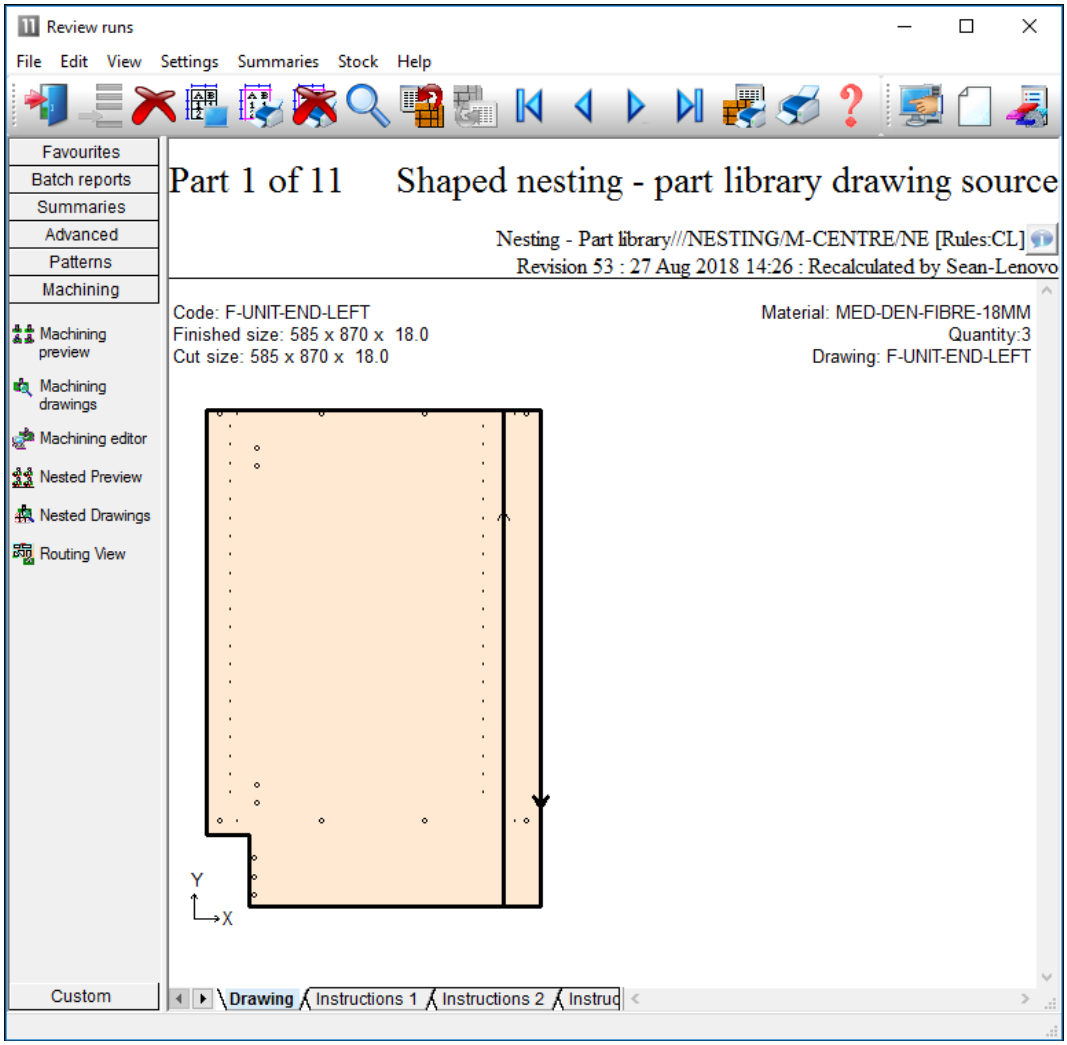


Machining job costing report

There are several specific reports and optiosn for Machining under the ‘Machining’ tab.

Machining drawing

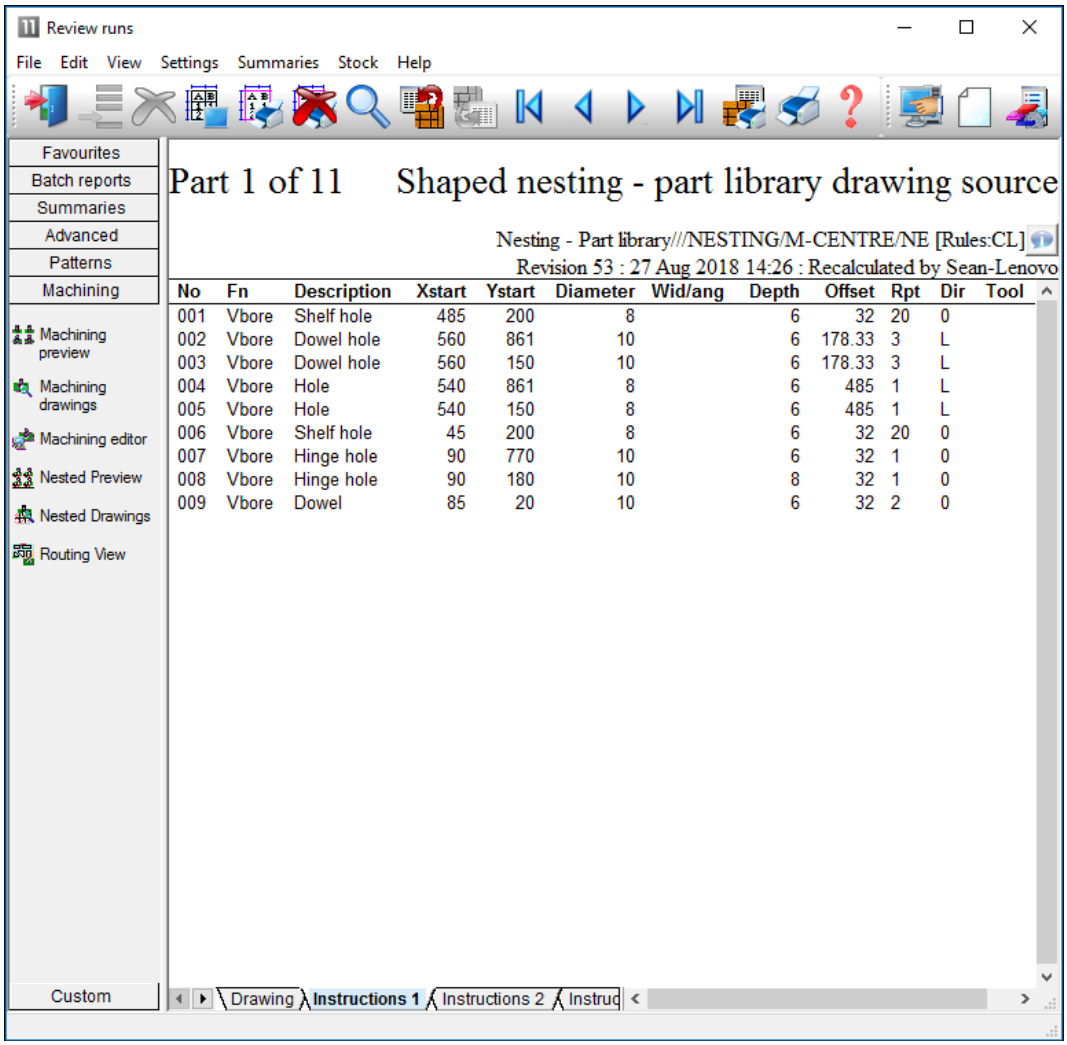
The machining drawing shows each drawing fully resolved.



The drawing shown has been resolved to absolute values fready for transfer.

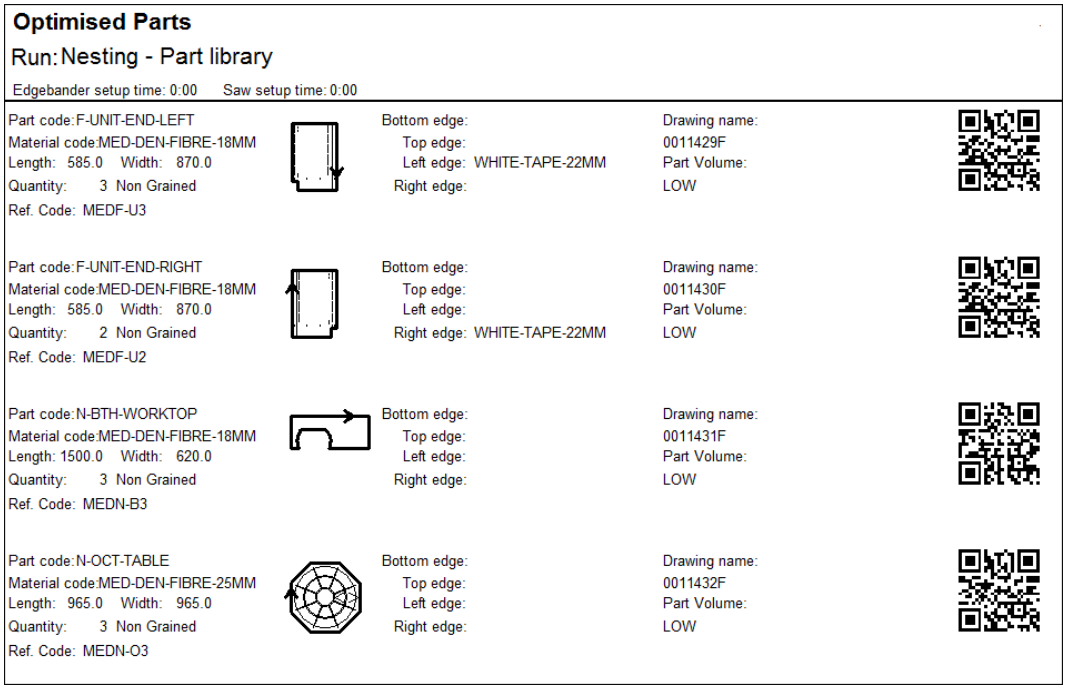
Machining Instructions

At the foot of each machining drawing are a set of tabs showing the full machining instructions.



At Review runs the instructions are resolved to absolute values.

With the parts and labels feature route cards or labels for each machined parts can be printed at the office.



Optimised Parts

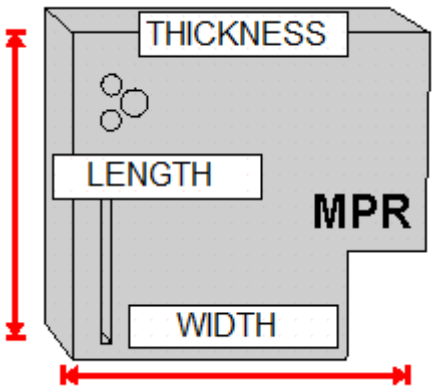
Run: Nesting - Part library

Edgebander setup time: 0:00 Saw setup time: 0:00

Part code: F-UNIT-END-LEFT Material code: MED-DEN-FIBRE-18MM Length: 585.0 Width: 870.0 Quantity: 3 Non Grained Ref. Code: MEDF-U3		Bottom edge: Top edge: Left edge: WHITE-TAPE-22MM Right edge:	Drawing name: 0011429F Part Volume: LOW
Part code: F-UNIT-END-RIGHT Material code: MED-DEN-FIBRE-18MM Length: 585.0 Width: 870.0 Quantity: 2 Non Grained Ref. Code: MEDF-U2		Bottom edge: Top edge: Left edge: Right edge: WHITE-TAPE-22MM	Drawing name: 0011430F Part Volume: LOW
Part code: N-BTH-WORKTOP Material code: MED-DEN-FIBRE-18MM Length: 1500.0 Width: 620.0 Quantity: 3 Non Grained Ref. Code: MEDN-B3		Bottom edge: Top edge: Left edge: Right edge:	Drawing name: 0011431F Part Volume: LOW
Part code: N-OCT-TABLE Material code: MED-DEN-FIBRE-25MM Length: 965.0 Width: 965.0 Quantity: 3 Non Grained Ref. Code: MEDN-O3		Bottom edge: Top edge: Left edge: Right edge:	Drawing name: 0011432F Part Volume: LOW

With the pattern editor last minute adjustments can be made to any drawing before sending the data to the CNC machining centre.

External drawings - The drawing editor and transfer of data to a CNC machine can be integrated with the use of external drawing files such as DXF and MPR(X).



In this case the stand-alone drawings can be used with parts so items do not have to be duplicated in the machining library or drawn twice.

Summary of Machining Interface

	MI
Machining Drawings	99999
Machining functions (drill, route, …)	•
Support for proprietary formats	•
Support for DXF	•
Transfer to Machining centre	•
Shaped drawings	•
Labels for drawings	•

Parametric drawings	•

Parts Library

For better management and tracking of parts

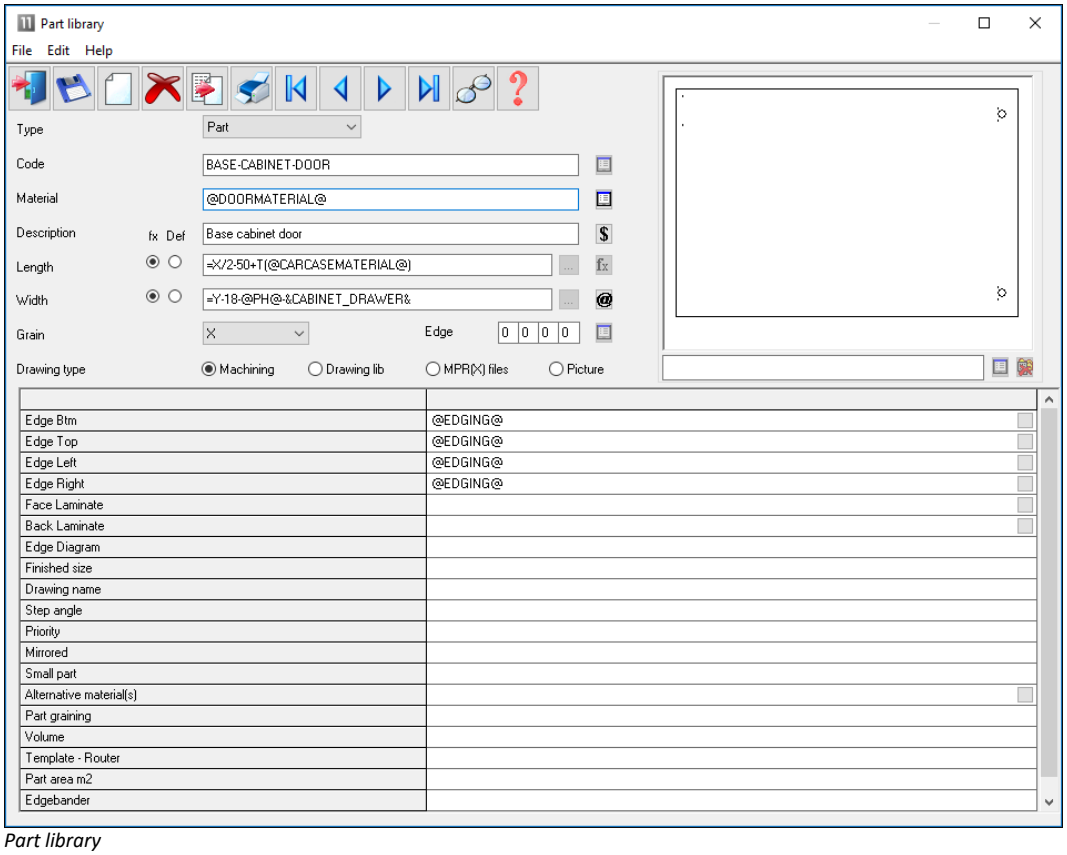
The Parts Library feature provides a database for parts and used with the form and label designer provides extensive facilities for managing extra data for parts.

It is especially useful where the same parts are used again and again in different cutting lists or where extra information is needed for each part for later processing, admin, or bar codes,

Parts can be added to any cutting list with minimum data entry - this saves times and avoids costly mistakes.

Part library

The data entry screen provides an easy way to enter part details.

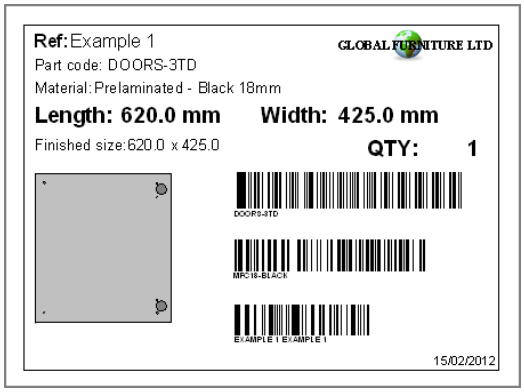


Part library

The part details include the standard items such as material code, length and width but any amount of user defined information can be stored with each part using extra fields (information boxes). This extra data can also be included on labels and reports to help with later processing of the part.

The part library can also include a picture of the part from the Machining library or a graphics file such as BMP, JPG or MPR(X).

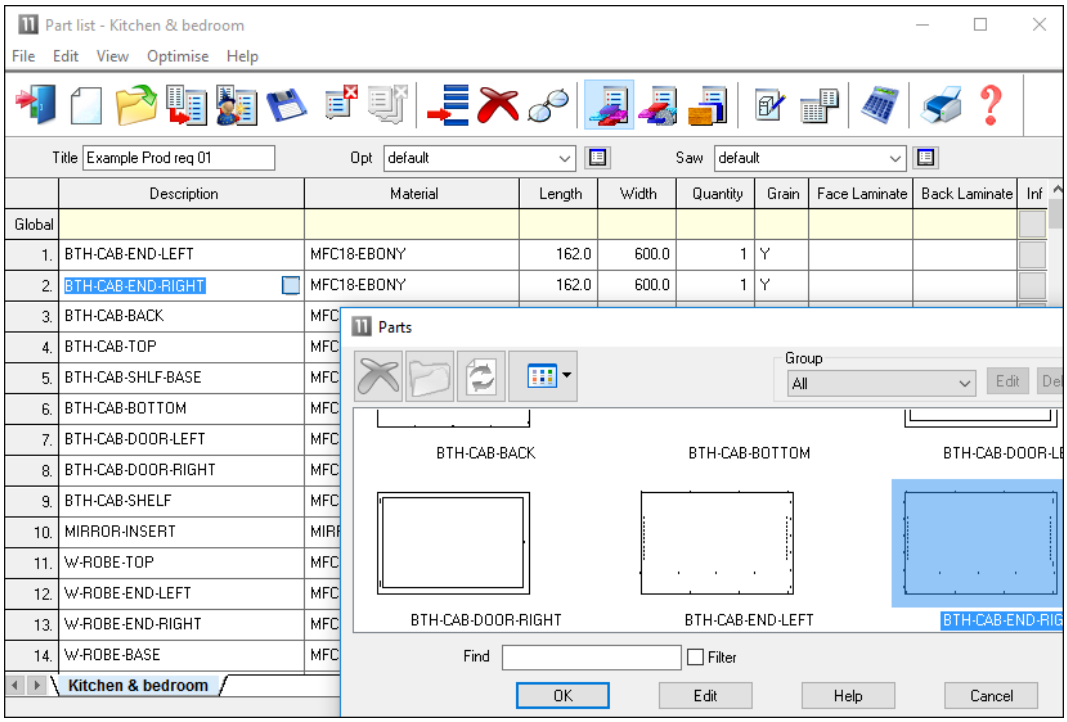
For some parts it is often useful to include a picture of the part on a label to help identify the part quickly.



Part label

At any cutting list the items in the library can be accessed by a single click and the part can be added to the list.

Typically only one or two items of information need to be adjusted such as the quantity required or possibly the material to use.



Cutting list - part library

Form & Label designer

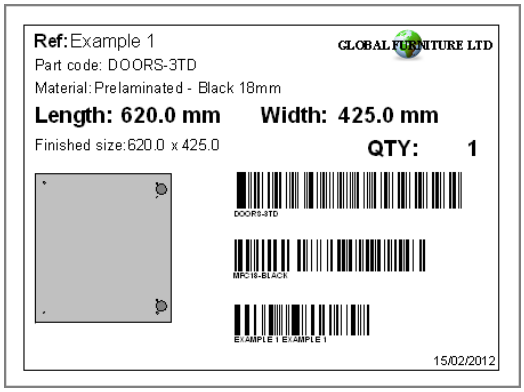
The program includes a designer screen so that almost any style of label (typically a small adhesive label) or a full form (a one page report or a route card) can be set up.

These are labels or forms for printing in the office

The data on the form or label can be chosen from any of the data set up for each part in the Part database. For example:-

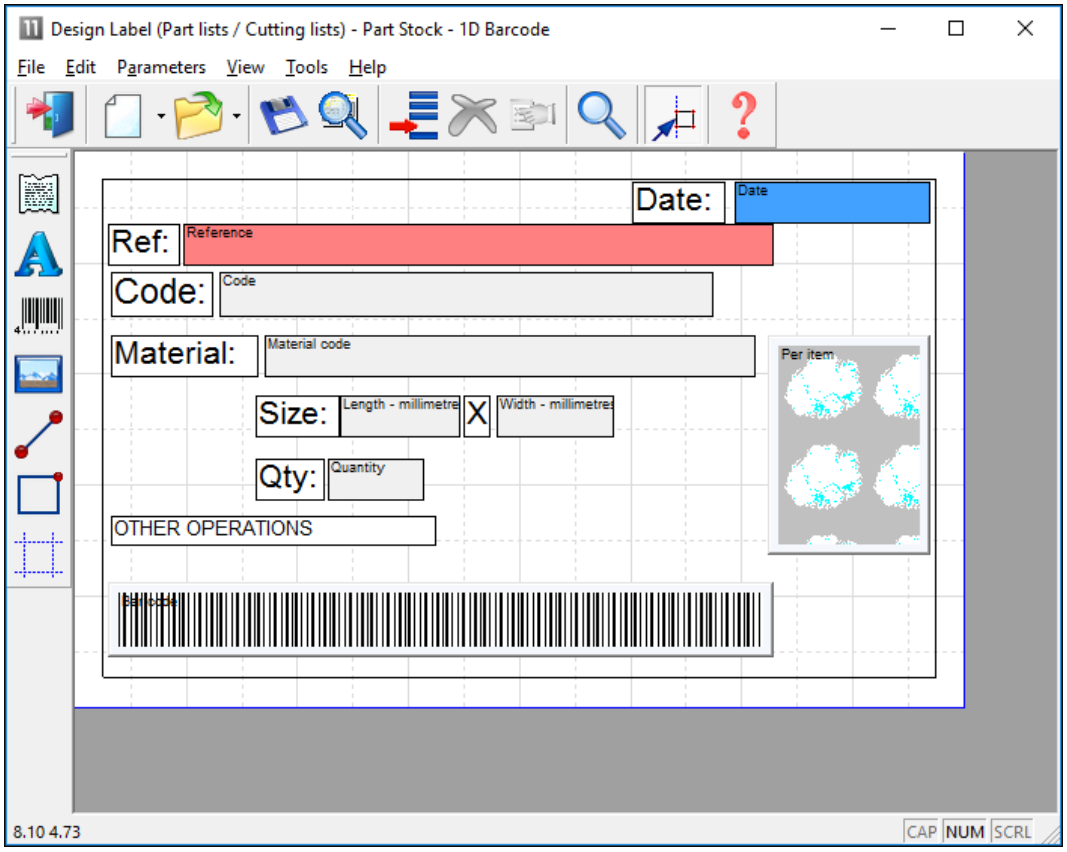
```
Material code
Length
Width
...
Part drawing
User defined details
Barcodes
Logos
...
```

The designer allows for the creation of a barcode for any of the items on the form or label, for example, barcodes for the part code and quantity.



Part label

The designer screen is easy to use and a variety of templates are already set up to use as a starting point.



Label designer

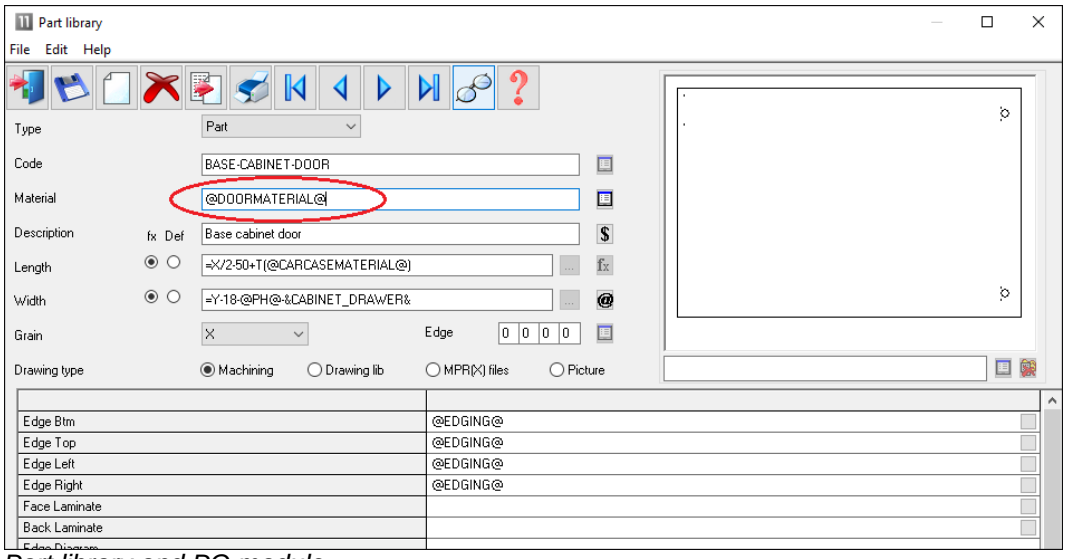
Each label or form is fully customisable. The designers include several options to help create effective designs.

- Grid, guidelines and snap options - to help place items on the design
- Different templates - with alternative designs and styles
- Quick preview - to check the layout
- Data preview - to make an accurate check of the layout

Parts & Labels with Products & Quotes (PQ) module

When used the with the PQ module the Part library extends the flexibility of the program since it can be used to define parts using variables and formulae for the part information.

The same part entry in the part library can be used for a range of colours, materials or sizes.



Part library and PQ module

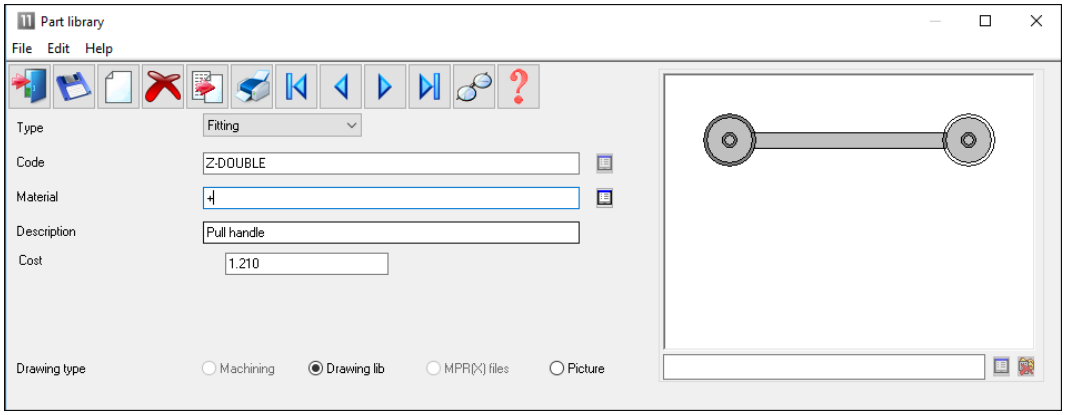
In this example the Material is defined by a variable '@DOORMATERIAL@' and the Length and Width are defined by formulae. This single part library entry can produce the correct specification for a range of cabinet doors in different materials, colours and sizes.

Fittings, Sundry parts, Operations

Requires the PQ module

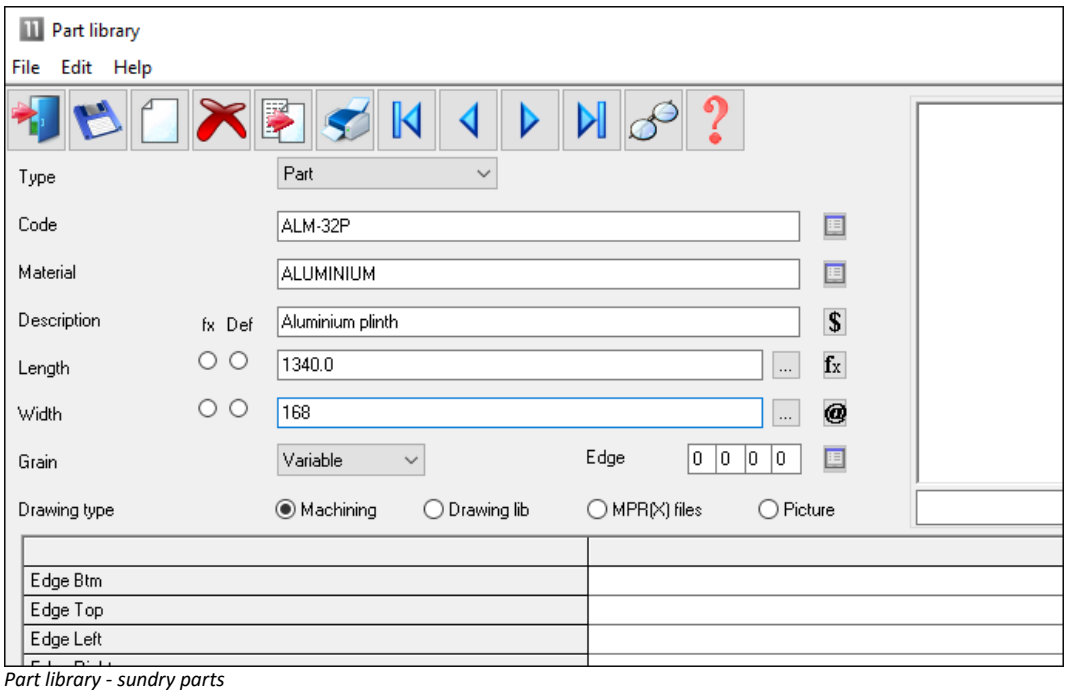
The parts database can also include fittings (hardware).

Fittings can include typical ironmongery items such handles, hinges and brackets and also larger 'bought in' appliances.



Part library - Fittings

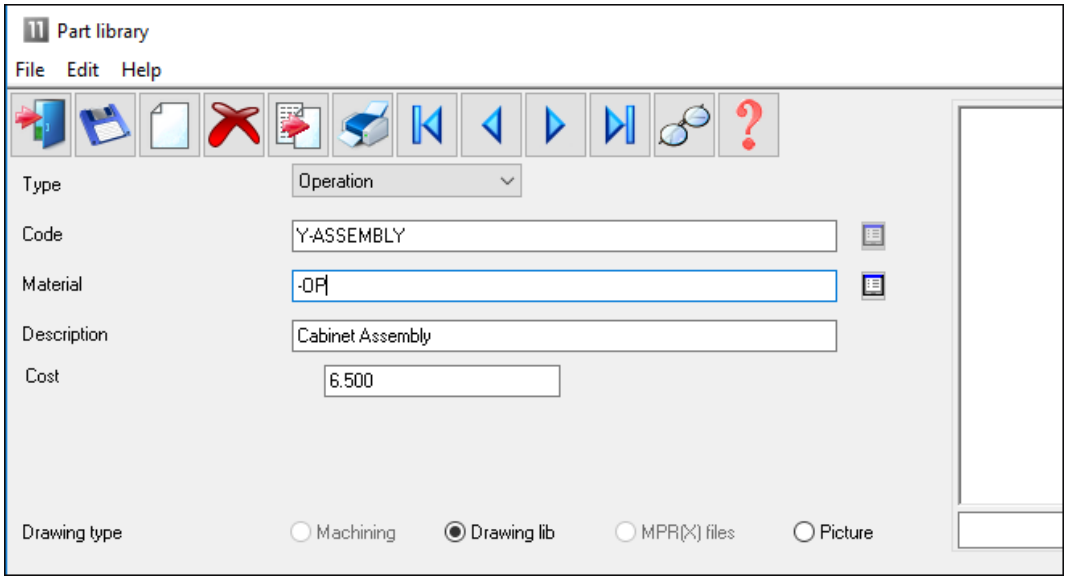
The library can also include 'bought in' or sundry parts that are required but are ready to use.



Part library - sundry parts

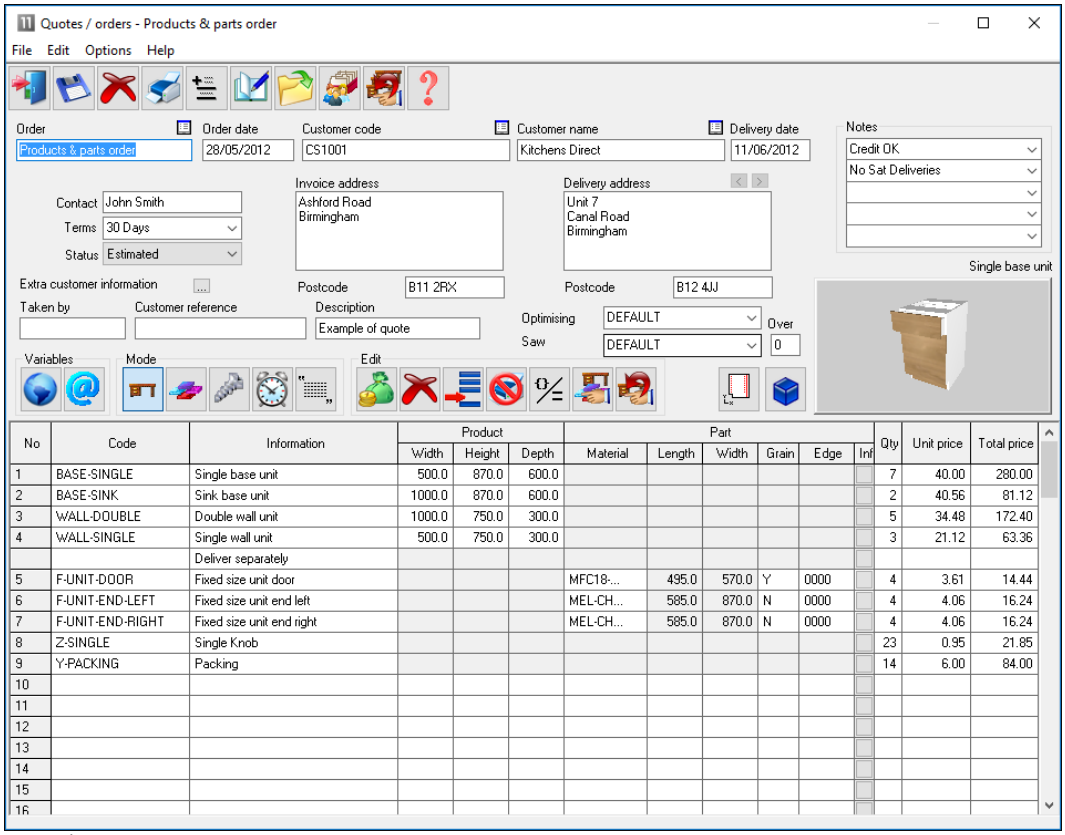
The operations required for each part can also be included in the database.

These are items such as, clamping, assembly, packing - where these can be allocated on a 'per part' basis.



Part library - operations

These items are added to the 'Order' so that a full specification (and costing) of the job is available.



Quote / order

Parts & Labels with the Machining Interface

The Part library is fully integrated with the Machining Interface; the part picture can be a machining drawing from the parametric Machining library. So any pictures and details created in the machining library can be passed through to the part label or form.

The part library can also be integrated with:-

- External bitmap (BMP, JPG) drawing

- WoodWop MPR(X) drawings

Parts & Labels with the Online PC option

The Online PC option can be used for designing and printing labels at the saw, it is typically used where there is no saw controller or the saw controller only has limited set of options.

Information and labels are automatically sent to the Online PC option to allow the viewing and printing of part information at the Saw.

Summary of Parts and Labels

- The form and label designer is not directly used for printing labels at the saw (other than via the Online PC option). It can be used to create designs for some saw controllers (e.g. Cadmatic) but there are often also label design options with many saw controllers.

	Parts & Labels	Parts & Labels + Online PC
Maximum items in library	99999	99999
Parts	•	•
Sundry parts	•	•
Fittings	•	•
Operations	•	•
Maximum length for part code	50	50
Form designer and templates	•	•
Label designer and templates	•	•
Parametric parts	•	•
Parametric drawings	•	•
External part drawings	•	•
Printing at Office	•	•
Printing at Saw		•
Import parts to database	•	•
Import external drawings to database	•	•

- The number of designs for the form designer or label designer is unlimited.
- Printing at the Saw is typically handled by software at the saw controller.