SECANT
for Sheet Cutting

Overview

SECANT creates high yield cutting patterns to produce the parts you need from the stock sheets that are available. The patterns are shown as clear diagrams that can be viewed and printed. The patterns can be manually adjusted if you wish and downloaded automatically to your saw.

SECANT is frequently integrated with the clients order processing and stock management systems. A number of interfaces are available including those for database and spreadsheet software. Vendors of software systems can directly access SECANT's functions via an API. The SECANT engine can already be found in a number of leading packages in the metal and wood industries in the USA and Europe.

Using SECANT

SECANT uses the familiar *menus and forms* image in its user interface. A comprehensive on-line manual and contextual help at each stage ensures rapid progress up the learning curve. The cutting list and stock file properties visible to the user can be tailored simply for each organisation. The terminology can be changed to match the industry conventions.

The user creates SECANT jobs each of which comprises a cutting list, a stock file and a set of controls. A library of jobs is maintained for rapid referral to past performance. Jobs may be entered manually, imported from other systems or created by merging standard orders.

Any precision can be used for panel and board dimensions.

SECANT allows units to be given as either **metric** or **imperial**. Dimensions can make use of **decimals** and **fractions**.

Pattern Building

The Objective

SECANT minimises the costs of cutting. The cutting cost includes both the **material cost** and the **handling** and **machine costs**. In addition penalties may be associated with undesirable pattern features such as changes in the cutting direction or third phase cutting. Material costs may be specified explicitly or estimated via a table relating cost per M2 with the sheet size. SECANT can frequently show savings on material and at the same time reduce the machine cycles required.

Panel Properties

SECANT generates patterns that will produce the panels specified in the cutting list. Both **exact** requirement production and controlled **over-make** are supported. SECANT will never under-produce on the requirement. You can however specify **optional** panels that may be cut if by so doing the yield is improved.

A cutting list may contain panels to be cut from **different materials**. SECANT will collate the panels and produce a pattern set for each distinct material.

The **grained** property allows you to control the orientation of a piece in every pattern used to produce that piece. This property also allows you to control the orientation of a piece within the strip from which it is cut. This feature may be required if the board is to be cut into strips and the strips edged before the pieces are cut from the strip.

The **class** property lets you restrict some panels to specific stocks while allowing less critical panels to be cut from any material.

Cutting Restrictions

Work flow: The highest yields and the most efficient saw usage can generally be achieved by allowing SECANT to freely combine any of the piece sizes in the cutting list. However such patterns may result in an unacceptable amount of work in progress where at any time a large number of orders are partially complete.

SECANT offers a number of facilities to address these issues.

- The patterns may be constrained so that no more than a given number of panels or a given number of **different panels** appear in any one pattern.
- The patterns may be constrained so that the pieces are produced broadly in line with a **production schedule**.
- The patterns may be constrained to be compatible with the available **destacking equipment** or **pallets**.
- A limit can be placed on the number of jobs or types of job in **progress** at any time.

Saw capabilities: Modern automatic saws come with their own restrictions and capabilities. SECANT has a rich set of controls that allow you to match the patterns produced to the capabilities of the saw. You can specify.

- Blade loss.
- Trims. Clean edge trims, strip trims and internal trims after change in cutting direction.
- Limits on the **blade reach**, the availability of **clamps and no-go areas** where cuts cannot be made**.**
- Limits on **head cutting**.
- Limits on **third phase cutting**.
- Limits on strip widths.
- Limits on the number of different panels within a phase.
- Maximum **book height**.

Ranging

Ranging is the process of **searching** for the best yield while varying the dimensions of a stock board. SECANT allows you to search for the ideal stock size to use with any job. You may specify the largest and smallest value of each dimension along with the dimension increments.

Pattern layout and preference

The order in which panels appear in strips and strips appear in patterns can be controlled. This may be necessary for the correct operation of the saw or may be just preferable for later processing.

Patterns may be forced to use **open packs** of stock sheets or to complete a pack once it has been opened.

Patterns may be sequenced to reduce **work in progress**.

Pattern Editing

The fully featured graphical **editor** allows you to display and edit several patterns simultaneously.

- Panels and strips can be dragged between patterns or to new positions within the same pattern. You will be warned if your edits violate any of the cutting controls.
- Panels can be dragged from the cutting list to infill offcut areas.
- Panels can be assigned to de-stacking stations.
- Patterns may be deleted from the pattern set and the shortfall in the panels produced can then be restored using a more relaxed set of cutting controls.
- A user-defined report is shown under the editing area so that the impact of changes on yields or panel production can be seen immediately.

Reporting and labeling

Labels

Labels can be produced for each cut panel, each stack of panels and each offcut. Label design is easy with a graphic editor that allows you to select job details, production date, production sequence, panel properties and sheet properties and drag them to their printing positions on the label. Special text formats and logos can be added. All standard label sizes and custom label sizes are supported.

Reports

A library of reports is provided as standard with the SECANT package. You may add to these reports by combining SECANTs reporting blocks with your own headings and text to produce your own customised reports.
Reporting blocks are available containing.

- Overall yield & timing summaries
- Panels produced
- Material used
- Offcuts created
- Z cutting
- Spread of panel production by pattern
- Feedline utilisation
- Pallet usage
- Coverboard usage.
- Diagram (for each pattern)
- Cutting instructions (for each pattern)
- Yield summary (for each pattern)

Job History and Statistics

SECANT maintains a **register** containing a history of the jobs that have been run. One register file is created for each month. These files are maintained by SECANT in a form compatible with standard spreadsheet software so that a monthly analysis of performance can be performed. If the stock updating facility is being used then the register of jobs is automatic. A record is written into the register when stock is assigned to the job and this record is replaced when the job is complete and the stocks

are updated. If the stock updating facility is not being used then you may explicitly register a job. When the first entry is made into the registry for any month a new register file is created and all records for incomplete jobs are copied forward from the previous month. In this way the register for a month will always contain a record of all jobs completed in that month plus all work in progress in that month.

The register contains an exhaustive record of the performance of each job, the panels produced, material used, stock area used, waste, offcuts, distance traveled by the saw, machine cycles, cutting times, etc.

Stock and offcut management

Large scale panel manufactures will rarely be concerned with the management of offcuts. Creation of offcuts will be avoided by over-making the requirement. However for smaller operations or where over-making is inappropriate the management of offcuts is more significant. SECANT supports both **over-make** and **exact production** regimes.

When over-make is permitted SECANT will permit the minimum additional production to complete the machine cycle. With SECANT over-make is minimal.

When offcuts are managed SECANT costs both the use and the creation of offcuts so as to keep offcut stocks to manageable levels.

SECANT provides a simple stock management system for users who do not already operate an external stock handling system.

- Stocks may be maintained in a library of files.
- Stocks may be entered, modified and deleted.
- Stocks may be reserved to a future job.
- Stocks may be automatically updated for the material used by a job and the offcuts created by that job.
- Stock files may be filtered to show only those items that meet stated criteria (i.e. items of a given specification that exceed given dimensions). Sales staff may use the SECANT stock screens when accepting orders.

Interfaces with cutting devices

The cutting patterns generated by SECANT can be converted into numerical control files suitable for a wide variety of controllers for automatic saws.

Available NC file formats include:

- **PTX** General format supported by a number of saws.
- **CPOUT** General format supported by a number of saws. May be configured to encode only sufficient instructions to cut the pattern into blocks made up of a single repeated piece.
- **Anthon** Raw format for Anthon saws and destacking plant.
- **Meyer** Raw format for Meyer saws.
- **Holzma/SAW** Raw format for Holzma saws, non-recursive patterns.
- **Holzma/REC** Raw format for Holzma saws, recursive patterns.
- **Schelling** Raw format for Schelling saws.
- **Homag** Raw format for Homag saws.
- **Giben** Raw format for Giben saw. May be configured to include or exclude the encoding of third phase cuts.

Please contact us if you require a different format and we will be happy to develop it if a specification of the format can be supplied.

You may choose to write the NC files to the floppy drive and transfer the files to your saw by floppy disk. Alternatively you may transfer the files over a serial connection. SECANT does not supply the transmission software for serial connection transfer. Such software will normally be provided by your saw manufacturer. SECANT does however support the transmission of the files to the Anthon saw over the computer network provided the saw is configured as a node on that network.

Integration

Developers wishing to integrate the SECANT engine with their own software should refer to the ***Integrators Guide*** available from the downloads section at www.pslopt.co.uk for details of the SECANT DLL library, the LINUX engine and the command line options.

Each SECANT job is a collection of simple ASCII comma separated files. Options are available to import the cutting list and stock file that define a job from spreadsheet software or from SQL databases.

SECANT can also be run in a batch or server mode. Folders are scanned for jobs that are then processed automatically according to a script. This approach can be used to add an optimizing capability to web-based ordering systems or other third party sales order systems.

Versions

Versions of SECANT are available for the single workstations (Windows 2000/NT/XP) for networked users and for terminal servers. A Linux version provides the optimization and reporting facilities as command line driven executables.

Contact information

If you have any further questions or would like to arrange for a demonstration then please contact us at the address given below, or visit our website at www.pslopt.co.uk.

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