OPTIFER 4 - Flexibility and modern designs

*OPTIFER 4 – an innovative, new and completely Windows based production control and scheduling system for glass processing companies including IGUs, toughened, laminated, furniture glass and mixed products. **OPTIFER 4** has been developed under the Microsoft Visual Studio.net® environment and tailored for the new operating system generation Windows® XP.*

Flexibility Without Limitations

Production relevant data containing sorting groups, exceptions, racking groups, sequences and other assignments may be defined individually by the customer. **OPTIFER 4** provides integrated **CAD/CAM** (**OPTICAD**) functionality (true-to-scale drawings), optimisation, cutting code generation and a visualisation system (**OPTIVIEW**). Statistical reporting about volumes on individual production resources includes detail on cutting tables, IG production, and toughening. These reports are freely definable by the user and are not limited to a certain degree of detail.
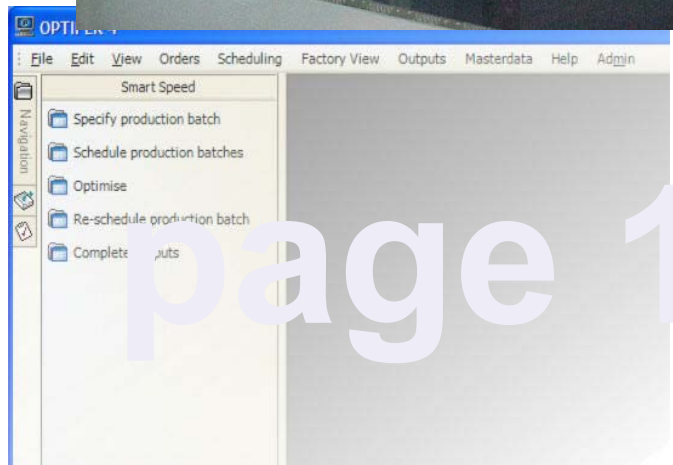
Master Data

OPTIFER 4 permits the user to create more than one production line with different parameters. Technical parameters relevant to size limitations, orientation, production flow and CNC code information are only a few of the many options available. Production resources include cutting lines, toughening furnaces, IGU assembly lines, gas filling equipment, laminated glass production lines, glass bending equipment, spacer benders/spacer saws, automatic sealing robots, Georgian production equipment, and processing lines. **OPTIFER 4** interfaces to all CNC machinery currently available and processes specially created CAD shapes as well as shapes defined in DXF format files. Planning parameters include information about Georgians, spacers, colours and their specific restrictions.

Planning Expert System

The planning module is an integral and important part of the overall solution and controls production methods, sorting sequences, groupings, production sequences and priorities in addition to other essential related criteria. Production strategies may be created as needed dependent on the specific production environment in which the software is utilised. **OPTIFER 4** is flexible enough to adapt to any type of production situation and is particularly tailored to the needs of glass processing, toughening, furniture glass production, IGU production, laminated glass production, as well as any combinations of the above. An important feature, when compared to similar systems available on the market, is the flexibility offered by **OPTIFER 4** whereby groups, sequences, and sorting methods may be created individually by the operator requiring no intervention from a programmer or system engineer. The number of different production strategies handled by the system is unlimited.
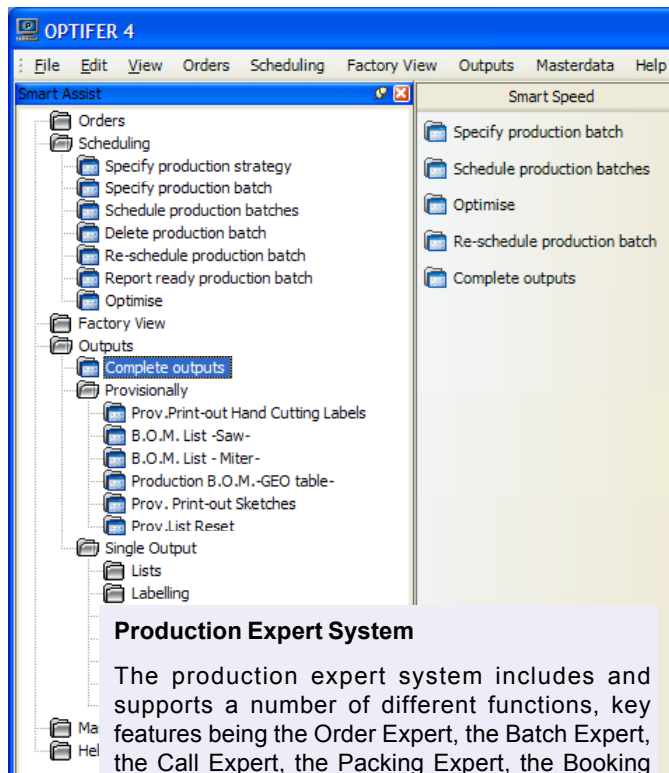
Any production strategy contains production groups. Groups could represent a certain type of product or a product group such as toughened, processed toughened, IGU products, stepped IGU products, shaped IGU products or others. Sorting sequences may be defined individually for each of these groups. For some groups the system may have to respect sequences. For example, in the case of stepped units, in order to create a special group within a production batch it is essential to force sheets belonging to the same unit to come out in sequence to avoid additional sorting. Due to the fact that these sorting rules may be user defined for each individual group the overall yield will hardly be affected.

Flexible Optimisation Parameters

Optimisation specific parameters are stored in separate tables and include general settings, optimisation algorithm lists, shape distribution, priorities and raw glass sizes. General settings control how the optimisation result is displayed (yield or waste), the maximum elapsed time to optimise and other pertinent requirements. Shape distribution parameters within patterns or sub-plates allow the user to define how shapes are to be distributed on the different stock sizes or traverses (in the first traverse, in the first plan, in the last plan).

OPTIFER 4 comes with a list of different mathematical and stochastic optimisation algorithms to be used for optimising production batches. Available stock sheets, including quantities, racks, trims and assigned cutting lines are defined in master data.

Call Expert System - Filtering

Orders or items called for production may be split and analysed from different angles using the intelligent filtering system. It could, for example, be desirable to call leaded, shaped or Georgian units beforehand to compensate for additional processes and longer cycle times. Toughened glass might have to be called for production in a separate batch. Order items containing sophisticated processes (hole drillings, edge cut outs, complex polishing or bevelling) may need additional time slots and should also be scheduled into separate batches. The system supplies all the necessary functions that enable the user to adapt to the ever increasing complexity of today's production. **OPTIFER 4** offers flexibility without limitations and will easily adapt to the requirements of your operation.

Production Expert System

The production expert system includes and supports a number of different functions, key features being the Order Expert, the Batch Expert, the Call Expert, the Packing Expert, the Booking Expert, and the Batch Progress and Order Progress Experts. Scheduling and release of batches for production is achieved with the Call Expert System.

Releasing Orders for Production

The intelligent call expert is a powerful tool used to mark orders according to desired criteria and release them for production. The system offers numerous ways of analysing, selecting and releasing orders for production. Orders may be called as a whole, or parts of orders may be called and released for production as a component call. In the case of IGU consisting of glass to be laminated in the component call, only the laminated glass components are called for production in the first step. After completion of the laminated components, all other products belonging to the final IGU unit may subsequently be called and scheduled for production. The call expert system is divided into three major screen sections. One section displays the quantities to be scheduled (number of items, units, and surface area). Another section displays quantities by route, detailing order information by selected route in a third section. These details include all orders due for delivery by a selected date or route with their number of items, m2, units, and additional details. The folders are controlled by an intelligent filtering system in order to separate orders by selected criteria, making it easy to create batches of any desired complexity.

Order Scheduling

Batches created in the previously described manner may be scheduled for production by selecting the required production strategy. As explained before, the number of different strategies is not limited and the best suited strategy (including groups and sequences) for each batch may be selected by the operator. The scheduling process assigns sequences, production numbers, and rack numbers to each individual component and controls the overall production sequence. Before selecting the required strategy the exact groupings and sequences within the selected method may be reviewed by the operator. **OPTIFER 4** offers the most sophisticated and flexible methods of sorting and supports all production areas. During scheduling the individual glass types are displayed with their respective quantities and assigned optimisation flags. At this stage, the user can not only change the cutting sequence and select the priority in which individual glass types should be cut, but may also intercept the process and remove the flag from specific glass products to assign to hand cutting volumes too small for optimisation. After orders have been scheduled they will be removed from the scheduling pool – batches already scheduled may be re-scheduled with a different production strategy at any time, or be resolved and returned to the existing order pool.

Optimisation

OPTIFER 4 includes powerful built in optimisation algorithms. The general optimisation mode is predefined by the selected production strategy. The system includes sequenced 'just-in-time' optimisation methods, random, cyclic (slot racks or automatic slotting systems) and duplex or duplex XT modes (mirroring of patterns for combinations or units of the same type [XT]). Duplex and duplex XT modes are generally used if a factory does not have the required space to load various A-frames at the same time. When this is the case, patterns are duplicated and sequences are copied from one side of the rack to the other forming the unit to be assembled. Sequenced 'just-in-time' methods are used for certain groups within a strategy whereby a specific sequence of glass required (stepped units, for example) has to be forced by the system. For IGU manufacturing including a sealing robot, it makes sense to divide the volume in size classes from large to small. This method ensures that larger units are produced first and avoids unnecessary movements of the robots. Overall, line cycle times are increased and direct packing of units behind the line may be achieved. In general terms it is the case that, after cutting, no further sorting is necessary and the system may be configured in the way the factory prefers to operate. After optimisation the result is displayed and allows user interaction to influence the result as to resolving patterns, adding depot sheets, or discarding the whole batch.
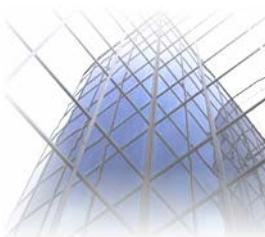
CNC Control Drivers

OPTIFER 4 supports the CNC control for all common production machines available on today's market. Supported cutting machines (straight line and shapes – with or without edge deletion) among others include Bystronic, Lisec, Hegla, Pannkoke, Bottero and Powergrind. The system accommodates the CNC control of sealing robots (Lisec/Lenhardt), automatic bending equipment (Lisec, Bayer, Rjukan), spacer and Georgian saws as well as processing equipment (Intermac, Bavelloni, TechnoMetal, Benteler).

CNC control can be done via serial or network link (depending on the manufacturer) or, if needed, floppy disk. In addition, visualization systems, for example the OPTIVIEW cutting plan and breakout displays are supplied with data from **OPTIFER 4**.

Outputs

Various print-outputs for the individual production areas like cutting, processing (e.g. production lists, rack lists, spacer lists) are part of the system and can be individually formatted. In addition, individual label layouts (also different customer layouts), including logos and barcodes may be defined within **OPTIFER 4.**

Additional expert systems

Order Expert System

This flexible tool allows tracing of orders and delivers accurate information about a specific order, order item and bill of material details. Once an initial screen is filled with known details (order number, item, or sizes, customer number, name, route number, order quantity and batch number) the system, in return, delivers accurate information about the state of the orders. Information includes the batch number each specific order entered production with, target quantities, quantities produced, and failures. Some of these details will only be generated with the use of the integrated bar-coding system **BDE2000** or by reporting orders manually, stage by stage. This tool delivers important details when a customer call comes in.

Batch Expert System

This system records all batches created and allows batch tracking similar to the order expert. Moreover, the module records details about the batch status, total target quantity and produced quantity. By selecting a particular batch the operator may also zoom down to view further details about the individual items.

Production Volume Display

This expert displays raw glass quantities for all orders to be produced, scheduled or unscheduled, sorted by delivery date. The date interval displayed comprises all delivery dates, including those in the future and from the last three days. All assigned orders may be displayed in detail per glass type.
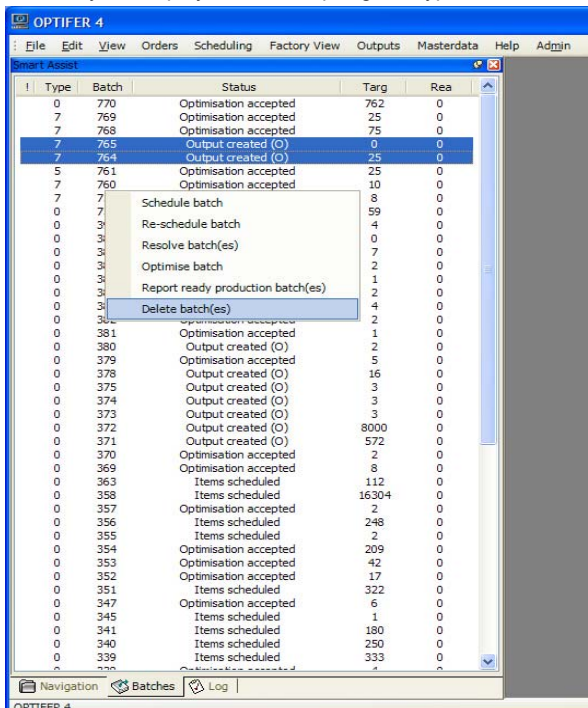
Packing Media Expert System

Detailed information concerning orders and items is readily available with the use of this software tool. Selection is made with a filtering system and as a result the system delivers packing information (some only available by bar-coding or manual booking).

Booking Expert System

The booking expert system, in addition to other functions, allows the manual booking of orders or order items. When using a bar-coding system these details are automatically written to the required database fields and the system may be used for information purposes.

Stock Expert

Manage typical stock items (pre-production of small sizes, long term deliveries) with this stockpiling depot expert. Priority control assists the user with warning messages in case of close delivery dates or large quantities. All items contained in this expert may be automatically used by optimisation to fill in residue plates.

Technical Details
Microsoft Windows 98, NT, 2000, XP
Databases: MSDE, MS SQL Server,
                    Sybase SQLAnywhere

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