

# AUTOLAY:

## The Hi-Tech Aid to Performing Cuts

### The Problem of Wastage

Industries as diverse as the sheet metal trade, the printing industry and the glass and furniture industries have a common characteristic: the need to cut their materials.

The materials, whether, for example, paper, cloth or glass, often need to be cut into shapes of different sizes from *sheets* of materials that may also vary in size.

Common among these shapes are rectangles (or shapes close to rectangular) of different sizes. For example, the labels for tinned goods, the materials that fold to produce cartons, wooden panels for cupboards and glass for windows.

Often the shapes (or *pieces*) to be laid out are required in quantities or sizes that do not fit neatly and easily onto the sheets.

Inevitably, there is bound to be a waste of materials. Some of the waste can be reduced by manually trying to fit more pieces onto a sheet.

### Reducing Wastage Manually

The problem of trying to fit or *layout* as many pieces as possible onto a sheet can be both complex and labour-intensive.

For example, in the printing industry a company

delta	gamma	gamma								delta	delta	delta		Piece Types	Number Excluded
beta	gamma	gamma	the	the	the	the	the	the		delta	delta	delta		gamma	0
beta														delta	0
beta	gamma	gamma	gamma	gamma	gamma	gamma	gamma	gamma	gamma	io	io	io	io	beta	0
beta	g9	g9	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	iota2	0
beta	g9	g9	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	0
beta	g9	g9	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	theta	0
beta	g9	g9	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	omega	0
beta	g9	g9	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	g9	0
beta	omega	g9	g9	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4		
omega	omega	g9	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4	j4		

  

ESC:Exit	F1:Help	F2:Move	F3:Insert	F4>Delete
F5:Undo	F6:Zoom	F7:Flipall	F8:Pieces	

might receive several orders, in hundreds of thousands, each for different sized labels. Often these quantities will not fit onto a single standard-sized sheet, but must be spread over many sheets of the same size.

The labels must also be laid out in the *same* way on each sheet so that they can be printed using the same printing plate.

The aim here is to minimize the *number* of sheets needed by fitting as many labels as possible onto a sheet.

To find the optimal layout, you need to systematically vary the position of every label on the sheet while keeping the position of one label constant. There are countless ways in which one label may be combined with others, and of course this would need to be done for every label and for

every position on the sheet.

Such a labour-intensive task as this is ideally suited to the qualities of a computer, but not so suited to the human mind.

### Reducing Wastage Automatically

In the kind of task described above, a computer has no difficulty in trying an immense number of layouts, and simultaneously calculating their efficiency.

Moreover it can do this at a far greater speed than its human counterpart.

AUTOLAY is a computer program designed to perform this and other layout tasks.

AUTOLAY can take just a few seconds to produce

a layout that could take a person several hours or days to produce.

It runs on a standard IBM PC or compatible computer system and has no special hardware requirements.

AUTOLAY's aim is to reduce the waste of sheet materials. It does this by searching for the most efficient layout of pieces on a sheet.

The efficiency of its solutions can result in a saving in *material* costs and its speed can reduce *labour* costs.

The user can also obtain precise figures regarding the waste of sheet materials in any layout: AUTOLAY provides an efficiency report for every solution.

Layout Problems

There are several versions of AUTOLAY that solve different types of layout problems, two of which are described below.

In both types of problems rectangular pieces of different sizes need to be fitted onto a sheet.

Different quantities of each type of piece may be needed. For example, a hundred of one type, ten of another, maybe one of another. Alternatively, the same quantity, perhaps one or perhaps thousands of each piece type may be required.

In the first type of layout problem, all the pieces must be fitted onto a single sheet. The aim here is to find the *smallest* sheet, from a stock of different sized sheets, on which the pieces can be laid out.

By contrast, in the second type of layout problem, the pieces may not fit onto a single sheet. In this case the aim is to find a layout of pieces on a sheet that will minimize the *number* of sheets needed.

This is like the printing example we discussed. The sheet is of a pre-determined size and each sheet has the same layout of pieces.

Using AUTOLAY

AUTOLAY is very easy to use. It has clear menus and the user can get help at every stage of its operation.

This feature is useful if a user decides to put a time-limit on AUTOLAY's search. In this instance, it is likely that AUTOLAY will have produced several possible solutions even though it might not have had time to produce the optimal layout.

The time spent on producing a layout, therefore, can be traded with the efficiency of the layout produced.

Another main feature of AUTOLAY is its *editing* facility. This allows the user to change a layout solution that AUTOLAY has constructed. For instance, the user might

Sheet Name	Width	M-LAYOUT SPECIFICATION	
		Height	
s45	200.00	150.00	
Piece Name	Width	Height	Number req'd
gamma	16.00	20.00	100000
delta	20.00	25.00	60000
beta	31.00	14.00	65000
iota2	10.00	19.00	80000
j4	11.00	16.00	450000
theta	12.00	50.00	50000
omega	19.00	12.00	20000
y9	15.00	11.00	120000
ESC:Exit		F1:Help	PGDN:Scroll down PGUP:Scroll up

To construct a layout, the user simply enters the size and quantity required of each piece type, and the size of the sheet, or sheets, to be used (see illustration above).

To make entering these details even easier, the user can set up a library (or store) of standard sheet and piece types. Then, when the user wants to construct a layout they can simply be selected.

Once AUTOLAY has been instructed to find a layout, it operates by finding progressively more efficient layouts.

want to re-group some pieces in the layout.

The editing facility allows the user to move, delete or insert pieces using either the keyboard or a mouse. There is also a zoom facility that enables parts of the layout to be enlarged so that a piece can be more accurately positioned.

For Further Information

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