Best Bet

Finding optimum solutions to problems is sometimes straightforward, but often it requires advanced mathematics. Computers take the job in their stride

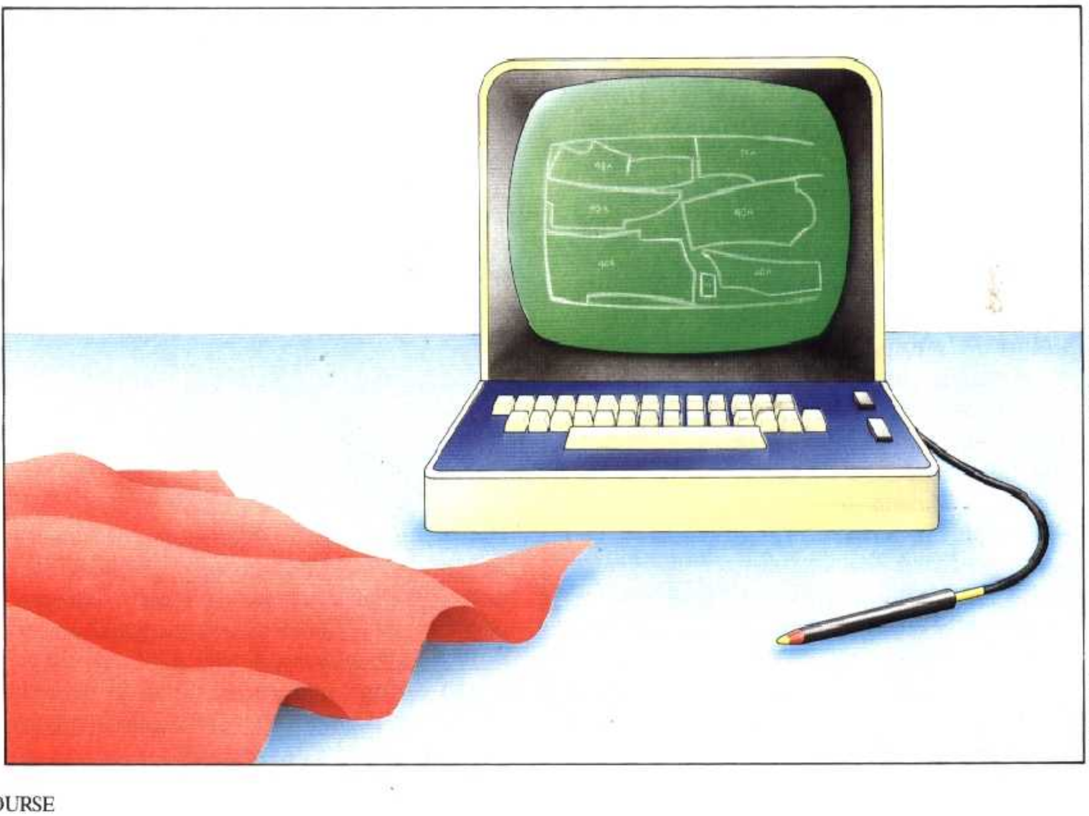
In every decision we make there is invariably a compromise — for example, between cost and effectiveness, or cost and time. We are unlikely to obtain absolute maximum output for absolute minimum cost. The 'optimum' result will fall somewhere between the two.

If we take as an example the choice between two brands of washing powder, the reasoning behind the decision might go something like this: 'If I buy this washing powder, it will cost me 48 pence for 150 grams, but if I buy that one, it will cost 90 pence for 300 grams. But what if I must use 20 per cent more of the less expensive washing powder to obtain the same result? Which brand is cheaper then?' When everything is reduced to a common form — in this case to percentage differences between products — the answer is easy to predict, even before any mathematical calculation is performed.

The concept of 'weighting' a calculation by a constant value is quite normal, and works well when the differences between similar components (the price, for example, or the physical weight), are themselves constant. But when these differences change at different rates, then the mathematics becomes more complex, and we must resort to a form of calculus (in which we solve a number of equations that use the same terms simultaneously) in order to arrive at the right answer. Where the number of terms is small, we might choose to enter them into a matrix, and then manipulate it. Another way is to guess at the answer, and then modify the guess successively until it fulfils all the conditions. Of course, the better the guess, the less time the process will take.

Optimisation techniques such as these are essential to commerce and industry, and are universally applied, especially in manufacturing and construction. Linear Programming, Critical Path Analysis, and PERT (Programme Evaluation Research Technique), are just some of the names given to this optimising method. They predate the computer era by some 30 years in their original forms, and previously required a great deal of manpower to come up with a correct answer in an acceptably short period of time. Applications of this type are quite suitable for home computers, but one should bear in mind that matrix (two-dimensional array) operation requires rather a lot of memory space, and that the matrix arithmetic is in itself quite complex. Fortunately, there are a number of software packages for small microcomputer systems, so the technique is readily available.

One commercial area that has benefited considerably from optimisation is that of clothes



Perfect Fit
Arranging patterns on a sheet of material in order to minimise wastage is a good example of computerised optimisation. One such application is in cutting sheet metal, another is tailoring. Here the computer displays its suggested layout on the screen, and an experienced operator can then make minor adjustments with the aid of a lightpen

ORIGINAL PHOTOGRAPH COURTESY OF BURTONS TAILORING

KEVIN JONES