Perfumer & Flavorist

Computers—
Who Needs Them?

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W hen I first became involved with computers in 1971, the answer to this question was usually, "Big business needs them to keep track of all of their data." At that time the public didn't think computers would become common in the work place as well as in our homes. Today, when I ask the same question to people, the response is quite different. Many people say they use a microcomputer for word processing or spread sheets. Others wonder what kind of system to buy for home or complain that a computer system has sent them the wrong bill or information. In other words, computers are an integral part of our lives whether we like it or not. The real question that must be considered is: "Computers—How can we best use them to make our work easier?"

Today, we find personal computers everywhere in business as well as in many homes. Today's personal computers are fast, powerful machines found on the desks of a large percentage of business people. General software systems are available that can be adapted by the users to meet a majority of their needs. In general, computers have become a common tool for doing business.

The future trend in computers is more computing power in a small package at about the same price as current computers. This additional power will be used to run better human interface programs and to support more sophisticated applications. Also, the millions of personal computers will be linked into large company networks so data can be easily exchanged between different users. More intelligent software will be developed to handle complex tasks currently done by people and more industrial spe-

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cific software systems will be written. Although the technology changes may not be as drastic as in the last ten years, the new technologies will eventually change the way we do business in the future.

Unfortunately, while the cost of the computer hardware has gone down, the cost of developing software has increased. Therefore, you will see companies buying software rather than spending the money to develop their own. These factors are leading many software companies to specialize in vertical markets rather than to offer general software across many industries.

Standard Computer Functions

As many other industries embraced computer technology, so did the companies in the perfumery industry. In general, computers were, and still are, being used by the perfumery industry for accounting, inventory control, and data analysis.

Using computers for accounting functions is taken for granted by most companies. The perfumery industry is no exception. Because accounting functions were usually the first applications that a business chose to automate, the early computer departments were usually a part of the accounting department. The use of computer for handling accounts receivable, accounts payable, general ledger, payroll and asset management is routine and common place. Accounting software is widely available for all types of computers and is considered a normal part of setting up a business. Even small business can purchase accounting software for use on personal computers.

Inventory control is very important to the perfumery industry because of the large number of raw materials that must be purchased and stocked. Since there are a large number of seasonal crops, it is important to keep track of usage trends and to be ready to increase or decrease inventories based on historical use. Today's modern inventory control systems do much more than keep track of the amount of material on hand and what has been used. They also assist in resource planning so that wiser purchasing decisions can be made. They are programmed to assist in planning the production schedule so equipment can be better utilized. Some systems are even programmed to output purchase orders automatically for needed materials without human intervention. Over the next decade, expect inventory control software to become even more sophisticated as software developers learn more about the perfumery industry and its unique problems.

The third major category of computer use is data analysis. Data analysis covers a very large spectrum from current business data and marketing forecasts to scientific and sensory testing data. It includes the analysis of any type of data where a large group of numbers must be reduced to simpler numbers or forms for interpretation. In the past this meant large printouts of rows and rows of numbers. Today, this might mean a single graph where the numbers have been reduced to a few curves showing the trends of the data.

Although microcomputers are used in many of the traditional areas today, all of the applications mentioned in this area have their roots in the early days of computers. Let's consider newer uses of computers in today's perfumery company as well as take a brief look into the future.

Computers in Perfumery

With the lower cost of computer technology, a great push has been made to move the technology into areas that continue to consume large amounts of human resources. In the perfumery industry, such an area is the creation of new formulas.

Formula Creation—Traditionally, a new formula is created by a perfumer through a repetition process of writing down the ingredients for the formula, having the formula compounded, evaluating the results, and then making a new version to improve or change the odor of the previous attempt or to reduce

the price. Over the last several years, a number of perfumery companies have developed software systems to assist perfumers in formula creation or they have purchased a software system called Per-Form that has been specifically designed for perfumers. Regardless of the source of the software, to be useful to a perfumer the software must contain some basic features:

1. The selection of an ingredient to be put into the formula should not be by a company code number. It is best to use ingredient names since perfumers create with named materials, not code numbers. The process for selecting names must be simple and require a minimum of typing. Ingredients should be able to be added anywhere within the formula; not only to the bottom.

2. As ingredients are added to the formula, the perfumer must be able to obtain easily the unit cost of the formula. In some systems the perfumer must make a request of the system to cost the current formula. In other systems, the cost information is displayed on the screen dynamically as new ingredients are added.

3. Once a formula is created, there must be a convenient way to request a sample to be prepared. This request should result in a printout or some other type of output in a format that is easily used by the compounders. This may include sorting the

Esther Morera, Chairperson of the American Society of Perfumers, greets the participants during the opening ceremonies at the Waldorf/Astoria Hotel, New York, New York.

formula and scaling ingredients to a new quantity.

4. The system should allow for the easy creation of new versions of an existing formula. The system should keep track of any changes and remind the perfumer of what has been done previously.

5. To speed up compounding, the system should allow a formula to contain one or more compounded subs or key bases. This should include not only subs that are used on a company wide basis, but also temporary subs that are important to the current formula.

6. The system should allow the perfumer to include any existing formula into another formula, or to create a new formula by merging two or more existing formulas. When this type of work is done, the system should allow the perfumer to work with sub-formulas as well as to allow the resulting formula to be exploded and linearized so the perfumer can correct anomalies introduced by the combination of formulas. Note, this also helps to keep the manufacturing department happy since the final formula has only one main level.

7. The system should allow for more than one formula to be displayed at one time. This not only makes it easier for creating new versions, but also allows two different formulas to be compared.

8. The system should calculate and display detailed cost information on each ingredient as used in the formula. This makes it easier to determine which ingredients are impacting the cost of the formula the most and makes it easier for the perfumer to develop a lower cost version.

This list represents some of the basic features of a perfumer's formula creation system that are necessary to make the system useful to the perfumer. Naturally, all of these features must be made available to the perfumer in a very friendly, usable manner with reasonable response times. Otherwise, the effort in learning the system and using it may overshadow the benefits. If implemented properly, however, a perfumer's formula creation system can easily pay for itself.

Formula Review—Another area where today's computers are being used more and more is in the review of final formulas. With the plethora of government and customer restrictions, all formulas must be reviewed to make sure they meet all applicable guidelines. This usually is referred to as formula review. This type of application is ideal for a computer since it involves the cross checking of a formula against multiple restrictions. A good review system must be able to: fully summarize the formula down to its most basic ingredients; review the formula based on the criteria selected by the person in charge of formula review; and produce output that

clearly indicates which ingredients are out of compliance and what is the acceptable amount. As more and more restrictions are generated, review systems will become more critical for the efficient checking of formulas.

Flexible Manufacturing—As the productivity of perfumers increase, the next place where a bottle neck develops is in the area of sample preparation. To help remove this restriction, computers and other technologies such as robotics can be combined to form a system that when given the list of ingredients, can manufacture a formula. Since each formula contains different items in differing quantities, a flexible system must be designed to handle all possible combinations. This type of system represents a major challenge because of the large number of raw materials that can be used in fragrance formulas. However, the technology exists today to develop such a system for fragrance formula production. Whether its cost can be justified is dependent upon the availability of compounders and their salaries.

Initially, sample preparation is the ideal starting point for the development and testing of the flexible manufacturing system. Here, the sample sizes are smaller so the technology can be thoroughly tested without wasting large production batches. However, once the technology is proven, there is no reason why the technology could not be scaled up to the production floor.

Future Computerization in Perfumery

A more futuristic use of computers in perfumery will be the optimization of a formula by a computer. A formula could be optimized in one of several ways including, but not limited to, stability, cost, odor, and market acceptance. In all cases, either formula engineering or expert systems would be involved.

In order to optimize a formula for stability, a database of known stability problems first must be generated. A set of rules must be developed that instructs the computer to replace certain unstable ingredients with other ingredients. This is the work that is now done by perfumers when a formula is extended into a complete product line. By programming a computer to do this work, a perfumer's time can be used for original creation work and fine tuning fragrances.

There are two methods to optimize a formula for cost. One involves changing the ratio of the formula's ingredients based on dose response curves of the individual items. This is the purest method since the formula's odor should be preserved. However, this method requires a substantial research effort to develop the necessary dose response data needed. The second method involves the systematic replacement of less expensive ingredients for more expensive ones. Like the stability optimization, an expert system would have to be developed so the replacement would be done with as little an odor change as possible. The reason to use a computer for this application is that the computer could try all possible combinations to come out with a version that meets the cost constraints.

The remaining two areas of formula optimization, odor and market acceptance, are very futuristic and would require substantial research and development to produce a system and the necessary databases to accomplish these tasks. However, this could be in store in the future.

Nobody needs computers unless they are properly programmed to assist in our work. A computer is merely a tool that can be programmed to increase our productivity by doing many repetitive and boring tasks. In the future, more powerful computers with more sophisticated software will take care of mundane tasks and leave us with more time to think, plan, and to be more creative.

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