

finished product being overweight, due to excessive moisture extraction in the blanch. Neither consumers nor regulatory bodies would be apt to complain in the latter case, but the Profit and Loss Statement of the firm will soon reflect a complaint.

Once the cans have been sealed the next step is the actual processing, that is, sterilization through heat. The length of time of the process depends partly on the initial temperature of the product — the average temperature of the contents of the coolest cans going into the process. The liquid which is added to the can should be at a temperature not less than 200° F. The sealing of the top upon the can should take place as quickly as possible, to insure a good vacuum.

The sealed cans should move to the cookers within a reasonably short time after closure, with the maximum delay not exceeding thirty minutes. As the time lapse between closure and processing increases, the initial temperature decreases, necessitating an increase in the time of processing. It is also known that an undue delay between closure and processing will result in a loss of vacuum in the can.

The actual processing has received a great deal of scientific attention. Processing techniques are likely to receive considerable improvement in the near future.

Upon completion of the actual processing, canned shrimp should immediately be cooled. With some canned products the cooling cycle may be terminated when the temperature of the can contents is down to 110-120° F., thus permitting the remaining internal heat to dry the exterior surface of the can. This is not so with shrimp, which should be completely cooled to insure the complete termination of the cooking.

It may come as a surprise to some here to learn that as canners, we consider refrigeration as one of our most efficient tools. In our own firm we use refrigeration at two levels. It is used first as a means of regulating production within the cannery. For this purpose we employ storage facilities where the temperature is maintained at 26-28° F. Our second use of refrigeration comes in the storage of the finished product. For this purpose we maintain warehouse storage facilities where the temperature is approximately 65° F.

The entire canning operation is designed to result in the best possible marketable product. Despite our best efforts to date canned shrimp have certain limitations; they do not remain in prime condition indefinitely. With age there comes a softening, accompanied by a fading or blending of color. The occurrence of struvite crystals in canned shrimp is a problem that has yet to be solved, as is true with a number of canned seafood items.

Because of the varied problems we are constantly working to make the canned shrimp produced in each successive year better than those produced in the preceding year.

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## **The Organization of a Quality Control Program In a Fishery Plant**

W. F. HAMPTON

*Manager, Fisheries Laboratories, Birds Eye Division,  
General Foods Corporation, Boston, Mass.*

Quality control is a technique used in the production of a product with two objects in mind: one is to keep the product out in front in the race for

the consumer's dollar, the other is to keep errors, waste and inefficiency at a minimum in the production process. There will be no disagreement over the fact that competition today makes the race for the consumer's dollar a keen one. It is equally certain that all fish producers are very much interested in any technique which will improve plant operations when such improvement is reflected in lower production costs. Quality control can go a long way toward helping achieve these aims, and consequently it deserves our closest attention. It is possible to go even further, and venture the opinion that any production or manufacturing business today takes unnecessary chances with its future if it does not have a quality control program. In fact it is doubtful if such a business can be considered a good risk.

In some form or other all fish plants have a system of quality control functioning, even though in some it may not be formally organized as a definite department. Some companies have really effective quality control departments. For all such groups, the comments in this paper may be useful from the point of view of comparison and evaluation. For those who have no quality control program, perhaps the points made will prove sufficiently stimulating to warrant giving the subject a closer look.

Let us first define what is meant by "quality" and "quality control". Most men in the trade have their own ideas as to the meaning of the term quality. Many are tempted to look upon quality in fish as simply a matter of being edible or inedible. These people know, of course, that this is not strictly the right attitude. To get a true interpretation of the term, it is necessary to examine the attitude of the consumer. It really matters little what the producer may think about quality in general, and the quality of his products in particular. The really significant thing is what does Mrs. Consumer think on the subject? If she likes our products she will buy them, if she doesn't like them we can depend upon it that she won't buy them. This is the consumer attitude that determines the kind of profits a company earns, and determines whether it stays in business.

It seems to me that the consumer's concept of quality reduces simply to "degree of excellence". To the consumer a high quality product is one that has a number of attributes for which she is usually prepared to pay a little more than the regular price. A high quality product may possess superior flavor, superior texture, superior color, or it may simply be convenient to use, its preparation requiring no fuss or mess. Also — and this is important — one of the criteria of excellence, as far as the consumer is concerned, is that the product must *consistently* come up to her expectations. In other words, she must be able to depend on it that every package that she buys will be the same. She will consider a product to be of poorer quality the more it fails to meet these desirable attributes and come up to her expectations in every package.

The term "quality control" is simple to define. It is merely the technique or the tool that the management of a company uses to achieve the degree of excellence desired in its products. There is nothing complicated about the quality control function, any more than there is anything complicated about the accounting or bookkeeping function. The accounting department keeps the score on the dollars, the quality control department keeps the score on the product.

Quality control is simple and straightforward, both to establish and to manage. However, it does require a little time and some patience, and it is

probably desirable in the beginning, when a program is first being established, to obtain help from some one who understands the mechanics of quality control.

The quality control program can be made simple or complex, depending upon the extent of the job that is to be done. A program to cover a fresh fish business might, for example, be fairly simple. On the other hand, a program designed for breaded shrimp or canned shrimp might be considerably more elaborate, while one for precooked frozen shrimp might be more elaborate still.

What does the quality control program consist of, and how is it established and operated? There are certain steps that must be taken and these are now described.

First, product standards and specifications must be established. Settling such questions becomes a matter for management, including production, sales and quality control, to decide. Next, procedures and specifications must be worked out covering the method of making the product. Obviously, these must be designed so that the product specifications can be satisfied. Next comes a system of operating controls and checks which are designed to keep watch on the operation. Finally a system of reporting and follow-up must be established.

#### *Product Specifications*

Product specifications are a fundamental part of the quality control program. The program cannot exist without them. They provide the standards which the production department must meet. Obviously, there will be some degree of deviation from the standards since no production department will always be completely successful. Product specifications, therefore, should be regarded as targets to be aimed at. It is the job of the production and quality control departments to work together to keep the score as high as possible. Usually specifications include tolerances to provide for variability in actual production.

The specifications should cover all aspects of the product as completely as possible. Ordinarily the attributes to be defined are flavor, texture, odor, color, size, net weight, number of pieces per package, and ingredients. Obviously, different products will have different specifications, but the general pattern is the same.

The selection of specifications must be given careful study, and is a matter for company management to decide. Samples which may serve as reference material for the selection of specifications may be from past production that was particularly successful, an experimental sample from the laboratory, or from the kitchen. Again, a sample of a competitor's product might serve as a reference standard.

The sales department must have a share in setting specifications, because sales personnel are the best informed group as to the product which will sell best. At the same time the production department must participate, since the product specifications finally selected must fall within the realm of practicality, and must be capable of production with available facilities. In the final result the two departments must concur. The production department must agree that the specifications selected are within their power to produce; the sales department must agree that the specifications represent the product they want to sell, and which they expect consistently to get from the production department.

It is a good idea to reduce specifications to writing. This helps to avoid confusion and misunderstanding in case a difficulty arises. The best method of doing this is to prepare an Operating Manual which covers all product and process specifications, quality control procedures and checks. This manual should be just as complete with detail as it can be made. One such manual in our organization comprises a loose-leaf book of closely typewritten pages over an inch thick.

### *Process Specifications*

Obviously, any haphazard process will not successfully and consistently produce the product for which specifications have now been written. It can readily be seen that there must be certain limitations to the process. By the preparation of process specifications these limitations can be defined to give the production department a procedure which can be expected to be successful practically all the time. These specifications then become part of the quality control program.

The process specifications should define the process as completely as possible, and it should indicate the degree of variation that is permissible at various stages in the operation. These variations are "working tolerances". As in the case of the product specifications, they should be reduced to writing, and should form part of the Operating Manual. This kind of information constitutes the so-called "know-how" of the company.

Process specifications should include an accurate description of the raw material used, and the manner in which it should be handled. For a shrimp product, for example, a specification might be written requiring that the flavor and color of the raw material to be used should possess certain characteristics. They might also state that in order to satisfy this requirement, the shrimp should have been well packed in ice for a period not exceeding a given number of days prior to processing.

In this connection the work carried on by Dr. Fieger and his associates at Louisiana State University is valuable. Their experiments have shown that palatability and flavor of fresh shrimp decreases slowly during the first five days of storage in ice, and disappears by the eighth day. From this point on the shrimp are characterized over a period of some seven days by a flat taste, or are actually tasteless. During this period, however, none of the off-flavors ordinarily associated with spoilage were noted. The scientists found that in this latter stage the cooked shrimp had lost the opaque white appearance which is characteristic of fresh shrimp, and had taken on a faint bluish translucent appearance. At the end of this second seven-day period, off flavors became evident and in the opinion of the research group, the shrimp were inedible.

This kind of information is the most valuable that can be obtained for the purpose of writing raw material specifications. It can readily be seen how the method of handling the raw material, and the time of storage, affects the color and flavor of the final product. In our frozen fillet business we have carried out a similar type of study, and written specifications for our product based upon a similar type of information.

The steps in the process obviously vary with the product to be packed. If it is a canned product, then the specifications must include method of obtaining the vacuum, hot fill or cold fill, minimum temperature for loading retorts,

process temperature and pressure, process time, etc. A frozen product will have a similar set of specifications. For a new product all these details must be worked out. For an established product, the experience and "know-how" of the operating personnel may be sufficient to supply the desired data.

One important phase of the whole program in the processing area is the training of operating personnel. The human element is always a question mark on a production line. The end product depends a great deal on how well each man on the line does his own particular job. It is reasonable, therefore, that time taken to explain carefully to each man his share of responsibility, and his duties, will be well spent. Failure on the part of an employee to carry out his job properly can spell failure for the product. Each employee can be expected to do his job adequately and properly only if he has been trained for it, and if he has an intelligent understanding of it.

### *Operating checks*

Having now settled the specifications for the product, and also for the process by which it is to be made, the next step is to install a system of checks on the actual performance. These consist of checks on the product as it comes from the line, and also checks at various key points in the production operation.

Samples of the product coming from the line should be examined at staggered intervals throughout the production period. The results are arranged alongside the product specifications, and a judgment then made as to whether the product is satisfactory or not. In the event that the results indicate a deviation from specifications, an examination of the production line is made at once to determine the possible cause. The testing procedures may include physical examination or microbiological examination, as well as subjective tests for taste, texture, odor, etc. In some companies it is common practice for the management of the company to participate in these tests, and a specified time is often set aside for them each day.

A recorder chart attached to a retort in a canning operation provides an excellent example of a check made on the performance of a given step in the production line. On this chart will be recorded the process time and temperature for each batch. Other line checks in a cannery operation may consist of precook temperatures, brine strengths, sealing machine performance, etc. Raw materials frequently are continually under observation by operating personnel at the receiving end of the line. Independent checks may also be made at intervals by quality control personnel.

Depending upon the type of operation, the amount of line checking to be done in a fish plant may be quite limited. In the production of frozen fillets, one might have raw material checks, checks for presence of bone, blemishes, or parasites, brine strengths and pick-up, freezing time and temperature, etc. Every process will have its own particular key points at which checks should be made.

### *Reports and Follow-up*

This consists of arranging all the test data obtained on the product and on the lines in report form for submission to the front office. When the need for action is indicated in these reports, it is better to place the responsibility for this directly with the production department, or with the management of the company. In this way the function of the quality control department

becomes one of making the necessary inspections, according to a pre-arranged plan, and reporting these to the proper authority in the plant for necessary action. It is usually the practice that quality control does not have the authority to make changes in the production procedure. This is left entirely to the management of the production department. Quality control should, of course, offer every assistance in attempting to resolve a difficulty without undue delays. For example, if the quality control finds something wrong along the production line, its first duty is to advise the production manager or supervisor without delay, so that corrective action can be taken without danger of lost production.

### *Conclusion*

Quality control is frequently regarded as consisting of a laboratory in which a man with a white coat does "bug counts", and makes other mysterious tests. The quality control manager is frequently recorded as a thoroughly unsympathetic detective who is always looking for trouble, and frequently causing it. These concepts are totally wrong. Quality control is a method of operation, a method of management, a method of thinking, such that production errors and risks may be reduced to a minimum. A quality control department is simply a part of that system. The quality control manager is not an unsympathetic detective, but rather a helpful constable.

A real quality control system involves a great deal more than a laboratory, a man, and a microscope. It involves an understanding of how the system works, an active and sympathetic participation by the management of the company itself.

Quality control is a useful function that can pay dividends. It requires setting high standards on the product to be produced, and determination to produce it that way. A company deciding to make use of a quality control program should first consult with some one experienced in the matter. Obviously, each operation must be worked out separately, and each may require different specifications and procedures. It is important to select the right personnel, and to obtain the full support of management.

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## **DISCUSSION**

### **Industry Section**

Discussion Leader: W. F. HAMPTON

Discussion Panel: MANUEL SANCHEZ, HARRY F. SAHLMAN,  
E. A. FIEGER, HARDEN TAYLOR

- Q. Hampton: How many shrimp are left on deck after a drag in the West Coast Mexican fishery?
- A. Pinson: Up to 2000 pounds, although the average drag (1½ to 2 hours) would yield 200 to 250 pounds.
- Q. Hampton: What precautions are taken, if a large catch is made, to protect the shrimp while on the deck?
- A. Pinson: Ice is shoveled over the shrimp and mixed thoroughly.
- Q. Fieger: Do you place ice on bottom and top?
- A. Pinson: Yes.