assist in the removal of the coatings or fats. This means that less clean-out material may be produced minimising this additional source of rework. In addition, finished products contain less cross contamination and are therefore of a higher quality.

A thorough determination of proper process procedures, followed by the training of employees to ensure their implementation, is vital in assuring that finished products are up to standard and not destined for the rework bins. The consistent use of suitable raw materials, with predetermined quality levels, is also an important factor here.

Once rework is generated, however, it is very necessary to understand where the rework can be best utilised. Well thought out procedures (on how to reclaim and use the rework) should be determined for all sectors of the production facility. However, adequate pre-planning may not be possible. Rework is not always predictable and one cannot invariably make good advance decisions on its possible use.

There is one thing that it is essential for all manufacturers to take into account, that is the maximum permitted usage levels of rework *must* be carefully determined. These maximum levels must then be monitored and strictly enforced.

17.3 Constraints

Many constraints limit the possible utilisation of rework. These include:

- Legal;
- Functional;
- Flavour;
- Hygiene;
- Quality control (including lot tracking);
- Allergens.

Legal and regulatory issues largely involve the labelling of the finished product into which the rework is incorporated. First, one must be sure the rework ingredients can be legally used according to the laws of the country where the final product (now containing the rework) is sold (see Chapter 28).

A major issue is assuring that the final product's ingredient statement or declaration includes all the constituents of the rework. This is vital, as greater emphasis is now being placed on full label disclosure of all ingredients, including those used at trace levels. Nowhere is the issue more acute as with allergenic constituents. Many individuals are sensitive to a wide variety of proteins. Their responses to extremely low levels of these proteins can be life threatening. Their only defence is one of avoidance. It is therefore vital that all rework ingredients appear on the final finished product label declaration, for example this product may contain nuts.

Legislation has been enacted in many countries requiring special identification of allergens. If any allergens can be carried in with rework, it is mandatory

that the allergen be highlighted in accordance with the specific national regulation. However, while a manufacturer needs to label if there is any possibility of introducing an allergen via rework, they must also be careful not to label if the allergen will not be present. Otherwise, there will be little available for the person with allergies to eat. Manufacturers should consider moving their allergen containing products (and rework) to separate, specialised facilities, ensuring their other products are not exposed to allergen.

Mandatory nutrition labelling has also become the norm in many countries. Although some deviation from stated values is permitted, to allow for differences in analytical methods as well as raw material variations, improper usage of rework could result in values which breach the regulatory standard.

Many companies have a "like into like" procedure for rework. Although this will help control the inadvertent introduction of improper ingredients, it is by no means enough to entirely avoid the addition of undeclared components. A thorough review of each lot of rework must be undertaken to ensure the ingredient label of the finished product is not compromised. For product consistency every effort should be made to use a consistent percentage of rework into the product. For example do not use 25% rework in one batch and 0% in the next.

Additionally, many countries have standards of identity for finished goods. These rules commonly dictate mandatory ingredient levels, as well as prohibiting the presence of certain components. Decision on the use of rework batches must take into account any compositional requirements for the finished product.

The maintenance of functionality in the finished product is of utmost importance and it is vital that any rework ingredients do not interfere with its processing or textural characteristics. Perhaps the biggest number of problems arises when rework alters the functional properties of the fat base. Incompatible fats in rework could render a chocolate or coating susceptible to poor texture, fat bloom and inconsistent processing temperatures (see Chapter 7).

Flavour is always critical for the manufacturer of any food item. Variability in flavour often occurs due to the natural deviations within the basic raw materials. The use of rework can exacerbate the already complicated job of maintaining a consistent flavour profile. The ability of the general public to detect changes to a product's flavour should never be underestimated.

Hygiene is also a very important issue (see Chapter 25), and the use of rework can greatly increase the risk from microbiological and other contamination. First of all, rework is subjected to extra handling, which in itself increases the opportunity for contamination. Rework can often be left in storage for extended periods of time (while it awaits the right "home" or until enough has been produced to be worth reprocessing); the longer the period the bigger the risk of infestation from insects.

The age of the chocolate rework needs to be carefully monitored. A general rule is not to hold rework longer than 25% of the shelf life of the existing finished