

PEELING

Peeling is used in the processing of many fruits and vegetables to remove unwanted or inedible material, and to improve the appearance of the final product. The main consideration is to minimise costs by removing as little of the underlying food as possible and reducing energy, labour and material costs to a minimum. The peeled surface should be clean and undamaged. There are five main methods of peeling:

1. flash steam peeling
2. knife peeling
3. abrasion peeling
4. caustic peeling
5. flame peeling.

Flash steam peeling

Foods (for example root crops) are fed in batches into a pressure vessel which is rotated at 4–6 rpm. High-pressure steam (1500 – 103 Pa) is introduced and all food surfaces are exposed to the steam by the rotation of the vessel for a predetermined time, which differs according to the type of food. The high temperatures cause rapid heating of the surface layer (within 15–30 s) but the low thermal conductivity of the product prevents further heat penetration, and the product is not cooked. Texture and colour are therefore preserved. The pressure is then instantly released which causes steam to form under the skin, and the surface of the food ‘flashes off’. Most of the peeled material is discharged with the steam, and water sprays are needed only to remove any remaining traces. This

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type of peeler is gaining in popularity owing to the lower water consumption, minimum product loss, good appearance of the peeled surfaces, a high throughput (up to 4500 kg h⁻¹) with automatic control of the peeling cycle, and the production of a more

easily disposable concentrated waste (Anon., 1984b).

3.4.2 Knife peeling

Stationary blades are pressed against the surface of rotating fruits or vegetables to remove the skin. Alternatively the blades may rotate against stationary foods. This method is particularly suitable for citrus fruits where the skin is easily removed and there is little damage or loss of fruit.

3.4.3 Abrasion peeling

Food is fed onto carborundum rollers or placed into a rotating bowl which is lined with carborundum. The abrasive surface removes the skin and it is washed away by a copious supply of water. The advantages of the method include low energy costs as the process operates at room temperature, low capital costs, no heat damage and a good surface appearance of the food. Irregular product surfaces (for example 'eyes' on potatoes) may mar the appearance of the peeled product and require hand finishing. The limitations of the method are:

- a higher product loss than flash peeling (25% compared with 8–18% losses, for vegetables)
- the production of large volumes of dilute waste which are difficult and expensive to dispose of
- relatively low throughputs as all pieces of food need to contact the abrasive surfaces.

An exception is the peeling of onions where the skin is easily removed by abrasive rollers at production rates of up to 2500 kg h⁻¹.

3.4.4 Caustic peeling

A dilute solution of sodium hydroxide (named lye) is heated to 100–120°C. In the older method of lye peeling, food is passed through a bath of 1–2% lye which softens the skin and the skin is then removed by high-pressure water sprays. Product losses are of the order of 17%. Although once popular for root crops, this method causes changes in the

colour of some products and incurs higher costs. It is now largely replaced by steam or flash peeling. A development of lye peeling is named dry caustic peeling. Food is dipped in 10% sodium hydroxide and the softened skin is removed with rubber discs or rollers. This both reduces water consumption and product losses and gives a concentrated skin 'paste' which is more easily disposed of.

3.4.5 Flame peeling

Developed for onions, this peeler consists of a conveyor belt which carries and rotates the food through a furnace heated to 1000°C. The outer 'paper shell' and root hairs are burned off, and the charred skin is removed by high-pressure water sprays. Average product losses are 9%.