



FRYING

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FRYING

- Frying is a unit operation which is mainly used to **alter** the eating quality of a food.
- A secondary consideration :
 - preservative effect that results from thermal destruction of micro-organisms and enzymes,
 - reduction in water activity at the surface of the food

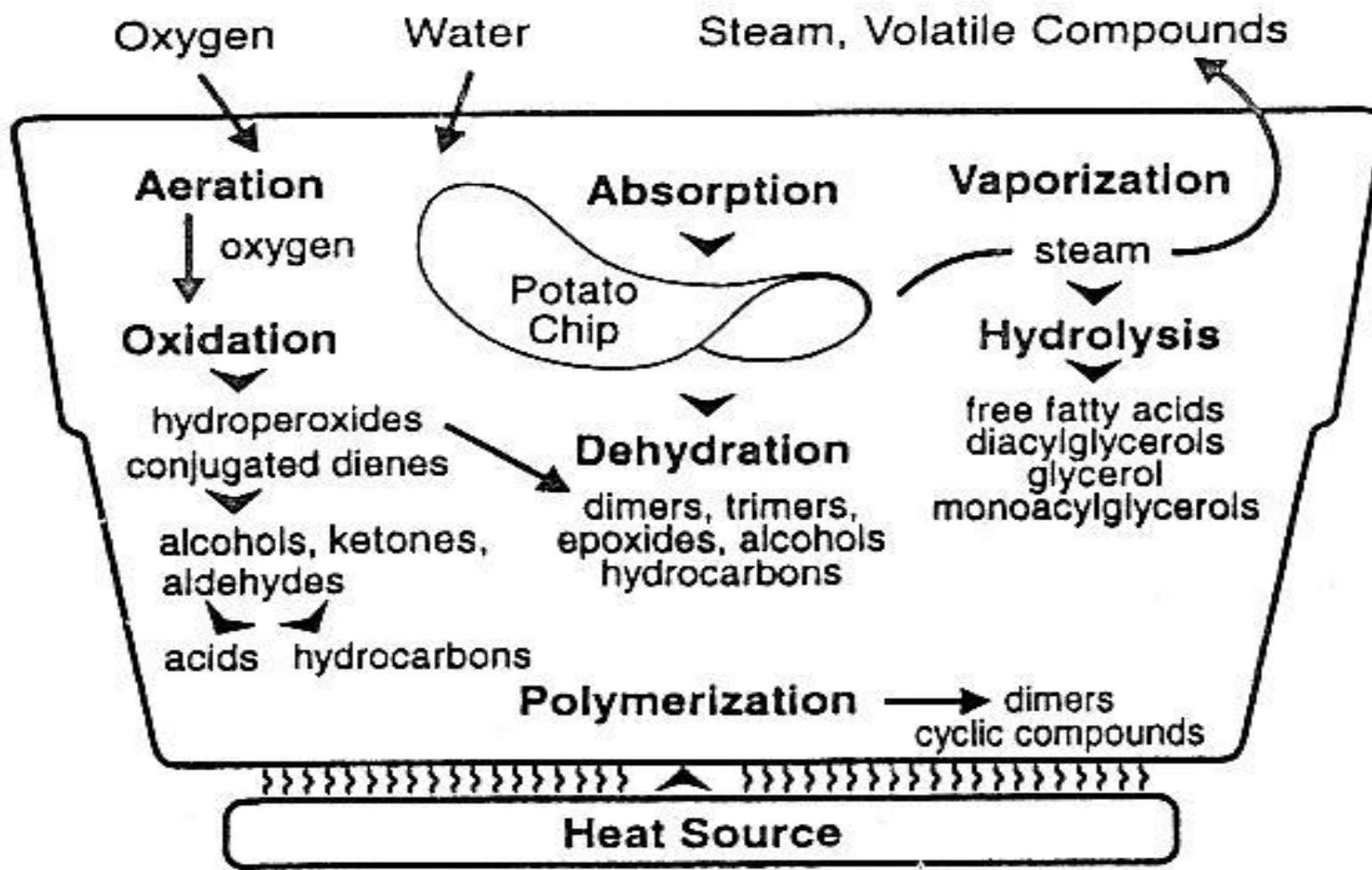
FRYING

- The shelf life of fried foods is mostly determined by the moisture content after frying:
- foods that retain a moist interior
 - have a relatively short shelf life
 - owing to moisture and oil migration during storage
 - for example doughnuts, fish and poultry products.

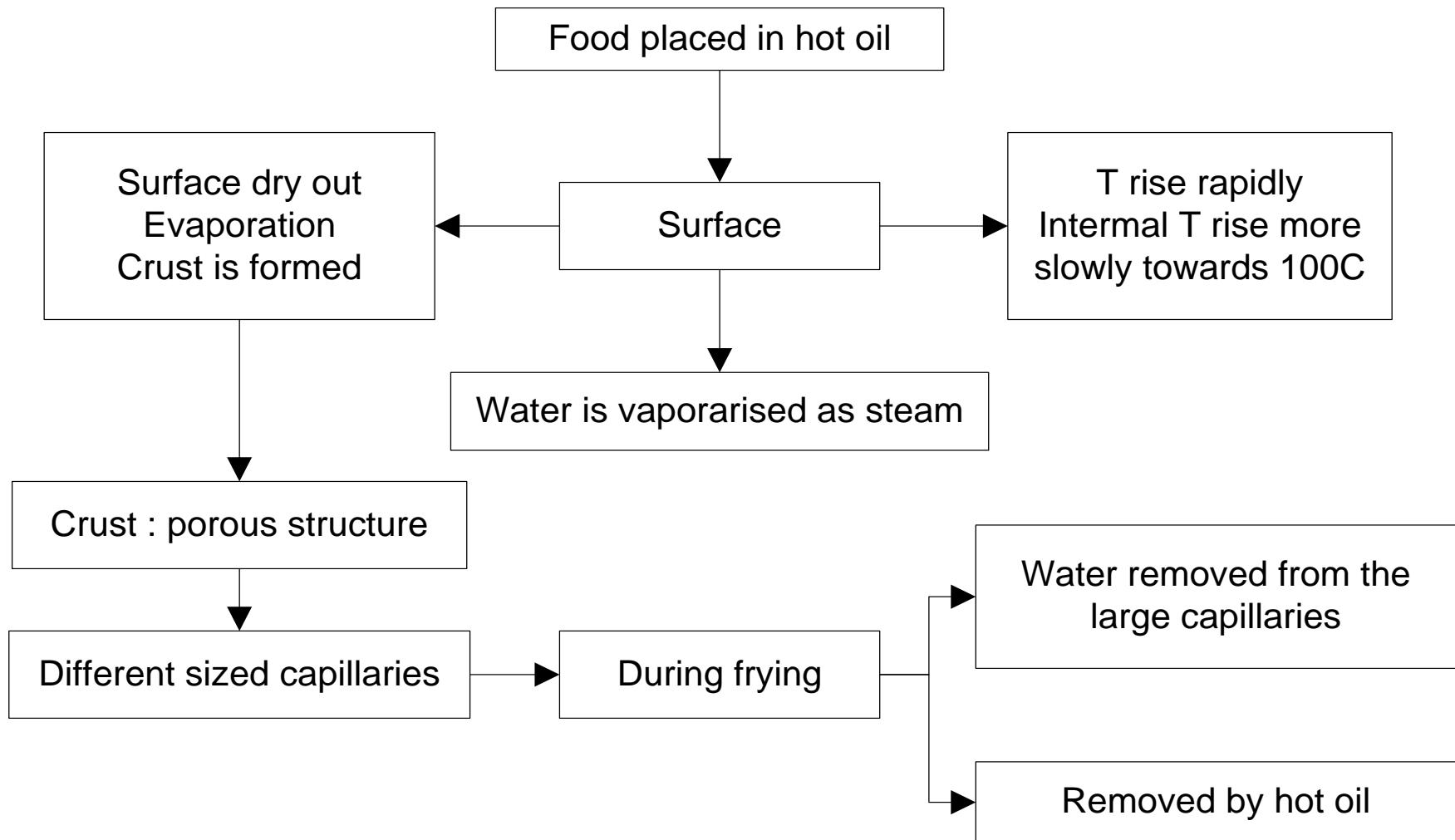
FRYING

- Foods that are more thoroughly dried by frying,
 - have a shelf life of up to 12 months at ambient temperature
 - The quality is maintained by adequate barrier properties of packaging materials
 - correct storage conditions.
 - for example potato crisps,

THEORY



THEORY



THE TIME TAKEN FOR FOOD TO BE COMPLETELY FRIED DEPENDS ON

- the type of food
- the temperature of the oil
- the method of frying (shallow or deep-fat frying)
- the thickness of the food
- the required change in eating quality.

MAIN METHODS OF FRYING

- **SHALLOW FRYING**
- **DEEP-FAT FRYING.**

SHALLOW FRYING

Definition

- Shallow frying is the cooking of food in a small quantity of pre-heated fat or oil in a shallow pan or on a flat surface (griddle plate).

SUITED TO

- foods which have a large surface-area-to-volume ratio
- Heat is transferred to the food mostly by conduction



HASIL

- Pencoklatan tidak merata
- Koefisien pindah panas dengan wajan tidak merata
- Permukaan bahan pangan tidak merata

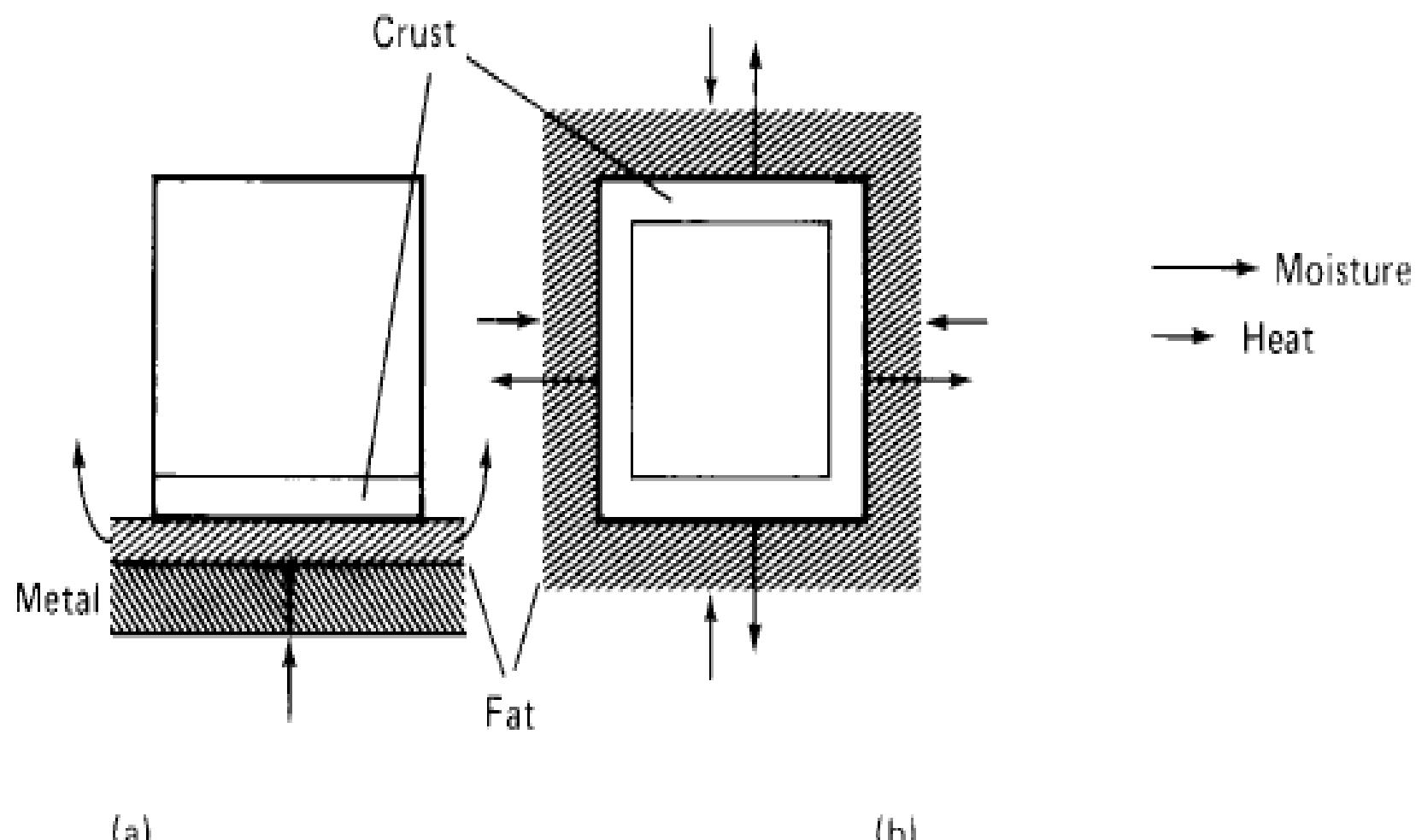


Fig. 17.1 Heat and mass transfer in (a) shallow frying and (b) deep fat frying.



DEEP FRYING



DEEP FRYING

- Ciri utama : Makanan terendam minyak dalam penggorengan
- Panas : konduksi-konveksi
- Sangat cepat
- Perlakuan panas seragam
- Warna lebih seragam

- Cocok untuk segala jenis bahan pangan dengan berbagai ukuran
- Luas permukaan tinggi cenderung menyerap minyak lebih banyak



Perubahan pada bahan pangan

- Pembentukan crust
- Perubahan citarasa, aroma, tekstur, warna
- Pengurangan air
- Penyerapan minyak
- Kekurangan vitamin
- Gelatinisasi pati
- Denaturasi/koagulasi protein

PEMILIHAN JENIS MINYAK

- Stabilitas minyak
- Kualitas minyak
- Biaya
- Kemudahan penanganan
- Effisiensi minyak dalam proses penggorengan

PROSES PENYERAPAN MINYAK PADA BAHAN PANGAN

SURFACE WETTING

CAPILLARY ACTION

VACUUM ABSORPTION

FAKTOR MEMPENGARUHI JUMLAH MINYAK DALAM BAHAN

KUALITAS MINYAK

SUHU DAN LAMA PROSES

BENTUK DAN POROSITAS PRODUK

KOMPOSISI PRODUK

PRE-PERLAKUAN BAHAN

PENGARUH PANAS DAN TRANSFER PANAS

- Tergantung
 - Bentuk makanan
 - Temperatur

PROCESS CHANGE IN OILS HEATING AND FRYING

- Physical change
- Chemical change



PHYSICAL CHANGE

- Panas dari minyak ke makanan
- Air menguap
- Minyak terserap

PHYSICAL

- How Food Fries
- How heat oil
- Degradation product interact with fried
- Optimize the frying process

CHEMICAL CHANGE

- Asam lemak
- Carbonil
- Polymeric compound
- Penurunan fatty acid unsaturation

KERUSAKAN SECARA KIMIA

- Hydrolisis
- Oxidation
- Polymeration
- Form volatile +

PERUBAHAN KIMIA

TERGANTUNG

- Food types
- Frying condition
- Oxygen availability

KEAWETAN TERGANTUNG

- Kadar air produk akhir
 - Poultry kadar air tinggi
 - Keripik kentang kadar air rendah

PRODUK AKHIR

- Kadar air 3 – 30%
- Waktu
- Luas permukaan
- Teknik menggoreng
- Jenis bahan pangan

LAMA/WAKTU MENGGORENG TERGANTUNG

- Jenis bahan pangan
- Suhu minyak
- Kriteria mutu produk akhir
- Metode penggorengan
- Ketebalan bahan pangan

- Suhu minyak // → laju penurunan mutu
minyak //
- Boiling yg dahsyat ≈ banyak minyak yg muncrat
- Suhu minyak // → produk mempunyai kerak di permukaan dan basah di bag. dalam

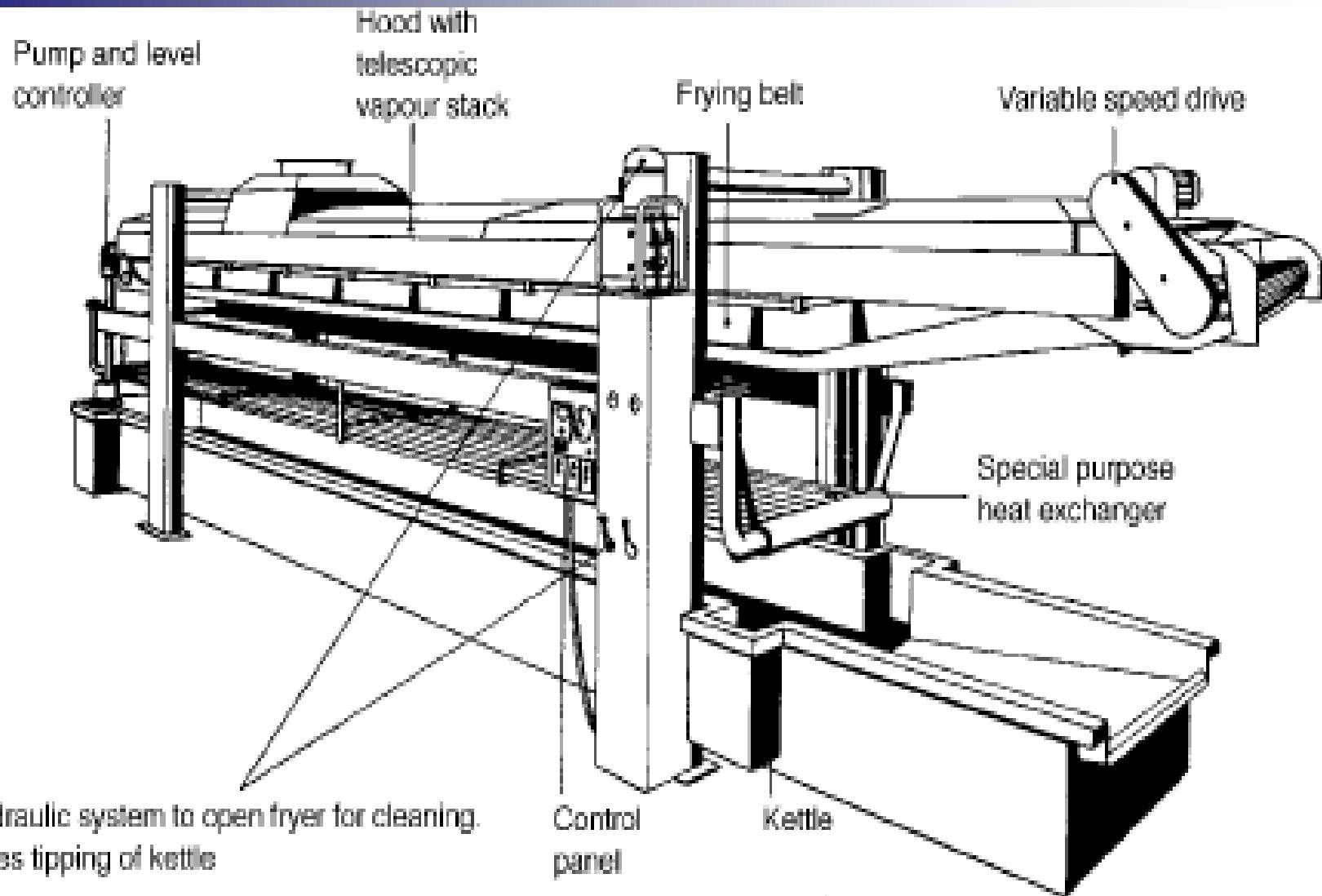


Fig. 17.2 Continuous deep-fat frier.
(Courtesy of Coat and Fry Ltd.)

CONTINUOUS FRYING



Vacuum Frying

- a deep-frying device housed inside a vacuum chamber.
- It was originally developed for potato chip production

