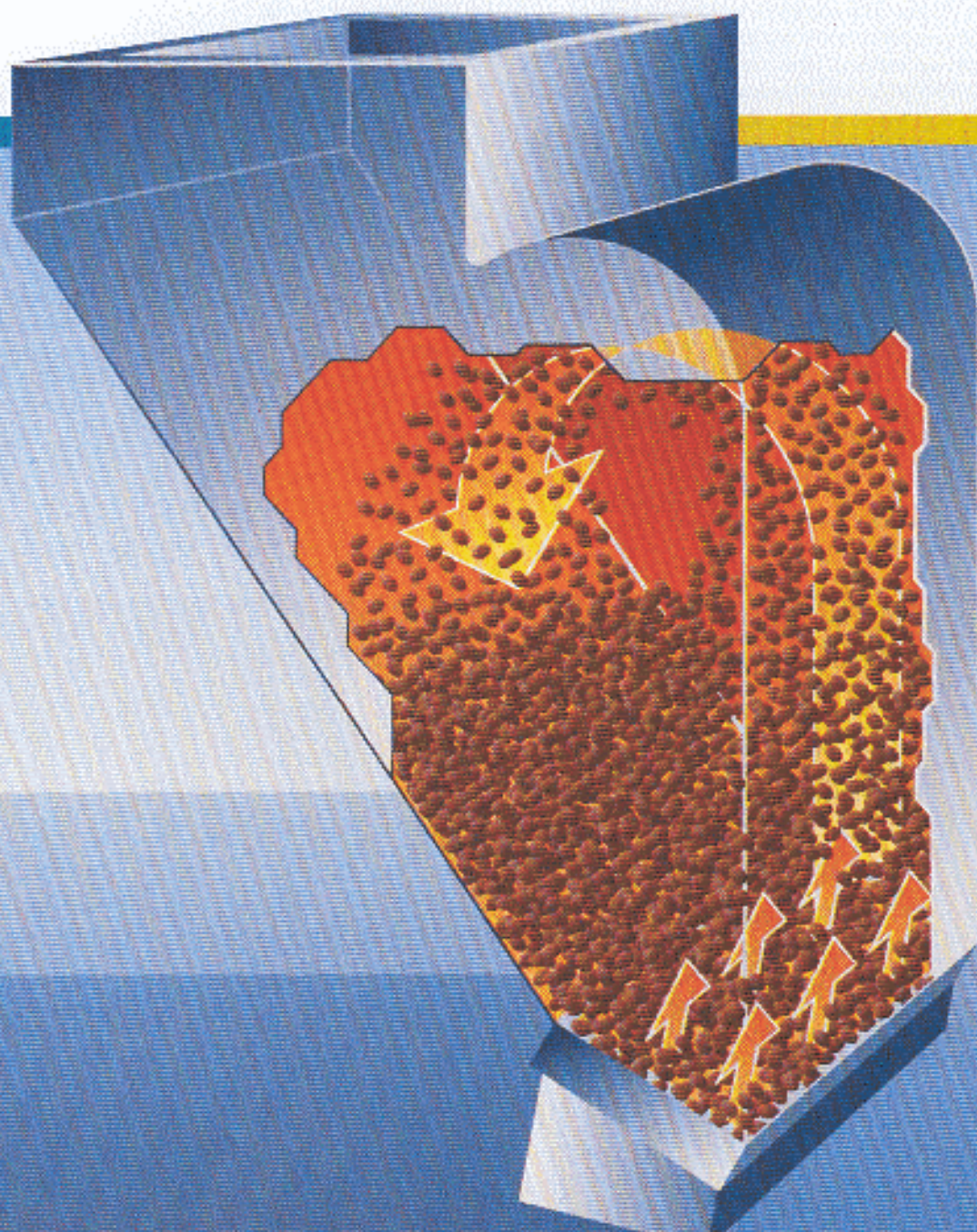




Rotating Fluidized Bed Roaster



RFB – Rotating Fluidized Bed Roaster

The RFB-Process

The RFB is a batch roaster. The complete system consists of a roasting and cooling section, both operate separately from each other. The main aggregates – the roasting and cooling chamber – are geometrically of identical shape. It is the shape of the chambers which leads to what is described as rotating fluidized bed. The bottom of the chambers are differently perforated plates through which the heating or cooling medium enters the chambers forming a fluidized bed with the coffee beans. The coffee batch is lifted and bowl-like conveyed from one side of the chamber to the other where it slides back to the bottom plate thus rotating around an imaginary axis.

At the lowest point of the chamber the discharge gate, as part of the vertical chamber wall, is located. This discharge gate is designed in such a way that the complete batch of roasted coffee beans discharges by gravity within five seconds. At the side of the chamber a sight glass is provided through which the roasting respectively cooling process can be observed. For chamber inspection and maintenance purposes the sloping wall of both chambers has a large removable cover.



RFB chamber

Recirculation

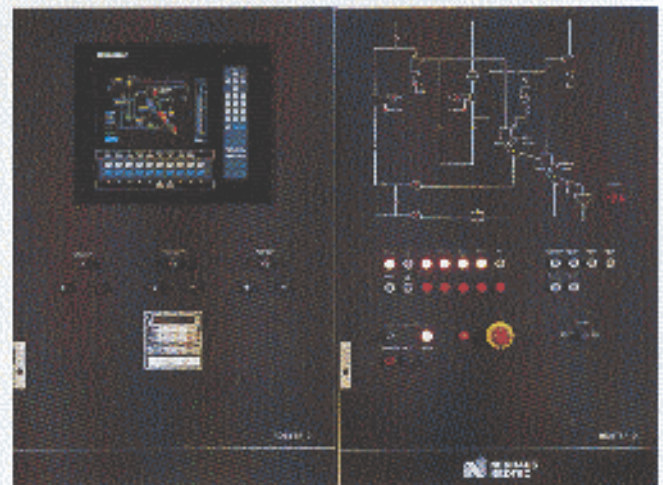
The heating gases are recirculated. A fan provides the required velocity and pressure for the heating medium to fluidize and rotate the coffee during roasting. When the heating gases recirculate they pass through a channel burner which compensates for lost heat during roasting. The burner capacity allows the system to warm-up to its required temperature level within 10 Minutes so that the plant can be operated automatically already shortly after start-up.

Bypass

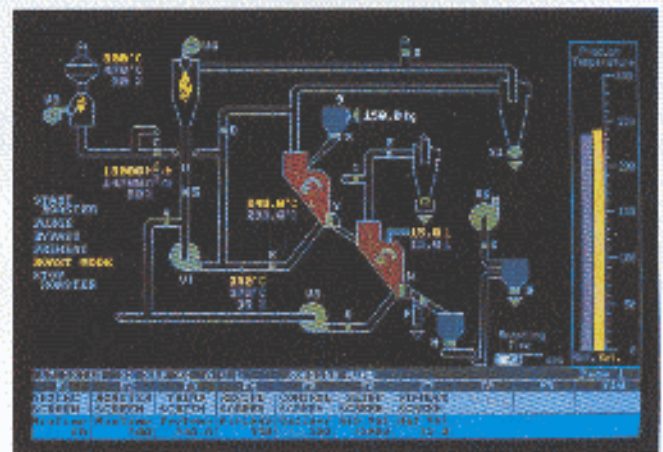
After the heating medium has transferred thermal energy to the coffee it passes through a cyclone to effectually separate dust and chaff prior to entering the channel burner. During feed and discharge of the roasting chamber the heating medium bypasses the chamber maintaining temperature, volume and pressure which has the advantage of energy savings and the possibility that roasting of the next batch can commence instantly at the required temperature.

Catalytic afterburner system

Excess gases of the roasting process are let out to atmosphere.



Typical RFB control panel



Screen display

through a fue stack. For cleaning of these exhaust gases catalytic afterburner systems are optionally available. The emission out of the cooler system is cleaned economically by using the roaster catalyst during the quench cycle. A damper is provided for economical control of the amount of exhaust gases.

Cooler

Cooling of roasted coffee is done in the same fluidized and rotating way as in the roasting chamber. For quenching purposes a number of spray nozzles are positioned in the upper part of the cooling chamber. Quenching starts automatically and instantly upon discharge of hot coffee beans from the roasting chamber.

After the cooling cycle is terminated, the coffee beans discharge into a receiving bin. Like in the roasting chamber the discharge is effected by an outlet gate. The cooler fan may take the cooling air from the room or from the outside.

Measuring-, Control- and Regulating Systems (MCR)

The operation of the plant is effected by a PC showing all process data of the plant on a screen display.

Further screen displays, such as input of coffee types, plant parameters and controller parameters with temperature curves, facilitate the plant operation.

Features of the RFB

- Optimum heat transfer in a fluidized bed allows short roasting cycles
- Low energy requirements due to recirculation of heating medium
- Energy savings due to water quenching in the cooler
- Installation is flexible and adaptable to site conditions
- No moving parts – little maintenance – easy to operate
- Effective cleaning of the roaster and cooler exhaust

If a visualization is not requested, the hardware controllers are included in the control panel.

Both designs have a PLC which controls and monitors the plant. All interferences are recorded and printed out. If requested, a protocol of the charges is also printed out.

The required volume of the heating medium is controlled by an adjustable damper. The temperature of the heating medium is measured before it enters the roasting chamber and kept constant by a controller.

The progress of the roasting cycle is controlled inside the roasting chamber by actual measurement of coffee bean temperature. When the predetermined temperature is reached which governs the degree of roast, the coffee beans automatically discharge from the chamber. The next batch can enter the chamber for roasting.

A damper for the required volume of cooling air is preset and does not need adjustment or control. The time of cooling depends upon the roasting time or ends automatically after a maximum set cooling time.

All drives, gates and dampers are interlocked logically and applicably to requirements of the system's process engineering. In case of breakdown of any important device the automatic program will be interrupted.

Technical Data

- Batch sizes : from 15 kg to 300 kg
- Roasting cycles : 1.5 to 8 Minutes
- Capacities : from 300 kg/h to 3000 kg/h
- Energy requirements : Thermal 0.280 kWh/kg
Electric 0.045 kWh/kg

Technical data are subject to alteration

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