

Hot expansion

IN AN EXTRUDER, RAW MATERIALS ARE SUBJECTED TO A LOT OF STRESS DUE TO THE HARSH AND HOT PROCESSING CONDITIONS.

+ Extruders are used for many applications – for pregelatinized flours for improvers, for making biscuits, cereals, peanut flips or dry flat breads. Raw cereal materials can be formed by hot extrusion or extrusion cooking. At temperatures far beyond 100 °C, the starch in flour or semolina gelatinizes. When the product is discharged through the die openings, water evaporates from the products resulting in an immediate expansion of the product. After a short time, the expanded cereal products will solidify and can be further processed. For extrusion of cereal products, manufac-

turers use single-screw or twin-screw extruders.

Single-screw extruders: + axial open system + helix in the shaft + conical housing

Twin-screw extruders: + co-rotating + counter-rotating + conical screw and shaft design

Extruder design and extrusion process

The screws inside the extruder are powered by a drive unit with motor. Dry raw materials are metered into the feeder and transported from there into

the extruder's housing. Liquid is added and the materials are mixed and conveyed by one or two screws. The resulting pumpable mass is compressed and heated. Temperature and pressure applied on the cereal components cause gelatinization of the starch. If needed, other masses can be incorporated in the product. Upon forced discharge of the mass through the die openings, the extrudate expands and is then cut. The properties of the final product are depending on the configuration of extruder screws, speed, heat introduced, product density, filling level, duration of process, and die opening. +++



++ figure 1
Extruder made by Bühler AG, Switzerland



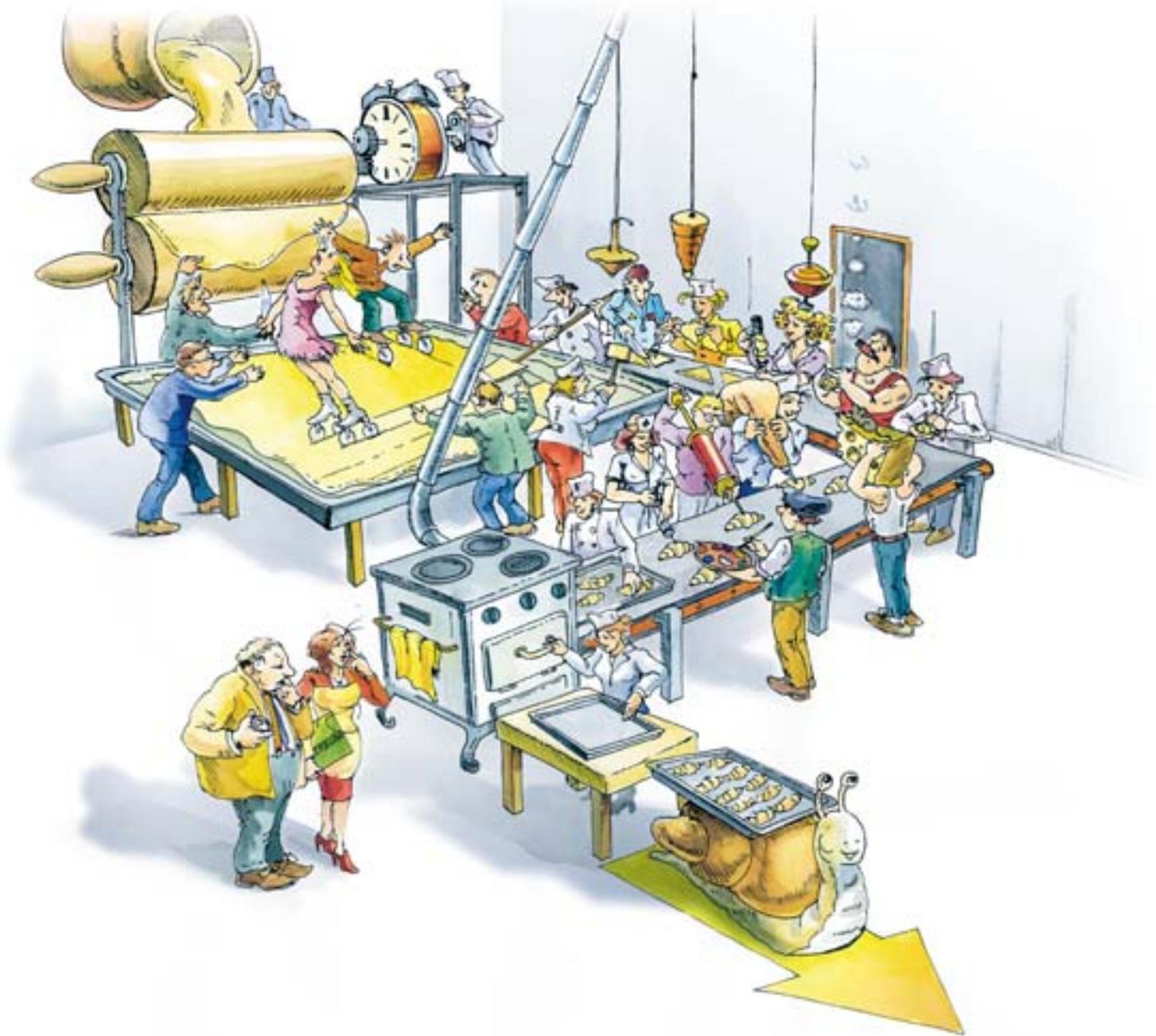
++ figure 2
Extruder made by Schaaf, Germany



++ figure 3
Extruder made by Amandus Kahl GmbH & Co.KG, Germany

Suppliers

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| Amandus Kahl GmbH & Co. KG, Reinbek, Germany, www.amandus-kahl-group.de | Extruders, capacity 200 kg to 4 tons/hour |
| Anko Food Machine Co., LTD, Taipei, Taiwan, www.anko.com.tw | Cookie extruders and others filling and forming machines |
| APV Baker, Peterborough, Great-Britain, www.apvbaker.com | From laboratory extruders to twin-screw extruders in various designs |
| Brabender OHG, Duisburg, Germany, www.brabender.com | Laboratory and pilot-plant extruders |
| Bühler AG, Uzwil, Switzerland, www.buhlergroup.com | From smallest extruders for laboratory use to single-screw and twin-screw extruders for directly or indirectly processed cereals |
| Canol s.r.l., Santorsa, Italy, www.canol.it | Various extruders |
| Clextral SA, Firminy/St Etienne, France, www.clextral.fr | Specialist for twin-screw extruders |
| Döinghaus GmbH, Delbrück, Germany, www.doeinghaus.de | Development and construction of complete production lines for the continuous production of fine bakery wares, including integration of several extruders |
| Grondona Mamba s.r.l., Origlio/Varesa, Italy, www.grondona-mamba.com | Single-screw extruders for snacks |
| Hosokawa Bepex GmbH, Leingarten, Germany, www.bepex.de | Plants to pelletize dry, moist or plastic materials |
| INDOPOL Group, Neu Delhi, India, www.isolutionsuk.com or http://isolutionsuk.gupta.info | Single-screw extruders with a capacity of up to 600 kg/hour |
| Lihotzky Extruder, HB-Feinmechanik GmbH & Co KG, Metten, Germany, www.lihotzky.de | Counter-rotating, tailor-made twin-screw extruders |
| Meincke A/S, Skovlunde, Denmark, www.meincke.dk | Single depositor/extruder and wire-cutter for various masses and doughs |
| Minipan s.r.l., Massa Lombarda, Italy, www.minipan.com | Co-extruder for filled bakery items |
| Rademaker B.V. Food Processing Equipment, Culemborg, The Netherlands, www.rademaker.nl | Plants for chips production |
| Robert Bosch GmbH, Stuttgart, Germany, http://vt.bosch.com | Fill extruders, co-extruders, tri-extruders, extruder cookers and more |
| Schaaf Technologie GmbH, Bad Camberg, Germany www.schaaf-technologie.de | Extruders with a capacity of up to 500 kg/hour |
| Werner & Pfleiderer, Industrielle Backtechnik, Tamm, Germany, www.wpib.de | Twin-shaft mixers for the preparation of all types of biscuit doughs, e.g. doughs for crackers, hard biscuits, soft and wire cut biscuits |



There must be a better way to make croissants ...

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