



COMPENDIUM

Puffing

WHAT IS THE MEANING OF PUFFING?

Puffing is a system designed for the product (whole grain) to be fed to a pressure vessel, which is thereafter locked with a special device. The product is exposed to overheated steam with high pressure. By reducing the pressure like a blow, the water contained in the product evaporates and transforms the starch. In continuously doing so, the product expands up to ten times of its original size. The product puffs up. The main characteristics of puffed products are:

- The structure of the kernel respectively the form of the raw grain can still clearly be recognised as such
- The puffed product has a volume up to ten times bigger than the raw material
- The starch is 100% gelatinized
- The texture becomes fine and is very nice to crunch

WHAT CAN BE PUFFED?

Basically, all kinds of grain can be puffed. To prepare the grain for the process it has to be cleaned and according to requirements, slightly hulled. The type of preparation of the grain depends on the required end product and is chosen individually in each case. For the preparation of the grain, conventional milling processes and machines are being applied. Apart from grain, tobacco respectively the stalks and panicles broken out of the tobacco leaves are also puffed. The so cracked screenings from tobacco processing may be added again to various tobacco mixtures after granulation and cutting.

WHAT KIND OF PUFFING PROCESSES ARE THERE?

With puffing we distinguish between direct and indirect expanding raw product:

With **direct puffing-expansion** the raw material is supplied to the puffing process in its original form which means without prior hydrothermal processing (for example cooking / shaping). Conventional representatives of the direct expansion are rice, hard and soft wheat, dinkel, barley, oat, amaranth, etc. Also tobacco respectively tobacco stalks belong to the category of direct expansion.

With **indirect puffing-expansion** the raw material is first cooked or shaped in extruders or pasta presses then dried and only then supplied to the puffing process. The advantage of this technique - in comparison with the direct expansion extruding technique - lies in the fine, even and nice to crunch texture. The pellets to be expanded may contain several components. In this way, almost any shape can be achieved.

Indirect puffing-expansion is a very young technology and is industrially applied only in countries with highly developed cereal markets as e.g. the USA. It is a mere question of time until further markets will as well make use of this extremely interesting and manifold technology.

WHAT DISTINGUISHES SYSTEM BICHEL FROM CONVENTIONAL SYSTEMS?

With conventional puffing plants the reaction of pressure drop involves a gun-like detonation causing violent and sudden rebound. This results in extremely heavy wear of machine parts. With the Bichel System, there is no detonation thanks to a completely new process technology. Also the forces of the rebound are only minimal and wavy. Puffing plants Bichel System are very low in maintenance and wear and therefore a high operational readiness. The plants work fully automatic and require no permanent presence of the operator.

WHAT DISTINGUISHES PUFFING FROM OTHER EXPANSION PROCESSES?

Puffing is not to be confused with "popping". Popping takes place with pressureless, respectively with low pressure devices. Only specific types of maize with a distinct germ can be popped (pop corn).

Puffing is neither to be confused with extruding. The difference in extruding lies in paste made out of flour which is cooked in a worm under certain mechanical shearing forces. The worm configuration feeds the product through various zones (delivering, mixing, cooking and maybe deaerating, pressing, expanding at the nozzle. Extruded products are in fact "overprocessed" products and forcibly require further refinement, mostly in the form of coating with sugar, colour or flavouring. The texture is uneven, hard and brittle and tends to stick to the teeth. Grain extrusion is a very young technology (approx. 20 years old). It is for all ranges of capacity relatively inexpensive. Thanks to its matured technique and inexpensive production it is well established in the cereal market.