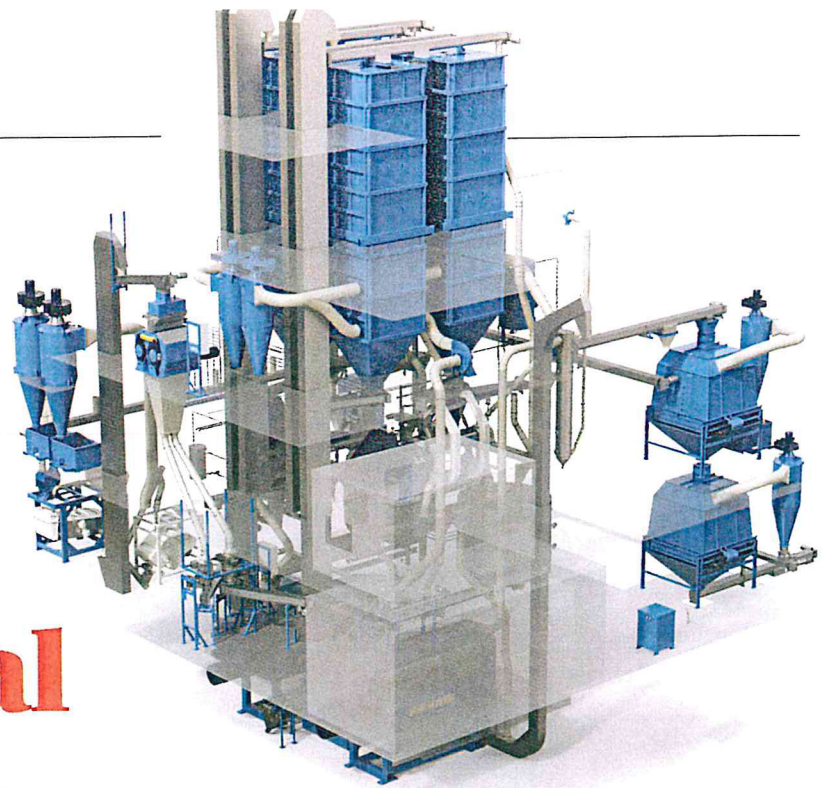


Extrusion-pressing offers a mechanical alternative to the traditional method of soyabean processing, which involves the use of volatile hexane as a solvent

The mechanical alternative



The mechanical processing of soyabean is a convenient alternative to chemical extraction, particularly for local processing at small and medium capacities of up to 400,000 tonnes/year.

Extrusion-pressing using screw presses and extruders offers a number of benefits, primarily low operating costs and the elimination of the risks associated with the handling of the solvent, hexane.

The traditional method of soyabean processing extracts oil from dehulled and flaked beans by a chemical solvent, usually hexane. Hexane is a very volatile and explosive substance, requiring strict safety measures. Being a toxic substance, hexane also needs to be removed entirely from the oil and meal, which is an energy-hungry process that requires a large amount of steam to achieve legislative limits for the residual hexane content.

Hexane free

Mechanical processing involves the extrusion of dehulled, or even hulled soyabean, with a subsequent pressing of the oil in a screw press.

As there are no chemical solvents involved throughout the entire process, there are also no special safety measures regarding toxicity and explosiveness.

Thanks to its compact dimensions, the whole technology demands less installation space, further reducing investment costs.

The availability of presses and extruders at different performance capacities allows the construction of a line at a capacity from 2,000-400,000 tonnes/year of soyabeans. These capacities fit well with the current trend of local

processing of agricultural commodities for the production of feed and food. The products of mechanical extraction are just raw vegetable oil and press cake, with no residual solvents.

Press cake – an added value

Mechanical pressing of oil offers a number of advantages over chemical extraction. The resulting oil contains less phospholipids, which makes subsequent oil refining easier. There is also a higher content of phospholipids in the cake, an advantage for its use in the feed industry.

Pressing with extrusion combines the advantages of both processes. Extrusion causes disruption of cellular structures, the removal of anti-nutritional substances, gelatinisation of starch and the heating of raw soyabeans.

This increases the oil yield in the subsequent pressing process as well as improving the digestibility of the cake.

Increasing heat exposure affects the soya proteins in a way that protects them from digestion by the rumen organisms in ruminants, increasing their usability for nutrition. Conversely, a lower heat exposure in extrusion-pressing leads to higher digestibility of protein, which is very convenient for the nutrition of monogastric animals such as pigs, poultry, and fish.

Because mechanical extraction does not involve the perfect separation of vegetable oil from the seeds, the residual press cake contains more oil (around 6-8%) and therefore more metabolisable energy compared to chemically extracted soya meal. In addition, the oil in the cake is bound in the cells, rather than

distributed freely, which further improves its use, especially in ruminants. This 'bound' oil also increases the mechanical resistance of granules in the production of granular compound feed from the cakes.

Consequently, due to the different feed-related qualities, press cake is not just a simple replacement for extracted meal. It is a different product, superior in many important characteristics, and thus also in its market value.

Energy savings

During extrusion and pressing, a considerable amount of heat is produced, particularly in the form of flash steam at the outlet of the extruder, and from the heat convection from the screw press.

A complex multi-stage recuperation system can recover up to 40 kWh/t of energy, which brings significant operational savings and makes mechanical extraction 150 kWh/t more energy-efficient than chemical extraction.

The low energy demands of the process and the possibility of local processing of locally grown soyabeans help reduce the carbon footprint of the production of soya cake-based feed.

A significant advantage of local processing is the ability to control quality all the way from the seed to the final product, including the processing of certified products such as GMO free, Certified Organic and Clean Label.

This article has been supplied by Czech engineering firm Farnet, which last year installed an extrusion-pressing system with a processing capacity of 65,000 tonnes/year for soyabean processing for Gamota JR sro in Slovakia