

AKT - KIX Drying Technology

A food recovery revolution

Relevance

Up to 40% of all food produced for human consumption around the world in any one year is lost in the form of spoilage. Much of this food waste in urban communities is produced at the home or in urban supermarkets and in many instances is destined for landfill. In addition to these losses are those which accrue in on-farm production or in losses in food processing and packaging factories. Large quantities of grain are also lost due to spoilage from moisture, mould, transportation and handling methodologies. In the instance of food wasted in homes or market places much of the material is pre-packaged in plastic and paper and is difficult to unpack without considerable losses. A lot of these food products which are diverted from landfill are simply macerated and sent to compost which, although recovering the products to an extent, also degrades the value of the product to lesser values in terms of food production. The KIX technology developed by AKT International over the past 40 years has principally focussed on adding value to waste streams from industrial processes in the fishing and similar industries. In more recent times, it has developed new techniques of combining material streams and is now ready to set its sights on the organic discards of the domestic and commercial world, where close to 100% of material streams are recoverable.

Innovation

AKT conducts its own R&D to ascertain the best opportunities for use of its technology. One of the refinements in recent years has been the separation of packaged foods from its packaging. The packaged food is put through the machine with a range of packaged and unpackaged goods included. The materials are macerated at high speed and held in a fluidised bed for 3 seconds at a temperature of 350 deg C (662 deg F). This express drying is comparable in efficiency to freeze drying but at a fraction of the cost. In this process the proteins in the food are turned to a grainy powder. Due to the low residence time in the machine, the packaging, although shredded, is not harmed and can be easily sieved from the powdered product and recovered for recycling. If these food reject products are processed with wet grain, the grain is turned to a flour and the proteins from the food are mixed with the flour. This produces a product which can be used for a range of animal or aquaculture feeds depending on the inputs. Correctly managed in a stainless-steel machine, some of these products are also suitable for human consumption. In such dual stream processing, the H₂O component in waste water becomes an asset, rather than a liability and the solids in that same mix can also be recovered for use in food rations. If salt water is used the mineral and trace elements in the sea water improve the quality of the finished product if used in foods. The effect on grain products in this process is to cause gelatinisation, which reduces the energy required for cooking and processing. Omega oils can also be incorporated for human and animal health improvements without effecting flavour as the oil is encapsulated in the powdered product and effectively reduces methane in cattle. All of this occurs with 80% less emissions than any other drying process and little or no odour.

Time to impact

The AKT KIX technology is currently in use in around 300 locations around the world. Demonstrations may be arranged at a number of sites. The current limitations for AKT technology is that manufacturing and assembly occurs only in one site in Australia. We are currently working to affect a more distributed manufacturing base, however clearly, the

principal obstruction to improving food reuse is the distribution of the technology. AKT has conducted research on over a thousand different organic products over the past forty years, making the application of the technology functional in every materials stream and every community worldwide, from supermarket and food processing waste to field operations in remote African villages to improve the gelatinisation of grains such as sorghum. In such an instance it would mean a direct impact on the reduction of energy or firewood needed to prepare food. The additional but substantial investment would enable planned production in numerous countries to rapidly impact on wasted food streams.

Scalability

The technology can be applied at any level from a single food processing business or at scale, in a community. The KIX machine has a range of five sizes depending on the required throughput. AKT have always been conscious of the need to keep the cost of the product as low as possible but high enough to assure some degree of expansion while allowing for research and further development. This has enabled some level of growth commensurate with demand, including the ability to run the processes in part or in full on renewable energy. In recent times the crises facing humanity and the pressure generated by the UN's Sustainability Development Goals has seen enquires from around the world increase exponentially. These enquiries will enable rapid development but not at the scale required to address the degradation of the world's soils and the requirement for expanded production. The substantial investment would greatly assist a rapid expansion to all areas on the globe.

Evidence

As stated earlier AKT has been conducting its own research and development for the past forty years. This has been done to help develop profitable markets for the outputs of the technology. The process is not only unique in term of its fluidised circular bed function, but the rapid process time preserves the quality of the processed product, while protecting any other separated materials such as packaging from physical damage. This type of functionality in terms of production is only available from freeze drying, but as stated earlier, at a fraction of the cost. The extensive uses for the technology are reflected in the material types tested and processed to date. Mass balances and practicable examples of output products commenced initially with materials such as oyster shell, mussel and mussel shell, crab exoskeletal, fish bones and shrimp peels, but now includes a comprehensive of supermarket and processed food outputs, including fruit and vegetables.

Systemic impact

The KIX system developed by AKT is having a dramatic impact on the processing systems of many companies. Where previous examples may have included the processing of shrimp peels into chitin products as saleable commodities, more recent trials have demonstrated that the processing of that same product today, with the inclusion of rice grain soaked in sea water until the endosperm of the rice is damp, will produce a gluten free, gelatinised flour for application in noodle or dumpling manufacture with the flavour of shrimp, but the short cooking time of an instant noodle. Such products will have an extensive systemic impact in the Asian food industry, where sources of quality protein are under constant pressure. The ethical standards and developmental policies of AKT insist that a meaningful level of production profits is returned to indigenous communities in any given region or to Médecins Sans Frontières (MSF) to assist in caring for people affected by conflict, disease outbreaks and disasters.