DESIGN AND FABRICATION OF CRYOGENIC GRINDER FOR PRESERVING THE AROMATIC CONTENT OF SPICY PRODUCT

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A PROJECT REPORT

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ABSTRACT

The project aims at developing a test model of cryogenic grinding machine for spices This is a new concept in spices processing, which results into higher production with better end product quality (aroma and color), than conventional spices grinding unit.

The fat content of spices poses problems of temperature rise during grinding. Due to this temperature rise, spices lose a significant fraction of their volatile oil or flavoring components. Therefore, a cryogenic grinding system is designed and developed to cool and maintain the cryogenic temperature in the grinding zone.

The main components of the cryogenic grinding system are screw conveyor, grinder, a liquid nitrogen dewar and power transmission unit. The design considerations, calculations and development of the cryogenic grinder have been worked out in this project. The tests conducted on grinding of cumin seed, black pepper and turmeric revealed that it could be successfully ground below the temperature of 60°C. The increase in grinding temperature from 60-70°C resulted in a significant increase in particle size of the product and specific energy consumption in grinding.

This technology uses liquid nitrogen to control the grinding chamber temperature, the result of which is reduction in loss of volatile essential oils in the spices, thus retaining its original properties.

Cryogenic grinding reduces the material to particle sizes, which is difficult to attain with ambient temperature while grinding in conventional grinding plants. This type of machine can be used for small scale industries and also large scale industries where the spice processing can get new technology by adopting this grinding unit. Further it also offers better value for the farmer by increasing the yield per acre land.