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胡萝卜微粉碎机盘刀设计及试验

Design and experiment on carrot micro-comminution cutters

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中文摘要:

为提高胡萝卜微粉碎机的粉碎效率,降低能耗,该文基于干燥后的胡萝卜力学特性,确定了其较佳粉碎方式为:采用剪切粉碎,胡萝卜片的含水率为5%。在此基础上,试验设计了3种粉碎盘刀(单刃盘刀、双刃盘刀、齿式盘刀),进而对粉碎物料及粉碎盘刀受力分析,表明3种盘刀运行时,受到的最大应力均小于其屈服力,工作稳定,不宜发生断裂。以盘刀类型、转子转速、刀底间隙为因素,以单位耗能粉体产量为试验指标,试验结果表明:齿式盘刀单位耗能粉体产量最高,其次为双刃盘刀,单刃盘刀最低;胡萝卜微粉碎机最佳工作参数为:齿式盘刀、转子转速为17455 r/min、刀底间隙为7 mm,此时生产120目的胡萝卜微粉单位能耗产量最大,该结果为胡萝卜微粉碎机的设计与推广使用提供了参考。

英文摘要:

In order to improve the smashing efficiency and reduce the energy consumption of the micro-comminution muller for carrot, based on the mechanical properties of the dried carrot, the better smashing method, the shearing grinding method was determined with carrot piece moisture content of 5%. Based on above research, 3 kinds of smashing cutters (the single edge smashing cutter, the double edge smashing cutter and the teeth-formula smashing cutter) were designed. The stress analysis of material and the smashing cutters showed that the biggest stress was smaller than the yield stress. and the cutters worked stable and was not easily ruptured. The smashing cutter type, the rotor speed and the cutter bottom gap were taken as influence factors, the energy consumption per unit powder output was taken as experimental target. The test results indicated that the energy consumption per unit powder output comminuted by the teeth-formula smashing cutter was the highest, followed by the double edge smashing cutter and single edge smashing cutter. The optimum technique and parameters of the micro-comminution for carrot were that using teeth-formula smashing cutter, the rotor speed was 17455 r/min, the cutter bottom gap was 7 mm, under which the maximum output per unit energy consumption could obtained with 120 mesh carrot powder. The research can provide a reference for carrot micro-comminution design.

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