

Design and Development of a Mechanical Force Gauge for the Square Watermelon Mold

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Abstract : This study aimed at designing and developing a mechanical force gauge for the square watermelon mold for the first time. It also tried to introduce the square watermelon characteristics and its production limitations. The mechanical force gauge performance and the product itself were also described. There are three main designable gauge models: a. hydraulic gauge, b. strain gauge, and c. mechanical gauge. The advantage of the hydraulic model is that it instantly displays the pressure and thus the force exerted by the melon. However, considering the inability to measure forces at all directions, complicated development, high cost, possible hydraulic fluid leak into the fruit chamber and the possible influence of increased ambient temperature on the fluid pressure, the development of this gauge was overruled. The second choice was to calculate pressure using the direct force a strain gauge. The main advantage of these strain gauges over spring types is their high precision in measurements; but with regard to the lack of conformity of strain gauge working range with water melon growth, calculations were faced with problems. Finally the mechanical pressure gauge has advantages, including the ability to measured forces and pressures on the mold surface during melon growth; the ability to display the peak forces; the ability to produce melon growth graph thanks to its continuous force measurements; the conformity of its manufacturing materials with the required physical conditions of melon growth; high air conditioning capability; the ability to permit sunlight reaches the melon rind (no yellowish skin and quality loss); fast and straightforward calibration; no damages to the product during assembling and disassembling; visual check capability of the product within the mold; applicable to all growth environments (field, greenhouses, etc.); simple process; low costs and so forth.

Keywords : mechanical force gauge, mold, reshaped fruit, square watermelon

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