Appendix C-1 Testing Parameters and Methods of Test

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| **TESTING PARAMETER** | **TESTING METHOD** |
| Determine Jet Angle | Run conveyor with holders attached and run jets. Observe clearance of jets from holders and adjust incrementally to provide the least contact with desired holding mechanism |
| Determine Jet Stream Intersection Height | Run conveyor with holder and broccoli. Observe where the intersection lies and how the product looks after cutting. Adjust height to get intersection in center of average sized floret and provide uniform sized pieces after cutting. |
| Determine best Broccoli Holding Mechanism | Attach various holders to the conveyor chain and observe effects of cutting. Choose holder that provides most support and least contact with the jet streams. |
| Determine Guide Rail Angle | Run Conveyor with holders and broccoli. Adjust rails so that they do not interfere with conveyance of broccoli but do provide guidance if a floret begins to fall out of holder. Optimize friction by minimizing. |
| Determine Maximum Loadable Speed of Conveyor | Run Conveyor with holders and have a person load machine and place a floret in every holder. Survey and choose a desirable speed. |
| Determine the gain from frequency input to conveyor speed | Perform timed trials for known length of conveyance to attain velocity of conveyor belt as a function of input frequency. Plot the points of speed vs. frequency and the slope of the line is the gain. |
| Determine Experimental Production Rate | Run conveyor at above determined angle and height with optimal holder design and guide rail configuration. Perform timed trial of cutting 10 lb of broccoli and multiply to find hourly rate per lane. |
| Analyze Shelf Life after Water Jet Cutting | Store clean cut broccoli in bags at a temperature of 39 degrees and check the one bag every 4 days so that the final bag is 16 days old. |
| Determine Amount of Product Weight Lost Due to Water Jet Cutting | Weigh the product for the timed trial (approximately 10 lb) before cutting and weigh the cut product produced. |
| Determine How to Dissipate Water Jet Energy Safely | Observe length of energy core as jet stream processes from nozzle tip and experiment with water bath or other catchers. |

Appendix C-2 Testing Parameters and Results of Test

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| **TESTED PARAMETER** | **TESTING RESULTS** |
| Determine Jet Angle | We obtained the good results with a jet angle of 60° degrees. The broccoli was cut into 4 good size pieces, and it had no interference with the conveyed broccoli. |
| Determine Jet Stream Intersection Height | The best jet stream intersection angle height obtained was 1.6” above the top surface of the chain with a jet angle of 60°. |
| Determine best Broccoli Holding Mechanism | The three petal broccoli holder made out of 1/8” folded galvanized steel sheets seemed to work the best; they offered great broccoli support and no water jet interference. |
| Determine Guide Rail Angle | Having the rails at angle of 60° had the best performance. At this angle, the rails did not have too much interference with the conveyed broccoli and kept the broccoli from falling. |
| Determine Maximum Loadable Speed of Conveyor | We concluded that a speed of 20 Hz is a reasonable speed to load the broccoli into the conveyor. |
| Determine the gain from frequency input to conveyor speed | We determined a gain of 0.0889 ft/s/Hz from the frequency input to the conveyor speed. |
| Determine Experimental Production Rate | We obtained a production rate of 138.4lb/hr per row and a production rate of 553.4 lb/hr for 4 rows. This production rate needs improvement to satisfy the desired production rate. |
| Analyze Shelf Life After Water Jet Cutting | The water jet cuts had a better appearance than the blade cuts after 16 days. All the analyzed samples satisfied the required 16 day shelf life. |
| Determine Amount of Product Weight Lost Due to Water Jet Cutting | We found a 7.55% broccoli weight lost due to the water jet cutting; therefore, we need to reduce this percentage weight loss even more. |
| Determine How to Dissipate Water Jet Energy Safely | The length of the fish line is about 3 inches, and from our observations we determined that a dissipation tank would be unnecessary since the uniform jet breaks into fine mist with increasing diameter. Now we need a solution to deal with the dispersed jet of mist. |