GOAL

Identify the bruise probability and grade classification on three locations of apple and four impact surfaces.

EXPERIMENTAL SYSTEM

- Encoder
- Angle adjustment
- Cushion material
- Force sensor
- DC Power
- Signal Conditioner
- cDAQ card
- Laptop with Signal Express

BRUISE OBSERVATION

Fig. 1 Pendulum impact device

RESULTS

- Fig. 2 Bruise probability for apple impact on aluminum plate at three different locations
- Fig. 3 Bruise probability for apple impact on four surfaces at the middle location of apple
- Fig. 4 ‘Extra Fancy’ probability for apple impact at the middle location on four surfaces
- Fig. 5 ‘Fancy’ probability for apple impact at the middle location on four surfaces

CONCLUSIONS

- Compared to another two locations on ‘Gala’ apple, the middle location resulted in the smallest bruise probability.
- Bruising initiated at about 0.024 J under the impact onto the aluminum plate, and this value increased when using the catching foam. Furthermore, the bruising initiating energy was getting larger with the increasing of the firmness of catching surfaces (0.3 psi to 1.6 psi).
- Of the different catching materials, the 1.4-1.6 psi foam gave the highest level of protection to the apple at the largest impact energy, leading to the highest ‘Extra Fancy’ probability.