CMSE1402 Automated Gin Seed Fingers-commercial application

Part 4 – Final Report Executive Summary

Gin stands are responsible for the removal of fibre from the seed. Seed fingers are an important part of the gin stand and are used to control the seed roll load. Yet mechanically the seed fingers are undeveloped in terms of their control and ability to be set. Until now seed fingers were set manually by the ginner who typically selects and then fixes a mechanical setting. This setting have been then not routinely adjusted because of the inconvenience in stopping the gin stand to make adjustments. Bagshaw (2012) in his research presented constant variations in seed roll density and the forces exerted on the roll box casing across the length of the seed roll. His research showed seed roll density could change significantly many times over a one minute period as material in the seed roll is charged and discharged. It was assumed that development of an automated seed finger system that has the capability to constantly self-adjust would improve distribution of forces on the seed fingers.

The seed finger system was designed and built at CSIRO and fitted into the fifth stand of a five stand Golden Eagle Series 161 gin with a capacity of up to 18 bales per hour located in Warren NSW. The seed fingers shaft is divided into three independently controlled partitions. The system uses load sensors (one sensor per partition) to monitor the forces exerted on the seed finger row and on the seed roll housing by the seed roll. These measurements were used to adjust segments of the seed fingers to ensure a uniform force is applied across the seed roll. The system was fitted prior to the start of the 2014 and trials continued during the 2015 Australian ginning season. The reported in this report was recorded during these seasons. The trials indicated reductions in residual lint between 0.4% and 0.6% when automatic force adjustment was activated. The largest reduction in the residual lint were found where the system was set at the low seed roll load.

Providing that gin stand is working at near to full production (15 bales per hour) the extra lint return in bales ranges between 45 and 63 bales per average Australian grower (600 ha at 10 bales/ha). This equates to an extra $22,500 - $31,500 (@$500/bale) per grower minus a small loss of seed weight (@$350/tonne). For the gin the return is calculated on the average gin's throughput of 80,000 bales. For each gin the return is an extra 320 to 480 bales at $70/bale, which equates to an extra $22,400 to $33,600/gin/season.