

An instrumented boll buggy for cotton trials

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Yield measurements from commercial-size plots (about one hectare in size) play an important role in developing new agricultural technology for the cotton industry. With the introduction of large capacity cotton pickers, module builders, and module-handling equipment at cotton ginneries, the technique of using hessian bags or seed-cotton baskets became unsatisfactory. A new method of weighing seed cotton in the field has been developed using electronic load cells on a 'boll buggy'.

The 'boll buggy' (a haul-out bin for seed cotton) comprises a single-axle, tractor-drawn trailer with a large open bin. Once the cotton picker has tipped the seed cotton into the boll buggy, the boll buggy bin then tilts hydraulically to tip the seed cotton in to the module builder.

Instrumentation

A commercially available boll-buggy was chosen and design requirements for the instrumentation included accuracy, ruggedness, reliability and cost effectiveness. No commercially available load cells were found to meet these requirements. This was because of the conflicting requirements of high strain levels for accuracy, and overload protection against the dynamic loading experienced during road travel and tipping.

The axle of the buggy was used as a load cell, and was strain gauged for bending at its centre (Fig. 1,1). The tilting bin, hinged on one side of the trailer imparted a load on the axle and also on the front tractor-mounted hitch (Fig. 1,2). The load on the axle and the hitch is measured by two strain gauge bridges. Positive overload protection at 150% of design load was achieved with shims between the axle and the chassis.

Both the axle and hitch strain gauge bridges are read using commercially available instrumentation. This unit consists of a regulated power supply, an instrumentation amplifier, and a 4 digit L.C.D. display. This hand-held display indicates to 1 kg on either channel. The reading may be set to zero with the boll buggy empty. The system then reads seed cotton weight. Should further accuracy be required, samples of seed cotton can be taken for laboratory ginning to measure ginning outturn. The weight of cotton lint can then be estimated.

The boll buggy has now been used at Emerald (central Queensland) for three seasons. Seed cotton yields of commercial size plots of variety trials, irrigation demonstrations, and fertiliser and pesticide trials have been successfully weighed.



Figure 1. Boll Buggy