

AE 340 Laboratory 7, Combine Separations

**Question 1.** The following data were collected in a field test while harvesting barley with a 4-m self-propelled combine:

total material over walkers = 9.4 kg	total material over shoe = 4.4 kg
free seed over walkers = 76 g	free seed over shoe = 289 g
unthreshed seed over walkers = 60 g	unthreshed seed over shoe = 81 g
total seed collected at grain tank = 17.6 kg	

The length of test = 12 m, the time = 21.3 s, and the average gathering loss = 10.2g/m<sup>2</sup>.

Calculate

- cylinder, walker, shoe, and total processing losses as percentage of total grain feed rate;
- gross yield, gathering loss, and processing losses in kg/ha;
- gathering loss as percentage of gross yield; and (d) walker, shoe, and total MOG feed rate in t/h.

**Question 2.** For the case as described in Example 12.1, what would be the separator length if the separation loss was to be under 1%? Is it practical? What other means do you have at your disposal to reduce the losses if the same separator length was used?

**Question 3:** The following data was collected from a field test for corn with a 12 row rotary self-propelled combine, (0.762m or 30 in rows). The gross yield on the field was 10 Mg/ha (160 bu/acre) and the MOG/Grain ratio during harvest was 0.40. The combine traveled at 7.2 km/h (4.5 mph). The measured losses were as follows:

Preharvest Loss 0.75%, Header Loss 0.1%, Threshing Losses 1.25%, Cleaning Losses 2%

Determine the following information

- The total mass of grain per hectare (acre) on the ground prior to harvest.
- The total mass of grain per hectare (acre) on the ground after header passes over the ground
- The total mass of grain per hectare (acre) on the ground after the combine passes over the ground
- The mass flowrate of unthreshed corn leaving the rear of the combine
- The mass flowrate of threshed corn leaving the rear of the combine
- The mass flowrate of corn measured by a grain yield monitor entering the grain bin.

**Question 4:** A combine is harvesting corn, with a 8-row head in 0.762 (30 in) rows at 7.2 km/h (4.25 mph). The yield in the field is 10 000 kg/ha, (160 bu/acre) and the MOG/Grain ratio is 0.30. Under these conditions, 75% of the grain is separated at the cylinder concave and the total separator losses are 5%.

- Determine the grain separation losses in the walker
- Estimate the length of walkers that will achieve these losses.
- If the walker length was increases by 25%, what will be the estimated percent separation losses from the machine assuming the cylinder concave operations does not change.

**Question 5.** List possible causes and cures for each of the following combining losses: (a) excessive header loss, (b) excessive amount of unthreshed seed, (c) broken kernels of grain, (d) excessive seed loss over the separator, (e) excessive amount of chaff in the grain tank, and (f) excessive cleaner seed loss.

**Question 6.** Estimate the power requirements for a 12 row (0.763m row width) self-propelled combine,

operating in 12.5 Mg/ha (200 bu/ac) corn at 8 km/h (5 mph). The estimated MOG/Grain ratio is 0.40

**Question 7.** Estimate the power requirements for a self-propelled combine with a 10.8 m grain platform, operating in 5.4 Mg/ha (80 bu/ac) wheat at 8 km/h (5 mph). The estimated MOG/Grain ratio is 0.80