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Interim Report 499

Versatile Trans-Axial 2000 Pull-type Combine

VERSATILE TRANS-AXIAL 2000 COMBINE
INTERIM REPORT

BACKGROUND

In the fall of 1985, evaluated the Versatile Trans-Axial 2000 combine. In the barley crops in which the combine was first tested, grain loss was unacceptable, as it did not drop below 4.5%. In addition, total loss in wheat was about 2.5 to 3% over the entire operating range, a level unacceptable for some farmers.

The manufacturer agreed that changes had to be made. The evaluation was delayed while design modifications were tried. Some of these changes greatly improved the combine's performance.

This report includes a general description of the combine and outlines the performance of the Versatile Trans-Axial 2000 before modifications. It also includes the manufacturer's plans for changes and PAMI's estimate of the effect of these changes on the combine's performance. PAMl's plans to continue the evaluation of the Trans-Axial2000 and additional comments from the manufacturer are also included.

GENERAL DESCRIPTION

The Versatile Trans-Axial 2000 is a power take-off driven pull-type combine with a single transverse mounted threshing rotor, two longitudinal separating rotors, and a cleaning shoe. Threshing and initial separation occur at the threshing rotor while final separation occurs at the separating rotors. Grain is cleaned by two tiers of adjustable lip sieves and air is supplied by a split, paddle-type fan.

RESULTS AND DISCUSSION

PERFORMANCE OF THE 1985 VERSATILE TRANS-AXIAL 2000 WITHOUT MODIFICATIONS

The Versatile Trans-Axial 2000 combine tested by PAMI last fall had unacceptable performance.

In barley, combine capacity at 3% total grain loss could not be determined as total grain loss was greater than 4.5% at all feedrates. Rotor loss was the major loss at low and moderate feedrates, but decreased at high feedrates. It ranged from 4% at a MOG feed rate of 200 lb/m in (5.5 t/h) to 2-1/2% at a MOG feed rate of 850 lb/min (23.2 t/h). However, at the high feedrates, shoe loss increased causing the total loss to remain high.

In wheat, capacity at 3% total loss was about 2.5 times the capacity of the PAMI reference combine. Total loss in wheat varied between 2.5 and 3% over the full range of feedrates. However, this loss may be unacceptable to farmers who prefer to operate with less than 1 or 2% total grain loss. Again, rotor loss was the largest loss and shoe loss increased at high feedrates.

ESTIMATED PERFORMANCE OF 1986 COMBINES WITH THE MANUFACTURER'S PROPOSED MODIFICATIONS

The manufacturer has indicated that all 1986 combines will have the rotor blades cut into shorter sections and staggered around the rotors in a spiral. In addition, the v-ribbed rasp bars on the threshing rotor will be changed to angle ribbed rasp bars. The angle of the ribs will be opposite on alternating bars.

PAMI estimates that with these two changes, the capacity of the Versatile Trans-Axial 2000 will be about 2 times the capacity of the PAMI reference combine in barley, and about 2.5 times the capacity of the reference in wheat. Rotor loss in both crops should be less than 1.5% at all MOG feedrates. Total loss should be less than 2% for the low and medium feedrates, while shoe loss will limit combine capacity at the higher feedrates. These estimates have not been verified by accurate field tests.

[1] *PAMI defines combine* capacity *as the amount of MOG (material-other-than-grain) processed by a combine while operating at a 3%* total *grain loss.*

[2] *The Pami reference combine is a John Deere 6600 self-propelled combine. (See* ***PAMI*** *report #27 (E05766)).*

ESTIMATED PERFORMANCE OF 1984 AND 1985 COMBINES WITH THE MANUFACTURER'S PROPOSED MODIFICATIONS

The manufacturer has indicated that only the separating rotors on 1984 and 1985 combines will be modified if conditions warrant.

PAMI estimates that in barley, with only the separator rotors modified, the capacity of the VersatiIeTrans-AxiaI 2000 at 3% total loss should be about 1.5 times the capacity of the PAMI reference combine. The modification should reduce rotor loss to less than 2% over the combine's acceptable operating range. Shoe loss should be unchanged by the modification and will increase with feedrate until total loss exceeds 3%. Although total loss should be greatly reduced, at lower feedrates, it may still be higher than some farmers would like to operate at.

Again, the above values are only estimates and have not been verified by accurate field tests.

PAMI EVALUATION

PAMI will continue the evaluation of the Versatile Trans-Axial 2000 in the fall of 1986. A final report containing information on all aspects of the combine's performance will be available in the spring of 1987.

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MANUFACTURER'S COMMENTS

Versatile believes that with only the change to the separating rotors, the capacity of 1984 and 1985 combines in barley will be closer to 2 times the capacity of the reference combine rather than 1.5 times as indicated by PAMI. Versatile agrees that with the addition of the alternating rasp bars on the threshing rotor, the combine's capacity will be 2 times the capacity of the reference corn bine.

In addition to those changes already discussed, Versatile will make the following changes on 1984 and 1985 Trans-Axial combines. All changes will be made at Versatile's expense.

1. Material flow through the transition area will be improved.
2. The variable speed driven shaft will be strengthened.
3. The right hand rotor drive shaft will be strengthened.
4. The return and auger drive shaft support will be improved.
5. Fan life will be improved.
6. Feeder drum bearing life will be improved.
7. The unloading auger top gearbox drive will be improved.
8. PTO driveline vibrations will be reduced.
9. The mounting for the main drive gearbox will be improved.
10. The mounting for the straw spreader will be improved.
11. An additional support will be added to the grain tank near the top tailings auger pulley.

In addition to these changes, the following changes will be made on the 1986 Trans-Axial 2000 combines:

1. The number of slats in the feeder chain will be reduced.
2. The concave bars will be changed from 50 mm (2.0 in) to 58 mm (2.3 in) deep.
3. A hydraulic motor with a larger displacement will be used to drive the pickup.
4. The table auger finger drive will be improved.
5. The return auger shaft will be improved.

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