

Evaluation Report

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Brandt Model 740 Grain Auger

A Co-operative Program Between



BRANDT MODEL 740 GRAIN AUGER

MANUFACTURER:

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DISTRIBUTOR:

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RETAIL PRICE:

\$1,275.00 (September 1978, f.o.b. Regina, complete with power take-off, less tires).



FIGURE 1. Brandt Model 740 Grain Auger.

SUMMARY AND CONCLUSIONS

At the manufacturer's recommended flighting speed of 600 rpm with a 30° elevation angle, corresponding to a lift of 6.15 m (20 ft), the capacity of the Brandt 740 was 49.2 t/h (1810 bu/h) in wheat, 46.8 t/h (2060 bu/h) in rapeseed, 31.8 t/h (2190 bu/h) in oats and 38.4 t/h (1510 bu/h) in corn. Power requirements ranged from 2.3 to 7.5 kW (3.1 to 10.1 hp). Capacity and power depended on auger speed, elevation, grain type and moisture content.

Grain damage in dry wheat was about 0.1% for each pass through the auger.

The Brandt 740 was easy to handle and convenient to operate. No major durability problems occurred during the test.

The Brandt 740 had several potential safety hazards. No guards were provided for the drive belt pulleys. Extra weight was required on the intake end to prevent the auger from upending.

No operator's manual was supplied with the auger tested.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to prevent the auger from upending when operating at or near maximum elevation.
2. Providing appropriate shields and warning signs to protect and caution against unsafe practices and danger points.
3. Providing a suitable operator's manual.

Chief Engineer -- E.O. Nyberg

Senior Engineer -- J.C. Thauberger

Technical Officer -- J. Russell

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Brandt Machine has been developing an instruction decal in conjunction with our continuous product updating program. Instruction decals will be provided on 1979 production.
2. All Brandt augers will be equipped with pulley guards and all appropriate warning and safety decals as prescribed by industry standards in 1979.
3. Brandt Machine has developed an operator's manual which will include complete set up instructions, operating instructions, parts list, warranty, and will be provided with augers in 1979 production.

Manufacturers Additional Comments

In reference to FIGURE 7, Brandt Machine has adopted a new style bottom end safety guard which has been in use since late 1977 (SEE PHOTO) This new guard meets all industry standards and was selected because it provided maximum safety and minimum flow restriction.



Capacity of Brandt augers with the new safety guard will be higher than those rated in this report since the auger tested was equipped with an older style safety guard. Field tests indicate flow restriction improved 10% with the new style safety guards.

GENERAL DESCRIPTION

The Brandt Model 740 Grain Auger (FIGURE 1) is a nominal 180 mm (7 in) diameter, 12.2 m (40.1 ft) long portable screw conveyor. The conveyor tube is mounted on a tubular frame supported by a single axle with two wheels.

Discharge height is varied with a crank operated cable winch. The auger flight is supported by bearings at both the intake and outlet ends.

The Brandt 740 may be powered with a tractor power take-off, stationary engine or electric motor using the same mounting arrangement. The engine attaches to a self-levelling mount near the axle with power transmitted through V-belts, a gearbox and drive chain.

The test machine was equipped with a power take-off drive.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Brandt 740 Grain Auger was operated for about fifteen hours while conveying wheat, oats, rapeseed and corn. In addition, it was transported over gravel and paved highways for a distance of 40 km (25 miles). It was evaluated for rate of work, power requirements, grain damage, ease of operation and adjustment, operator safety and suitability of the operator's manual.

RESULTS AND DISCUSSION

EASE OF OPERATION AND ADJUSTMENT

Discharge Height: The discharge height could be varied from 2.3 to 7.2 m (7.6 to 23.6 ft) with a crank operated, cable winch. Elevating the auger was easy, and required a maximum winch handle force of 55 N (12 lb) with the auger empty and the lifting mechanism well lubricated. The winch was conveniently located. It took about 130 turns of the winch crank to fully raise or lower the auger.

Auger Reach: Horizontal reach and clearance of the Brandt 740 are shown in FIGURE 2. Reach, measured from the top of the front support to the outlet, varied from 2.5 m (8.2 ft) at 12°, to 4.0 m (13.1 ft) at 36°, while clearance, measured from the tire to the outlet, varied from 4.5 m (14.8 ft) to 4.0 m (13.1 ft). Hitch weight varied from 23 kg (50 lb) at minimum elevation to 14.5 kg (32 lb) at maximum elevation.

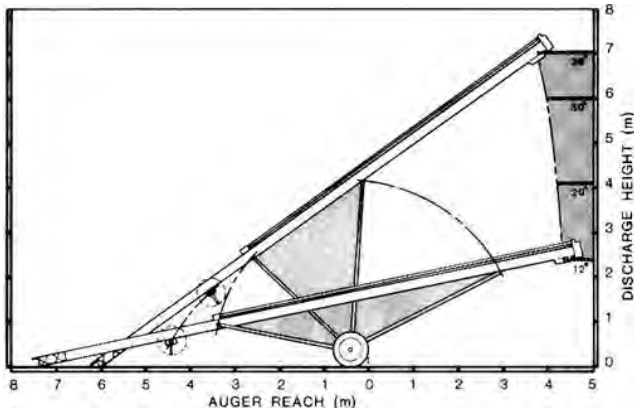


FIGURE 2. Auger Reach at Various Discharge Heights.

Adjustments: A convenient slotted lever was supplied for adjusting the drive belt tension for either engine or power take-off applications.

Transporting: The Brandt 740 transported well and was stable at speeds up to 100 km/h (60 mph) on paved highways and 50 km/h (30 mph) on gravel roads. A fixed clevis hitch at the inlet end when used with the proper hitch pin, provided a reliable connection. It is recommended that, the operator use a suitable safety chain to prevent accidental unhitching when transporting on public roads. Transport height with the auger fully lowered, was about 2.3 m (7.6 ft) providing adequate clearance under power lines.

RATE OF WORK

Capacity: FIGURE 3 shows the capacity of the Brandt 740 in dry wheat over the full range of auger elevations and over a range of flying speeds, with the inlet end completely submerged in grain. Maximum capacities ranged from 56 t/h (2060 bu/h) at the minimum elevation of 12° to 43.8 t/h (1610 bu/h) at the maximum elevation of 36°. Maximum capacity occurred within an auger flying speed range from 575 to 625 rpm. This corresponds to a power take-off speed of 520 to 560 rpm when equipped with the standard drive.

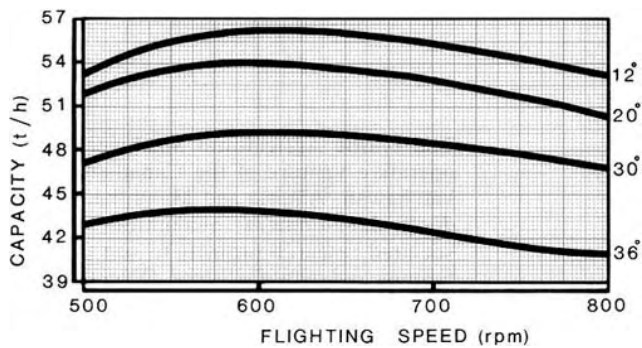


FIGURE 3. Capacity in Dry Wheat.

FIGURE 4 shows capacities of the Brandt 740 in dry wheat, oats, corn and rapeseed at an elevation angle of 30°. Maximum capacities were 49.2, 31.8, 38.4 and 48.6 t/h (1810, 2190, 1510 and 2140 bu/h) for wheat, oats, corn and rapeseed respectively. Maximum capacities occurred at flying speeds ranging from 480 to 675 rpm. Lower capacities can be expected for tough or damp grains.

Specific Capacity: Specific capacity is a measure of the efficiency of a grain auger. A low specific capacity indicates inefficient power use while a high specific capacity indicates efficient operation. FIGURE 5 shows the specific capacity, per metre of vertical lift, when operating at 30° in dry wheat, oats, corn and rapeseed. Specific capacity ranged from 6.5 to 11.4 t/kW-h. Lower

Page 3 specific capacities can be expected for tough or damp grain at normal operating speeds.

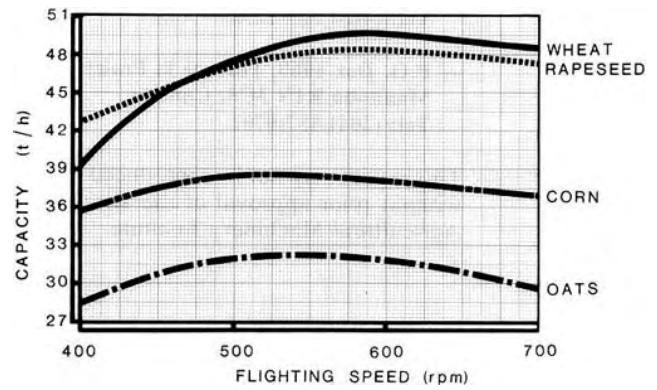


FIGURE 4. Capacity at 30° Elevation.

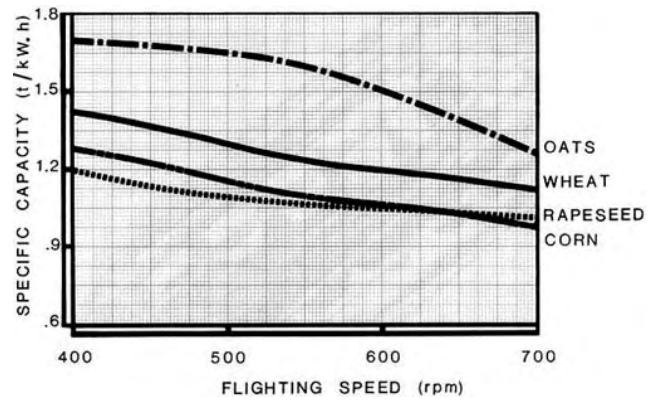


FIGURE 5. Specific Capacity Per Metre of Vertical Lift (at 30° elevation).

Critical Speeds: As indicated in FIGURES 3 and 4, maximum capacities occurred at certain flying speed for each grain and elevation angle. In general, suitable speeds were about 540, 550, 530 and 600 rpm in wheat, oats, corn and rapeseed respectively. In addition, at certain critical speeds, flying vibration occurred. This phenomenon, known as resonance, is common to all grain augers. The resonant speed is dependent on grain type, condition and elevation angle. A close watch should be kept to ensure that the auger is not operated at the critical speed.

POWER REQUIREMENTS

FIGURE 6 shows the power requirements for the Brandt 740 in dry wheat, oats, corn and rapeseed for an elevation angle of 30°. More power would be needed to auger grain with higher moisture content or in unusual conditions. In general, a 10 kW (14 hp) engine would have ample power to operate the Brandt 740 at maximum capacity in most conditions.

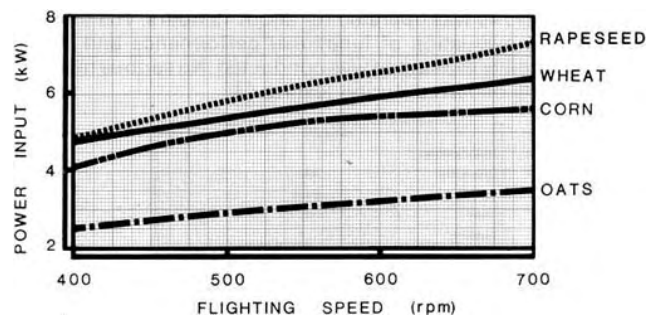


FIGURE 6. Power Requirements at 30° Elevation.

Grain Damage: Grain damage, in dry wheat, at 11% moisture content was less than 0.1% for each pass through the Brandt 740. This was insignificant as long as the same grain was not augered many times. Crackage at higher moisture contents would be lower.

OPERATOR SAFETY

When the Brandt 740 was operated near maximum elevation

additional weight was needed on the intake end to prevent the auger from upending. This tendency to upend was greater when the auger was full of grain.

Some features of the Brandt 740 did not meet current auger safety recommendations.¹ The grille openings (FIGURE 7) in the removable inlet guard were too large, although some operator protection was provided.

When lowering the Brandt 740 from a raised position the handle had to be turned clockwise at least two clicks to fully engage the locking mechanism. Failure to lock the winch occasionally resulted in the winch free-wheeling.



FIGURE 7. Removable Inlet Safety Guard.

The exposed nip-points on the belt drive posed a potential hazard that could be reduced by safety shields. As with all augers, care should be exercised when operating around overhead power lines or when towing at high speed on curves or rough roads. Appropriate caution signs were not supplied with the Brandt 740.

OPERATOR'S MANUAL

No operating instructions were provided with the Brandt 740. It is recommended that a suitable operator's manual containing appropriate operating, servicing and safety instruction be provided.

DURABILITY RESULTS

The Brandt 740 was operated for about 15 hours. The intent of the test was evaluation of functional performance and no extended durability evaluation was conducted. No serious mechanical problems occurred during testing.

¹American Society of Agricultural Engineers. Standard, S318.6 "Safety for Agricultural Equipment", March 1978.

APPENDIX I SPECIFICATIONS

Serial Number:	25487
Make:	Brandt
Model:	740
Dimensions:	
-- overall length along auger tube	12,215 mm (481 in)
-- overall width	2040 mm (80.4 in)
-- wheel tread	1950 mm (78.8 in)
Auger Tube:	
-- inside diameter	170 mm (6.75 in)
-- length inlet to outlet centers	11,885 mm (488 in)
-- length of inlet	330 mm (13 in)
-- size of outlet	(oval) 178 x 216 mm (7 x 8.5 in)
Fighting:	
-- diameter	150 mm (6 in)
-- pitch	
-exposed	80 mm (3.125 in)
-in auger tube	155 mm (6.1 in)
-- length of exposed intake fighting	330 mm (13 in)
Elevated Height:	
-- maximum (36°)	7165 mm (282 in)
-- Minimum (12°)	2316 mm (61.2 in)
Lubrication:	
-- number of prelubricated bearings	5
-- oil bath gear box	1
-- number of prelubricated bearings	6
-- wheels	packed
Drive:	
-- PTO/fighting speed ratio	0.9
-- number of V-belts	
-engine drive	2
-power take-off drive	2
-- number of roller chains	1
-- number of gear boxes	1
Winch:	
-- make and model	Dutton - Lainson B1200
-- average cable wind	76 mm/turn (30 in/turn) approx.
-- turning torque (maximum)	19 N-m (14 ft-lb)
Tires:	2 - G78 x 15
Inlet Safety Shield:	
-- grille openings	32 x 476 mm (1.25 x 18.75 in) approx.
-- overall size	229 x 495 mm (9 x 19.5 in)
Weight (PTO Drive):	
	Raised Lowered
-- left wheel	204.5 (450) 200 (440)
-- right wheel	197 (433) 193 (425)
-- hitch point	14.5 (32) 23 (50)
TOTAL	416 kg (915 lb) 416 kg (915 lb)
Optional Equipment:	813 mm (32 in) flex spout, 3048 mm (120 in) drag-out auger, 533 x 1067 mm (21 x 42 in) hopper.

APPENDIX II METRIC UNITS

In keeping with the Canadian metric conversion program, this report has been prepared in SI units. For comparative purposes, the following conversions may be used.

1 tonne (t) = 1000 kg	= 2204.6 pounds (lb)
1 metre (m) = 1000 mm = 3.28 feet (ft)	= 39.37 inches (in)
1 kilowatt (kW)	= 1.34 horsepower (hp)
1 kilogram (kg)	= 2.2 pounds mass (lb)
1 newton (N)	= 0.22 pounds force (lb)



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