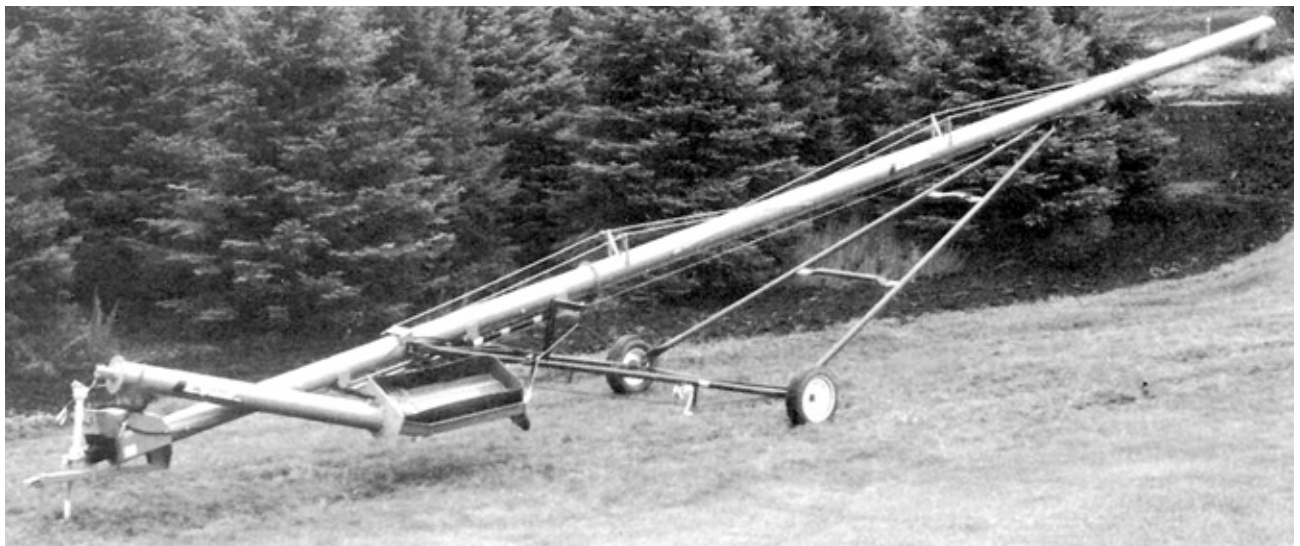


Evaluation Report 410



Brandt 10 x 60 Swing Away Auger

A Co-operative Program Between



ALBERTA
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PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

BRANDT 10 X 60 SWING AWAY AUGER

MANUFACTURER:

Brandt Industries Ltd.
705 Toronto St.
Regina, Saskatchewan
S4R 8G1

RETAIL PRICE: \$5,140.00 (February 1985, f.o.b. Portage la Prairie, Manitoba) 10 in. x 60 ft. (250 mm x 18.3 m) Swing Away Auger.

DISTRIBUTORS:

Alberta	Saskatchewan	Manitoba
Brandt Ind. Ltd.	Brandt Ind. Ltd.	Brandt Ind. Ltd.
Federated Co-op Ltd.	Federated Co-op Ltd.	Federated Co-op Ltd.
United Farmers of Alta.	Saskatchewan Wheat Pool	
Oliver Agricultural Supply		

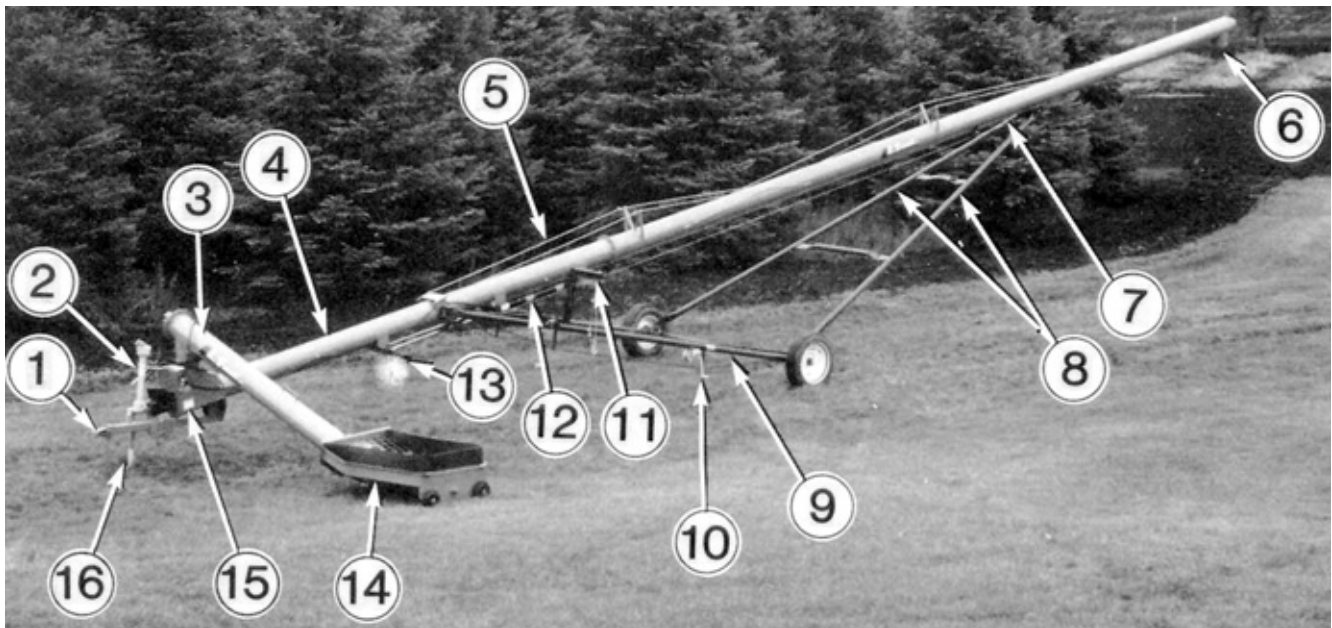


FIGURE 1. Brandt 10 x 60 Swing Away Auger: (1) Tow Hitch, (2) Power Take-off Driveline, (3) Swing Auger, (4) Main Auger Tube, (5) Truss Rods, (6) Discharge Spout, (7) Elevating Track, (8) Lift Arms, (9) Lower Arms, (10) Swing Auger Winch, (11) Swing Auger Lift Boom, (12) Hydraulic Cylinder, (13) Swing Auger Transport Arm, (14) Intake Hopper, (15) Auger Boot, (16) Jack.

SUMMARY

Ease of Operation: The Brandt 10 x 60 was very easy to position and operate since raising the main tube and engaging the flighting was performed from the tractor seat. Maneuverability was good and transportability was very good.

Rate of Work: At the 30° elevation angle, corresponding to a discharge height of 32 ft (9.7 m), maximum capacities were 4800, 6000, 4600 and 4900 bu/h (131, 88, 109 and 110 t/h) in wheat, oats, corn and rapeseed respectively. Maximum capacities were usually obtained at flighting speeds between 470 and 570 rpm.

Power Requirements: Combined power requirements for the main auger and the swing auger ranged from 8.0 to 49 hp (6.0 to 37 kW) in dry grain.

In damp grain, combined power requirements ranged from 11 to 62 hp (8.5 to 46 kW).

Quality of Work: In dry wheat, damage was less than 0.2% for each pass through the auger.

Safety: All nip points, rotating drive shafts, and inlet flighting were guarded in accordance with safety standards.¹

Operator's Manual: The manual was very well written and clearly illustrated.

Mechanical History: Two shear pins broke due to overloading the main auger flighting.

RECOMMENDATIONS

It is recommended that the manufacturer consider modifications to the boot and hopper to allow for more thorough cleaning and inspection of the flighting.

Station Manager -- G.M. Omichinski

Project Engineer -- D.J. May

THE MANUFACTURER STATES THAT

This recommendation is presently under consideration.

¹American Society of Agricultural Engineers Tentative Standard ASAE S361.2T, "Safety for Agricultural Auger Conveying Equipment," December 1983.

GENERAL DESCRIPTION

The Brandt 10 x 60 Grain Auger (FIGURE 1) is a 10 in (250 mm) diameter, 60 ft (18.3 m) long portable screw conveyor with a hopper section at the bottom which swings to either side of the main auger.

The main auger tube is mounted on a tubular steel under carriage and supporting truss cables, and is raised or lowered hydraulically. The swing auger is raised or lowered with a hand-operated cable winch.

The test machine utilized a direct drive 540 rpm, PTO drive shaft to the main auger and a hydraulic motor drive on the swing auger.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Brandt 10 x 60 was operated for about 10 hours while conveying a total of 500 tons (450 t) of dry and damp wheat, oats, corn and rapeseed. A standard test material (APPENDIX II) was also used. The machine was transported over gravel and paved highways for a distance of 500 miles (800 km). It was evaluated for ease of operation and adjustment, rate of work, power requirements, quality of work, operator safety and suitability of the operator's manual.

RESULTS AND DISCUSSION

EASE OF OPERATION AND ADJUSTMENT

Discharge Height: The discharge height (FIGURE 2) could be varied from 12.0 to 41.7 ft (3.7 to 12.7 m) with the hydraulic lift mechanism. Corresponding elevation angles varied from 10° to 41°. See TABLE 1.

The auger discharge height could be easily adjusted from the tractor seat. The hydraulic lift required a pressure of 1500 psi (10.3 MPa) to raise the auger.

Auger Reach: The bin eave clearance and horizontal reach (FIGURE 2) of the Brandt 10 x 60 are shown in TABLE 1. Bin eave clearance, measured from the ground to the auger tube at the foremost part of the undercarriage, varied from 9.3 ft (2.8 m) at 10° to 22.0 ft (6.7 m) at 41° elevation. The reach, measured from the foremost part of the undercarriage to the centre of the discharge, varied from 13.1 ft (4.0 m) at 10° to 22.0 ft (6.7 m) at 41°.

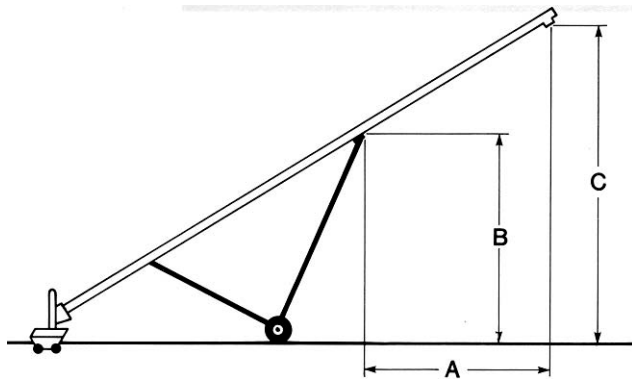


FIGURE 2. Dimensions: (A) Horizontal Reach, (B) Bin Eave Clearance, (C) Discharge Height.

TABLE 1. Reach Clearance and Discharge Height at Various Elevations.

ANGLE Degrees	A HORIZONTAL REACH		B BIN EAVE CLEARANCE		C DISCHARGE HEIGHT	
	ft	(m)	ft	(m)	ft	(m)
10 (min)	13.1	(4.0)	9.3	(2.8)	12.0	(3.7)
20	16.4	(5.0)	16.2	(4.9)	22.5	(6.9)
30	20.4	(6.2)	20.2	(6.2)	31.9	(9.7)
41 (max)	22.0	(6.7)	22.0	(6.7)	41.7	(12.7)

Maneuverability: The Brandt 10 x 60 was designed as a tractor implement. It could be transported, raised, positioned, and operated from the tractor seat. The large hitch weight of 400 lb (182 kg) made moving the auger by hand impractical. Despite the great length of the auger and the added length of the tractor, the maneuverability was good. However, it was difficult to judge distance between the auger outlet and obstructions, due to its length.

The auger transported very well and was stable at speeds up to 50 mph (80 km/h) on paved highways and up to 30 mph (50 km/h) on gravel roads, although the manufacturer cautions against towing faster than 20 mph (32 km/h). The auger was supplied with a rigid reliable hitch. The operator should use a suitable hitch pin and safety chain to prevent accidental unhitching when transporting on public roads. A transport boom was supplied to secure the swing auger. Clearance under power lines was adequate when fully lowered. The transport height was 13.6 ft (4.2 m). See cover photo.

Swing Auger: The swing auger was easily moved to and from the transport position. It was easily positioned and operated very well with most grain trucks. The swing auger and winch could be moved from one side to the other in twenty minutes. The fighting speed of the swing auger varied with the engine and hydraulic pump speed of the tractor. It did not have a flow control valve to vary the fighting speed in relation to the fighting of the main auger. There were two clean out holes along the front bottom of the hopper and one at the bottom of the auger boot, however, it was difficult to completely clean out all of the grain. It is recommended that the manufacturer consider modifications to the boot and hopper to allow for more thorough cleaning and inspection of the fighting.

The swing auger motor would occasionally stall if the hopper was overloaded. This problem was virtually eliminated with the installation of a metal deflector plate provided by the manufacturer near the end of the test period. See FIGURE 4.

RATE OF WORK

Capacity: FIGURE 3 shows the capacities of the Brandt 10 x 60 in various dry grains at 30° elevation angle. Maximum capacities at this angle were 4800, 6000, 4600 and 4900 bu/h (131, 88, 109 and 110 t/h) in dry wheat, oats, corn and rapeseed respectively. As fighting speeds are increased, the capacity of screw conveyors increases to a peak, then levels off or decreases. Maximum or peak capacities for the Brandt 10 x 60 occurred at fighting speeds (PTO speeds) ranging from 470 to 570 rpm.

The effect of elevation angle on capacity is illustrated in TABLE 2. Peak capacities in wheat dropped 29% from 5500 bu/h (150 t/h) at 20° elevation to 3900 bu/h (106 t/h) at maximum elevation.

TABLE 2. Peak Capacity, Specific Capacity and Power Requirements vs Elevation Angle (Dry Wheat).

ELEV. ANGLE Deg.	DISCHARGE HEIGHT		PEAK CAPACITY		SPECIFIC CAPACITY		POWER INPUT	
	ft	(m)	bu/h	(t/h)	ton hp-h	(t) (kW-h)	hp	(kW)
20	22.5	(6.9)	5500	(150)	4.3	(5.2)	39	(29)
30	31.9	(9.7)	4800	(131)	3.0	(3.7)	43	(32)
40	41.7	(12.7)	3900	(106)	2.6	(3.2)	44	(33)

Specific Capacity: Specific capacity is the amount of grain moved per unit of power in a specific time. A high specific capacity indicates efficient use of energy. In general, specific capacity decreases (less grain is moved per horsepower-hour) with increasing fighting speed and elevation angle. Specific capacity at 30° ranged from 5.5 to 2.6 ton/hp-h (6.7 to 3.2 t/kW-h) in dry wheat, oats, corn and rapeseed. TABLE 2 indicates the effect of elevation angle on peak and specific capacities for the Brandt 10 x 60.

Critical Speeds: At certain critical fighting speeds auger vibration may become excessive. This phenomenon, known as resonance, is common to all augers (although the critical speed may be outside of the operating range of any particular auger) and varies with grain type and operating conditions. Care should be taken not to operate at these critical speeds. On the Brandt 10 x 60 a drop in capacity due to resonance was occasionally noted at a PTO speed of about 530 rpm.

Power Requirements: FIGURE 3 gives power requirements for the Brandt 10 x 60 in dry wheat, oats, corn and rapeseed at a 30° elevation angle. Power requirements ranged from 8.0 to 49 hp (6.0 to 37 kW). It should be noted that the swing auger uses 25 to 40% of the total power input of TABLES 2 and 3 and FIGURE 3.

The intake feed hopper motor required a hydraulic fluid flow rate of at least 12 (lmp) gpm (54.5 lpm) at 1300 psi (9.0 MPa) for proper operation. The hydraulic lift mechanism had a pressure requirement of 1500 psi (10.3 MPa).

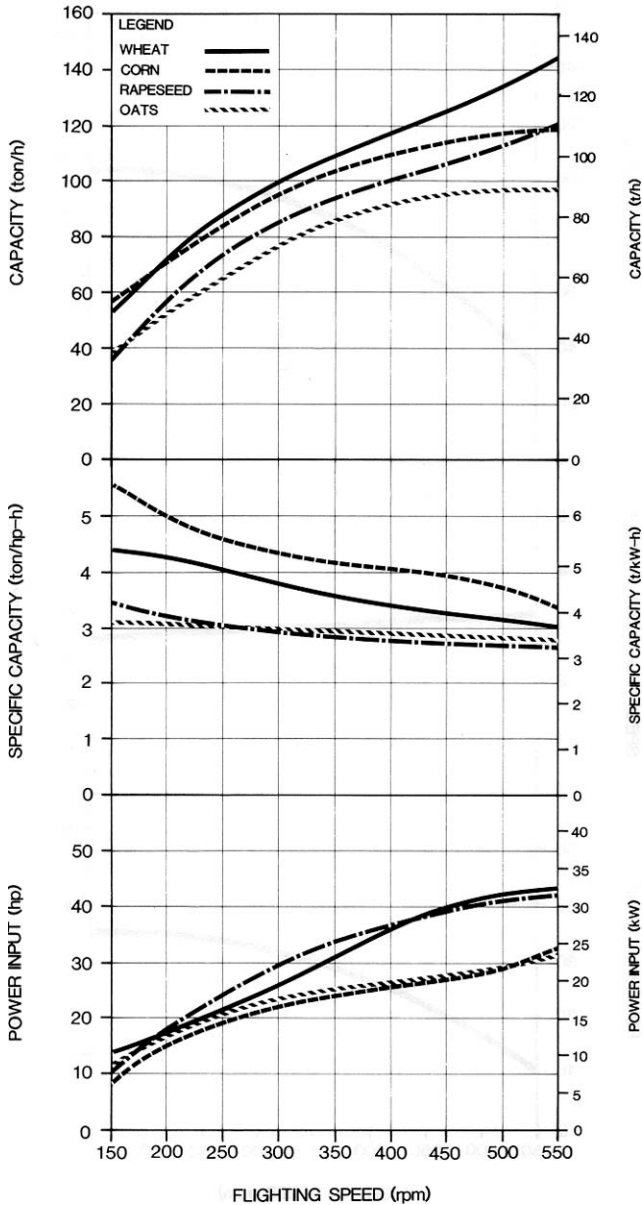


FIGURE 3. Capacity, Specific Capacity and Power Requirement for Various Speeds at 30° Elevation Angle (Dry Grain).

Damp Grain: TABLE 3 shows the effect of damp grain on peak capacity, specific capacity and power requirements for the Brandt 10 x 60.

TABLE 3. Peak Capacity, Specific Capacity and Power Requirements in Damp Grain at 30° Elevation.

GRAIN (MOISTURE CONTENT)	PEAK CAPACITY		SPECIFIC CAPACITY		POWER INPUT		POWER INPUT (DRY GRAIN)	
	bu/h	(t/h)	ton hp-h	(t (kW-h)	hp	(kW)	hp	(kW)
Wheat (20% MC)	2700	(74)	1.5	(1.8)	55	(41)	44	(33)
Corn (30% MC)	3200	(81)	1.5	(1.8)	62	(46)	32	(24)
Rapeseed (15% MC)	3300	(75)	2.5	(3.1)	32	(24)	43	(32)

Generally, as grain moisture contents rise, power requirements increase while capacities decrease. If augers are used to move damp grain the power source should be sized accordingly.

The power requirement for augers without side delivery will increase by approximately 5%, 33% and 50% when moving damp rapeseed, corn and wheat respectively.

QUALITY OF WORK

Grain Damage: Damage in dry wheat was less than 0.2% for each pass through the auger. This was insignificant as long as the same grain was not augered many times. Crackage would be lower at higher moisture contents.

OPERATOR SAFETY

The Brandt 10 x 60 met current safety standards for grain augers. It was safe to operate if normal precautions were observed. Safety signs were appropriately displayed alerting the operator of potentially hazardous areas.

Shielding was provided for all rotating shafts and pinch points. An adequate inlet safety guard (FIGURE 4) was provided. All capacities were determined with this inlet safety guard in place. The Institute strongly recommends that grain augers be operated with all safety equipment in place.

OPERATOR'S MANUAL

The operator's manual included instruction on set-up, operation, maintenance, storage, warranty and safety. It was generally very well written and clearly illustrated.

MECHANICAL HISTORY

The Brandt 10 x 60 was operated for about 10 hours. Two shear pins broke when attempting to start up a full auger too rapidly or at too steep an angle.

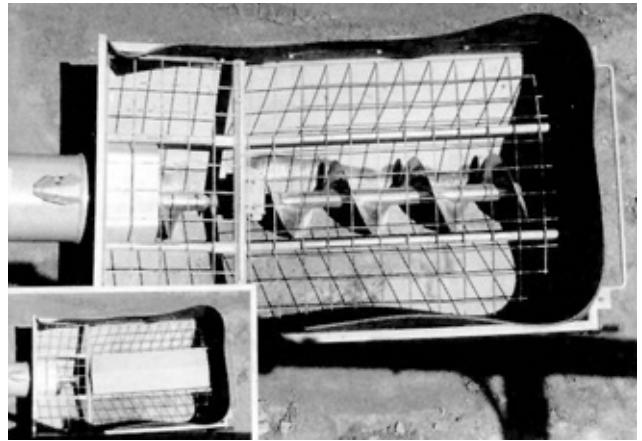


FIGURE 4. Inlet hopper and safety guard. (Deflector shield in inset)

APPENDIX I

SPECIFICATIONS:

MAKE:	Brandt		
MODEL:	10 x 60 Swing Away Auger		
SERIAL NUMBER:	004014		
OVERALL DIMENSIONS:			
-- transport length along ground	62.3 ft	(19.0 m)	
-- field width	13.2 ft	(4.0 m)	
-- transport width	9.9 ft	(3.0 m)	
-- transport height	13.8 ft	(4.2 m)	
DRIVE:			
Main Auger			
-- 540 rpm tractor power take-off			
-- direct drive			
-- power take-off to flighting speed ratio	1:1		
Intake Feed Auger			
-- hydraulic motor			
-- displacement	6.2 in ³	(102 cm ³)	
-- motor to flighting speed ratio	1:1		
LUBRICATION:			
-- pressure grease fittings	5		
-- sealed bearings	4		
-- packed wheel bearings	2		
AUGER TUBE:			
-- inside diameter	9.9 in	(250 mm)	
-- material thickness	0.1 in.	(3.0 mm)	
-- discharge spout	9.9 in	(250 mm)	
FLIGHTING:			
-- diameter	9.1 in	(230 mm)	
-- pitch	9.4 in	(240 mm)	
-- double at bottom of main auger			
-- exposed length	43 in	(1090 mm)	
-- thickness			
-- inner	0.16 in	(5 mm)	
-- outer	0.13 in	(3 mm)	
INLET SAFETY GUARD:			
-- material dimensions	0.20 in dia.	(5 mm)	
-- overall size	52 x 33 in	(1310 mm x 840 mm)	
-- grill openings			
-- maximum open area	8.7 in ²	(56 cm ²)	
-- maximum open dimensions	4.2 in	(105 mm)	
LIFT MECHANISM:			
-- type	hydraulic cylinder & cable		
-- cylinder size	3.5 x 40 in	(90 x 1020 mm)	
-- minimum pressure	1500 psi	(10.3 MPa)	
WEIGHT:	Maximum Elevation	Minimum Elevation	
-- right wheel	1122 lb (509 kg)	1147 lb (520 kg)	
-- left wheel	944 lb (428 kg)	1001 lb (454 kg)	
-- hitch	483 lb (219 kg)	401 lb (182 kg)	
TOTAL	2549 lb (1156 kg)	2549 lb (1156 kg)	

APPENDIX II

Performance with Standard Test Material

The standard test material is a big h density granular polyethylene. The material is consistent and not subject to damage or changes in physical properties as are grains.

FIGURE 5 gives the capacity, specific capacity and power requirements for the Brandt 10 x 60 in a standard test material. These data maybe used for comparison of different grain augers.

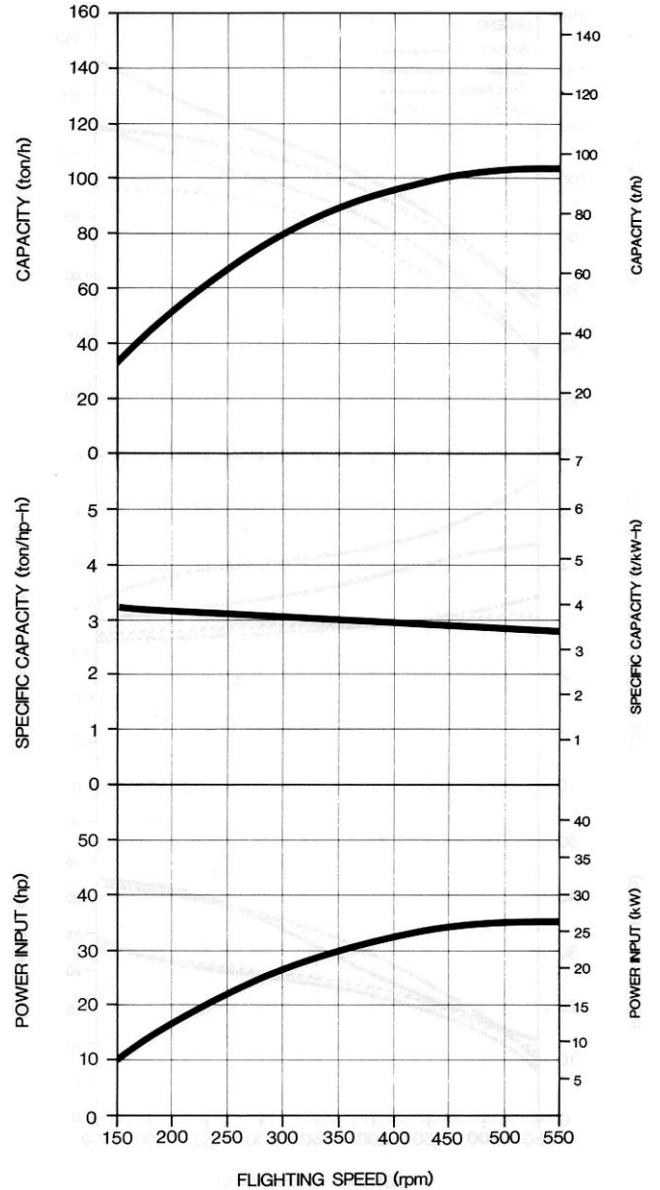


FIGURE 5. Capacity, specific capacity and power requirements with standard test material at 30° elevation angle.

APPENDIX III

MACHINE RATINGS

The following rating scale is used in Machinery Institute Evaluation Reports:

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

SUMMARY CHART

BRANDT 10 x 60 SWING AWAY AUGER

RETAIL PRICE:	\$5,140.00 (February 1985, f.o.b. Portage la Prairie, Manitoba).	
EASE OF OPERATION:		
Maneuverability	Good	
Transportability	Very good	
RATE OF WORK:		
Capacity at 30°:		
Wheat (dry)	4800 bu/h	(131 t/h)
Standard material	104 ton/h	(94 t/h)
POWER REQUIREMENTS:		
Dry grain	8.0 to 49 hp	(6.0 to 37 kW)
QUALITY OF WORK:		
Dry wheat	-- less than 0.2% damage per pass.	
OPERATOR SAFETY	-- guarded in accordance with safety standards.	
OPERATOR MANUAL	-- very well written and clearly illustrated.	
MECHANICAL HISTORY	-- two shear pins broke.	



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