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## Processing Soybeans for Better Quality

George M. Dougherty<sup>1/</sup>

Processing soybeans for better quality requires that the processor recognize that a completely equipped processing facility can, at best, only improve the quality of a seed-lot that is received for processing. The heights to which seed quality can be improved through processing is dependent on several factors, among which are: the processing equipment available, and how it is used; and perhaps of even greater importance the quality of the seed as it is received for processing.

High quality seed, that is seed characterized as being vigorous, viable, genetically and mechanically pure, and uniform in attractiveness, is not solely the product of a processing plant; it receives its start in life in the seed field. High quality production control standards do, therefore, become an essential ingredient in the processing of quality seed; these standards must necessarily be higher than those considered average for the industry. The standards adopted must take into consideration the capabilities of the processors processing operation.

Processing soybeans for high quality seed is not particularly difficult provided the crop has met relatively high minimum field standards, and provided pre-processing handling practices have been such as to

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prevent the occurrence of contamination or excessive mechanical injury. Generally, good, uniform, quality seed-lot of soybeans can be processed into a high quality product using only an air-screen cleaner and spiral separators, provided the limitations of each of these machines is not exceeded.

The initial, or basic, cleaning or processing operation is performed on the air-screen cleaner. Air-screen cleaners are not all alike, and each has its own limitations. Selection of a cleaner should not be based solely on its cleaning capacity. In selecting a cleaner the processor's primary concern should be in determining the machines performance capabilities and its limitations. For example, a cleaner equipped with a single air system has built-in limitations not usually found in cleaners equipped with two air systems. Likewise, a 2-screen cleaner has limitations not encountered in a conventional 4-screen seed cleaner. For the processing of high quality soybeans it is almost necessary that cleaners have two air systems and be of the conventional 3-or 4-screen type. The "cleaned" seed product from the air-screen cleaner should be a saleable product. It will generally, however, lack the uniformity in appearance associated with high quality seed.

Enhancement of the appearance of the beans is accomplished on spiral separators. These machines will separate the non-spherical shaped particles from the spherical shaped soybeans, thus producing a product any seedsman can sell with pride. Spiral separators are easy to

operate and relatively inexpensive, but they are low capacity machines. For the cleaning of high quality beans capacities of a single 2-spiral unit range between 25 and 35 bushels per hour. To obtain greater capacities, additional machines are required. A very effective and efficient arrangement of spiral separators in a soybean processing plant is shown in figure 1. The multiple units pictured, are arranged, side by side, in two "banks" or rows. The two rows are separated by a walk-way which provides the operator access to each unit.



Figure 1. Spiral Separator installation in a Wilson, Arkansas, Soybean Processing Plant.

		SEED		SEPARATION										PRINCIPLES								
PRINTED BY GADSDEN COUNTY TIMES GAINESVILLE, FLORIDA		P=PRIMARY APPLICATION, SEPARATION OR RESULT S=SECONDARY APPLICATION, SEPARATION OR RESULT										WILLIAM D. MUNROE, SR. COPYRIGHT 1961 AND 1968 P. O. BOX 4663, GAINESVILLE, FLORIDA 32634, U.S.A.										
MACHINES	APPLICATIONS				SEPARATIONS BY	SEPARATIONS BASED ON										SEPARATION RESULTS			COMMENTS			
	ROUGH CLEAN	CLOSE CLEAN	FINAL CLEAN	CLOSE GRADE		GROSS SIZE	WIDTH	ROUND-HOLE-THICKNESS	SLOT-HOLE-LENGTH	SHAPE	GRAIN CHARACTER	RESILIENCY	COLOR	SPECIFIC GRAVITY	MOISTURE	ELECTRIC CONSTANT	CHARACTER CHANGE	BY REMOVING		BY ADDING	INCREASED PURITY	INCREASED GERMINATION
SCALPER	P				SHAKING OR ROTATING (REEL) SCREEN(S), SOMETIMES WITH ASPIRATION	P													P			INCREASES CAPACITY OF FOLLOWING MACHINES, BUT DOES LIMITED CLEANING JOB, GOOD CAPACITY
ASPIRATOR	P	P			AIR FLOTATION BASED ON TERMINAL VELOCITY	S			S	P		P	P						P	P		INCREASES CAPACITY OF FOLLOWING MACHINES, LARGE CAPACITY ON ROUGH CLEANING, LOW CAPACITY ON CLOSE CLEANING
PNEUMATIC SEPARATOR	P	P			AIR FLOTATION BASED ON TERMINAL VELOCITY	S			S	P		P	P						P	P		DUSTIER THAN ASPIRATOR, OTHERWISE THE SAME
SCREEN, AIR MACHINE	S	P	P	S	ASPIRATION & SHAKING OR ROTATING (REEL) SCREEN(S)	S	P	P	S	S			S		AIR, HULLS, BEANS	WATER SAWDUST			P	P	S	BASIC SEED CLEANING MACHINE, BUT SOME SEPARATIONS NOT POSSIBLE
SCREEN GRADER			S	P	SHAKING OR ROTATING (REEL) SCREEN		P	P	S										S	P	P	CLOSE SIZING BY WIDTH & THICKNESS, SHAPE SEPARATIONS DEPEND ON THIS
DISC SEPARATOR			P	P	ROTATING INDENTED DISCS					P									P	S	P	LENGTH SEPARATIONS ONLY, LOW CAPACITY
INDENT CYLINDER			P	P	ROTATING INDENTED CYLINDER					P									P	S	P	LENGTH SEPARATIONS ONLY, FAIR CAPACITY
ROLL SEPARATOR				P	PAIRS OF COUNTER-ROTATING, FABRIC COVERED ROLLS					S	P								P			SPECIALIZED APPLICATIONS, LOW CAPACITY
BELT (DRAPER) SEPARATOR				P	INCLINED, MOVING FABRIC BELT, SOMETIMES CANTED, SOMETIMES VIBRATED					P	S								P	S		SPECIALIZED APPLICATIONS, LOW CAPACITY
GRAVITY TABLE			P	S	AIR FLOTATION BASED ON SPECIFIC GRAVITY AND, OR TERMINAL VELOCITY	S			S	S		P	P			WATER SAWDUST			P	P	S	SPECIALIZED APPLICATIONS, REASONABLE SKILL & PROPER INSTALLATION REQUIRED, REASONABLE CAPACITY
STONER				P	AIR FLOTATION BASED ON SPECIFIC GRAVITY AND, OR TERMINAL VELOCITY	S			S	S		P	P						P	S		SPECIALIZED APPLICATIONS, SENSITIVE TO FEED, REASONABLE SKILL & PROPER INSTALLATION REQUIRED, GOOD CAPACITY
BUMPER MILL				P	INCLINED & CANTED, BUMPING, SOLID, TEXTURED DECK					P	P	S							P			VERY SPECIALIZED APPLICATIONS, VERY LOW CAPACITY
VIBRATING TEXTURED DECK				P	INCLINED & CANTED, VIBRATING, SOLID, TEXTURED DECK					P	P	S							P			SPECIALIZED APPLICATIONS, LOW CAPACITY
SPRAL GRAVITY SEPARATOR				P	INCLINED, SPIRALED SURFACE					P	S		P						P	S		SPECIALIZED APPLICATIONS, LOW CAPACITY
HORIZONTAL DISC SEPARATOR				P	ROTATING HORIZONTAL DISCS & STATIONARY FLOWS					P	P	S							P	S		MORE FLEXIBLE & MORE CAPACITY THAN SPIRAL GRAVITY SEPARATOR
NEEDLE SCREEN				P	FREELY VIBRATING, SPACED FINGERS (GRIZZLEY)	S	P												P	S	P	SCREENS ARE SELF-CLEANING; GOOD CAPACITY
PHOTO SEPARATOR				P	PHOTO-ELECTRIC CELL								P						P	S		HIGH FIRST COST, HIGH SKILL REQUIRED, LIMITED TO COLOR SEPARATIONS ONLY, LOW CAPACITY
MAGNETIC SEPARATOR				P	CONCENTRATED MAGNETIC FIELD						P					WATER IRON POWDER			P	P		HIGH FIRST COST, HIGH SKILL REQUIRED, SPECIALIZED APPLICATIONS, LOW CAPACITY
ELECTRO-STATIC SEPARATOR				P	HIGH TENSION ELECTRIC FIELD									P		ELECTRICAL CHARGE			P			HIGH FIRST COST, HIGH SKILL REQUIRED, SENSITIVE TO AIR HUMIDITY, PRODUCT MOISTURE & TEMPERATURE OF BOTH, SPECIALIZED APPLICATIONS, LOW CAPACITY
RESILIENCY SEPARATOR				P	HARD, INCLINED SURFACE						P								P			SPECIALIZED APPLICATIONS, VERY LOW CAPACITY