

A New Slant on Chips for Pellet Production

CHIPPERS

- Whole Log
- Wastewood
- Veneer
- Core
- Slant Disc

CHIP SCREENS

- DiamondRoll™ Thickness
- Disc Thickness
- Dual Drive Rotary
- Disc Scalpers
- DiamondRoll™ Fines

RESIZING

- Chip Cracker
- Chip Slicer
- Rechipper
- Hog

CHIP MEASUREMENT

- Continuous Moisture
- Size Classification

AIR SEPARATORS

SYSTEM COMPONENTS

- Feeders & Distributors

SPARE PARTS

REBUILT PARTS

SERVICE

Acrowood has long been known as a chipper manufacturer. From 42" diameter disc rechippers to 175" diameter whole log chippers, Acrowood and our predecessors Black Clawson and Sumner Iron Works have supplied chippers and forest products equipment for over 100 years. Since the 1960's, our slant disc chippers have seen wide spread acceptance and use in waste wood chipping applications. In recent years, there has been increasing utilization of smaller diameter stems. The downturn in the housing market has reduced availability of sawmill residuals. Both of these factors have contributed to an increasing interest in the use of small, low quality round wood to produce fuel pellets. High fuel oil prices, coupled with an increasing demand for pellets from overseas have spurred significant growth in the pellet industry in North America. Acrowood has used our experience in chipper manufacturing and focused on the production of small chips for the pellet industry.

Producing smaller chips using a disc chipper reduces the horsepower required for the primary breakdown of the logs. The smaller chips are dried more easily and require less milling to be converted into a size suitable for pellet production.

In order to learn more about the range of chips that can be produced; Acrowood set up a production model 5216 Slant Disc chipper in our product Development Center and ran trials producing 1/4" (6mm) long chips. The chipper used was a standard, horizontal feed, overhead discharge chipper with six knives. The above photo depicts this chipper in our test center. A small chain conveyor was adapted to feed the chipper, with the resulting chips blown to an existing cyclone and collected as they dropped out below.



The resulting chips were very small and fairly uniform in size. The following table and graphs present the chip classification data from the chips produced. Both thickness and length classifications were done.

Table 1. Length classifications for 1/4" chip length

Sample	>1 1/8" RH	>7/8" RH	>5/8" RH	>3/8" RH	>3/16" RH	Pan
Dry Peeler Core	0%	0%	0.2%	2.7%	57.2%	39.9%
Green Alder	0.3%	0.6%	1.0%	6.5%	69.2%	22.5%

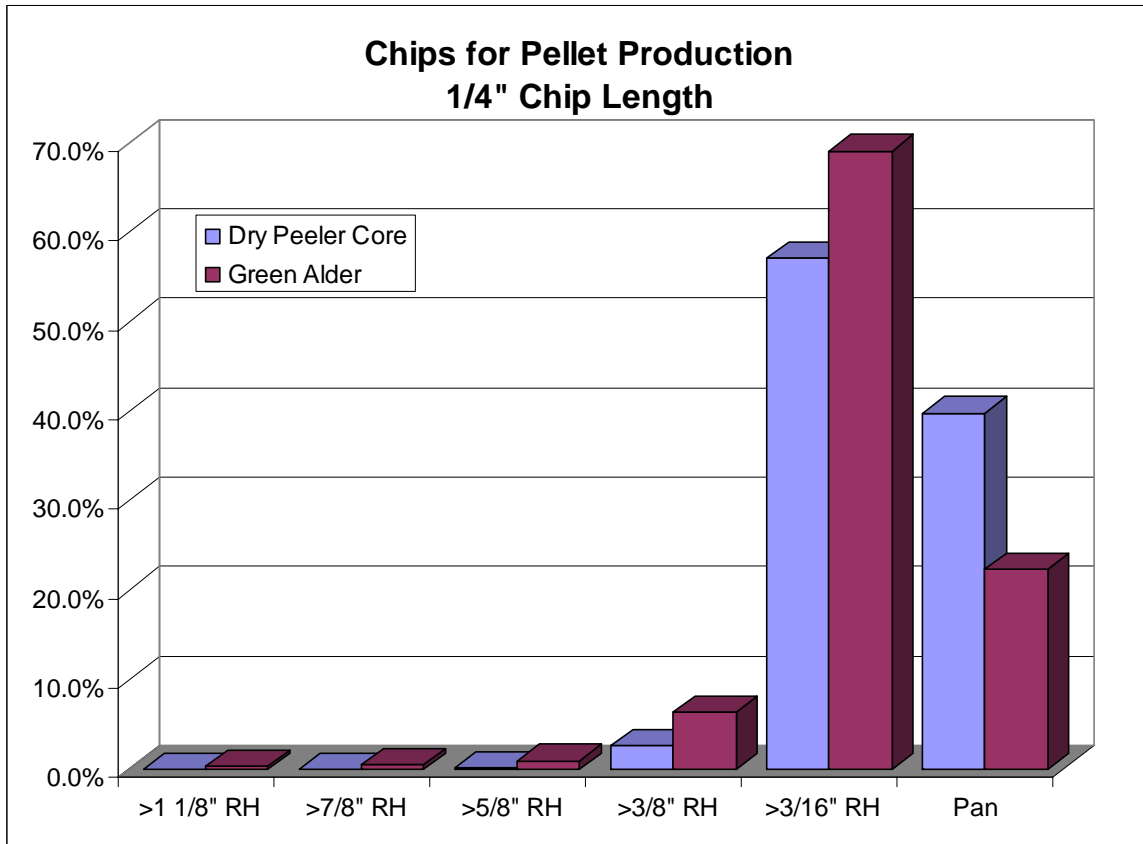


Table 2. Thickness classifications for 1/4" chip length

Sample	>8mm bar	>6mm bar	>4mm bar	>2mm bar	>3mm RH	Pan
Dry Peeler Core	0%	0.2%	1.2%	42.5%	42.9%	13.1%
Green Alder	0.1%	0.3%	1.9%	53.5%	38.7%	5.7%

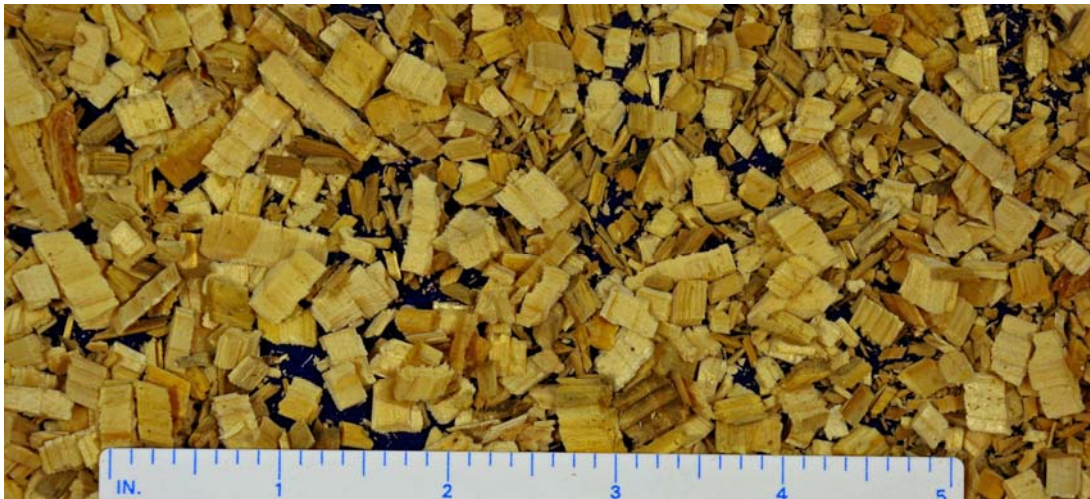
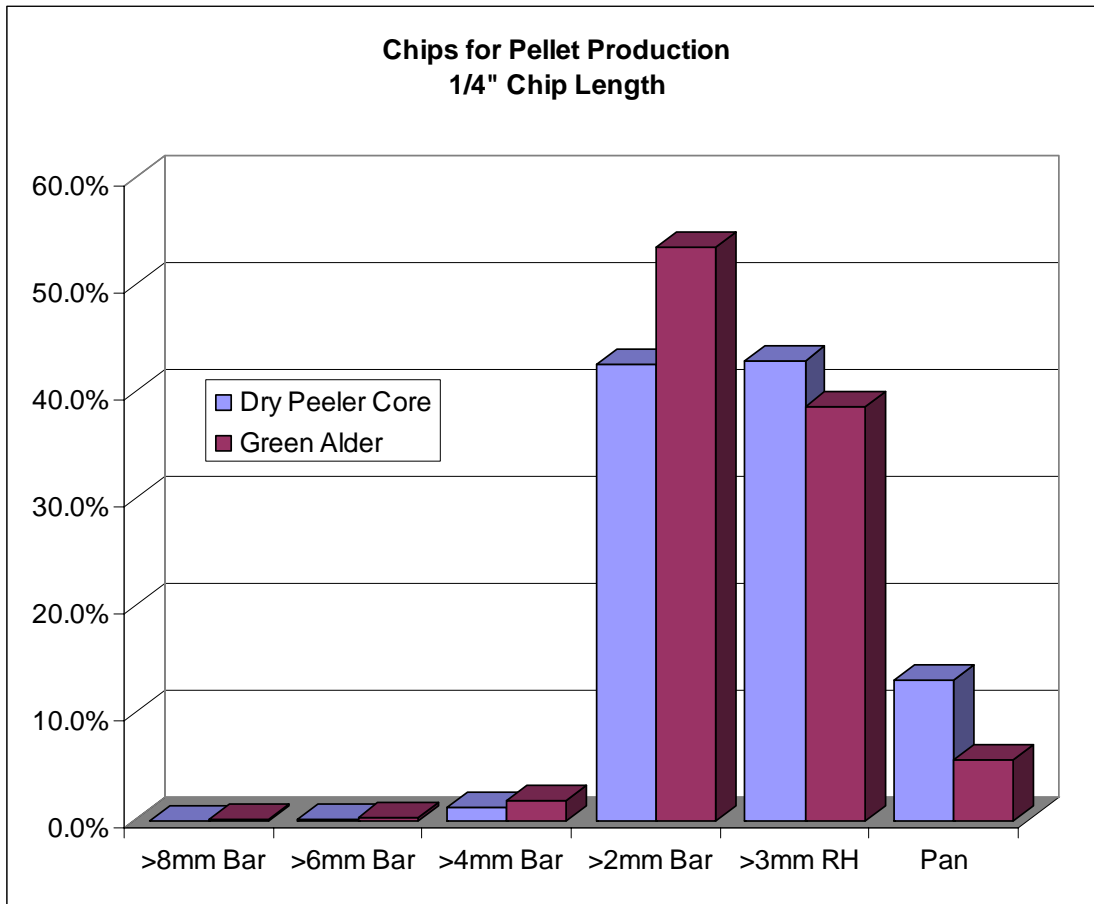
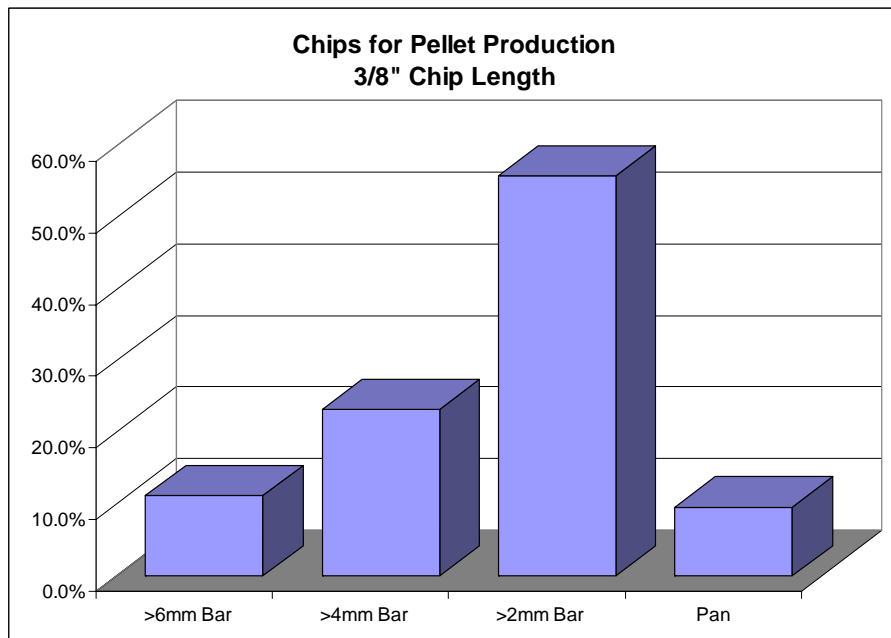
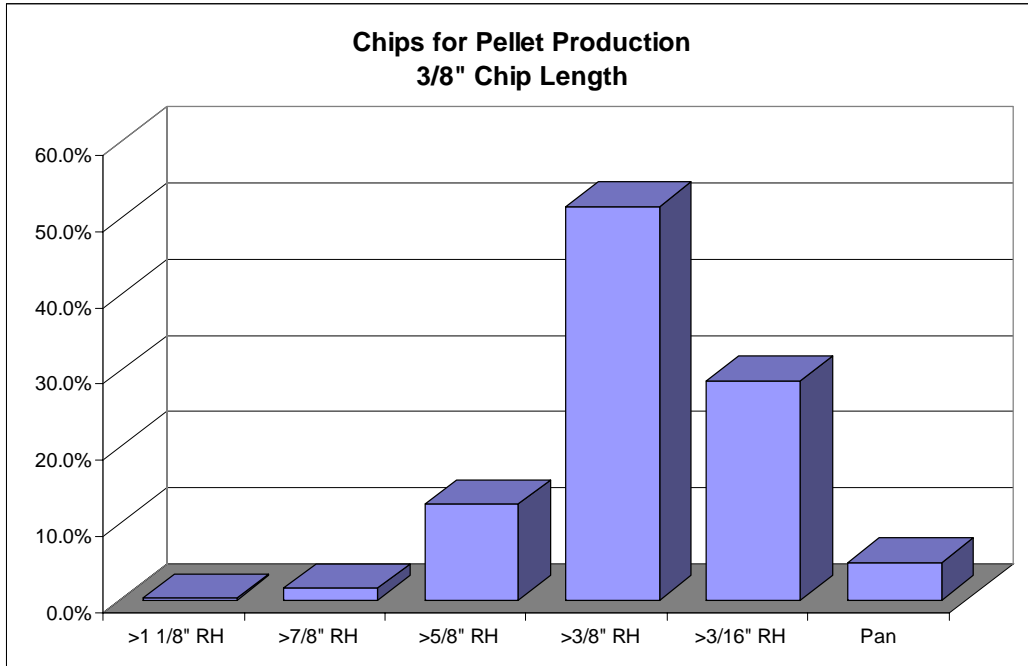
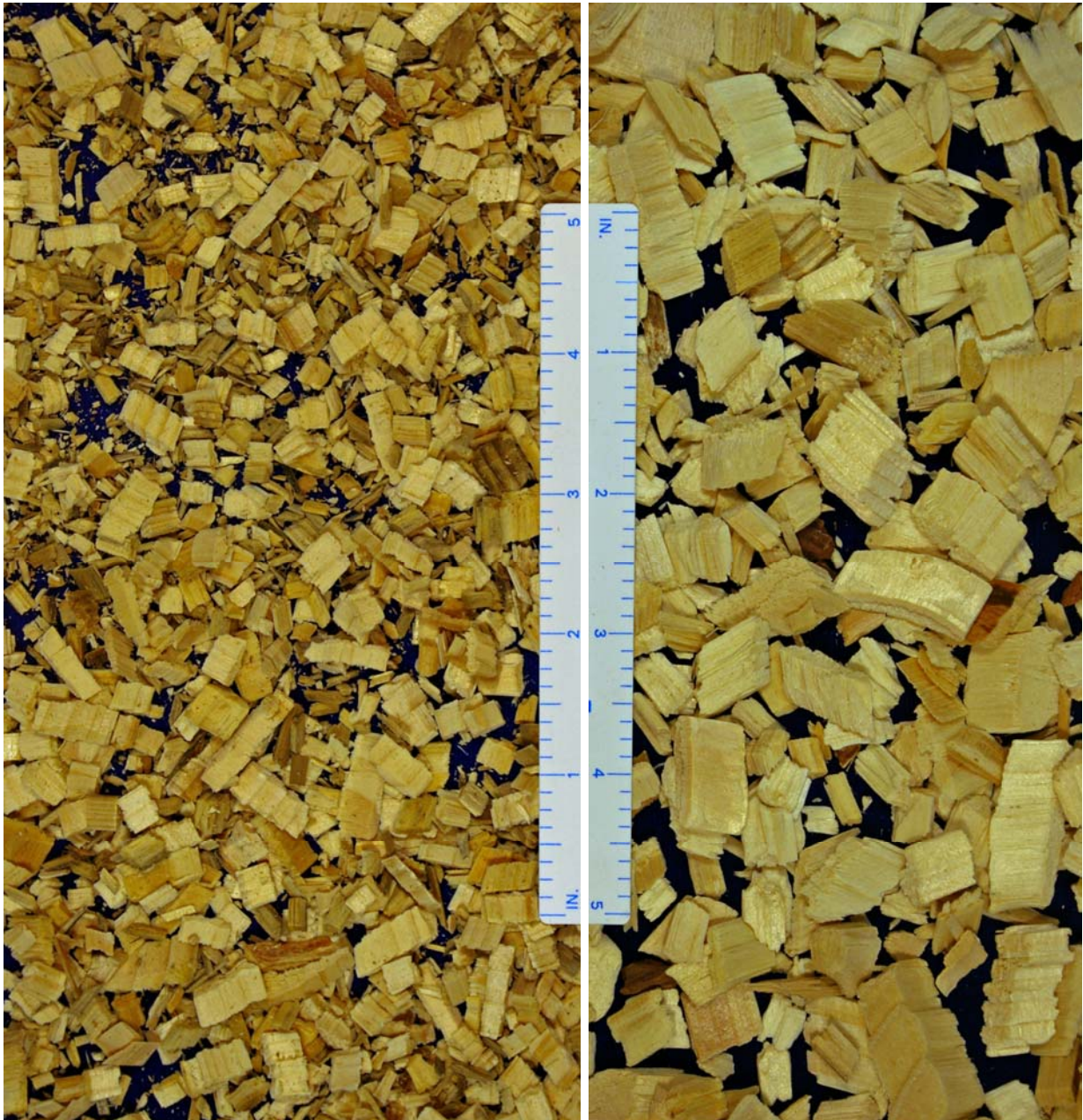


Table 3. Sample classifications for 3/8" chip length

	>1 1/8" RH	>7/8" RH	>5/8" RH	>3/8" RH	>3/16" RH	Pan
Green softwood	0.3%	1.6%	12.6%	51.7%	28.9%	5.0%
	>8mm bar	>6mm bar	>4mm bar	>2mm bar	Pan	
Green softwood	NA	11.2%	23.3%	55.8%	9.6%	





The above photos compare the chips produced with a 1/4" chip length with those produced by a production chipper running a 3/8" chip length and worn anvil. The chips produced by both chip lengths were consistently thin and maintained roughly the same thickness to length ratio that is typically found in larger pulp chips produced by a disc chipper.

Production Rates

The following tables summarize the production rates when chipping various diameter stems at ¼" and ⅜" chip lengths. The chipper is an eight knife unit running at 500 RPM. Feed speed equals 83 feet per minute with a ¼" chip length and 125 feet per minute at ⅜" chip length. The tables are based on chipping lodgepole pine at 40% MC and a solid wood density of 34.9 lb/ft³

Table 1. Output assuming a continuous ribbon of logs and a ¼" chip length.

<i>Log Diameter</i>	<i>Volume (ft³) per log</i>	<i>Tonnage chipped</i>	<i>Volume per hour (ft³ of chips)</i>
6	3.9	17 gtpH	2,827
8	7.0	30	5,026
12	15.7	69	11,309
16	27.9	122	20,106
20	43.6	190	31,415
23	57.7	252	41,546

Table 2. Output assuming a continuous ribbon of logs and a ⅜" chip length.

<i>Log Diameter</i>	<i>Volume (ft³) per log</i>	<i>Tonnage chipped</i>	<i>Volume per hour (ft³ of chips)</i>
6	3.9	26 gtpH	4,241
8	7.0	46	7,540
12	15.7	103	16,964
16	27.9	183	30,158
20	43.6	286	47,123
23	57.7	378	62,320

Obviously, it is not possible to have a continuous ribbon of logs feeding into a chipper. However, the above tables do provide an indication of the volume that results from chipping different log diameters. Running multiple stems is often done with smaller diameter logs. With a disc chipper, there is no screen or grate to restrict the output of the chipper. A properly designed feed system and attentive operators will ensure high throughput.

Typical Horsepower Requirements

When cutting short chip lengths with a disc chipper, the power requirements are reduced. For example, an 84" chipper with eight knives, running at 500 rpm would require the following motor sizes for the indicated chip lengths, maximum log diameters and species.

<i>Species</i>	<i>Max. Log Diameter</i>	<i>Motor Size (3/8" Chip)</i>	<i>Motor Size (1/4" Chip)</i>
Mixed Hardwoods (North America)	24"	1,200 HP	800 HP
Mixed Hardwoods (North America)	20"	800 HP	600 HP
Southern Yellow/Radiata Pine	24"	1,000 HP	700 HP
Southern Yellow/Radiata Pine	20"	700 HP	500 HP
Spruce/Pine/Fir	24"	800 HP	600 HP
Spruce/Pine/Fir	20"	600 HP	400 HP•

- - Under 500 HP would require special attention to the starting system and acceptance by the motor supplier due to the torque requirements when starting the chipper.

The above horsepower calculations are based on TAPPI Standard TIS 0406-02, which calculates the power requirements of disc chippers. These calculations are conservative in nature.