# CTL line + automated shear = flexible blanking

Combination produces wide range of both dimensions and quantities at Ryerson Tull's Little Rock processing center.

By J. Neiland Pennington, Executive Editor

**Carey Dye transfers a sheet to Ryerson Tull's automated shear feeder with a Canrack vacuum sheet handler. The double-articulated handler has a sensing device that will not allow the load to be released as long as there is tension on the lift cable.** ***Photographs by the author.***

Flexibility is the operative word when Ryerson Tull managers detail the advantages of the cut-to-length and automated shear installations at their Little Rock, Arkansas, metal processing center—the former AFCO Metals facility. Although the 60-in. wide Red Bud CTL line is capable of producing small blanks, repetitive cuts tend to lower throughput. For reduced sizes, generally with one dimension 24 in. or less, Ryerson Tull believes it is more efficient to produce large master blanks on the CTL line, then shear them to finished sizes. Six months ago, the company added a 12-ft. Cincinnati mechanical shear and a Canrack/PMI CNC shear feeder.

"We knew from previous experience that we couldn't accept some of the business we wanted without a shear to produce a full range of sizes and quantities," said Phil Wylie, vice president of Ryerson Tull's Southwest Division. "Certain customers couldn't be served effectively with the equipment we had.

"A customer comes to you with a package order for blanking. It may range from sizes that are used in quantities of 10,000 lbs. per week to sizes that total only 50 lbs. a week. We have both very large and very small quantities, and we have to take the entire order. With the addition of the shear, we can more efficiently serve customers that require a variety of dimensions, whose orders don't have the volume to run on the CTL line alone."

### Master blanks or finished dimensions

With a wide range of dimensions and quantities, shearing master blanks makes eminently good sense, according to Bill Rath, Ryerson Tull's manager of operations in Little Rock. "You have the choice of inventorying relatively few master blanks or many finished dimensions.

"It takes less time to put metal on the shear than on the CTL line. If you are running a 40,000-lb. coil, you have to process the entire coil. You can't afford to remove the coil and change your setup in the middle of the run. Combining the shear with the CTL line gives us more flexibility, and the shear allows cutting smaller quantities of smaller sizes that would be impossible on the cut-to-length line alone."

Why not add a slitter to upgrade the CTL line to full multi-blank capability? "When we installed the Red Bud equipment in 1997, we made a conscious decision to buy it without multi-blanking capability," Phil Wylie said. "We didn't see enough of the right kind of blanking business in our market area to support multi-blanking with a slitter. You have to have a pretty high volume of blanks that fall into being the same length to make the economics work.

"The shear helps us address the type of business that we en-

counter. Not necessarily small-volume customers, but ones that don't have tremendous quantities of the same length of blanks that make the economics favorable for a multi-blanking line."

Although in practice the shear and its attendant feeder produce relatively small parts, the installation has a 12- x 12-ft. capacity. The thickness range is 26 ga. to 1/4 in. and the weight limit is 600 lbs., monitored by a resistance fault code.

Up to four pneumatic grippers hold the blank and advance it through the shear. Once the blank is positioned in the grippers, shearing is a hands-off operation.

The grippers are driven by an AC servomotor and a ball screw, and move the sheet at 1100 in./min., regardless of dimensions and weight. The gripper movement is similar to one axis of the feeder on a turret punch press, and the feeder control also trips the shear.

The smallest practical shearing increment is 1 in. The feeder will produce narrower strips, but they tend to curl and corkscrew.


**The shear installation mates a Canrack/PMI feeder with a 12-ft. Cincinnati mechanical shear. The shear feeder advances sheets at 1100 in./min. for all weights, and positions to an accuracy of ±0.005 in.**

### Matched length tolerances

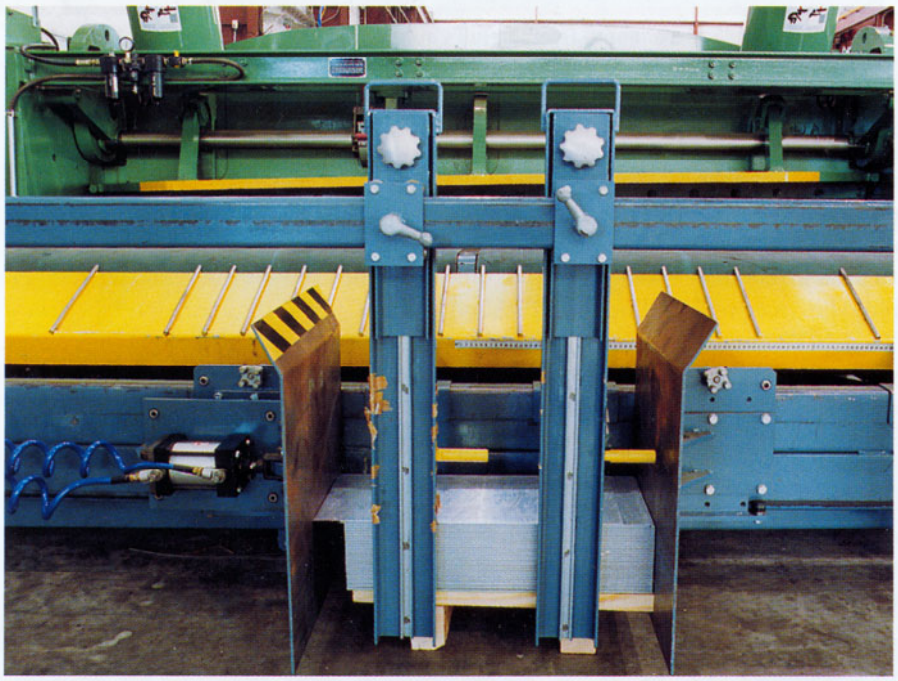
The computerized shear feeder maintains a length tolerance of ±0.005 in., the same as the CTL line, so there is no compromise in accuracy. The shear feeder returns to absolute zero on every new program, and spring-loaded compensating nuts on the ball screws are said to eliminate backlash.

The computer control emulates the procedure an experienced operator would follow with a manual shear, communicating in familiar terms that minimize the transition time to automation.

"The operators don't have to change how they think," emphasized Bob Howard, Canrack/PMI president. "For example, they have the option of a front gauge or a back gauge. In a manual blanking operation, the front gauge stop is very often the first cut. That shears the finished dimension in front of the blade.

"Say an operator wants to trim a 4-ft. sheet to 47½ in. He enters the code 'A1' for front gauge and 47½ in. If he puts in something erroneous, the control flashes 'error.'

"Now suppose the operator wants to cut 6-in. strips. In our program line, he enters 'I' for incremental cut—the back gauge—and 6 in. for the width of the strip."



**The shear is not integrated with the packaging station. Blanks are transferred from the stacker to packaging by forklift. The shear has both front and back gauges, and scrap is removed from either the front or the back through a trap door onto a conveyor.**

### Two operating modes

"Strip" and "part" settings on the shear feeder change how the gripper movements are calculated. If the goal is consistency of width, you program the controller for strips. That mode measures each gripper movement from the point of the previous cut. Three-inch wide strips are cut repeatedly in a 3-3-3-3 pro-

gression, and the width is very consistent.

The part setting programs in a growth allowance that compensates for the slight increase in width when the blank is sheared. "The part setting is very useful for blanks that have been previously punched," Howard explained. "Instead of shearing many small blanks and sending them to the turret punch press, you punch large blanks containing many parts. You then bring the large punched blanks to the shear feeder and produce the individual pieces.

"On the part setting, with the growth allowance, the edge-to-hole tolerance will be maintained. Instead

**Packaging for the shear is a batch operation. Carey Dye has no difficulty keeping pace with the shearing operation, using the ergonomically correct packaging table.**

using the previous cut as a reference, the computer calculates each cuts from the original starting point. Three-inch blanks would be sheared in a 3-6-9-12 progression from the point of the initial cut. This produces somewhat more variation in the overall dimensions of the blanks, but no growth. The edge-to-hole tolerance remains correct."

The strip setting, Howard noted, is favored by service centers, which want a high level of dimensional repeatability. Fabricators are partial to the part setting to provide precise positioning of features on the blank.

Canrack/PMI prefers to install its feeders on mechanical shears. Hydraulic shears have a slower operating cycle, and the feeder must wait for the blade to return. According to Howard, a mechanical shear takes advantage of the feeder's high gripper speed and provides almost double the production.

### The importance of packaging

Packaging at Ryerson Tull is integral to the efficiency of both the cut-to-length and shearing operations. For large blanks that will not be sheared, a new in-line packaging station has effected an almost immediate productivity gain of 15 percent. Packaging now keeps pace with the sheet stacker.

Also built by Canrack/PMI, the packaging station is fed by a roll transfer directly from the CTL line's right-angle discharge conveyor. "Previously, they shut down the CTL line while they cleared each skid," Howard reported. "Now, the line runs continuously, and they can accumulate up to three completed skids downstream of the packaging station."

Ryerson Tull stopped short of automating the strapping cycle, preferring to continue with an operator wielding a pneumatic bander. But the ergonomically designed line requires only one person, who can package most skids in 3 min.

The packaging station for the shear is a stand-alone operation. Blanks are removed from the stacker by a forklift truck and deposited on a strapping table at the correct height to keep the operator from bending.

"We never intended to integrate packaging with the shear stacker," Bill Rath stated. "At the speed the CTL line runs, an in-line system is the only way to package as fast as we cut. But packaging has no problem keeping pace with the shear."

Ryerson Tull has yet to document the process improvement afforded by the CTL line/shear combination, but Phil Wylie is confident the company's decision will be validated. "In some cases," he said, "we are able to cut finished sizes more efficiently. The unit cost may not be lower, but we may get better utilization of our inventory, scrap may be reduced or we may not have to stock as many widths of master coils. There are many ways to quantify efficiency."■

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