

CIF 227

Fibre Line Backscraping Drum



Final Project Report, December 2010
Ottawa Valley Waste Recovery Centre
CIF # 227

Table of Contents

1. Executive Summary.....	4
2. Background Information and Project Objective.....	5
3. Monitoring and Reporting.....	6
3.1 Equipment Operator Labour Reduction.....	6
3.2 Fibre Line Sorter Labour Reduction.....	6
3.3 Budgeted Costs vs Actual Costs of Installation.....	6
3.4 Problematic Materials	7
3.5 Black Belt Trials.....	7
3.6 Maintenance Requirements.....	8
3.7 Health and Safety.....	8
3.8 Baled Fibre Quality.....	9
4. Baseline versus Current Data.....	9
4.1 Black Belt Trials.....	9
4.2 Equipment Operator Labour.....	10
4.3 Fibre Line Processing Capability.....	10
5. Summary.....	10
5.1 Cost Savings.....	10
5.2 Findings.....	10
5.3 Lessons Learned.....	11

Acknowledgement:

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This Project has been delivered with the assistance of Waste Diversion Ontario's Continuous Improvement Fund, a fund financed by Ontario municipalities and stewards of blue box waste in Ontario. Notwithstanding this support, the views expressed are the views of the author, and Waste Diversion Ontario and Stewardship Ontario accept no responsibility for these views.

1. Executive Summary

This is the final report of a project implemented by Ottawa Valley Waste Recovery Centre on May 21, 2010. The project objective was to decrease MRF labour costs by installing a backscraping drum on the MRF fibre line. Waste Diversion Ontario – Continuous Improvement Fund (WDO – CIF) provided financial assistance and Machinex installed the drum with assistance from facility staff.

The Ottawa Valley Waste Recovery Centre operates a MRF with dual stream processing; containers and fibre. The fibre line is fed manually by an equipment operator using a loader and the various fibre materials (OCC, OBB, office mix, newspaper) are manually sorted into bunkers for baling. The equipment operator feeding the fibre line cannot leave to perform other tasks such as spotting incoming trucks. There is also an average of 5 minutes per hour of black belt time on the fibre line with the inconsistent feed.

A backscraping drum on the fibre line would increase the fibre processing capability by providing a consistent feed to the sorters with minimal black belt time and decrease equipment operator labour costs by allowing the operator to load large amounts on the conveyor and leave to do other tasks while the drum meters the material on the belt.

The drum was installed on May 21, 2010 and the six months following installation has shown that the objective to decrease MRF labour costs has been achieved. The fibre processing capability has increased from 3.1 MT/hr to 3.3 MT/hr which has saved \$970 in six months. Allowing the equipment operator more time to perform other tasks has decreased the need for one equipment operator during double-line days which are days both lines are running in the MRF. This has decreased labour costs by \$7,635 in the first six months of operation.

The backscraping drum has also helped with health and safety issues. Large pieces of cardboard would often jam on the sorting conveyor belt. The sorters would have to manually pull the cardboard apart sometimes causing injuries. Now that the material is metered, incidents of jammed cardboard are rare. A controlled, consistent fibre depth to the sorters is also an ergonomic aid as the sorters do not have to dig through large amounts of material to sort.

The original budget cost to complete the project was \$40,000. The Ottawa Valley Waste Recovery Centre was approved up to \$20,000 funding from the Continuous Improvement Fund and the estimated return on investment for the total project was 4.53 years. The actual project cost was \$40,154 and after 6 months of operating it is apparent the estimated return on investment will be achieved.

2. Background Information and Project Objective

The Ottawa Valley Waste Recovery Centre operates a dual stream MRF with container and fibre lines. The MRF runs a two shift operation, days and afternoons, five days a week. Normally one line operates per shift but during busy periods, both lines will run during the dayshift which is called a double-line day. The material handlers on the fibre line manually remove cardboard, boxboard and contaminants (plastic, wood, containers, etc) and put these materials into bunkers to be baled. The clean newspaper then goes off the end of the conveyor into one of two bunkers. Previously it took four equipment operators to work in the MRF during a double line day to complete the tasks required; baling, loading the container line, loading the fibre line, spotting incoming trucks and loading outgoing trucks. Loading the fibre line was the one task that needed 100% of an operator's time because the fibre was feathered onto the conveyor with a loader. When the operator had to leave to get another bucket of fibre or leave to accomplish another task, the fibre line would run empty resulting in black belt. This resulting black belt meant sorters were standing at the edge of the conveyor with no material to sort.

The project objective was to decrease MRF labour costs by installing a backscraping drum on the fibre line incline conveyor. This drum would provide two opportunities to decrease costs:

- Reduce MRF equipment operator staffing by one person on double-line days because the drum would allow the operators to load large amounts of material on the floor conveyor and leave to do other tasks. The drum would meter the material to the sorters on the incline conveyor.
- Reduce black belt time on the fibre conveyor. This would increase productivity and thus reduce costs.

3. Monitoring and Reporting

3.1 Equipment Operator Labour Reduction

Previously the MRF would operate with four equipment operators during double-line days; one operator loaded the container line and spotted incoming trucks, one operator loaded the fibre line, one operator baled material, one operator moved bales, loaded incoming trucks and covered breaks.

With the backscraping drum one operator is not tied to the fibre line 100% of the time so now the MRF operates with three equipment operators on double-line days to complete the same tasks. From May 25 to December 1, 2010, the MRF ran 42 double line days which resulted in 336 fewer equipment operator hours. This has reduced the labour costs by \$7,635 over the six months.

3.2 Fibre line Sorter Labour Reduction

Previous black belt trials on the fibre line averaged 5 minutes of black belt per hour. With the backscraping drum in place the black belt time has approached zero which has resulted in an increase in the fibre processing capability. The previous average productivity was 3.1 MT/hour. The average productivity from May 25 to December 1, 2010 was 3.3 MT/hour. The same volume of material can be processed in less time meaning fewer sorter labour hours are needed. This has reduced the labour costs by \$970 over the six months.

3.3 Budgeted Costs versus Actual Costs of Installation

The budget costs versus the actual costs of installation are shown in the table below.

Budget item	Budget Cost	Actual Item	Actual Cost
1. Backscraping drum, freight, installation and commissioning	\$34, 280	1.Backscraping drum, freight, installation and commissioning	\$36,928
2.Electrical service	\$2,500	2.Electrical service	\$528

3. Move fire protection piping so stairs could be moved	\$1,220	3. Stairs did not have to be moved	\$0
4. Move stairs on north end of fibre house	\$1,000	4. Stairs did not have to be moved	\$0
5. Internal labour costs for installation	\$1,000	5. Internal labour costs for installation	\$3,371
Total	\$40,000	Total	\$40,827

The actual project cost was within 2.1% of budget. The stairs did not have to be moved as originally planned because there was sufficient room beside the conveyor for the motor housing. Machinex and OVWRC employees did more of the electrical service work so the cost for the electrical contractor was less and the Machinex and OVWRC costs were higher.

3.4 Problematic Materials

The one problematic material is large pieces of cardboard. The packaging cardboard from refrigerators, freezers and other large appliances or furniture does not flow well under the drum during normal operation. The large cardboard will build up in front of the wheel over time and then the operator has to lift the wheel to let it flow under. The wheel can then be brought back down for normal operation.

3.5 Black Belt Trials

There were a total of six black belt trials performed on the fibre line between July and November 2010. The results are summarized below:

	July 15	July 20	August 25	September 14	October 13	November 9	Average
Black Belt Time (minutes)	0	0	1	0	0	0.5	0.25

3.6 Maintenance Requirements

To date there have been no maintenance issues with the backscraping drum. The bearings on the shaft are greased on a regular basis.

3.7 Health and Safety

There have been no health and safety issues with respect to the backscraping drum operation. In fact, the drum has been positive in several ways:

Previous Issue	Solution
Large amounts of wet cardboard would travel up the conveyor all clumped together. It was heavy and cumbersome for the sorters to remove from the line.	The drum meters the wet cardboard on the conveyor so a manageable amount goes to the sorters.
Several pieces of large cardboard would come up the incline conveyor and jam where the material fell onto the horizontal sorting conveyor. These same large pieces would also jam in the conveyor entrance window in the sorting house. Employees would have to pull these jams apart with their hands and rakes. This was very strenuous and sometimes would result in injury.	The drum has to be lifted to allow the large cardboard through but it still meters the cardboard so the depth is controlled.
Large amounts of cardboard frozen together. This can cause injuries to the sorters because the pieces are heavy and cumbersome.	The drum will tend to break the large bundle of frozen material apart as it tries to pass under the drum.

There was one minor incident during installation. A contractor was welding on the side of the conveyor when a spark ignited some of the grease on the conveyor chain. The flames were extinguished immediately with a fire extinguisher. The lesson learned from this incident was to remove more side panels on the conveyor to allow greater access in case a larger fire had developed. It would be difficult to shoot fire extinguisher powder into the middle part of the conveyor with the side panels on.

3.8 Baled Fibre Quality

There have been no quality issues or complaints from the customers with respect to the quality of the fibre bales.

4. Baseline versus Current Data

4.1 Black Belt Trials

Before the backscraping drum was installed, four black belt trials averaged 5 minutes of black belt per hour.

After the backscraping drum installation, six black belt trials averaged 0.25 minutes of black belt per hour.

A 95% decrease in black belt time.

4.2 Equipment Operator Labour

Before the backscraping drum was installed, four equipment operators were used in the MRF on double-line days to process material on the fibre and container lines.

Since the backscraping drum installation, three equipment operators are used for double-line days in the MRF.

To date (six months), there have been 336 fewer equipment operator hours used in the MRF on double-line days.

4.3 Fibre Line Processing Capability

Before the backscraping drum was installed, the fibre line processing capability was 3.1 MT/hr.

After the backscraping drum installation, the processing capability increased to 3.3 MT/hr.

An increase of 6.5 %.

5. Summary

5.1 Cost Savings

- Operating with three equipment operators instead of four on double-line days (42 days in first six months) - \$7,635
- Increasing fibre line processing capability from 3.1 to 3.3 MT/hr (first six months of operation) - \$970
- Total cost savings in first six months of operation - \$8,605

5.2 Findings

- Three equipment operators can successfully operate the MRF on double-line days. This has saved OVVRC \$7,635 in the first six months and these savings will increase as more material is processed.
- The fibre line processing capability has increased from 3.1 to 3.3 MT/hr which has saved the facility \$970 in the first six months of operation. These savings will also increase as more material is processed.
- The drum has had a positive effect on the previous fibre line health and safety issues; large clumps of wet cardboard, large pieces of cardboard jamming, large frozen bundles of cardboard.
- The backscraping drum is more efficient if there are no large pieces of cardboard in the mix. The large pieces of cardboard build up in front of the drum over time and then the drum must be raised to allow the material to meter through.

- The drum's height must be adjusted to the mix of fibre being processed. If the mix is mostly paper, the drum height must be reduced to reduce the burden depth to the sorters. If the mix is mostly cardboard, the drum height must be increased to allow the cardboard to pass under the drum and still present an acceptable burden depth to the sorters.

5.3 Lessons Learned

- The original Machinex drawing showed the stairs at the north end of the fibre house had to be moved because the motor on the backscraping drum would stick out into the stairway. After measuring the clearances, it was decided the stairway would be left and would be moved after the project if it was deemed a safety issue. It turned out the stairway did not have to be moved after post-installation field measurements were completed. This was a cost-saving.
- The incident investigation after the minor fire during installation showed more side panels need to be removed on the conveyor to make the inside of the conveyor more accessible if fire extinguishers or other fire-fighting media is needed. It also showed the importance of having someone on fire-watch when hot work is being performed.