Aluminum Blower Replacement

CIF #656.2

Final Project Report, October 2012

Ottawa Valley Waste Recovery Centre

CIF # 656.2

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Ackowledgement:

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1. Executive Summary

This is the final report of a project implemented by Ottawa Valley Waste Recovery Centre on February 13, 2012. The project objective was to decrease labour costs on the container sorting line by replacing the small aluminum (UBC) blower and associated piping with a larger blower system. Waste Diversion Ontario – Continuous Improvement Fund (WDO – CIF) provided financial assistance and Machinex installed the blower and piping with assistance from facility staff.

The Ottawa Valley Waste Recovery Centre operates a MRF with dual stream processing; containers and fibre. The aluminum materials on the container line are separated by an eddy current belt and then the materials fall into a blower system where they are conveyed to a bunker. The blower system experienced on average four blockages per eight hour shift because the 5 h.p. blower and 12" diameter piping were too small. This equated to one hour of processing time lost per shift.

Replacing the small blower system with a 10 h.p. blower and 24" diameter piping has allowed the container line to run continuously without blower blockages and therefore has increased processing time and decreased labour costs.

The new blower system was installed on February 13, 2012 and the seven months following installation has shown that the objective to decrease labour costs on the container line has been achieved. The container line processing capability has increased from 1.3 MT/hr to 1.5 MT/hr which has saved $16,575 in the first seven months.

The new aluminum blower system has also strengthened the quality of the baled aluminum and has had a positive effect on health and safety. Five loads have been sent out since the new blower was installed and every load received a 100% quality score. With health and safety, the sound level in the vicinity of the blower has decreased even though the new blower is twice the horsepower of the old blower.

The original budget cost to complete the project was $60,000. The Ottawa Valley Waste Recovery Centre was approved up to $26,834 funding from the Continuous Improvement Fund and the estimated payback for the total project was 1.9 years. The actual project cost was $ 60,084 and after 7 months of operating the savings are $16,575. Using the 2011 containers weight (2391 MT), the annual savings realized will be $29,648 and the payback will be 2.0 years.

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. The container line at OVWRC uses an EC belt at the end of the line to separate out aluminum containers. The aluminum containers fall into a blower system where they are blown into a bunker for storage. The old blower system was undersized for the material collected and sorted. The material jammed in the small diameter piping (12" diameter) and the container line had to be shut down to clean the material out of the pipe. It takes approximately 15 minutes to clean the piping and this happens on average 4 times per day. This was 60 minutes per day of lost sorting time for containers.

The project replaced the smaller blower system with a larger system which includes a short transfer conveyor, 24" diameter piping and a larger CFM blower. The objective of the project was to prevent blower blockages and increase the container sorting time by 1 hour per 7 hours processing time. This would be a 14% increase in processing time on the container line. Overall this would amount to an annual savings of $32,500 in labour costs.

3. Operations Monitoring and Measuring

The data in this section was taken between the time period February 15, 2012 to October 18, 2012 unless otherwise specified.

3.1 Number of Blower Blockages

Baseline – Average 4 blockages per shift resulting in 15 minutes downtime per blockage or 1 hour downtime per 7 hours processing time.

New Blower – There have been no blower blockages since the new blower system was installed. Therefore there is no downtime due to a blocked blower.

3.2 Budgeted Cost versus Actual Cost of Installation

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

Budget Item	Budget Cost	Actual Cost
Blower and associated equipment, freight, installation, start-up, operating & maintenance manuals	$47,443	$54,256
Internal Labour – taking old blower system apart and disposing of it	$3,000	$1,546
Electrical equipment and labour	$5,000	$4,282
Contingency	$4,557	
Total	**$60,000**	**$60, 084**

The total actual expenses were within 1% of the anticipated budget.

The blower and associated equipment actual costs were $6,813 more than budgeted. When the detailed design engineering started Machinex realized the structure holding the piping needed to be stronger so the support structure was reinforced.

The internal labour cost to remove the old blower was not as high as budgeted because the old piping was removed using the large forklift Machinex had rented for the project.

The electrical costs were slightly lower than budget.

3.3 Maintenance

There have been no maintenance issues or increased cost due to the new blower system. Preventative maintenance is done on a regular basis and the system is performing well.

3.4 Power Consumption

The power consumption number is only available for the total MRF. Detailed numbers are not available for specific areas in the MRF.

Month	2011 Power Consumption (kWh)	2012 Power Consumption (kWh)
March	22,054	21,390
April	30,175	24,827
May	22,154	16,424
June	25,973	31,321
July	22,918	25,591
August	27,883	24,827
Average	**25,193**	**24,063**

Comparing a six month period in 2011 to 2012, the average power consumption has decreased by 1,130 kWh/month. There are many factors that affect the power consumption number in the MRF including many pieces of equipment so the decrease cannot be solely attributed to the new blower system. The old blower was 5 HP motor and the new blower is a high efficiency 10 HP motor. The fact that the consumption did not increase is positive.

3.5 **Container Line Productivity**

The container line productivity increased from an average of 1.3 MT/hr to 1.5 MT/hr over the 5 month period from March to July 2012.

Month	Container Tonnage Received (MT)	Processing Hours
March	182.29	114
April	171.15	129
May	185.84	122
June	183.71	120
July	211.59	147
August	232.69	158
September	169.36	120
Total	**1336.63**	**910**

Average MT processed per hour – 1.5

This is a 15% increase in container line productivity.

3.6 **Aluminum UBC Quality**

Since the installation of the new blower system on February 13 & 14, there have been no quality complaints with reference to the aluminum bales. There have been five loads shipped and the quality score for each load has been 100% which is definitely a positive step forward with respect to aluminum quality. With the new system there are not as many contaminants going into the aluminum bunker.

3.7 **Health and Safety**

There have been no health and safety issues with respect to the new aluminum blower system. The positive aspects of the new system are:

- Employees do not have to open pipe access ports and reach awkwardly into tight spots and unblock piping.
- There is no longer a housekeeping issue at the blower system. When piping was continuously being cleaned, there was always material all over the mezzanine and floor which was a big housekeeping issue.
- The average sound readings from the new blower system have decreased from 83.2 decibels to 80.2 decibels taking readings from six different locations. This is good considering the size of the blower system has doubled.

Location	**Old Blower System (Decibels)**	**New Blower System (Decibels)**
Baler	85	80
MRF Entrance	73	72
Corner of Container Line Mezzanine	88	83
Container Line Glass Spot	85	84
Container Line Magnet	85	82
Baler Conveyor Control Panel	83	80
Average	83.2	80.2

4. Summary

4.1 Findings

- The container line processing capability has increased from 1.3 MT/hr to 1.5 MT/hr which has saved the facility $16,575 in the first seven months. This works out to an annual savings of $29,648 (using 2011 tonnages) and a project payback of 2.0 years.

- The overall power consumption in the MRF decreased by 1130 kWh per month compared to the same time period in 2011. It was expected the consumption would increase because the blower motor doubled in horsepower from 5 to 10 but the "high efficiency" aspect of the new motor has made a difference.

- The quality of the aluminum bales has increased. On the old blower system, the aluminum cans jumped over a partition (eddy current) and fell directly into the blower piping. Having the blower piping so close to the end of the eddy current belt caused a venturi effect and light contaminants (small plastic bags, styrofoam) would often come off the end of the belt and float over the partition into the blower piping. The new system has a conveyor belt at the end of the eddy current belt which transfers the aluminum to the blower piping thus eliminating the venturi effect and reducing contaminants.

  The new piping system also has a "drop-out" chute at the end of the transfer conveyor so heavy items fall out of the system. The light cans fall into the blower air stream and travel to the bunker and any heavy items (aluminum non-UBC material) fall through the air stream into a drop-out chute.

- The sound levels in the vicinity of the blower system have dropped from an average of 83.2 to 80.2 decibels. Again it was expected the sound levels would increase when the motor, fan size and pipe diameter were doubled but that was not the case. The high efficiency motor and well-engineered fan and piping system have made the difference.

4.2 **Lessons Learned**

- During the design phase of the new blower system there were discussions about the increased size of the motor and fan and possible increased sound levels. It was assumed the sound level would increase because the motor and fan size had doubled, so the original design had a sound dampening box around the motor and fan unit. The cost of the sound dampening box was going to be very high because it had to be engineered to provide proper sound dampening and air flow for the system. The decision was made to leave the sound dampening box out of the project and it would be added later if needed. In the end it was a good decision because the sound levels actually decreased.