MONITORING REPORT FOR WOOD CHIP BLOWER

HA FOOTE HAULAGE LTD

WOOD CHIP DELIVERY

June 2009

Prepared by

aircomm

building services design engineers

MONITORING REPORT FOR WOOD CHIP BLOWER

Consultant

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Revision	Description	Date	By
A	Draft	25/05/09	Mika Miettinen
B	Final	28/05/09	Mika Miettinen
C	Final with modifications	5/06/09	Mika Miettinen

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1 COMMISSIONING CHECK

1.1 GENERAL DESCRIPTION

HA Foote Haulage, a trucking and landscaping supplies company, supplies wood chips from 22 Bridgman Street, Dunedin to Tahuna Intermediate School in Dunedin. A truck with a 9 m^3 wood chip capacity is used for delivery. Wood chips are blown into a fuel bunker using a wood chip blower system as shown in Figure 1. As can be seen the figure, wood chips are sucked from the truck into the blower (on the trailer) via a locally supplied flexible plastic pipe (diameter 210 mm) and then blown into the wood chip bunker via a galvanised sheet mild steel pipe. This second pipe is made of galvanised sheet mild steel due to the fire risk associated with electrostatic charging if this pipe were plastic.

Figure 1 Wood chip blowing from the truck to the wood chip bunker

1.2 SPECIFICATIONS

The manufacturer's specifications and the site measured data for the wood chip blower are shown in Table 1. The site measured data was taken on site during a wood chip delivery to Tahuna Intermediate School.

Table 1 Manufacturer's specifications and the site measured data for the wood chip blower

Description	*Unit*	*Manufacturers specifications*	*Site measured*
Make		MUS-MAX	-
Product		Wood chip suction blower	-
Make of motor		LENZE	-
Power of motor	[kW]	9.2	-
Outtake/suction connection	[Ømm]	210	-
Conveying height	[m]	10	2
Conveying distance	[m]	7	8
Capacity	[m³/h]	13-15	18
Voltage	[V]	415	-
Frequency	[Hz]	50	-
Power connection	[A]	32	-
Full load current	[A]	17.4	18
Run current (no load)	[A]	-	10
RPM	[1/min]	2915	-
Noise level at 3 m	[dBA]	-	90-100
Noise level at 17 m	[dBA]	-	80-90

1.3 INVOICES

Ha Foote Haulage applied for funding towards the purchase of a blower and modifications to the truck and trailer. The estimated and actual (invoiced) costs of the blower, accessories and modification are shown in Table 2 (excluding GST). The total cost of the blower setup was $13,757.06 (excluding GST), which was less than the estimated cost because of variations in the exchange rate. Also item 3 was less than estimated cost because of the existing trailer was used (no cost for the existing trailer).

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Table 2 Estimated and actual (invoiced) costs of the blower, accessories and modification

Item	*Description*	*Supplier*	*Estimated cost*	*Actual cost*	*Invoicing date*
1	MUS-MAX 9.2kW blower housing on wheels, 3.5m of galvanised pipe (Ø210), 90º corner angle, 9 connecting clips	Spark Biomass Energy	$13,800.00	$13,207.38	13/01/2009
2	Suction hose	Airtight Solutions Ltd	Included above	$565.08	30/04/2009
3	Convert an existing tail door to the delivery truck and facilitate transport of the blower to existing trailer with the delivery truck	HA Foote Haulage Ltd	$3,000.00	$2,611.06	5/06/2009
	TOTAL		$16,800.00	$16,383.52	

All items in Table 2 excluding item 3 (modification) have been identified.

1.4 OPERATIONAL

A grant was obtained by HA Foote Haulage from EECA to purchase a wood chip blower, and convert a truck to incorporate the blower in such a way that wood chips could be transferred from the truck into the bunker. The commissioning check was performed on 22.5.09 and 5.6.09, and the wood chip delivery setup, involving a truck and the blower on a trailer, was as described in paragraph 1.1.

The wood chip blower capacity to transfer wood chips from the truck to the bunker will be increased as the blower users learn to optimise the wood chip feeding rate. If the amount of wood chips fed to the blower is too high the blower may clog and cause delays. The last measured (5.6.09) delivery time was 30 minutes for 9 m^3 wood chips. This is equal to 18 m^3/h and indicates the specified capacity from the specifications can be achieved (13 m^3/h at 10 metres height).

The noise level of the blower was not mentioned in the specifications. The noise measured 3 metres from the blower was between 90 and 100 decibels and at 17 metres from the blower it was between 80 and 90 decibels. Ear-protective devices have to be used. In addition, eye protection is required due to dust produced when blowing the wood chips.

These relatively high noise levels need to be carefully considered for any future installation to ensure the delivery procedure does not generate complaints from the client or neighbours. The dust proximity to neighbouring properties, fresh air intakes, windows, etc. also need to be considered.

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The noise levels could be reduced with the addition of an acoustic cover over the blower if considered to be a problem. The dust generation could be reduced if the discharge to the wood chip bunker was sealed, but a transfer vent from the bunker would be required with a suitable filter fitted to relieve any excess pressure in the bunker.

1.5 DELIVERY AND INSTALLATION

The wood chip blower was delivered without a plug suitable for our 415 V electrical system. The blower needed to be rewired before it was usable (no cost to change). A flexible hose for connecting the blower to the truck was purchased from the local supplier, because this was cheaper than purchasing from the blower manufacturer. It was noted the wood chip blower requires a local 3-phase power supply. At Tahuna an outlet was provided inside the boiler house. This need to be allowed for in any future installations and an exterior electrical outlet close to the bunker would be ideal.

Installation of the blower onto the trailer that is suitable to be towed by the delivery truck has not yet been completed therefore these costs can not be confirmed.

1.6 GOOD NEWS

The wood chip blower works as expected. Therefore it is possible to deliver wood chips into bunkers that require the wood chips to be transferred to a high level. This often the preferred method of delivery, especially for smaller volumes and where existing coal bunkers have had the delivery door removed and wall installed to increase the capacity to store wood chips.

This is the first delivery system of its kind in Dunedin that we are aware of which gives customers the alternative option of wood chip delivery by blower.

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2 MONITORING REPORT

2.1 FINANCIAL

Ha Foote Haulage applied for funding towards the purchase of a blower and modifications to the truck and trailer. The estimated and actual (invoiced) costs of the blower, accessories and modification are shown in Table 2 (excluding GST). The total cost of the blower setup was $13,757.06 (excluding GST), which was less than the estimated cost because of variations in the exchange rate. The modification to truck and trailer (item 3) will be finished 5.6.2009. Also item 3 was less than estimated cost because of the existing trailer was used (no cost for the existing trailer).

Table 3 Estimated and actual (invoiced) costs of the blower, accessories and modification

Item	*Description*	*Supplier*	*Estimated cost*	*Actual cost*	*Invoicing date*
1	MUS-MAX 9.2kW blower housing on wheels, 3.5m of galvanised pipe (Ø210), 90º corner angle, 9 connecting clips	Spark Biomass Energy	$13,800.00	$13,207.38	13/01/2009
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	TOTAL		$16,800.00	$16,383.52	

The simple payback for this project cannot be easily calculated as this is emerging market which is expected to grow over the next few years. The simple payback calculation is shown in Table 4. At the moment the blower has one customer at 200 m³ per year. The revenue from blowing for this customer is $5.00 per cubic metre (m³). It is assumed that the revenue with the larger customer will be $2.50 per cubic metre (m³). Another customer requiring the blowing wood chips at 5,000 m³ per year is expected to use the blower in 2010. Therefore the payback time for the blower setup would be under 3 years. The operation and maintenance costs are assumed to be so small that they are not included in the payback calculation.

Table 4 Simple payback calculation for the blower, accessories and modification

Description	0	1	2	3	4	5
Delivered wood chips		200 m³	5200 m³	5200 m³	5200 m³	5200 m³
Investment cost	-$16,384					
Income		$1,000	$13,000	$13,000	$13,000	$13,000
Total	-$16,384	$1,000	$13,000	$13,000	$13,000	$13,000
Cumulative	-$16,384	-$15,384	-$2,384	$10,616	$23,616	$36,616

2.2 EMPLOYMENT

New people are not employed as a result of this project, however it has meant that existing staff can be retained during the economic down turn.

2.3 ENVIRONMENTAL

Carbon dioxide emissions have been reduced as indicated in Table 5.

Table 5 Reduction of annual CO_2 emissions for Tahuna Intermediate School in Dunedin when compared to coal

Description	**Unit**	**Wood chips**	**Coal**
Annual delivered volume	[m³/y]	200	
Annual delivered mass	[kg/y]	43,600	
Annual fuel consumption	[MWh/y]	153	153
Specific emissions	[tonneCO_2/MWh]	0	0.336
Annual CO_2 emissions	[tonneCO_2/y]	0	51

2.4 WOOD FUEL QUALITY

The type of wood chips delivered is as shown in Table 6.

Table 6 Delivered wood chip specifications

Size	S50
Moisture % by weight as received	M30
Ash % by weight as received	A1
Bulk density	218 kg/m³
Energy density	12.6 MJ/kg

2.5 PLANT PERFORMANCE

The wood chip blower capacity to transfer wood chips from the truck to the bunker will be increased as the blower users learn to optimise the wood chip feeding rate. If the amount of wood chips fed to the blower is too high the blower may clog and cause delays. The last measured delivery time was 30 minutes for 9 m^3 of wood chips. This is equal to 18 m^3/h and indicates the specified capacity from the manufacturer can be achieved. The amount of energy consumed by the plant is 0.38 kWh/m^3 (assumed to be maximum power 9.2 kW 75 % of the time, Table 7).

Table 7 Amount of electricity consumed by the wood chip blower

Description	*Unit*	*Value*
Power of motor	[kW]	9.2
Duration of maximum power	[%]	75
Delivery time	[h]	0.50
Delivery volume	[m^3]	9
Specific energy usage	**[kWh/m^3]**	**0.38**

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