TECHNICAL NOTE

TN - 49

April, 1999

Air Curtain Destructor- log-yard waste incineration trial

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Figure 1 - Top, Air Curtain Destructor blowing air into pit. Bottom, looking into fire pit, arrows indicate direction of air flow. Note - log barriers along sides of fire pit

Introduction

In September, 1998 an Air Curtain Destructor was trialled at a log yard in Kaingaroa Forest. The Air Curtain Destructor (ACD) is a device designed to blow air down and across a pre-prepared pit in which a fire has been lit. Wood wastes and residues are fed into the pit and burned. The air flow created by the ACD creates a forced draft fire and the recirculating air flow keeps smoke and spark emissions very low.

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Results

The fire pit was excavated in a pumice soil prior to the arrival of the ACD. It was 2.4m wide, 5.8m long and 4.8 m deep. It is important that sides of the pit are straight and square.

The fire was set with light woody material and a small amount of diesel (once the fire takes, the ACD is started and the high velocity air curtain forces oxygen into the fire). When the fire was well established (this can take 2 to 4 hours) combustion was quite rapid and large size material could be burnt. The temperature in the pit was extremely high and light material near the edge of the holes was inclined to catch fire. A clear area around the pit was therefore essential and some sort of guard barrier around the top of the pit was also necessary as a safety measure. The dirt excavated from the hole can be used to create a berm around the 3 sides of the pit not occupied by the ACD.

The waste material being burnt varied from the bearers to slovens and stem off-cuts. Some of the off-cuts were small, being less than 200mm diameter and less than 0.5 m long. However, some were quite large, being old skid site bearers of 4.8m length and over 300 mm diameter were combusted. Some reject sawn timber was also burnt (150mm*12mm*4.8m). Much of the material being burned was green.

During the trial, once the fire was established, waste wood consumption was estimated at 3.4 tonnes per hour. It takes 2 to 4 hours to get the fire well established, so continual operation is necessary to keep a good rate of waste wood consumption.

The cost of the ACD operation will vary with the way it is used. However, 24 hour operation is assumed for the 2 options costed. Option B assumes that there is other work available to occupy the man and machine for the rest of the day.

A. ACD, fully manned for 24 hours (2 * 12 hour shifts), full time 10 tonne excavator
   = $935 per day or $11.88 per tonne
B. ACD, part-time manned (12 hours per day), part-time (4 hours per day) 10 tonne excavator
   = $550 per day or $6.74 per tonne

The ACD reduces the waste to a fraction of its former volume, 1 tonne (1m^3 of solid volume) of piled waste wood is likely to occupy a space of 3 m^3 to 5 m^3. The ACD will reduce the waste wood to between 1% and 4% of its former solid volume.

Summary

The Air Curtain Destructor is capable of reducing waste wood to a fraction of its former stacked or solid volume at a rate of 3 to 4 tonnes per hour at an operating cost of $6.74 per tonne (assumes 24 hour operation with part-time manning).

When the fire is well established there are minimal smoke or spark emissions.

Erection of safety barriers around the fire pit is essential.

Acknowledgments

Liro acknowledges the assistance of Fletcher Challenge Forests and Finegan Forest Equipment with this study.

The costs in this report were derived using procedures shown in the LIRO Handbook, Business Management for Logging. They are indicative and do not necessarily represent the cost of the operation.