

Cleaner UBC Composting Pails

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CIVIL 202 CBEL PROJECT

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1.0 Short Term Solution

The problem is that only paper or organic liners can be used for the compost bins. Currently residences uses the plastic bags as liner then toss the emptied bags in the trash, or just dump the compost in the garbage because there aren't any liners that fit into the bins. Specialized bin liners are too expensive. As a result we designed a liner for a short term solution. Our design involves folding newspaper into a compost bin liner. It is intended to fit the current bins in the university residences.

1.1 Benefits

This solution allows for less frequent washing of compost bins. Washing compost bins is a nuisance and it can deter people from wanting to compost. Newspaper is also readily available and free on campus (student union building as well as residence common's blocks). Folding the newspaper is actually quite fun. It makes you feel slightly more sophisticated which we think UBC students will enjoy. The newspaper can be broken down in the system that UBC has and at the same time we are being green by using used newspaper.

1.2 Inhibitors

Because it is paper, it will only last for so long before it deteriorates, especially if the organic contents is quite wet. It doesn't have any handles so it could be slightly awkward to carry. The liner does not fit perfectly into the compost bins in the residence, so there has little gap in between the liner and the compost bin which the food scraps can go into.

1.3 Implementation

Because folding newspaper into the compost bin liner is unfamiliar to students in residence, we are suggested to make a video that teaches people how to fold the newspaper. This video could be a segment in the "This Week at UBC" videos, which many students watch. Also, UBC can put the recycling bin just for the newspaper in the residence, so the students can easily acquire recycled newspaper to use as compost bin liners. It is important to note that many newspapers are currently freely available on campus (in Gage residence, Student Union Building, etc.). The team made posters illustrating the folding method (Appendix A). These posters are to be placed above the newspapers specific recycling bins in the common areas of residences so students can easily grab the newspaper. We believe that calling this poster-newspaper combination Extreme Compost Units will encourage more people to compost because it catches students' attention and they can make handmade compost bin liners for themselves for free.

2.0 Long Term Solution

A solution that cannot be actualized starting in September but requires further development is taking the waste pulp from the UBC Pulp and Paper Centre (P&P Center) and remanufacturing it as a simple paper compost liner to be used by students and faculty members in the small composting pails.

The P&P center outputs approximately 8 tonnes of dried unused pulp per month. This pulp was made directly from wood and is not from recycled paper. This is beneficial because non-recycled paper is of higher quality such that the strength and porosity of the paper are at levels more valuable for use as a compost liner.

2.1 Liner Dispensers

To distribute the paper in a fair manner to ensure that all students have access to the paper, we have designed a prototype liner dispenser that will as the name implies, dispense liners. The dispensers will slice the roll into the individual sheets as they are dispensed. The dimensions are as labeled in figure X. The dispenser can be connected to the UBC Carding system so that each student can be allocated a certain number of liners per month. This will prevent student from using them for alternate purposes or using them so frequently such that UBC cannot sustain the demand (replacing the liner daily). There is also the option of charging a small fee for liner (10 cents). If the program is successful and UBC sells all 136,000 liners there could be extra \$13,600 of income for the program to run. If you chose to set a price it must be kept in mind that price must be kept low enough that students will find it a justifiable alternative to washing their pails, or returning to the use of plastic bags.

2.2 Liner Output Estimation

For our initial calculations, we assumed the paper being created had a unit weight of 80 grams per meter squared and that 100% of the pulp could be manufactured into this paper (view Appendix B for calculations).

The dimensions of the pail are 11" x 8.5" x 9.5" (Figure.a). Considering the net of the object (Figure.b) the paper size needed to comfortably fit the pail is 34" x 31.5". Upon further research we discovered that one of the standard sizes for kraft paper rolls is 36" and so in order to reduce costs of requiring a manufacturer to create a custom size paper, the standard size can be used. Our final paper liner dimensions will be 36" wide in a roll of 131.25 yards. In metric this translates to 0.9144m wide in a roll of 40m (Figure.c). Each roll will be able to make 50 paper liners.

With the total amount of paper that can be produced from the pulp we would be able to make 2734 rolls of paper or 136,684 paper liners per month.

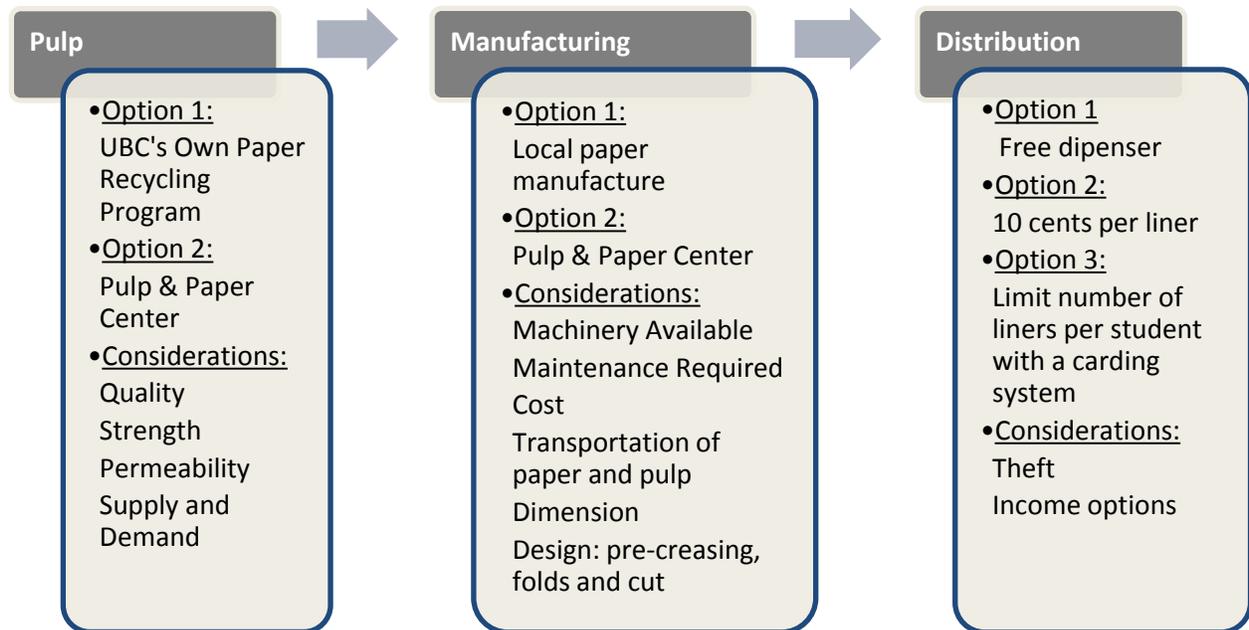
If we consider that there are about 10,000 pails in use currently and assuming each pail is emptied weekly, our manufacturing capabilities will be considerably greater than the demand for the paper liners. This provides a good factor of safety and allows for an increase in demand for composting across campus.

2.3 Implementation

Our plan includes reusing this waste pulp and producing it into a compost paper liner. In order to do this there are three options. The first is for UBC to process the pulp within the pulp and paper center to create the paper. The problem with this option is that the facility is mainly used for research and does not have the equipment or space for the production of their pulp into paper. The second option is for UBC to build its own facility such that it can manufacture the paper on campus. However, land on campus is limited and the costs associated with building such a facility make this option generally unviable. Our last, and recommended option is to send the pulp to a local off-campus manufacturer to make the paper for us. Disadvantages of this include the cost of contracting the company and transporting the pulp and paper to and from the university. Advantages, include not having to pay the capital costs of a new system, not having to use up valuable campus land and not interfering with the research of the pulp and paper center.

After the paper is created to the dimensions we specified earlier all that is required is the transport of the paper to the individual dispensers and the maintenance and management of the dispenser system. Apart from the marketing of the program, that is all for UBC's part in this proposal.

2.3.1 Options

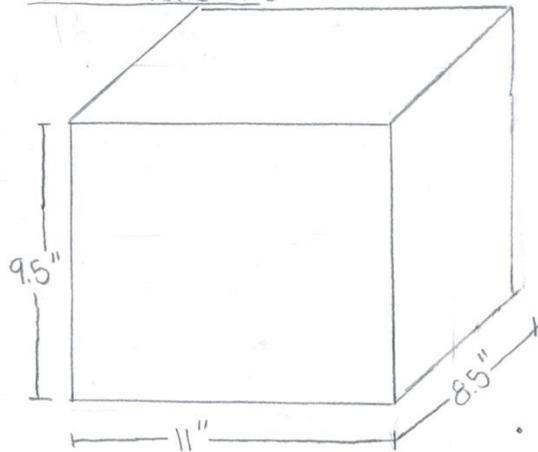


Appendix A

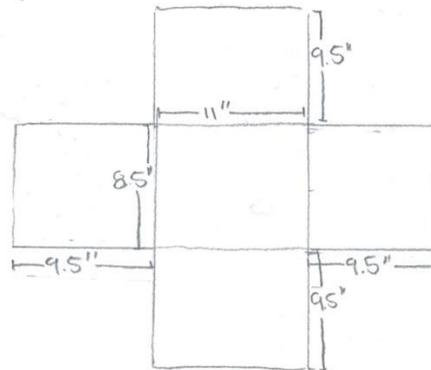
Appendix B

Linear Output Estimate Calculation

Pail Dimensions:



Paper Dimensions (not drawn to scale)



Paper Production

Assumptions

- unit weight of paper = $80\text{g}/\text{m}^2$
- 100% of the weight of the pulp goes into the paper

• 8 tonnes $\left(\frac{1 \times 10^6 \text{g}}{1 \text{ton}} \right) \left(\frac{\text{m}^2}{80\text{g}} \right)$
 $= 1 \times 10^5 \text{m}^2$ of paper produced

Number of rolls

$$\frac{1 \times 10^5 \text{m}^2}{35 \text{m}^2} = 2857 \text{ rolls}$$

Number of liners

$$(2857)(50) = 142850 \text{ liners}$$

- Min. Paper length: $9.5'' + 8.5'' + 9.5'' = 27.5''$
- Min. Paper width: $11'' + 9.5'' + 9.5'' = 30''$
- Extra length added to both sides in all dimensions = $+2''$

• Necessary dimensions = $34'' \times 31.5''$ (w x l)

• Available paper rolls width = $36'' = 131.25\text{m}$

• Want 50 liners per roll

• Total paper length per roll = $50(31.5'') = 1575'' = 40\text{m}$

• Total paper per roll = $(40\text{m})(34'') \left(\frac{0.0254\text{m}}{\text{in}} \right) = 35\text{m}^2$

Demand

$$(10,000 \text{ pails}) \left(\frac{3 \text{ liners}}{\text{week}} \right) = 30,000 \text{ liners}$$

$$30,000 \ll 142,850 \quad \checkmark$$