

## Wood 474 Assignment 2013: Solution

### Impact of technological developments on roundwood demand

#### Calculations

1. Determine total structural panel demand in 2005:
  - 1.1. Panel demand =  $388 \times 10^6 \times 25.1 \text{ [m}^2 \cdot \text{kg/m}^2\text{]}$   
 $= 9.74 \times 10^9 \text{ kg}$   
 $= 9.74 \text{ million tonnes}$
2. Determine roundwood requirements for each panel product in 1980 and 2005.  
 Data are summarized in the table an example calculation for 2005 is presented in detail.

Year	1980		2005	
Panel product	Plywood	OSB	Plywood	OSB
Market share (%)	95	5	20	80
Product consumption (tonnes)	9,251,860	486,940	1,947,760	7,791,040
Product consumption (m <sup>3</sup> )	19,477,600	760,844	4,100,547	12,173,500
Roundwood input required (m <sup>3</sup> )	38,955,200	864,595	8,201,095	13,833,523
Total roundwood demand (m <sup>3</sup> )	39,819,795		22,034,617	

3. Example calculations for 2005. This approach also applies to the 1980 data.
  - 3.1. Determine Plywood and OSB consumption in tonnes.  
 From 1 above, panel demand in 2005 =  $9.74 \times 10^6 \text{ tonnes}$   
 From market shares: plywood demand =  $9.74 \times 10^6 \times 0.20$   
 $= 1,947,760 \text{ tonnes}$   
 OSB demand =  $9.74 \times 10^6 \times 0.80$   
 $= 7,791,040 \text{ tonnes}$
  - 3.2 Determine Plywood and OSB consumption in m<sup>3</sup>.  
 Given panel densities:  
 Volumetric plywood consumption =  $1,947,760 / 0.475 \text{ [tonnes/(tonnes/m}^3\text{)]}$   
 $= 4,100,547 \text{ m}^3$   
 Volumetric OSB consumption =  $7,791,040 / 0.640 \text{ [tonnes/(tonnes/m}^3\text{)]}$   
 $= 12,173,500 \text{ m}^3$
  - 3.3 Determine roundwood required to produce these panel volumes.  
 Given manufacturing yields:  
 Roundwood input required for plywood production =  $4,100,547 / 0.50$   
 $\text{[m}^3 \text{/(m}^3 \text{ green input/m}^3 \text{ dry output)]}$   
 $= 8,201,095 \text{ m}^3$

= 8.2 million m<sup>3</sup> green peeler logs required adjusted for significant figures

Roundwood input required for OSB production =  $12,173,500 / 0.88$   
[m<sup>3</sup> / (m<sup>3</sup> green input / m<sup>3</sup> dry output)]  
= 13,833,523 m<sup>3</sup>  
= 13.8 million m<sup>3</sup> green OSB logs

Total roundwood requirement for structural panel production = 22.0 million m<sup>3</sup>

## Discussion

The following important points should be covered in the discussion. This section is presented in bullet point form to give an indication of the topics that must be addressed for full marks. A well written discussion section is required – not a cryptic bullet point list!

- Over the study period, there has been a major shift in roundwood consumption. Total roundwood demand has decreased from 39.8 million m<sup>3</sup> to 22.0 million m<sup>3</sup>, a 45% reduction. This is despite there being no change in the mass of panels produced in 1980 and 2005.
- Demand for peeler logs required for plywood production decreased substantially from 38.9 million m<sup>3</sup> to 8.2 million m<sup>3</sup>, a 79% decrease.
- Peeler logs are high quality and value logs from desirable species such as Douglas fir. They should have large diameters, few knots and minimal taper to maximize veneer production. They therefore have relatively long rotation lengths and usually require good silviculture.
- Demand for OSB logs required increased greatly from 0.86 million m<sup>3</sup> to 13.8 million m<sup>3</sup>, a 16 fold increase.
- OSB can be made from lower grade tree species (such as aspen) or other low quality fibre sources and the log diameter is much less important than for veneer production. Knots or straightness have a minimal impact on OSB manufacture due to the stranding process and the way the boards are manufactured. Because wood quality is not so important stand density can be increased for OSB logs and the use of mixed stands could be considered.
- The development of engineered wood products and advanced panels can significantly affect the amount and quality of roundwood required from a forest. However, given the rotation lengths employed in Canada it is very difficult to accurately forecast the types and volumes of roundwood required to meet future market demands.