7.19 Industrial wood processing

7.19.1 Coverage

The wood processing industry is composed by many activities. Sawmill, flooring, panel production, furniture production are the main activities covered by this wide sector.
Wood processing is mainly a source of dust emissions.
This chapter covers the different activities of wood processing. Although, wood processing industries use wood to fed boilers, wood combustion is not included in this chapter.

7.19.2 Emission sources

Wood processing activities can be separated between primary and secondary processing steps. Primary processing covers raw wood processing activities while secondary processing covers activities transforming primary processed wood.
During primary processing, wood harvest is cut, barked, cross cut or pressed. Then, wood is secondary processed into wooden floor, panels, furniture, toys, etc.

Different types of wood are used in wood processing industry; they are presented in the following table. [1]

Table 1: wood processing activities (sources of dust emissions) associated to types of wood used.

Process	Dry wood	Moist wood	Timber	Panel
Wood harvest cut		X	X	
Slicing		X	X	
Primary cut		X	X	
Storage of fine sawdust and chips	X	X		
Defibration, milling and chipping		X	X	X
Drying of laminations, particles and sawdust		X	X	X
Screening				
Seasoning of timber and drying of panels			X	X
Pressing of panels	X			X
Cutting	X		X	X
Sanding	X		X	X
Other machining (edging, planning, etc.)	X		X	X
Workshop cleaning	X	X	X	X

Dust emission levels and characteristics depend on 2 main factors:

- type of wood processed,
- water content of the wood processed.

Therefore, dry wood, moist wood, timber and panel are separated in the previous table.

7.19.3 Available Techniques, Associated Emission Level (AEL)

Techniques used to reduce dust emission levels depend on particle sizes, which themselves depend on the process applied and the wood used. Therefore, it is necessary to distinguish primary processing from secondary processing.

Primary processing steps [1]

Primary processing steps are essentially debarking, slicing, primary cutting, routing, milling, chipping and pressing. Those processes are not major sources of fine particle emissions. Emissions are mainly composed by particles with a diameter of more than 700 µm except from the routing process which is a source of particles with a diameter of more than 100 µm.

Debarking, slicing, primary cutting and routing:
During these processes, dust emissions are mainly coarse particles. To reduce dust emission levels, a spray of water on the trunk can be considered as sufficient during the debarking process which is a source of low emission levels while cyclones can be used to control dust emissions from slicing, primary cutting and routing which are sources of higher emission levels.

Milling and chipping:
In most of the cases, the mill grinder is open and dust emission levels are high. However emissions can be collected by an aspiration system and dust emission levels can be reduced by the use of fabric filters.

Pressing:
A wet electrostatic precipitator can be used to reduce dust emission levels from collected emissions of the pressing process.

Secondary processing steps [1]

Secondary wood processing steps are important issues concerning fine particle emissions. The higher level of PM_{10} and $PM_{2,5}$ emissions can be explained by the fact that the wood used in secondary processing steps is dry.

Drying, sanding and edging processes are major sources of high dust emission levels. Mainly fine particles are emitted during these processes, thus emissions should be collected and treated. Multi-cyclones or a combination of cyclones and wet scrubbing system can be used to treat emissions from drying systems. Fabric filters can be used to reduce dust emission level from sanding or edging.

As heated air used in the dryers usually comes from boilers fed by wood fuel, dust come also from the boiler and emission levels need to be reduced before entering the dryer.
Collected dust from fabric filters or other dry dust reduction techniques should be recycled and re-used in the process as far as possible or used as biomass fuel. The collected dust or sawdust should be transported between the different process steps in closed conveyor equipped with an aspiration system and a dust treatment system.

Emissions from sawdust storages are mainly fugitives. Storages have thus to be protected from the wind and handled carefully. Good housekeeping may also contribute to reduce dust emissions.

Dust emissions can also be abated using electrostatic filters, but this technique is very expensive and does not seem to be cost effective in the wood processing industry. However it can be considered as available techniques for new installations while fabric filters can be considered as available techniques in existing installations for most emitting processing steps.

Panel production can be separated from other wood processing industries. In wood processing industries, small companies of less than 20 employees are numerous while panel production establishments are significantly larger in size. Therefore, secondary measures to reduce dust emission levels are more cost effective in panel industry than they are in other small wood processing industries.

Table 2: Associated dust emission levels with available techniques to reduce emissions in panel production industry. [1]

Emission source	Techniques	Associated emission level (mg/Nm^3)
Dryers in particle board production	Cyclone	100 – 230
	Wet scrubbing system	15 – 75
	Combination of cyclone and wet scrubbing system	25
Dryers in fiberboard production	Cyclone	7
Machining in fiberboard production	Bag filters	0,03 – 0,6
Dryers in oriented strand board	Cyclone filter	60 – 70

7.19.4 Emerging techniques

No emerging technique is considered for the wood processing industry.

7.19.5 Cost data for emission reduction techniques

The following table gives an overview of the costs for different abatement techniques in particle board industry.

Table 3: Cost of techniques to control PM emission in particle board industry. [2]

Technique	Investment (Euros/1000m² of board)[1]
Cyclone	5.4
Wet Cyclone	7.2
Fabric Filters	21.6
Dry ESP	28.8
Wet ESP	32.3

[1]Conversion rate used: 1C$/1000m² = 7.19€/1000m².

7.19.6 References used in chapter 7.19

[1] Technique de dépoussiérage utilisées dans l'industrie en 2006, ADEME, décembre 2007

[2] Carte routière technologique – panneaux de particules, Strategis Canada, 1998.

[3] EGTEI-State of progress.doc", for WGSR, April 2009.