



Wood Tracking Manual of Procedure for Small-Medium Enterprises

This manual is a contribution of the Kumasi Wood Cluster Association (KWC) towards assisting small and medium-size timber companies to show compliance with Wood Tracking System (WTS) in Ghana. The study, development and testing of the systems described in the manual were outputs from Project TFL-SPD 007/09 "Strengthening the Capacity of Small-medium Enterprises in Ghana to Produce and Trade in Timber Products from Legal and Sustainable Sources", funded by the International Tropical Timber Organization, ITTO.

Introduction

The purpose of this manual of procedures is to describe the procedures that should be carried out by small and medium-size timber producers from the source of timber and allocation of rights through pre-harvest preparation, and the stages of harvesting, transporting to mill, processing and transformation into products in factories and mills. The procedures will be carried out by company employees and will be verified by FSD, RMSC, TIDD and TVD staff. It is assumed that FSD and TIDD staff will carry out as completely as possible their assigned tasks but it is also recognised that it is unlikely that FSD staff will be present in the forest at all times when each tree is felled, nor TIDD at the mill each time timber arrives for processing, during which time company employees would carry out the procedure and keep data to be verified later. The manual describes the procedures to be carried out at all critical control points from forest to logyard and the mill. It provides templates or formats for collecting

information and data along a timber supply chain and which can aid verification by inspection authorities. The additional critical points from the mill to the point of export which are not covered in this manual will be included as the national WTS under development for FLEGT licensing is finalised and approved by the FC.

This manual is a contribution of the Kumasi Wood Cluster Association (KWC) towards assisting small and medium size timber companies to show compliance with the Wood Tracking System (WTS) that the Forestry Commission (FC) will use to award FLEGT licences to cover sale of timber products. The study, development and testing of wood systems described in the manual were outputs from Project TFL-SPD 007/09 "Strengthening the Capacity of Small-medium Enterprises in Ghana to Produce and Trade in Timber Products from Legal and Sustainable Sources", funded by the International Tropical Timber Organisation, ITTO.

Data Capture in a Timber Flow Process

I. Timber Rights Allocation

The company creates and maintains a data base or register of its address, location, contacts source of timber (Form #1.1 - Details of TUCs).

II. Stock Enumeration and

III. Yield Selection.

Yield Selection, pre and post harvest survey are entirely within the responsibility of the FSD and RMSC and for this reason are not described here since the only interaction is for the company to receive the yield allocation and stock survey maps from RMSC and FSD. Company then creates a yield database (form #1.2 and balances (form # 1.3) from the Yield

Approval by the FSD Regional Manager and operational records. FC must be informed when the compartment will be opened for harvesting. It is in the interest of company to initiate harvesting from a compartment soon after yield allocations have been issued by FSD/RMSC to avoid illegal removal of trees by chain saw operators. *Where there is considerable time lapse between when harvest yield is issued by RMSC/FSD and when the company enters a compartment to operate, it will be in the interest of the company to carry out 100% pre-harvesting inspection of the compartment to check out if allocated trees for felling are still standing and report any missing trees to the FSD for their action before starting to harvest in that compartment.*



Figure 1: Tree selection for felling

IV. Tree Felling and Log Production

Point of Harvest

Prior to felling a tree the operator will confirm that the tree is included in the allocated yield by checking the stock number inscribed on the base against the yield list provided by the FSD.

The operator will confirm that the stump bears a bar code label already fixed during enumeration by FSD, in a position that will not be destroyed during the felling.

The information from the bar code label is recorded onto the appropriate form (Form # 1.2: Yield Summary) or electronically.

Tree felling.

Immediately after felling a tree a stump bar code issued by the FSD is attached to the cut surface of the stump. Another bar code (for the felled tree or primary log) issued by the FSD is also attached to the butt end of the fallen tree. The stump barcode and the primary log barcodes are entered onto the form (Form # 1.2).



Figure 2: Label on tree stump and log butt



Figure 3: Manual printing of tree details on tree stump and log butt

The following information is printed with paint onto the butt end of stem and onto the cut surface of the stump.

(Species code, Locality mark, Stock number, Company/Contractor tree number, Property mark, Forest Reserve Code, Compartment number, TIF number)

The crown of the tree is removed as close as possible to the point of branching.

The fallen stem is now measured by the Range Supervisor, if present or the Bush Manager. The greatest and least diameters at the butt and top end are measured.

The information from the tree bar code and the size are recorded onto Form # 2.1 (Primary (1°) Log). Form # 2.1 may be completed in addition to the TIF issued by FSD. The TIF is completed by the Range Supervisor and signed by him and the company Bush Manager.

Where there is any concern about the merchantability of the fallen tree, a Range Officer must be called to evaluate the situation and make such changes as necessary to the stated dimensions. This will be done before the stem is moved.

The tree information form (TIF) is taken by the operator responsible for hauling the logs to the place where the tree will be crosscut.

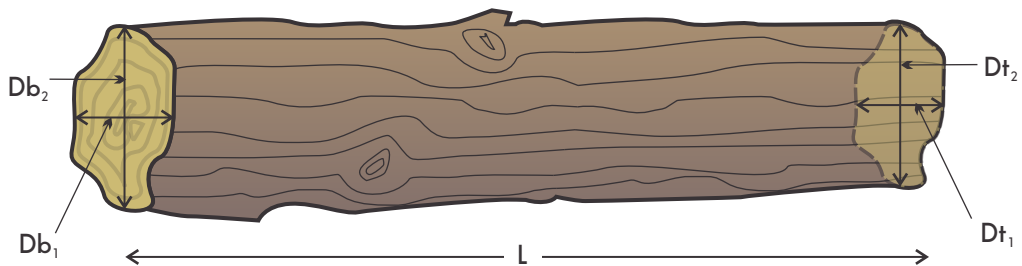
TIFs should be in triplicate: one each is retained by the company, the range officer and the third is handed to TIDD officer at mill prior to arrival of logs at the mill. These forms are the basis of charging the stumpage of the timber. Log dimensions can be double checked by TIDD at mill.

Cross cutting.

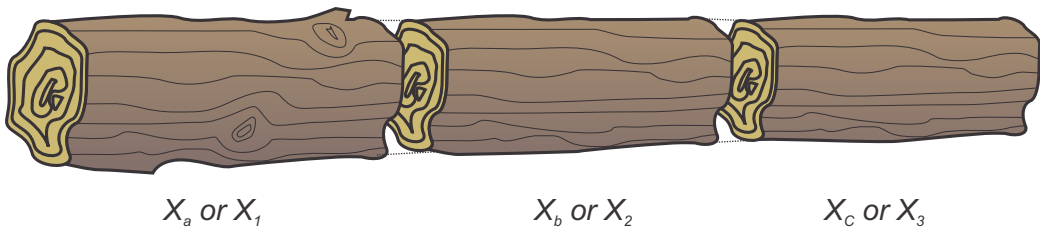
Cross cutting may be carried out at the stump or the stem may be hauled to a forest landing for this purpose.

The operator cross cuts the stem and places a bar code tag issued by FSD onto the cut surface of the lower end of each log produced (secondary logs) .

The first log (primary log) will already have a bar code on it that was attached immediately after felling. It is not necessary to attach a second barcode to this log. The following information is printed with paint onto the lower cut surface of each log (Species code, Forest reserve code, Locality mark, Stock number, Compartment number, Company Log number: with subscript a, b, c...or 1, 2, 3, ...showing the nth log (120/1 or a; 120/2 or b) from the same tree, Property Mark, TIF number (for primary log), LIF number (for secondary log)).



Each log is measured by the length (l), the diameters across two points of the large end (Db_1 and Db_2) and that of the smaller end (Dt_1 and Dt_2). The bar code is also recorded. Average diameter D_o of the log is the sum of the four diameters divided by four ($\Sigma Db_1, Db_2, Dt_1, Dt_2$)/4.. The volume of log is computed using the formula $3.142 \times D_o^2/4 \times l$. The measurements of the logs to be removed from the forest and its particulars above are recorded onto the LIF and the company Secondary logs form (Form # 2.2). Where logs or parts of logs are discarded after cross cutting they will retain a barcode label and be recorded on the LIF form or Form #2.2 as discards. In other to reconcile timber yields between primary and secondary logs from one tree, the length and volume of the primary log (Form # 2.1) are compared with those of the total number of logs from that tree (Form # 2.2) and entered onto Harvested Total Logs Form # 2.3 to assess variations in the length and volume, if any.



V. Transportation

a. Landing

Logs to be conveyed are loaded onto a truck at the log landing and transported to FSD nodal points for the issue of LMCC.

The company waybill (Form # 3.1) is issued to the driver at the forest landing as the logs are transported out of the forest. At the forest landing information entered onto the waybill are waybill number, property mark, reserve/off reserve name, compartment number, destination, vehicle number, driver's name, date species of wood, LIF number where log is recorded at landing, log barcode number and sizes of log. The vehicle with logs and the driver carrying the Waybill and LIF moves to nearest FSD LMCC issuing point. The LMCC is issued later and its number is entered onto the waybill at the factory gate or factory logyard



Figure 4: Loading a timber truck at forest landing

b. LMCC Issuing Point

The FSD LMCC Officer will make the following checks:

- That each log has a barcode attached.
- The number of logs stated on the LIF corresponds with the number of logs on the truck.
- The information on the LIF corresponds with the waybill information.
- Stock numbers on the LIF are included in the yield.

He will complete the LMCC form (LMCC measuring point reference, Forest District, LMCC barcode number, Mill or destination code, Contractor name, Property mark, Driver's name) and issue it to the driver. The driver keeps the waybill and LMCC on him at all times and submit them for inspection at TIDD check points.

c. Intermediate Depot

Logs from the forest may be stored at a transit depot and later transported to the factory or sold.

Two processes are involved in receiving the log and later removing it from the depot:

i. Intermediate Log Depot In.

Same Procedure as Mill gate in (see below), except that no log measurement takes place.

Barcodes of incoming logs are recorded and added to record of stock at depot.

ii. Intermediate Log Depot Out.

New Waybill is prepared for vehicle carrying the logs, and details of the logs recorded as on Form # 3.1.

Barcodes of outgoing logs are recorded on Form # 3.3: Log Transfer from Temporary Storage and subtracted from stock at depot.

New LIF is prepared for the logs being removed. The Waybill and LIF are sent together with the truck carrying the logs to the LMCC issuing point. If LMCCs were issued to cover the logs previously before being temporary stored, copies should accompany the logs in the new load being conveyed. Physical stocks of all bar coded logs at depot are carried out weekly and as required by random checks of TIDD and TVD.

d. TIDD Check Points

At TIDD check points TIDD Inspectors will check for the following:

That all logs have barcode tags.

That log numbers on LMCC correspond with logs on truck.

That LMCC details are complete and valid

That LMCC is signed and countersigned by company and FSD.

Logs without barcode are re-tagged, LMCC issued and LMCC code or number issued.

VI. Mill/Factory Gate and Logyard

Mill Gate In

Arrival Procedures

The company security at the entrance gate and/or Logyard Manager will carry out the under listed checks, using Form # 3.1-Waybill, Form # 3.2 -LMCC and Form # 4.1 - Security Gate Records. Where TIDD Inspectors are present at a company, they may undertake similar checks, including using their own data capturing equipment (such as Hand Held Computer, HHC) and forms.

- Verify stock numbers on LMCC against physical stock numbers on logs
- Verify stock numbers against yield
- Record stock numbers against yield (Log by Log) approved by FSD
- Check that barcodes are intact

Document following in the Security Diary:

- Record number of logs on the truck
- Record arrival information
 - Date in, Time in, Vehicle, Driver, Origin, etc.
- Record document numbers ;
 - LMCC, Waybill
- Execute irregularity procedure, for trees/logs outside of harvest yields and logs without barcode, if necessary. No unloading to take place until irregularity procedure is completed.



Figure 5: Log on truck entering factory gate and log information taken at the gate

Logyard Procedures

- For small companies, TIDD staff may not be present at all times; company log yard supervisor carries out under listed activities to be later on checked by TIDD Inspectors.
- For large companies, TIDD staff are present at all times and carry out under listed activities TIDD, TVD and independent auditors periodically and randomly carryout similar checks.
- Each log delivered to the logyard must be labelled with a unique identification: Colour (e.g. yellow for legal, green for certified, red for controlled, etc); number (such as stock number, contractor number, log number, etc); code (bar code, tag) and description (species, forest type, etc.). The numbers and codes are best ways of tracking materials at the logyard and during processing and product storage.
- Use Form# 4.2 (or other appropriate form) to document details of each log received at the yard. Under no circumstance may logs, from unknown sources, of unknown legality, without barcode/tag or covered by LMCC be received or kept at the logyard. FC must be informed of such logs within 24 hours of their arrival for further action
- Record details of the log: Date received, Species, Bar Code/tag number, LMCC #, Contractor #, Company () #. Company # is a serial numbering of each species of log from the beginning of the year that is received and stored at the yard. Also record log dimensions (length, diameters at butt end, diameters at top of log)

Logyard Stock

Use Form# 4.4/5/6 to record the stocks of logs that were kept at the yard on a daily, monthly and annually. The information to enter is Date/Month/Year of stock, Species, Incoming volume, Outgoing volume and Balance Volume.

Data Capturing in Timber Production Process

Material Accounting

The basic principle of FLEGT licensing is that products must be made from legal materials only. Only wood of LEGAL category must be used as INPUT MATERIAL, which can enter into the production process for the manufacture of PRODUCTS eligible to be covered by a FLEGT License.

Once INPUT material is only of a LEGAL category, the **TRANSFER Control System** will be used to assess material balance between input material and the product output(s). The processes to be followed are:

Material Input

Re-manufactured or Cross-cut Logs (Bolts)

Some mills may allocate parts of same log (bolts) to different processing mills (sawmill, rotary or slicing). Some logs may also be cut to different lengths based on grade or defects before processing.

Figure 6: Re-measurement of logs and cutting of bolts for milling

Form# 4.3 can be used to document details of the re-manufactured log (bolt), linking them to their original identification in Form # 4.2. and the products to manufacture. Details of all re-manufactured logs, whether to be used or discarded must be recorded to explain their use.

Details of the log to be recorded are Species, Factory or Job #, Identification color (for legal, Certification, etc. identification), Log/ Bolt # (a sub-set, a, b, c.....of the Company/Factory #), Mill (at which log is to be processed, Length, Bottom and top end diameters



Material Request (for processing)

A Mill Production Manager requests material (log, bolt, semi-processed material) to be taken out of storage for processing during a **Production Batch**. A Material Request and Issue Form is presented to the Logyard/Warehouse Manager and between them material input is recorded for production records and same quantities are deducted from logyard/warehouse inventory.

The material request section will show records of date of request, production identification number (purchase order, job number, etc.), production date when material must be delivered, description of material (species, grade, legal/environmental status).

The material supply section shows quantity of material delivered for production, identification code/number of the delivered material (Log/Bolt number).



Records for a batch production of a contract are entered onto Form # 6.1 - Sawmill Production; Form # 6.2 - Plywood Production; Form # 6.3- Veneer Production to show material input volume and the corresponding products output volume relationships.



Figure 7: Sawmill batch production-headrig boards to finished lumber

Form # 6.1 – Sawmill Input-Output Relationship

Information to complete the form are:

- i. *Date* : Date of production
- ii. *Species*: Species of log/bolt being sawn
- iii. *Log/Bolt number*: Identification code/number of log or bolt being sawn (picked from Form # 4.3)
- iv. *Identification*: Any special identification of log/bolt, such as colour to be maintained throughout its progression along the production line.
- v. *Shift*: The shift of processing the log/bolt
- vi. *Volume*: Input volume of log/bolt (picked from Form # 4.3)
- vii. *Cumulated Log/Bolt Volume*: Additions of volumes of logs/bolts (of same species) processed to fill a job/contract input
- viii. *Contract/Job number*: The number to identify products or pieces with a specific customer order (also linked to a batch number, bundle number, stack number, delivery number.). The job number of the final product needs to be connected to the log/bolt number and as far back as the secondary/primary log and the tree by its contractor/stock number.
- ix. *Batch/Bundle number*: The numbers of groups or batches/bundles in which products or components are produced to make up a contract or job number. The batch number is thus linked with the Job number and connected to the log/tree/stock numbers.
- x. *Volume in Batch/Bundle*: The volume of products from a logs/bolts of a specific species of wood contributing to a contract/job order
- xi. *Cumulated Batch/Bundle Volume*: Additions of volumes of similar products from logs/bolts of a specific species of wood in a contract as they are accumulated to fill the contract volume.
- xii. *By Product /By Product Volume*: Products, other than specified in a contract under production of a job order and the volumes of such products.
- xiii. *Conversion Factor/Yield*: The ratio between volume/weight of total products output and total volume weight of log/bolts input to fill a contract/job order. It shows how much material was lost during processing. For products made from a mixture of species or grades, the yield must be calculated for each component of the final product. The yield, also referred to as Conversion Factor (in percentage) = $((\text{Total Volume of final products (or components) / Total Volume of Input materials - logs/bolts}) \times 100)$. Or $(\text{Total weight of final products (or components) / Total Weight of Input materials}) \times 100$
- xiv. *Specifications Tally Sheet*: Use to tally dimensions of individual sawn lumber or components that make up a job/batch order, bundle...

Form # 6.2 – Ply-mill Input-Output Relationship

The sections of Form # 6.2 are a. Contract/ job order of a production batch; b. Log/bolt input to peel for veneer; c. Green Veneer from the peeler; d. Plywood produced from the veneer; e. Yield = vol of veneer produced from a log (bolt)/ Volume of the log/bolt x 100; f. Specification table to record veneer data.

Information to use in completing the form are:

Section a. **Contract/Job details**

- i. *Date*: Date of production
- ii. *Contract/Job number*: The number to identify products or pieces with a specific customer order (also linked to a batch number, bundle number, stack number, delivery number.). The job number of the final product needs to be connected to the log/bolt number and as far back as the secondary/primary log and the tree by its contractor/stock number.

Section b. **Log/bolt Information**

- iii. *Species*: Species of log/bolt being peeled
- iv. *Log/Bolt number*: Identification code/number of log or bolt being peeled (picked from Form # 4.3)
- v. *Identification*: Any special identification of log/bolt, such as colour to be maintained throughout its progression along the production line.
- vi. *Shift*: The shift of processing the log/bolt
- vii. *Volume*: Input volume of log/bolt (picked from Form # 4.3)
- viii. *Cumulated Log/Bolt Volume*: Additions of volumes of logs/bolts (of same species) processed to fill a job/contract input

Section c. **Rotary veneer information**

- ix. *Batch/Pallet number*: The numbers of or batches/pallets on which veneer are parked after peeling (before drying), after drying and before gluing for pressing. The batch/pallet number must be linked with the Contract/Job number and connected to the log/tree/stock numbers.
- x. *Type of Veneer (Core/Surface)*: The veneer must be classified as material for the core or surface of plywood.

xi. Green Veneer Volume (in a batch or on a pallet): The volume of veneer from the peeler. Record the sizes in length (cm), width (cm), thickness (mm) in the specification table of section f to calculate volume of each veneer in cubic meters.

xii. Dry Veneer (in Batch/on pallet): The volume of veneer after drying (from the dryer). Record the sizes in length (cm), width (cm), thickness (mm) in the specification table of section f to calculate volume of each veneer in cubic meters.

Section d. **Plywood**

xiii. *Pallet Number*: The numbers of or batches/pallets on which veneer are packed for gluing to be pressed into plywood. The pallet number may not follow through green, dry and pressing as pallets may be broken after drying to select veneer from several pallets to be pressed, depending on a contract. In all situations track must be kept on veneers used to build plywood in a contract/job and linked to the bolt/secondary/primary log, to be connected to the source tree by their labels or numbers.

xiv. *Type of Veneer (core or surface)*: The veneer type on pallet (may be re-constituted) before gluing and pressing

xv. *Volume of Veneer*: Volume of veneer in xiii

xvi. *Volume of Plywood*: Volume of graded plywood

xvii. *Volume Rejects*: Volume of rejected plywood

Section e. **Yield Estimation**

xviii. *Conversion Factor/Yield*: The ratio between volume/weight of total plywood or veneer and total volume/ weight of log/bolts input to fill a contract/job order. It shows how much material was lost during processing. For products made from a mixture of species or grades, the yield must be calculated for each component of the final product. The yield, also referred to as Conversion Factor (in percentage) = $((\text{Total Volume of final products (or components)/Total Volume of Input materials - logs/bolts}) \times 100)$. Or

$(\text{Total weight of final products (or components)/Total Weight of Input materials}) \times 100$.

Section f - **Tally Sheet**

xix. Specifications Tally Sheet: Use to tally dimensions of individual sawn lumber or components that make up a job/batch order, bundle...

Form # 6.3 – Sliced Veneer Mill Input-Output Relationship

The sections of Form # 6.3 are a. Contract/ job order of a production batch; b. Log/bolt input to slice for veneer; c. Sliced Veneer from slicer & drier; d. Yield = volume of veneer produced from a log or bolt (Sum of veneer from flitches produced from the bolt)/ volume of the log/bolt x 100; e. Specification table to tally the veneer produced.

Information to use in completing the form are:

Section a. **Contract/Job details**

- i. *Date:* Date of production
- ii. *Contract/Job number:* The number to identify products or pieces with a specific customer order (also linked to a batch number, bundle number, stack number, delivery number.). The job number of the final product needs to be connected to the log/bolt number and as far back as the secondary/primary log and the tree by its contractor/stock number.

Section b. **Log/bolt Information**

- iii. *Species:* Species of log/bolt being sliced
- iv. *Log/Bolt:* Identification code/number of log or bolt being sliced (picked from Form # 4.3)
- v. *Identification:* Any special identification of log/bolt, such as colour to be maintained throughout its progression along the production line.
- vi. *Shift:* The shift of processing the log/bolt
- vii. *Volume:* Input volume of log/bolt (picked from Form # 4.3)-(Link flitches to log/bolt
- viii. *Cumulated Log/Bolt Volume:* Additions of volumes of logs/bolts (of same species) processed to fill a job/contract input

Section c. **Sliced veneer information**

- ix. *Batch/Pallet number:* The numbers of or batches/pallets on which veneer are packed after slicing and drying. The batch/pallet number must be linked with the Contract/Job number and connected to the log/tree/stock numbers.



x. *Area (in a batch or on a pallet):* The surface area of veneer sliced is tallied by length (cm) and width (cm) using the specification sheet (section e). The thickness (mm) of sliced veneer is recorded and only used in computing the volume of veneer, where necessary.

Section d. **Yield Estimation**

xi. *Conversion Factor/Yield:* The ratio between volume/weight of total veneer and total volume/ weight of log/bolts input to fill a contract/job order. It shows how much material was lost during processing. For products made from a mixture of species or grades, the yield must be calculated for each component of the final product. The yield, also referred to as Conversion Factor (in percentage) = $((\text{Total Volume of final products (or components)}/\text{Total Volume of Input materials (logs/bolts)}) \times 100$ or $(\text{Total weight of final products (or components)}/\text{Total Weight of Input materials}) \times 100$.

Section e. **Tally Sheet**

xii. *Specifications Tally Sheet:* Use to tally dimensions of individual sawn lumber or components that make up a job/batch order, bundle...



Figure 8: Log flitches to sliced veneer

Form # 6.4 – Production Batch Summary

Information provided on the Batch Production Form will enable the connection be established between the products of a Batch/Job and the logs used to produce them , as well as trace the log to the forest source.

Information to complete Form # 6.4 are:

- ▶ Batch/Job number: The batch productions that fill a contract or job.
- ▶ Contract/Customer Purchase Order: The contract number under production
- ▶ Contract Specifications: Description of the contract (size, moisture content, grade, etc.
- ▶ Contract Code: Any codes or labelling of the goods instructed by the customer
 - i. *Serial number*: A serial numbering of the bolts processed for the batch production.
 - ii. *Species*: Species of wood processed
 - iii. *Bolt(s) Processed*: Each log/bolt processed has an identification number recorded on Form #s 4.3, 6.1, 6.2, 6.3, depending on the products being lumber, plywood or veneer.
 - iv. *Contractor number*: The bolt or log processed is from a secondary or primary log identified by a contractor number (Form # 3.)
 - v. *Log tag/barcode number*: The bolt or log processed is from a secondary or primary log with a tag or barcode whose number is to obtained from Form # 4.3)
 - vi. *TUC Area*: The TUC area from where the log was produced (Form # 1.1).
 - vii. *Compartment number*: The Compartment of the TUC where the log was obtained (Form # 1.1).
 - viii. *Stock number*: The enumerated number given to the tree from which the log was produced (Form # 1.2).
 - ix. *Bolt(s) Input Volume*: The volume of each bolt/log processed, and the sum of the volumes of the bolts processed in a batch or job production (Form #s 6.1/6.2/6.3).
 - x. *Product Volume*: Volume of lumber, plywood or veneer processed from each bolt/log and their sum from all bolts/logs used to process in a batch or job production.
 - xi. *Yield (Conversion ratio)*: Product yield from the bolts/logs processed. It is the net product volume/gross input material (bolts or logs) volume.

Mill Gate Out.

Record all volumes and details of all products leaving mill. These may include logs transferred between mills or sold out.

Record waybill numbers of.

- Export Products
- Waste products
- Domestic market
- By species and volume

All products leaving mill to have company duplicate waybill showing species, volume and destination. LMCCs issued to cover logs before being moved out should accompany the logs in the new load being conveyed.

Duplicate waybill and LMCC to be signed by recipient and returned to mill.

Material Tracking and Organisation

Identification Numbers

The following procedures are useful guides in identifying materials and products

- Use a Code to identify the status of the material e.g. KLS for “known legal source”
- Avoid using same number within two years, unless they accompanied with a code (e.g. of the year). If numbering is started from 1 each year (without a code), and assuming stocks are left in storage over one year, they can be mixed up and difficult to identify.
- The use of one colour creates a visual link from a log throughout the production process, to semi and finished products.
- Each different material or product must have a unique ID number when it arrives at the mill or when in storage.
- The ID code/number must be attached to the material/product or its storage container (pallet, bundle, etc.)
- When a new ID number is introduced, both old and new numbers must be recorded in the processing records

Storing, Separating and identifying Wood by Origin

Some best practices to note:

- A storage inventory form is used to keep records of material in storage, when it entered, was removed for processing and balance in storage. The contents of the form are

identification number (bundle number, log number, etc.), description, date material entered storage, Volume or weight entered, date material removed from processing, volume or weight removed, production identification number (contract number, batch number), volume or weight remaining in storage.

- **Storing raw material**

- o Define a specific area in the yard for storing legal or certified material. There must however be adequate storage space so that there is no problem even where the space is kept empty when there is no legal or certified material to store
- o Paint the area on the floor of the storage area. Disadvantage is area is kept empty even when there is no material store
- o Separate an area with ropes, chains or movable fences. Allows for better use of storage space
- o Use Signs to indicate exclusive storage areas, e.g. "Storage area for legal logs of known sources". They must be separated by piles, spaces, binding, etc.
- o (Metal or plastic) Banding material to hold pieces together. Better if bands are coloured. Piles must be re-banded when pieces are removed.
- o Tags - can be metal, plastic, coloured to show material status and identification number of pile, bundle, log, etc.
- o Plastic wrap to hold small pieces are finished goods
- o Cards attached to each delivery material - can record specific information on card.
- o Colours at ends of logs. Bright colours preferable. One colour for each category of material (certified, legal, etc). Re-apply if ends of log are cut off.
- o Bar codes. Store identification numbers. Best to track logs, rough sawn timber, packs of large pieces. Require technology, investment and training
- o Radio chips. Large data storage. Expensive. Require technology and training.

- **Identification during production**

- o Painted cones. Bright coloured cones put on top of each pile of wood as it moves through each stage of processing.
- o Painted pallets - Bright coloured pallets that identify the category of the batch of wood as it is processed
- o Signs - written records that follow each step of production process
- o Painted end of timber pieces - re-apply if ends are cut off
- o Chalk - re-applied if ends of wood are cut off
- o Baskets, wheeled trolleys - Good for small pieces
- o Bar codes and hand held scanners - best for tracking logs, rough sawn timber

(large pieces), on trolleys, pallets. Not practical for tracking individual pieces during processing

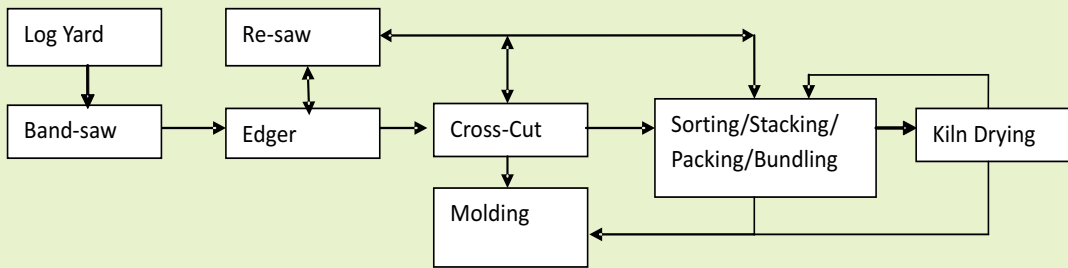
- o Radio chips - same as bar codes
- **Separation during production**
 - o Batch or lot production - Certified or legal products processed separately from uncertified or material from unknown sources. Identify start and end of each batch. Identify and trace material through all production stages including handling, packaging, storage, transportation and delivery
 - o Mill separation - process legal or certified material at separate area or line in the mill.
- **Final Product identification**
 - o Packaged and labelled products do not need to be stored at separate areas.
 - o Use a storage separation method above if package is not labelled.

Production Flow

a. Sawmill Process

- Receiving logs at the log yard.
 - > Re-measuring logs and recording their details in log forms or notebooks. Inspection, sorting, identification and segregating logs by species, grade, legality, certification status before storage
 - > Cross-cutting logs into contract lengths (bolts) or suitable for product type (slice veneer, rotary veneer, lumber) and labelling them to create a link to their source logs
 - > Cutting logs on the Bandsaw or Headrig into boards according to contract **thickness.**
 - > Edging boards at the Edger to remove defects, bark and/or to achieve contract **width.**
 - > Sawing on the Re-saw Bandsaw of thick boards to achieve contract thickness (**Optional**).
 - > Cut boards on the Cross-cut machine to remove defect and/o achieve contract **length.**
 - > Sorting, grading, tallying, packing of boards for kiln drying or slaes (if sold as air dried lumber).
 - > Inspection and grading of kiln dried boards/lumber and where necessary reprocessed to remove defects, for machining at molding mill.
 - > Lumber, machined lumber (moldings) are stacked, bundled and labelled (tagged) ready for export/sale.

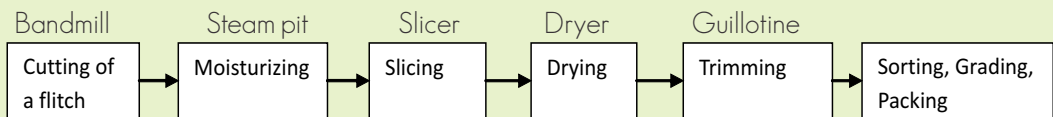
Work Flow



b. Slice Veneer Mill Process

- Receipt of logs/bolts from log yard.
- Re-measurement and recording of log dimensions.
- Cutting of flitches at the Bandmill.
- Moisturizing of logs at steam pit.
- Slicing.
- Drying.
- Trimming at Guillotine.
- **Sorting and grading**
- Packing.

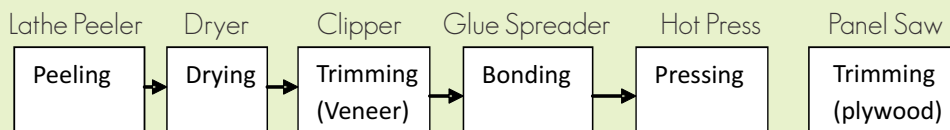
Work Flow



c. Plymill Process

- Receipts of logs from log yard.
- De-barking.
- Re-measurement and recording of log dimension.
- Peeling.
- Drying.
- Trimming veneer sheets.
- Grading and selection of rotary veneer for sale?
- Bonding.
- Pressing.
- Trimming of plywood.

Work Flow



FORMS

Form # 1.1: Details of TUCs

REGION	FOREST DISTRICT	STOOL LAND	TRADITIONAL AUTHORITY	RESERVE NAME / OFF-RESERVE AREA	COMPT NO.	AREA (km2)	APPROVAL REFERENCE	DATE OF GRANT	DURATION (Years)

TIMBER RIGHTS HOLDER:

Name & Address

Form # 1.2: Yield Summary

Compt. No./Coupe Area		Property mark		Year of Yield Allocation	
Compt. Area	153.43	Locality mark		Approval Ref. No.	

Species	FC stock survey No.	Stump Barcode	Primary Log barcode	Contract or tree #	DBH (cm)	Harvested * (Yes/No)	Date of harvest	Stump Marking Confirmed	TIF#	LIF#	Estimated No. of Logs	Actual no. of logs

Form # 1.3: Yield Balances

Compt. No		Year of Yield Allocation	
Compt. Area (Hectares)	153.43	MLNR Approval Ref	
Duration		Date of Last Harvest	
Date of first harvest			

SPECIES	NO. OF TREES ALLOCATED	NO. OF TREES REMOVED	TREE BALANCES
TOTAL			
No. of Trees Removed per Hectare			

Form # 2.1 : Primary Log (TIF)

Property Mark				Locality Mark								
TIF Serial No.	Species	Compartment #	Stock #	Tree / 1° Log / Barcode #	Contract or Tree / 1° Log #	Length of 1° Log (cm)	Db1 (cm)	Db2 (cm)	Dt1 (cm)	Dt2 (cm)	Average Diameter, D _a (cm)	Volume (m ³)
				152	13	1100	80	80	78	78	79	5.39185
											0	0
											0	0
											0	0
											0	0
											0	0
											0	0
											0	0
											0	0

Form # 2.2: Secondary Logs

Compartment #	Species	Tree / 1° Log							2° Log									
		Tree / Barcode #	Contractor Tree #	TIF No.	TIF Length	TIF Db	TIF Dt	LIF No.	Contractor log #	Log Barcode #	Length (cm)	Db ₁ (cm)	Db ₂ (cm)	Dt ₁ (cm)	Dt ₂ (cm)	Diameter D _a (cm)	Volume (m ³)	

Form # 2.3: Harvested Log Totals

Tree/1° Log				
Stock No.	Tree / 1° Log / Barcode #	Length (cm)	Average Diameter (cm)	Volume (m ³)

2° Logs		Variations	
Total Length of Logs (cm)	Total Volume of Logs (m ³)	Length (cm)	Volume (m ³)

Form # 4.3: Crosscut Log Details - Log Yard

Species	Log Factory / Job #	Identification Colour	X-cut No.	Mill	Length of Log (cm)	Db1 (cm)	Db2 (cm)	Dt1 (cm)	Dt2 (cm)	Average Diameter	Volume (m3)	X-cut No.	Mill	Length of Log (cm)	Db1 (cm)	Db2 (cm)	Dt1 (cm)	Dt2 (cm)	Average Diameter	Volume (m3)	
										0	0									0	0
										0	0									0	0
										0	0									0	0
										0	0									0	0
										0	0									0	0
										0	0									0	0
										0	0									0	0
										0	0									0	0
										0	0									0	0
										0	0									0	0

X-cut No.	Mill	Length of Log (cm)	Db1 (cm)	Db2 (cm)	Dt1 (cm)	Dt2 (cm)	Average Diameter	Volume (m3)	X-cut No.	Mill	Length of Log (cm)	Db1 (cm)	Db2 (cm)	Dt1 (cm)	Dt2 (cm)	Average Diameter	Volume (m3)
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0

X-cut No.	Mill	Length of Log (cm)	Db1 (cm)	Db2 (cm)	Dt1 (cm)	Dt2 (cm)	Average Diameter	Volume (m3)	X-cut No.	Mill	Length of Log (cm)	Db1 (cm)	Db2 (cm)	Dt1 (cm)	Dt2 (cm)	Average Diameter	Volume (m3)
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0
							0	0								0	0

X-cut No.	Mill	Length of Log (cm)	Reject				Average Diameter	Volume (m3)	Total length	Total Volume
			Db1 (cm)	Db2 (cm)	Dt1 (cm)	Dt2 (cm)				
							0	0	0	0
							0	0	0	0
							0	0	0	0
							0	0	0	0
							0	0	0	0
							0	0	0	0
							0	0	0	0
							0	0	0	0
							0	0	0	0



For more information on KWC Certification Program



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