

# Getting Started with your first time study for the Forest Productivity Database

Key Reference website: <http://www.forestproductivity.co.za/>

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## I. Study Idea Development

- A. Look at your current operations to find processes or procedures that might not be working perfectly or where production might be improved or costs lowered.
- B. Identify the equipment, location, stand factors, objectives, and other general descriptions of the proposed study.
- C. For instance, I want to study a harvester in smaller diameter KZN Eucalyptus plantations – flat topography, to better understand debarking productivity. How much time might we save by doing 3 passes instead of 5 debarking passes?

## II. Study Design

- A. Consult [forestproductivity.co.za](http://forestproductivity.co.za) and follow the decision tree questions under the section “Select Objective” in the Time Studies tab – The end result here will be a proposed “study type” and “experimental design”. Links are provided to the *South African Time Study Standards* that have detailed descriptions and examples on how to set up your study.
- B. Using these guides, design your study to collect the correct data so they can be used to meet your study objective and allow for appropriate statistically analyses. Failure to design your study up front often leads to wasted effort and investment in irrelevant or unnecessary data collection.
- C. Also at [forestproductivity.co.za](http://forestproductivity.co.za) look up the equipment/operation specific time study elements that will need to be timed or measured. These are located in Section 5.0 of the *South African Time Study Standards*.
- D. For instance, looking up a pitting machine for doing single pits, the pre-defined elements to study are listed as “Pit and Move” and “Turn”. Break points are listed to clearly define when to start and stop timing, and additional measurements or data to be collected like distance are also noted. Pay close attention to the “Specific time-study information required” section below the table of elements for additional information about the measurement units, the measurement equipment to be used, and other reference for more information. (see example below)

*EXAMPLE: Pitting machine: Single pit*

Elements	Break points	Detail required
<b>Pit and Move</b>	From the time the pitting <b>head makes contact with the ground</b> for a pit, until the <b>pitting head makes contact with the ground again</b> for the next pit	Time (t) and distance (d)
<b>Turn</b>	From the time the pitting <b>head leaves the ground after the last pit in the row</b> , until the pitting head <b>makes contact with the ground for the first pit</b> in the new line	Time (t) and distance (d)
Delays		
<b>Refuel time</b> (in-shift)	From when <b>machine stops</b> work due to fuel shortage to when the <b>current operation resumes</b> (whatever the operation was previously)	Time (t) for refuelling (RF - refer Time Models)
<b>Repair time</b> (in-shift)	From when the machine <b>stops</b> for repair to when the current operation <b>resumes</b> (whatever the operation was previously)	Time (t) for repairs (RT - refer Time Models)
<b>Maintenance time</b> (in-shift)	From when the machine <b>stops</b> for maintenance begins to when current operation <b>resumes</b> (whatever the operation was previously)	Time (t) for maintenance (MT - refer Time Models)
<b>Other workplace time</b> (refer to Time Model) delays such as planning, rests, work preparations etc.	From when the machine <b>stops</b> for the delay to when operation <b>resumes</b> (whatever the operation was previously)	Time and reason (t) for delays (refer Time Models)


**Specific time-study information required**

- **Time:** Measure time in minutes and centi-minutes – i.e. hundredths of a minute.
- **Distance:** Record distance travelled (m) either through pacing, measuring wheel or GPS data
- **Measuring equipment:** Callipers (digital or manual), vertex (or other simple hypsometers - Suuntu) and tape measure or logging tape. A GPS is another useful tool for truck distance measurement, particularly when longer distances are being studied. For measuring methodology refer to South African Forestry Handbook (2012 & 2000).
- **Refer to IUFRO Time-models**

### III. Background Information Sheets

- A. Background information sheets have been developed and are available at [forestproductivity.co.za](http://forestproductivity.co.za). These are available for download (PDF and Excel) for filling out and use in the field. Locate these forms under the “Time Studies” tab in the “Study Forms” section.
- B. The top section of these sheets will be used to record general information such as name, company, dates, etc.
- C. Additional sections have space to record stand and site factors, equipment information, operating factors, and additional information/notes about your study.
- D. It is imperative that this information is accurate and complete. These data sheets will provide future database users the relevant study details so they can find datasets of interest. For instance, some users may only be interested in studies focusing on Eucalyptus. Without the background information included on these sheets, users will not be able to filter the data set to find the appropriate studies.

## IV. Time Study App

- A. As part of this Forest Productivity project an android app was developed leveraging the South African Time Study Standard with the specific elements for each machine. Functions include:
1. Element time recording
  2. Delay time recording
  3. Other manually input information and notes (tree #'s, distances, comments)
  4. Ability to output to a .CSV file for processing and analysis
- B. This app can be downloaded from [forestproductivity.co.za](http://forestproductivity.co.za) under the “Apps” tab.
1. Users must enter their email address in order to start the download. Your email will be used to contact you with any updates to the app.
  2. You will download a file titled “timer-v1.0.0.0.apk”, open this file from your Android device to install the application. The installed application will be titled “Forestry TimeStudy”, with this icon: 
  3. A step by step video of the installation process is available to help show you how to do this. This video is available on the [forestproductivity.co.za](http://forestproductivity.co.za) site. [LINK](#)
- C. Setup/Use
1. A walk through video is provided to go over the basic use of the Time Study App. [LINK PROVIDE SOON](#)

## V. Collect Tree / Site Data

- A. Collection and recording of additional data regarding specific site and tree information is not covered on the background info sheets or in the Time Study App, and will need to be done prior to starting the time study.
- B. In section “5.1 Standardised Element Lists by Machine” of the Time Study Standards, each machine has listed “Specific time-study information required”. Review these details to ensure that you will collect all necessary data. Depending on the machine, addition measurements might include
1. Numbering and measuring DBH/height/log lengths
  2. Distance between trees/planting sites/other activities and total distance traveled during each cycle
  3. Quantities and rates such as pump rate (L/hour) and fluid quantities.

- C. Measuring equipment and measuring methodology are listed including references to the South African Forestry Handbook.

## VI. Time Study Data Processing

- A. Data collected on Android devices using the Time Study App can be easily downloaded into Excel on any computer.
  1. Study Data can be exported/shared directly from the app to many different cloud storage spaces, emails, messages, etc.
  2. To manually download data, first plug the Android device into the computer using a USB connector, open device folder on the computer, and search for “Timer” on the device. A folder should appear titled “Timer”, which can be opened to view all collected datasets, in Excel format. File naming is as follows: Activity/process\_date\_time. For example, a file could have the title “auger\_13-2-2017\_3-48-42.csv”.
- B. Raw data output by the Time Study App will have the following columns:
  - A: Cycle number
  - B: Element
  - C: Element time
  - D: Cumulative time
  - E: Tree number (only one per cycle)

Example: Harvester

A	B	C	D	E
Cycle	Element	Element time	Cumulative Time	Tree number
1	Felling	0.078	0.078	
1	Processing	0.091	0.17	
1	Processing	0.243	0.415	1
1	Travel	1.015	1.432	
1	Boom-out	0.027	1.459	
2	Felling	0.083	0.083	
2	Processing	0.484	0.569	2
2	Boom-out	0.031	0.6	
2	Boom-in	0.074	0.676	
3	Felling	0.058	0.058	
3	Boom-in	0.066	0.125	
3	Processing	1.749	1.876	3
3	Travel	1.749	1.876	
3	Travel	0.114	1.993	
3	Boom-out	0.089	2.083	

This data is not in an appropriate format for easy data analysis and must be organized before submitting to the database.

1. Reorganization of the data can be easily completed using pivot tables and vlookup functions in excel. A step by step video that goes through this process is available [here](#)
2. Properly formatted data should look like the following:

Example: Harvester

G	H	I	J	K	L	M
Cycle	Tree #	Felling	Boom-in	Processing	Boom-out	Travel
1	1	0.078	0	0.334	0.027	1.015
2	1	0.083	0.074	0.484	0.031	0
3	3	0.058	0.066	1.749	0.089	1.863
4	0	0.034	0.034	0.212	0.103	0
5	0	0.103	0	0	0	0
6	5	0.052	0.033	0.287	0.063	0
7	4	0.036	0.198	0.092	0.078	0.099
8	7	0.045	0.107	0.228	0.081	0.078
9	8	0.031	0.038	0.193	0.068	0.07
10	9	0.032	0.046	0.509	0.284	0.073

## VII. Submission to Database

### A. Background Information:

1. An electronic background information form has also been developed for use when submitting background information. This form can be located at [forestproductivity.co.za](http://forestproductivity.co.za) under the “Time Studies” tab in the “Study Forms” section. It will ask for the same content as the in-field background information sheets.

### B. Data:

1. Until automated upload systems have been developed, all data should be submitted to [brewer@sun.ac.za](mailto:brewer@sun.ac.za) in a properly processed excel file.
2. Please name the file with your company name, equipment, and collection date – for example: CompanyA\_Auger\_2017-12-31.xlsx