



John Arlinger

2010-11-09

Minutes from the meeting with the StanForD-group 2010-11-09

Place:	Skogforsk, Uppsala, Sweden
Present	
Manufacturing members:	Lars-Erik Andersson, Rottne Mikael Eliasson, LogMax Lars Henriksson, SDC Pasi Palonen, Parker Hannifin Erik Kindlund, John Deere Teemu Paldanius, Ponsse Niclas Eriksson, Komatsu Forest Jonas Thorsson, Dasa
Others:	Jonas Gustafsson, Sveaskog Anders Gustafsson, Haglöf Tapio Räsänen, Metsäteho Juha-Antti Sorsa, Metsäteho Timo Melkas, Metsäteho Björn Urbanke, KWF Jean Plamondon, Feric (phone)
Skogforsk:	John Arlinger, Secretary Johan J. Möller, Chairman Nazmul Bhuiyan

§1 Opening of the meeting

Johan J. Möller opened the meeting and especially welcomed Pasi Palonen who is the new representative from Parker and Lars Henriksson since SDC has now become a manufacturing member of StanForD. The proposed agenda was accepted.

§2 Clarifications and modifications of variables

UPDATING DATA TYPE OF VAR431_T1 (ENGINE TIME)

Proposal based on comment from Per Knutsson, Logica (2010-10-14).

Per has discovered that the data type of var431_t1 (ENGTIME) is string while the unit is hours. A similar var330_t1 for registering engine time has the correct data type integer.

It was thus suggested that the data type is corrected to integer for var431_t1 according to the following table:

Var	Name	Type	Data type	Unit	Description
330	SPECTIME	11	Integer	hours	Total engine time (covering total life time of the engine when the file is generated) when reparation/maintenance/disturbance first started: 1...var330_t1 / 1...var211_t
431	ENGTIME	1	<u>Integer</u>	hours	Total engine time, covering total life time of the engine when the file is generated.

Comment from Niclas Eriksson, Komatsu:

Variable 431, type 1, has probably been implemented as a string in many systems. Niclas therefore suggests that we keep it, as it is, in order to avoid even more confusion.

The meeting decided not to update var431 based on Niclas arguments.

UPDATING PRIORITY OF VAR532 (DSECVOL) IN STM

Var532 includes the total yield volume (m3sob) per diameter section and species. It has priority 1 in prd-files.

It was discovered by Halvard Olderlund, Komatsu, that var532 presently also has priority 2 in stm-files. Halvard suspected that this is a copy/paste error. When the secretary studied the minutes from the meeting (2005-11-25) when the variable was implemented it was found that this was actually an error. The variable shall not have a priority in stm-files.

It was decided that the var532 is given priority 0 in stm-files.

UPDATING DESCRIPTION OF VAR61_T7 (FREE TEXT ABOUT CONTROL MEASUREMENTS)

Based on proposal from Teemu Kananoja (John Deere) and Metsäteho.

It was decided that free text about control measurements could be given for each scale control event and not only as one text per file. It was decided that definition is changed as follows:

Var	Name	Type	Data type	Unit	Description
61	WEIGHTCONTRL	7	String	free text	Optional free text about control measurements, calibration

Var	Name	Type	Data type	Unit	Description
					reasons, weight scale faults and repairs etc.: <u>1...var61_t1</u> .

UPDATING DEFINITION OF VAR61_T11 (FORWARDER'S WORKING TYPE)

Question from Teemu Paldanius, Ponsse.

Teemu Paldanius has raised a question if the forwarder's working type when weighting with weight scale should be specified in prl per scale control event. It was decided that the definition is changed as follows:

Var	Name	Type	Data type	Unit	Description
61	WEIGHTCONTRL	11	Integer	code	Forwarder's working type when weighting with weight scale is done: <u>1...var61_t1</u> . Codes: 1 = loading, 2 = unloading. Variable only used for weight scale control measurements. See var446_t1 for production reporting.

§3 Multi tree harvesting (MTH)

MTH VOLUMES PER SPECIES AND OPERATOR IN PRD

Proposal from Skogforsk and Teemu Paldanius, Ponsse (2010-05-20).

New variables for registering number of stems, stem bunches and log bunches were added to the prd-file at the last meeting based on a proposal from John Deere (2010-04-13). However MTH volumes can still only be registered per operator and not per species. This makes it impossible to e.g. calculate an average stem volume per species and operator.

It was therefore decided that the following variables are added to the prd-file with priority 2:

Var	Name	Type	Data type	Unit	Description
246	BUNCHED-VOL	13	Integer	m3sob	Total volume over bark (stacked) of bunched wood stems in multi tree felling as calculated by harvester/ operator/tree species: <u>1...var211_t2/1...var111_t1</u> Some type of feller-buncher system used. Species is dependant on first stem in stem bunch. This volume is to represent estimated merchantable log volumes based on previously single processed stems. Possible calculation methods described in appendix.
246	BUNCHED-PROD	14	Integer	m3 (ob)	Total volume of multi tree processed stems (several stems delimbed and cross cut simultaneously) / operator/tree species: <u>1...var211_t2/1...var111_t1</u> The volume is based on the total diameter (diameter measured as if only one stem is processed)
246	BUNCHED-PROD	15	Integer	m3sob	Total volume of multi tree processed stems (several stems delimbed and cross cut simultaneously) as calculated in harvester (definition in

Appendix 1

Var	Name	Type	Data type	Unit	Description
					appendix) / operator/tree species: 1...var211_t2/1...var111_t1 These volumes are to represent estimated merchantable log volumes based on previously single processed stems. Several different methods allowed as described in appendix.
246	BUNCHED-PROD	16	Integer	m3sub	Total volume of multi tree processed stems (several stems delimbed and cross cut simultaneously) as calculated in harvester (definition in appendix) / operator/tree species: 1...var211_t2/1...var111_t1 These volumes are to represent estimated merchantable log volumes based on previously single processed stems. Several different methods allowed as described in appendix.
246	BUNCHED-PROD	17	Integer	m3 (ob)	Total volume of multi tree processed stems (several stems delimbed and cross cut simultaneously) /tree species: 1...var111_t1 The volume is based on the total diameter (diameter measured as if only one stem is processed)
246	BUNCHED-PROD	18	Integer	m3sob	Total volume of multi tree processed stems (several stems delimbed and cross cut simultaneously) as calculated in harvester (definition in appendix) / tree species: 1...var111_t1 These volumes are to represent estimated merchantable log volumes based on previously single processed stems. Several different methods allowed as described in appendix.
246	BUNCHED-PROD	19	Integer	m3sub	Total volume of multi tree processed stems (several stems delimbed and cross cut simultaneously) as calculated in harvester (definition in appendix) /tree species: 1...var111_t1 These volumes are to represent estimated merchantable log volumes based on previously single processed stems. Several different methods allowed as described in appendix.
246	BUNCHED-PROD	20	Integer	No	Number of log bunches (equal to no of cross-cuts excluding felling cut) from multi tree processed stems / operator/tree species: 1...var211_t2/1...var111_t1
246	BUNCHED-PROD	21	Integer	No	Number of log bunches (equal to no of cross-cuts excluding felling cut) from multi tree processed stems /tree species: 1...var111_t1

MTH IN PRI-FILE

Proposal form Johan Möller, Skogforsk (2010-06-03).

It was decided that estimated DBH (code 721), operator (code 750) and species (code 3) should be included for each stem in var266_t2 and var266_t3.

Assortment code

Code 20 is today available in var256_t3. However this quite recent assortment code has not been implemented by all manufacturers. It was therefore decided that code 1 (assortment no based on order of assortments in var121) is added to var256_t3.

Reference Diameter

Today the only measured diameter registered for MTH stems is DBH in pri-files. However in most cases this is an extrapolated diameter since the harvester head normally measures the first diameter some dm below 120 cm (height from the stump). This means that we actually base volume calculations on an estimated diameter. It would be better if we also register the actually measured diameter of MTH stems.

It was decided that we add a new code 723 to var266_t1-3 for the first measured diameter used when predicting MTH DBH in var266_t2 and t3:

Code	Description
723	Reference diameter used for predicting DBH in multi tree harvesting. Normally the first measured diameter. The diameter is measured at distance from stump in var266 according to code 724.
724	Reference diameter height. Height from stump to the reference diameter used for predicting DBH in multi tree harvesting. Normally the first measured diameter. The diameter is registered in var266 code 723.

§4 Items for discussion and information

MANAGEMENT OF MTH ASSORTMENTS IN AP1 AND OAI

Tapio presented the question about how to handle tree species – especially in case of mixed species – and initial grades for MTH assortments in ap1- and oai-files (Apteri). This question had been raised by UPM and discussed in the Finnish StanForD meeting. The issue was brought up for discussion only and no proposals for changes in StanForD was seen to be needed.

All main manufacturers have a possibility to set a special MTH initial grade. It is also possible to set ‘mixed species’ as a tree species, but it seems to be not so clear how widely this is used in Finland and Sweden. A common way is to select the most normal tree species (like pine or birch depending on the forest) for the species of mixed species bunch. Of course this leads to errors in stem counts per tree species, but it is probably not critical in those cases.

It was decided to make a proposal for adding MTH-volumes per assortments in prd-file for the next meeting.

Tapio also presented another question brought up by UPM concerning the distribution of MTH bunches consisting either of 1, 2, 3 or more stems in a bunch. This information is seen useful for analyzing the MTH working techniques of machines and operators as well as studying how suitable different kind of forests are for MTH logging. It had been noticed that the stem structure of StanForD 2010 with StemBunchKey makes it possible to calculate the bunch distribution afterwards. Therefore no new changes to the present standard was proposed.

SKOGFORSK MTH-PROJECT (VOLUME ESTIMATIONS)

Nazmul Bhuiyan presented preliminary results from the project. After six tests the results show that if we use the reference diameter of the first trees and calculate the volume based on single tree cutting the result will be within +/- 10 % from manually controlled volume for MTH bunches. If all trees in the bunch is calculated based on the first stem size the variation increases to +/- 25 %. Average for all 100 bunches in the tests gives a 3 % difference.

The result is promising but it also show that there is a need for a calibration method for MTH bunches

CALIBRATION OF MTH VOLUME CALCULATION

Johan presented his preliminary ideas concerning calibration. The problem is that the size of the first stem can differ systematically from the size of the second and the third stem 2 and 3. Skogforsk have a suggestion that maybe one stem bunch for each work shift is sampled randomly. It might work like this: when the first bunch shall be felled the feeding is stopped and the driver has to measure the size of the stems in the bunch. The driver then measure the Reference diameter and/ or DBH for each of the stems in the bunch. The system then gets a correction table for stem 2 and 3 compared to the first stem in each bunch. The suggestion is that the correction shall be adaptive and for each DBH/ reference diameter class the last 5-10 correction figures are stored (adaptive table).

DBH	0-	50	75	100	125	150	175+
correction	+20	+10	+5	0	-5	-10	-15

Skogforsk is interested to do some test if there is some interested manufacturer. The test will be analyzing the suggested calibration method and test if the correction shall be done in mm or % and if the correction shall be made for DBH classes or for the total MTH volume.

FINNISH REPORT FOR HARVESTER MEASUREMENT CONTROL

The Finnish demands on a printable report of measurement control results in harvesters were presented by Tapio Räsänen. The requirements are described in appendix 1. The specification of the report requirements has been written by Metsäteho and translated into English in October 2010.

Timetable for the report implementations had been set to 2010-01-01 by the Finnish StanForD group, but none of the machine manufacturers has been able to reach that. However, the Finnish forest companies see that the report is a necessary tool for follow-up of the measurement accuracy and calibrations of harvesters together with their own applications based on ktr –reporting. Therefore, the companies' wish is that the machine manufacturers would implement the report as soon as possible in their new software versions and that they could offer it also as an update to older versions.

GUIDELINES FOR RANDOM SAMPLE STEM SETTINGS

Tapio Räsänen described the problems with the present setting of random frequency. The present Statute of Ministry of Agriculture and Forestry on harvester measurement requires that

- sample stems must be selected randomly
- one sample stem should be measured per working day
- official minimum is once in 2 – 3 days

The situation with the forest companies' working instructions concerning randomly sampled stems and their settings in harvesters is very unclear today and so far only one company has been able to define their instructions. The same company has carried out also field tests to study the suitability of random sampling in practice. The operator's feedback has been that the presently used way to set the sampling interval based on tree-species specific stem numbers is not a good one and leads very often to continuous turn on/off of sampling. There is a common understanding now (discussed also in the Finnish StanForD meeting) that sampling should be based on machine's working hours preferably than stem numbers or produced timber volume. This seems to be also the machine manufacturers' opinion. Some manufacturers have told that they have already started to implement the working hours -option into their next software version. Also the Swedish users, represented by Sveaskog, think working hour is the best solution for sampling.

The meeting decided that we shall try to defined machine working hour to the next meeting which shall be used as a base for the random sampling. It was by realized by Tapio after the meeting that there is today no specific code for 'working hours' in the present standard. It is therefore suggested by Tapio that discuss at the next meeting whether to implement a new code 4 (working hours) in var361 SAMPLE t4? Maybe an e-mail conversation about this needed?

SWEDISH IDENTITIES IN STANFORD 2010

A first version of a list with StanForD 2010 id elements for use in Sweden was presented by Lars Henriksson, SDC. The list also describes which id-elements that will be used by most Swedish forest companies as well as how these map against the present standard:

StanForD2010	StanForD	Swedish names	Comments
General information			
CreationDate	Var 12 t 4	Spardatum	Sätts när meddelandet sparas
ApplicationVersion Creation	Var 5 t 1		Versionsbeteckning på styrsystemet
Maskinuppgifter			

StanForD2010	StanForD	Swedish names	Comments
MachineUserID	Var 3 t 2 alt Var 3 t 1	Maskin-nummer	Uppdragsgivarens maskinnummer
MachineOwner. BusinessID	Var 34 t 2	Kod avverkn.- företag	Kod avverkningsföretag
Object info			
ContractNumber	Var 35 t 2	Virkesorder	Virkesorder i VIOL
LoggingOrganization. BusinessID	Var 35 t 1		<i>För företag med fasta VO-nummer för flera avverkn.obj. Metoden under avveckling.</i>
RealEstateIDObject	Var 21 t 1		<i>För företag med fasta VO-nummer för flera avverkn.obj. anges objektsid (leverantör-urspr-uppdr) här. Se ovan</i>
RealEstateID- SubObject	Var 21 t 2 *	Delobjekt	Identifierar under (del-) objekt. Lagras som levkod i VIOL.
ContractCategory		Kontraktstyp	Attribut för styrning av typ av vederlag. Exakta vederlagstyper inte klart än.
ObjectDefinition. Startdate	Var 16 t 4	Startdatum	Startdatum för objektet
ObjectDefinition. Enddate	Var 17 t 4	Slutdatum	Signal för att avverkningen på objektet är klar.
Product info			
ProductIDInfo	Var 121 t 2	Produkt	Sortimentskod (SSTEK) enligt VIOLs kodifiering.
ProductUserID		Produkt- matrisID	Unik identitet på produktmatris. Kan användas för att identifiera vilken produktinstruktion som har använts för en viss produkt på ett objekt.
ProductInfo1	Var 121 t 3	Produktinfo	Klartextfält som beskriver produkten
ProductBuyer. BusinessID	Var 32 t 2	Köpare	Huvudkod på mottagaren (siste köpare) av produkten.
ProductDestination. BusinessID	Var 32 t 2 *	Mottagnings- plats kod	Mottagningsplats enligt VIOLs kodifiering. Nytt element.
DiameterClass- LowerLimit	Var 131 t 1		Diameterklassbotten
LengthClass – LowerLimit	Var 132 t 1		Längdklassbotten
Species info			
SpeciesgroupIDInfo	Order no	Trädslag	Kod för trädslag (trädslagsgrupp)
Stem data			
DBH	Tree code 740	DBH	Brösthöjdsdiameter
BioEnergyAdaption	Tree code 505	Biobränsle	Signal om att trädet avses användas för biobränsle..

§5 StanForD 2010, PROGRESS DURING LAST 6 MONTHS

Johan J Möller gave a brief presentation of what has been done in the project to develop StanForD 2010.

STANFORD2010 TEST (AUTUMN 2011)

Johan J Möller gave a brief presentation of the plans to arrange a harvester test in the autumn of 2011 in Sweden. The aim with the test is to test how the implementation of StanForD 2010 works in practice, as a support for the manufacture when they implement the standard and as a support for the user when they shall start use StanForD 2010. The test can be done in different areas (where there is an available machine). Time is planned from middle of August to November (when manufacturer think they are ready for tests). Below is a preliminary test plan described:

- Practical test with StanForD 2010 messages
 - oin, pin, spi (messages made in an administration tool)
 - cutting of at least 30 trees test bucking in practice including pulp wood control by apportionment bucking?
 - check of different StanForD functions implemented (volume types, length margin, apportionment bucking, etc)?
- Test of calibration and quality control system for the harvester's measuring?
 - hqc (messages), send data to and from a StanForD 2010 adapted caliper
- Production and operational monitoring result
 - hpr, thp, mom (messages)
 - Control of that the messages follow the schemas and content all data
- Communication and reporting
 - Reporting of messages hpr, thp, mom, hqc, caliper communication, eventually SDC or and Logicas sending program
- Administration of data,
 - saving of data, backup, naming of identities and other elements
- Is there other important functions implemented for the special manufacturer?

- (If implemented, test map program/ ogi, ogr, gps signal in hpr)

The preliminary time table is that we will try to send out an invitation to all manufacturers to participate in the test. In April we will make a test plan, in April-May it will be possible to meet Skogforsk and go through the test plan. Then the plan is to have practical test from middle of August to November. If there is some manufacturer which prefers to make the test earlier it will be possible. Our ambition is to write a report at the end of 2011 so if someone will make a test later it will not be possible to have it included in the report.

§6 Other issues

No other issues were discussed.

§7 Next meeting & future of “StanForD classic”

Next meeting will take place on the 4th to 5th of May 2011, at Skogforsk in Uppsala, starting at 10.00 a.m. Proposals for the meeting shall be the secretary by hand preferably not later than April 21st 2011.

It was decided to merge StanForD classic and StanForD2010 from this meeting and onwards. It was also decided keep StanForD classic active (updatable) until autumn 2011. We will then bring up the issue of whether or not to close the old standard.

§8 End of meeting

Johan J Möller (chairman) closed the meeting.

Secretary

John Arlinger

Metsäteho Oy
 Tapio Räsänen
 Asko Poikela

13.10.2010

REPORTING OF HARVESTER MEASUREMENT ACCURACY CONTROL

Specification of the reporting application

Version 2009-10-19

Document history and reasons for changes	Date	Changes of the specification
Version 1.0 of the specification	22.01.2009	
	13.03.2009	several
	19.10.2009	changes related to calibration values and calibration history (table 4) decided in StanForD Finland meeting 2009-10-06
English version of the specification	13.10.2010	

GENERAL

Finnish StanForD working group has discussed in its meetings needs and possibilities to specify and implement a common and uniform summary report for follow-up of harvester control measurements and for calibrations of the measuring system. It was set as a goal to specify a summary report which would be based on the use of StanForD ktr-files. The report should include main information about the control measurements carried out, statistical key figures of measuring accuracy calculated out of control measurement data as well as diameter and length calibrations carried out and the correction (adjustment) values of the calibrations.

Summary report is designed for verifying how the measuring accuracy of the harvester has been followed, how control measurements have been carried out for following purposes and how the changes to the calibration of the measuring system have made. It is expected that the new reporting tool will promote common and uniform practices for measuring accuracy follow-up. In the first place the report is supposed to serve logging contractors and timber sellers as well as their representatives. In the wood procurement organizations the follow-up of the measuring accuracy will probably be based also in the near future on ktr-files transferred automatically from the harvester as it is done today. However, a common

summary report gives support also to the follow-up practices of the forest companies.

Starting point for the specification has been that not a new version of ktr-file is defined. Only a summary report will be specified in which the data contents and variables behind the data would be the same in all machine manufacturers' applications. Primarily the aim is to build up the report in pdf-format for sending it via e-mail or for printing out in the machine. It is possible also that the information of the report is gathered in a spreadsheet application (e.g. Excel) and changed into some more suitable format. The report information can be transferred for instance in xls- or text format to the user.

Languages to be used in printout of the report are Finnish and Swedish.

INFORMATION, construction of data and stanford variables

In the layout of the report notice should be taken to good readability.

There can be several printing options:

- all parts (tables) of the report at the same time
- each part (table) to be printed separately.

On every page of the report printout reporting time interval (see below) and printing time are shown in order to attach the page to other parts of the report and to other pages of the same part. Then it is not necessary to repeat machine identification information on each of the printouts pages.

The report is required to include the next information groups and data inside them. An example of the proposed report output is attached to this specification.

Identification information

- Identification information of logging contractor, machine, harvesting head, measuring system and its program version

Reporting time information

- Reporting time interval: time, which is used for selecting control measurement stem and log data and calibration data for the tables of the report

Time interval must be freely selectable (for example a day/week/month backwards from the reporting time point, previous calendar month etc.). The maximum time in the reporting is 6 months backwards and it is not required for the reporting application to support older data than that.

Control measurements -table

- Summary information of each control measurement event carried out during the reporting time interval: time, type of the measurement, tree species codes, number of individual diameter and length measurements and reason of the rejection of randomly selected control stem.

All randomly selected sample stems (type 1, also the rejected) and sample stems selected by the harvester operator (type 2) are shown in the table. Type 2 category includes both single stems selected by the operator and also a larger item of measured stems selected for calibration control or calibration adjustment. When the operator saves control measuring data of the stems selected by himself he can decide if they are included in the list or not. All the stems accepted in this list are included also in Measuring accuracy –table

(statistical key figures), if both diameters and lengths have been measured from them. Stems which are selected just for length control are listed in this table only.

Measurement information is reported in time order, latest information as first.

Measuring accuracy –tables

- Basic information and statistical key figures describing the measuring accuracy by log strata (log grouping) within the selected report time interval:

- O number of logs
 - harvester (pieces), control measurement (pieces)
- O volume of logs
 - harvester (m³), control measurement (m³)
 - difference in volume (m³ and %)
 - absolute difference in volume (m³) is calculated by formula

$$\text{harvester (m3)} - \text{control measurement (m3)}$$

and relative difference in volume (%) by formula

$$\frac{\text{harvester (m3)} - \text{control measurement (m3)}}{\text{harvester (m3)}} \times 100$$

- O differences in diameter
 - average (mm), median (mm), standard deviation (mm), [-x .. +y] mm (%)
 - harvester operator can select parameters x and y
 - differences in diameter are calculated from single diameter measurement values by formula

$$\text{harvester (mm)} - \text{control measurement (mm)}$$
 - a single diameter measurement value is the average of two cross-measured diameter values (rounding principle used??)
- O differences in length
 - average (cm), median (cm), standard deviation (cm) , [-x .. +y] cm (%)
 - harvester operator can select parameters x and y
 - differences in length are calculated from single length measurement values (lengths of logs) by formula

$$\text{harvester (cm)} - \text{control measurement (cm)}$$

- if the accuracy of the length measurement device is better than 1 cm, length values are rounded into even classes of 1 cm before length differences are calculated

Statistical key figures are presented in two equal tables:

- 1) randomly selected control stems
 - key figures of randomly sampled stems only
- 2) control stems selected by harvester operator
 - key figures of all other control stems than those of randomly sampled

Proposed layout of the tables in printing:

- key figures of a single log strata (group) on a horizontal line (number of key figures does not change)

Log stratification (grouping) of the tables can be done by three different principles:

- I Grouping based on log's stem type
- II Grouping based on log's top diameter
- III Grouping based on log's timber assortment (name, code)

Report printout based on alternative I should be possible to get from all of the new measuring system versions (priority 1).

However, this alternative alone does not fulfill all the information needs of different measurement parties. Therefore it is recommended that machine manufacturers would implement also either alternative II or alternative III, or both.

Reporting alternatives:

I. Measurement accuracy by stem types

Statistical key figures are calculated and presented by log strata (group) that are based on the stem type into which timber assortment of measured log in ktr-file belongs to (log's stem type in ktr according to variables 123_t1 and 124_t1).

Stem type value of a log is specified by stem type code of apt-file (stem type codes of the forest company). It is recommended that commonly in Finland used PMP stem type codes (described in StanForD) would be applied:

- 11 Sawlogs of tree species 1 (in Finland usually pine, Mät)
- 12 Pulpwood logs of tree species 1 (in Finland usually pine, Mäk)
- 21 Sawlogs of tree species 2 (in Finland usually spruce, Kut)

- 22 Pulpwood logs of tree species 2 (in Finland usually spruce, Kuk)
- 31 Sawlogs of tree species 3 (in Finland usually birch, Kot)
- 32 Pulpwood logs of tree species 3 (in Finland usually birch, Kok)
- etc.

Statistical key figures are calculated and presented also by tree species.

Those stems and logs which do not have stem type information should not be included in this measurement accuracy table. Weakness of this type of calculation and reporting is that butt end reject pieces or other unclassified logs can not be recognized and kept separated.

II. Measurement accuracy by top diameter classes

Logs are stratified into sawlog sized (large) and pulpwood sized (small) groups by tree species according to the top diameter registered by the harvester. Diameter limit value between the groups is set as the same as the minimum diameter of sawlog is and it is presented as a parameter specified by tree species. The operator can change the diameter limit value freely. This enables a common and permanent way to follow measurement accuracy. It is not possible in this type of reporting either to keep butt end reject pieces or other unclassified logs separated, so they should be counted in the group in which they belong according to the top diameter.

Grouping that is based on top diameter does not separate sawlog and pulpwood log assortments as effectively as alternative I. This is problematic specifically with hardwood because its sawlog minimum diameter can vary several times during the reporting interval and variation of timber quality is big. However, this alternative makes it possible to prepare for those situations where stem type information lacks for some reason.

III. Measurement accuracy by timber assortments

Timber assortment stands here for log stratum (group) for which an unambiguous and usually company-specific timber assortment code has been specified.

Information of each timber assortment is presented separately. Number of rows in the table depends on the number of timber assortments. It can be considerably large particularly if the

reporting period is long. When the report is interpreted, it must be noticed that one single timber assortment may contain a very little number of logs which makes also the result of that timber assortment unreliable.

Presenting order of the timber assortments can be selected openly, but from a point of readability it is recommended that the timber assortments are presented in alphabetical order or so that those timber assortments that have been used latest are presented first in the list.

This reporting alternative is needed particularly when information about one single and specific timber assortment (e.g. spruce veneer logs, small-sized logs) is needed.

Calibration adjustment values and adjustment history

Harvester measurement order of Ministry of Agriculture and Forestry provides that length and diameter calibration adjustment values and times must be possible to print out.

Calibration principles and presentation style of adjustment values varies from machine to machine. That is why it is not relevant to make a strict definition for the presentation form of the calibration history. Easyness of printing out and a definite and clear presentation layout are prerequisites for the requirement provided by Harvester measurement order.

There are several variables in ktr-file in which calibration adjustment values are saved. Using those variables it is possible to report at least next key figures that describe the calibration history:

- Calibration time stamps (date, time)
- Calibration adjustment values of length and butt end correction of length by tree species at different calibration times
- Calibration adjustment values of diameter by tree species at different calibration times

”Adjustment value” can be for example a diameter class specific adjustment value. Number of diameter classes can vary from machine to machine and by harvesting head models (by size of harvesting head). In the measuring systems which have a “one point” calibration principle the calibration value can be presented as combined regression factors for the whole diameter range instead of diameter classes.

As a minimum requirement it must be presented in the report the times (time stamps) of length and diameter calibrations by calibration events and by tree species (table 4). This data is normally saved also in ktr- and prd-files. Calibration adjustment values can be included in the table as optional. Calibration adjustment values of diameter can be presented in millimeters or per mille according to the calibration method that is used by the machine manufacturer.

Data specifications

Priority of data 1 = mandatory
2 = recommended

Data group	Data	Definition and construction of data	StanForD variable	Presentation form	Data type	Example	Priority
Identification information	Contractor information	Identification and contact information of logging contractor	var34_t1-6 (all are not needed)	text in row or in table	string	Mittamoto Oy Yrittäjänpolku 13 00970 Metsälä puh. 040 5555159	var34_t3: 1 other types: 2
	Machine information	Identification information of harvester (make and model)	var3_t2 var3_t5-6	text in row or in table	string	1234 John Deere 1270E	1 1
	Harvesting head information	make and model information of harvesting head	var3_t7-8	text in row or in table	string	John Deere H270	1
	Measuring system information	Model and program version of measuring equipment	var5_t1	text in row	string	Timbermatic 300	2
Reporting time	Reporting time	Time interval of reporting: it is specified from which time period the control measurements and calibrations are reported	-	text in row	date dd.mm.yyy y	30.6.2008 - 30.8.2008	1
Control measurements	Control measurement time	Time of the caliper measurement of the control	var18_t5 or var18_t6	table	date dd.mm.yyy y time hh:mm	19.7.2008 6:20	1
	Type of control measurement	Type of control measurement: 1= randomly selected sample stems 2= sample stems selected by the harvester operator <i>Code 0 is not used.</i>	var38_t4	table	integer	2	1
	Tree species	Tree species codes of control measurement item in list. Names of tree species can be used as well.	var120_t1	code list in a cell of a table	string	1, 2, 3 or pine, spruce, birch	1
	Number of	Total number of measured diameters of		table	integer	126	1

	measured diameters	all the logs in the control item. Information is achieved from the machine's measuring system (database).					
	Number of measured lengths	Total number of logs in control item = total number of length values. Information is achieved from the machine's measuring system (database).		table	integer	28	1
	Rejection reason	Reason for the rejection of randomly selected control stems. Codes of StanForD are used. To be presented by stem and only when the operator has rejected the stem.	var38_t10	table	integer	-	2
Statistical key figures of measurement accuracy	Number of logs (harvester)	Number of logs in harvester measurement per group. Information is achieved from the machine's measuring system (database).	-	table	integer	25	1
	Number of logs (control)	Number of logs in control measurement per group. Information is achieved from the machine's measuring system (database).	-	table	integer	25	1
	Volume (harvester)	Total volume of logs in group according to harvester measurement.	to be summed (var299_t3)	table	float 3 desim.	4.017	1
	Volume (control)	Total volume of logs in group according to control (caliper) measurement.	to be summed (var299_t4)	table	float 3 desim.	3.941	1
	Difference in volume (m ³)	Volume difference, m ³ <i>calculation formula:</i> $volume\ diff. = vol_{harvester} - vol_{control}$		table	float 3 desim.	+0.076	1
	Difference in volume (%)	Volume difference, % <i>calculation formula:</i> $volume\ diff. = (vol_{harvester} - vol_{control}) / vol_{harvester} \times 100$	-	table	float 1 desim.	+1.9	1
	Difference in	Average value of diameter differences,	(differences	table	float	+0.2	1

	diameter (average)	mm	of var373_t3 and var373_t5)		1 desim.		
	Difference in diameter (median)	Median of diameter differences, mm		table	float 1 desim.	0	1
	Difference in diameter (standard deviation)	Standard deviation of of diameter differences, mm		table	float 1 desim.	2.6	1
	Difference in diameter [−x .. +y] mm, %	Percentage of diameter differences which are inside the variation range defined by the operator (set in application)		table	float 1 desim.	74.8	1
	Difference in length (average)	Average value of length differences, cm	(var293_t3 ja var293_t5 erot)	table	float 1 desim.	-1.3	1
	Difference in length (median)	Median of length differences, cm		table	float 1 desim.	0	1
	Difference in length (standard deviation)	Standard deviation of length differences, cm		table	float 1 desim.	1.8	1
	Difference in length [−x .. +y] cm, %	Percentage of length differences which are inside the variation range defined by the operator (set in application)		table	float 1 desim.	92.0	1
Calibration information	Calibration time	Times of length and diameter calibrations done during the reporting period presented by calibration events and by tree species. Date and time when the calibration has been registered in the measuring system. Date and time can be presented separated in their own	var41_t4 / var44_t4	table	date dd.mm.yyy y time hh:mm	17.8.2008 14:40	1

		columns.					
<i>Next information is optional and not required in the minimum version of the report.</i>							
Calibration adjustment values	Adjustment values	Changes of adjustment values set in calibration: - Diameter correction done - "yes / no" is enough - optionally it is possible to show the change that has been done either in millimeters or per mille according to the calibration method - Length correction (mm or %) - base value on second title row - Butt end length correction (mm or %) - base value on second title row	var46_t1 (length and butt end length correction) var48_t1 (diameters)	table	string / integer	<i>Diameter correction:</i> Lpm-korjaus kyllä <i>Length correction:</i> Pituus -1 <i>Butt end length correction:</i> Tyvikorjaus 0 ...	1

PRINTING LAYOUT MODELS

Appendix 2

Note: In the implementation version titles and texts of tables must be either in Finnish or Swedish. Look at the original Finnish version of this specification.

Table 1

MACHINE IDENTIFICATION:						
MEASURING SYSTEM IDENTIFICATION:						
PROGRAM VERSION OF MEASURING SYSTEM:						
REPORTING TIME INTERVAL: 1.7.2008 - 31.8.2008 (Printed 4.9.2008 09:45)						
CONTROL MEASUREMENTS (1=randomly selected, 2=selected by operator):						
Date	Time	Type	Tree species	Diam. 1)	Length 2)	Rej. reason
29.8.2008	4:27	1	1	9	2	-
29.8.2008	4:15	1	1	-	-	3
28.8.2008	14:01	1	1	17	4	-
28.8.2008	8:21	2	1	-	9	-
26.8.2008	14:50	2	2,3	70	15	-
26.8.2008	14:25	1	2	24	5	-
26.8.2008	14:00	1	3	-	-	2
26.8.2008	9:00	1	2	16	3	-
23.8.2008	16:00	1	1	20	4	-
22.8.2008	12:20	1	1	15	3	-
17.8.2008	14:28	2	1,2	56	12	-
17.8.2008	14:11	1	2	20	4	-
22.7.2008	11:20	1	3	9	2	-
21.7.2008	12:33	1	1	16	3	-
19.7.2008	6:20	2	1	126	28	-

1) Number of measured diameters

2) Number of measured lengths

There is a summary from July-August 2008 in this example of report output. The harvester has been working one week in the end of July and the two last weeks of August.

After both of the breaks (19.7. and 17.8.) operator has measured a larger amount of control stems (28 and 12 logs).

The first item was purely of tree species 1. The second item included tree species 1 and 2.

There has been a problem with measuring accuracy on 26.8., when the operator has measured 15 control logs of tree species 2 and 3.

On 28.8. at 8:21 the operator has taken one more separate item of length control (9 logs).

Rest of the stems from the reporting interval have been randomly selected and the operator has rejected two of them (on 26.8. at 14:00 and on 29.8. at 4:15).

PRINTING LAYOUT MODELS

Appendix 2

Note: In the implementation version titles and texts of tables must be either in Finnish or Swedish. Look at the original Finnish version of this specification.

Table 2

ALTERNATIVE I (Grouping based on stem type of the log):

MEASURING ACCURACY (randomly selected control stems):

1.7.2008 - 31.8.2008 (Printed 4.9.2008 09:45)

		NUMBER OF LOGS		VOLUME				DIFFERENCE IN DIAMETER				DIFFERENCE IN LENGTH			
		machine pieces	control pieces	machine m3	control m3	difference m3 %		average mm	median mm	std. dev. mm	[-3 .. +3] %	average cm	median cm	std. dev. cm	[-3 .. +3] %
TREE SPECIES 1	11 (Sawlog)														
	12 (Pulpwood)														
	Tree species 1 total														
TREE SPECIES 2	21 (Sawlog)														
	22 (Pulpwood)														
	Tree species 2 total														
TREE SPECIES 3	31 (Sawlog)														
	32 (Pulpwood)														
	Tree species 3 total														
ALL	Sawlog														
	Pulpwood														
	Tree species total														

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Table 2

ALTERNATIVE II (Grouping based on diameter limit values by tree species):

MEASURING ACCURACY (randomly selected control stems):

1.7.2008 - 31.8.2008 (Printed 4.9.2008 09:45)

DIAMETER CLASS		NUMBER OF LOGS		VOLUME				DIFFERENCE IN DIAMETER				DIFFERENCE IN LENGTH			
		machine pieces	control pieces	machine m3	control m3	difference m3 %		average mm	median mm	std. dev. mm	[-3 .. +3] %	average cm	median cm	std. dev. cm	[-3 .. +3] %
TREE SPECIES 1	? 15 cm														
	< 15														
	<i>Tree species 1 total</i>														
TREE SPECIES 2	? 16 cm														
	< 16														
	<i>Tree species 2 total</i>														
TREE SPECIES 3	? 18 cm														
	< 18														
	<i>Tree species 3 total</i>														
ALL	? 15,16,18 cm														
	< 15, 16, 18														
	<i>Tree species total</i>														

PRINTING LAYOUT MODELS

Appendix 2

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Table 2

ALTERNATIVE III (Grouping based on timber assortment of the log):

MEASURING ACCURACY (randomly selected control stems):

1.7.2008 - 31.8.2008 (Printed 4.9.2008 09:45)

TIMBER ASSORTMENT	NUMBER OF LOGS		VOLUME				DIFFERENCE IN DIAMETER				DIFFERENCE IN LENGTH			
	machine pieces	control pieces	machine m3	control m3	difference m3	%	average mm	median mm	std. dev. mm	[-3 .. +3] %	average cm	median cm	std. dev. cm	[-3 .. +3] %
<i>Anjakuk4</i>														
<i>HAK_AANE</i>														
<i>JOENSUU</i>														
<i>KEITELE</i>														
<i>KUI32</i>														
<i>KUK_JAMS</i>														
<i>KUTKINN</i>														
<i>LAHOKUUS</i>														
<i>PIKKUTUK</i>														
<i>RAAKKI</i>														
<i>SELLUKUK</i>														
<i>SUOLAHTI</i>														
<i>UHARJ16</i>														
<i>UNCLASSIFIED</i>														
Total														

PRINTING LAYOUT MODELS

Appendix 2

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Table 3

ALTERNATIVE I (Grouping based on stem type of the log):

MEASURING ACCURACY (control stems selected by machine operator):

1.7.2008 - 31.8.2008 (Printed 4.9.2008 09:45)

		NUMBER OF LOGS		VOLUME				DIFFERENCE IN DIAMETER				DIFFERENCE IN LENGTH			
		machine pieces	control pieces	machine m3	control m3	difference m3 %		average mm	median mm	std. dev. mm	[-3 .. +3] %	average cm	median cm	std. dev. cm	[-3 .. +3] %
TREE SPECIES 1	11 (Sawlog)														
	12 (Pulpwood)														
	Tree species 1 total														
TREE SPECIES 2	21 (Sawlog)														
	22 (Pulpwood)														
	Tree species 2 total														
TREE SPECIES 3	31 (Sawlog)														
	32 (Pulpwood)														
	Tree species 3 total														
ALL	Sawlog														
	Pulpwood														
	Tree species total														

PRINTING LAYOUT MODELS

Appendix 2

Note: In the implementation version titles and texts of tables must be either in Finnish or Swedish. Look at the original Finnish version of this specification.

Table 3

ALTERNATIVE II (Grouping based on diameter limit values by tree species):

MEASURING ACCURACY (control stems selected by machine operator):

1.7.2008 - 31.8.2008 (Printed 4.9.2008 09:45)

DIAMETER CLASS		NUMBER OF LOGS		VOLUME				DIFFERENCE IN DIAMETER				DIFFERENCE IN LENGTH			
		machine pieces	control pieces	machine m3	control m3	difference m3 %		average mm	median mm	std. dev. mm	[-3 .. +3] %	average cm	median cm	std. dev. cm	[-3 .. +3] %
TREE SPECIES 1	$\geq 15 \text{ cm}$														
	< 15														
	<i>Tree species 1 total</i>														
TREE SPECIES 2	$\geq 16 \text{ cm}$														
	< 16														
	<i>Tree species 2 total</i>														
TREE SPECIES 3	$\geq 18 \text{ cm}$														
	< 18														
	<i>Tree species 3 total</i>														
ALL	$\geq 15, 16, 18 \text{ cm}$														
	$< 15, 16, 18$														
	<i>Tree species total</i>														

PRINTING LAYOUT MODELS

Appendix 2

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Table 3

ALTERNATIVE III (Grouping based on timber assortment of the log):

MEASURING ACCURACY (control stems selected by machine operator):

1.7.2008 - 31.8.2008 (Printed 4.9.2008 09:45)

TIMBER ASSORTMENT	NUMBER OF LOGS		VOLUME				DIFFERENCE IN DIAMETER				DIFFERENCE IN LENGTH			
	machine pieces	control pieces	machine m3	control m3	difference m3 %		average mm	median mm	std. dev. mm	[-3 .. +3] %	average cm	median cm	std. dev. cm	[-3 .. +3] %
<i>Anjakuk4</i>														
<i>HAK_AANE</i>														
<i>JOENSUU</i>														
<i>KEITELE</i>														
<i>KUI32</i>														
<i>KUK_JAMS</i>														
<i>KUTKINN</i>														
<i>LAHOKUUS</i>														
<i>PIKKUTUK</i>														
<i>RAAKKI</i>														
<i>SELLUKUK</i>														
<i>SUOLAHTI</i>														
<i>UHARJ16</i>														
<i>UNCLASSIFIED</i>														
Total														

PRINTING LAYOUT MODELS

Appendix 2

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Table 4

CALIBRATIONS:

1.7.2008 - 31.8.2008 (Printed 4.9.2008 09:45)

Date	Time	Tree species	Diam. correction (yes/no, mm or %)	Length (mm or %)	Butt end correction (mm or %)
26.8.2008	15:05	1	+1 mm		
	15:05	2	yes	-1	
17.8.2008	14:41	2	-1 mm		
	14:40	1	-1 mm		
19.7.2008	14:24	3	yes		+1
	13:52	1	yes	+1	+1
	13:52	2	yes		

There is a summary from July-August 2008 in this example of report output.

The machine has been calibrated altogether three times during the time interval.

On 19.7. calibration has been corrected for all tree species, later only for species 1 and 2.

Shape of the diameter calibration curve has been changed with all of the tree species on 19.7. (=x) ja with species 2 once again on 26.8.

Rest of the calibrations have been equal in value on whole range of the diameter area.

Length measurement has been calibrated on 19.7. and 26.8., and the length correction has also been changed at the first calibration.

Calibration events are presented in time order, last calibrations are on top of the list.