

Minutes from the meeting with the StanForD-group 2009-11-11

Place:	Skogforsk, Uppsala, Sweden
Present	
Manufacturing members:	Lars-Erik Andersson, Rottne Mikael Eliasson, LogMax Joonas Kaarnametsä, John Deere Teemu Paldanius, Ponsse (phone) Peter Assarsson, Komatsu Forest (phone) Fredrik Tjernberg, Komatsu Forest (phone) Halvard Olderlund, Komatsu Forest (phone)
Others:	Jonas Gustafsson, Sveaskog Jon Rudman, StoraEnso Per Knutsson, Logica Lars Henriksson, SDC Tapio Räsänen, Metsäteho Juha-Antti Sorsa, Metsäteho Timo Melkas, Metsäteho Jean Plamondon, Feric, FPIInnovation (phone)
Skogforsk:	John Arlinger, Secretary Johan J. Möller, Chairman

§1 Opening of the meeting

Johan J. Möller opened the meeting. The proposed agenda was accepted.

§2 Clarifications and modifications of variables

NO OF WORK TIMES (VAR328_T5) IN DRF-FILE

Proposal from Peter Assarsson, KomatsuForest (2009-05-30).

Var328, type 5-29 was implemented in 2008-05-06 based on a proposal from Komatsu. The basic idea with this variable is to make it possible to register total times per work types, operator, shift and harvesting object. Peter Assarsson has observed that var328_t5 might be misinterpreted. It was decided to update var328_t5 according to the table below (new text underlined):

Var no	Name	Type	Data type	Unit	Description
328	TOT-WORK-TIME	3	integer	code	Type of total working time including time away from machine and meal breaks. 1...var328_t2 / 1...var211_t2 1= Start time, 2 = End Time
328		4	String	Yymmdd hhmss	Start / end time (normally time paid time for employee) per operator: 1...var328_t2 / 1...var211_t2
328		5	integer	No	Number of work times per operator: 1...var211_t2 (<u>Equal to the number of code 1 in var328_t3</u>). <u>The sum of this variable should be equal to the total number of all start times (unique code 1) in var328_t3.</u>

§3 New variables

ASSORTMENT DATA PER TRANSPORT OBJECT (VAR442_T8)

Proposal from Peter Assarsson, KomatsuForest (2009-05-30).

The following variables can today be registered for each transport object in order to link assortments to each transport object:

Var no	Name	Type	Data type	Description
442	TRNS-SORT	1	Integer	No of assortments per transport object: 1...440_t1
		2	String	Name of tree species per assortment and transport object (compare with var120): 1...442_t1 / 1...440_t1
		3	String	Tree species code(see Swedish appendix) per assortment and transport object: 1...442_t1 / 1...440_t1
		4	String	Description per assortment and transport object (same as stored in var121_t1): 1...442_t1 / 1...440_t1
		5	String	Assortment codes per assortment and transport object (same as stored in var121_t2): 1...442_t1 / 1...440_t1
		6	String	Additional identity description of assortment per assortment and transport object (same as stored in var121_t3): 1...442_t1 / 1...440_t1
		7	String	Buyer per assortment (same as stored in var32_t2, see Swedish appendix): 1...442_t1 / 1...440_t1

Observe that all these variables (type 2-7) are copies of already existing variables (var120, var121_t1-3, var32_t2).

KomatsuForest has seen a need for making it possible to include also information about for example stem type for each assortment (var121 and var123) belonging to a certain transport object.

It was decided to add the following new variables to the prl-files in order to simplify how we link assortments to transport objects:

Var no	Name	Type	Data type	Prio	Description
442	TRNS-SORT	8	Integer	1	Price matrix number (refers to var121_t6): <u>1...var442_t1/1...var441_t1/1...var440_t1</u> <u>To be used instead of var442_t2-7.</u>

As a consequence it was decided that the following new priorities should be implemented in the prl-file:

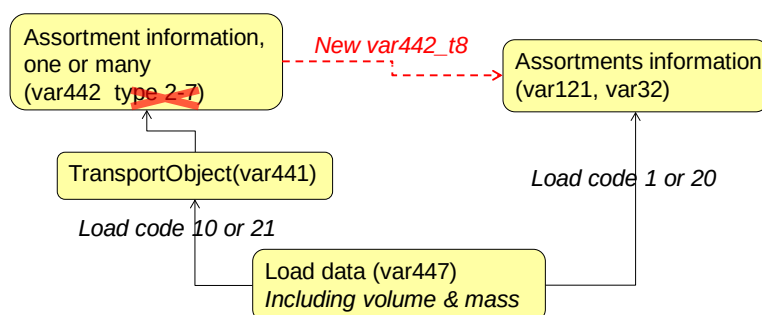
- Var121_t6 to have priority 1
- Var442_t2-7 to have priority 4

It was decided that it will be pointed out in the documentation of prl-files that there is a problem regarding the possibility to link forwarded production in two ways, either by using a direct reference to an assortment via load code 1/20 or by using a reference to a transport object via load code 10/21. The transport object in its turn can link to one or several assortments. If several assortments are tied to the same transport object, load code 10 and 21 doesn't have the capability to reflect this, and we may get conflicts between load code 1/20 and 10/21.

The conclusions are that:

- var442_t8 should be the primary source for information about referenced assortments
- assortments linked through load code 1/20 must also be included using var10/21 and var442_t8
- applications creating prl-files using both load code 10/21 and 1/20 should control that there is no conflict between these codes.

The following diagram illustrates how load data in var447 can be linked to a certain assortment based on decisions at the meeting:



The following example illustrates how to use the new var448_t8 in order to identify what assortments have been forwarded. Observe that it is fully possible to have a one-to-one relationship between assortments (var121) and transport object (var441, var442).

Var No	Name	Type	Data			
121	ASSTDESCR	1	PineSaw	PinePulp	SpruceSaw	SprucePulp
121		2	0110	1000	0120	1000
121		6	1001	1002	1003	1004
32	BUYER	2	PineMill	PulpMill	SpruceMill	PulpMill
442	TRANSSORT	1	1	1	2	
442		8	1001	1003	1002	1004
441	TRANSDSCR	1	PineSaw	SpruceSaw	Pulp	
441		2	0110	0120	1000	
441		12	101	102	103	
445	NUMLOADCODE	1	4			
446	LOADCODE	1	2	402	450	21
			<u>Load</u>	<u>Vol</u>	<u>Mass</u>	<u>Transport object</u>
447	LOADDATA	1	1	9	7200	101
			1	3	2400	102
			2	13	10400	103
			3	12	9600	101

FORWARDED FOREST FUEL VOLUMES IN DRF-FILE

Proposal from Ola Söderlund and Fredrik Tjernberg, KomatsuForest (2009-06-01).

Forwarded volumes in the drf-file exist in var448 (per operator) and var328 (per shift, work type and operator). Forwarded volumes are not included in var329 (per shift, sub-shift and operator).

Existing units for forwarded volumes in the drf-file are m3sub, m3sob and kg. This is problematic if we also want to include volumes for products that cannot be easily measured using these units, for example branches and tops (forest fuel) or bundles.

It was therefore decided to

- update the present variables in order to specify that they are to be comparable with volumes registered in the prl-file
- add a new variable for loose volumes (often harvest residuals used for forest fuel assortments)

The following tables describes the updated and new variables :

Name	Unit	Description	Variables (new variables underlined)
LogVol	M3sub	Forwarded volumes, <u>same volume as reported on load code 402 (var446_t1) in prl-file</u>	var448_t1, var448_t3, var328_t14
LogVol	M3sob	Forwarded volumes, <u>same volume as reported on load code 401 (var446_t1) in prl-file</u>	var448_t2, var448_t4, var328_t13
Mass	Kg	Forwarded green mass, <u>same mass as reported on load code 450 (var446_t1) in prl-file</u>	var448_t5, var448_t6, var328_t15

Var no	Name	Type	Data type	Unit	Prio	Description
328	TOT-WORKTI	16	integer	<u>M3 loose</u>	3	Forwarded volume per specified work time and operator, <u>same volume as reported on load code 410 (var446_t1) in prl-file: 1...var328_t6 / 1...var328_t5 / 1...var211_t2</u>
448	FRW-PROD	7	Integer	<u>M3 loose</u>	3	Forwarded volumes, <u>same volume as reported on load code 410 (var446_t1) in prl-file</u>
448		8	Integer	<u>M3 loose</u>	3	Forwarded volumes per operator, <u>same volume as reported on load code 410 (var446_t1) in prl-file: var211_t2</u>

§4 Definition of processing in drf-files

HEAD WITHOUT FEED ROLLERS (OFTEN FELLER BUNCHER)

Proposals based on question from Komatsu, Dasa, John Deere and Ponsse.

Processing time in harvester is today defined as having simultaneous activity in harvesting head and linkage (harvester). The machine indicators used in monitoring of harvesters are defined as:

- Harvesting head – indication through the feed rollers, meaning that feed rollers are in motion (turning).
- Loader/linkage – indication through the slew (on loader) or swing (on cab or linkage), meaning that the slew or swing is in motion (turning).

The definition of harvester head activity is problematic when using a head without feed rollers, for example using a cutting head for multi-tree-felling (felling and accumulating whole trees into tree bunches).

It was decided that the definition in the drf-specification is widened by stating that if not possible to use feed rollers any relevant signals to the head may be used in combination with activity in the linkage.

It has also been discussed to change the definition from feed rollers to the rotator. However this may also mean that we have to change the definition if new techniques are invented.

BUNDLER

Proposal from Laine Marko, John Deere (2009-10-26).

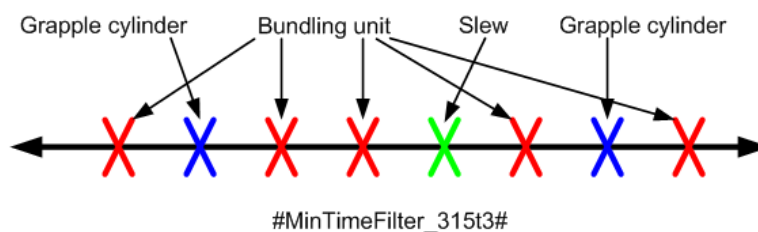
No definition of processing time exists for bundlers today.

It was decided to add the following definition of processing time to the specification of drf-files:

- simultaneous indications from slew, grapple cylinder and feeding in bundling unit is needed in order to register time as processing in a bundler.

The figure below illustrates the new definition:

Time should be defined as "processing" if we have any indications from all three: bundling unit active (feeding), grapple cylinder and slew during #MinTimeFilter_315t3#. See below:



§5 Quality certification of measuring

GENERAL RECOMMENDATIONS (SKOGFORSK)

Today 700-800 Swedish harvesters send in ktr-data to companies/SDC for analyzes. Around 50 of these harvesters are certified according to the Measurement Council's rules, that number will probably increase fast in the coming 2-3 years.

Some adjustment is needed according to the rules today

Some Swedish comments concerning the system for randomized selection of control stems:

- A new demand for registering history sampling frequency (last 5 settings) as described in next section

- It would be good if the first log is not taken into account for when being extremely short (minimum for example 2-3 meter) when counting the number of logs before giving operator signal that the present stem has been randomly selected for control
Comment at meeting: var361_t9 can be used for this purpose (see also next section)
- Some old requirements which presently do not work in all machines
 - Driver has to accept a control stem before the head cuts the log
 - Reason (codes) for rejected control stems not implemented
 - First stem at new object should be selected within 50-150 first stems
- Control stem number in var270_t2 and var270_t3 should be implemented according to StanForD definitions
- New Swedish bark functions (Skogforsk) shall be default
- Important to register coordinates in stm and ktr-files if harvester has GPS
- Important with a general use of butt end taper, suggested that the Finnish spp-file is used as default also in Sweden

PROPOSED NEW LOG VARIABLES FOR RANDOM SETTINGS

Proposal from Skogforsk and group of Swedish users (forest companies), (2009-10-23).

Today the following information is registered in the stm and ktr-file for each randomly selected control stem :

Var no	Name	Type	Prio	
361	SAMPLE	1	2	Sampling principle for stm files: 1 = all stems, 2 = random sample
361	SAMPLE	3	2	Sampling interval, random
361	SAMPLE	4	2	Code stating the type of interval between samples: 1 = Number of stems, 2 = Time, 3 = Volume
361	SAMPLE	5	1	Minimum DBH for randomly selected tree
361	SAMPLE	6	1	Log number when operator is notified that the stem has been randomly selected for control purposes. Is to be done when position for cutting of log has been decided but prior to the actual cutting of the log.
361	SAMPLE	7	2	Earliest time when stem is to be randomly selected, used in order to avoid random selection during the dark hours. This variable must be used in ktr-files if a timer exist for turning off random selection.
361	SAMPLE	8	2	Latest time when stem is to be randomly selected, used in order to avoid random selection during the dark hours. This variable must be used in ktr-files if a timer exist for turning off random selection.
361	SAMPLE	9	3	Minimum log length for randomly selected stems. At least one

Var no	Name	Type	Prio	
				log within a stem must be at least this long if stem is to be selected as a randomly selected control stem.

We do not presently include information about how long these settings have been valid. A large number of Swedish forest companies and the wood measuring associations (VMR) have therefore suggested that new variables where the last five settings could be registered are to be included in StanForD. This would make it possible to make certain that the settings are not manipulated against the rules of the Swedish quality certification system.

The following new variables were therefore decided with priority 2 (tyope25-27 priority 3) in stm- and ktr-files:

Var no	Name	Type	Description
361	SAMPLE	20	Number of random control stem settings per species, recommendation is the last five settings:1..var111_t1 The order shall be latest setting first.
361	SAMPLE	21	Sampling interval for randomly selected control stems (for present species): 1...var361_t20/1..var111_t1 Observe that unit depends on code in var321_t22
361	SAMPLE	22	Code stating the type of interval between samples for present species: 1...var361_t20/1..var111_t1 1 = Number of stems, (<u>one control stem per frequency according to var361_t21</u>) 2 = Time, (<u>one control stem per machine hour according to var361_t21</u>) 3 = Volume, (<u>one control stem per m3sob according to var361_t21</u>)
361	SAMPLE	23	Minimum DBH for randomly selected tree (present species): 1...var361_t20/1..var111_t1
361	SAMPLE	24	Log number when operator is notified that the stem has been randomly selected for control purposes (present species). Is to be done when position for cutting of log has been decided but prior to the actual cutting of the log: 1...var361_t20/1..var111_t1
361	SAMPLE	25	Earliest time when stem is to be randomly selected for present species, used in order to avoid random selection during the dark hours. This variable must be used in ktr-files if a timer exist for turning off random selection: 1...var361_t20/1..var111_t1
361	SAMPLE	26	Latest time when stem is to be randomly selected for present species, used in order to avoid random selection during the dark hours. This variable must be used in ktr-files if a timer exist for turning off random selection: 1...var361_t20/1..var111_t1
361	SAMPLE	27	Minimum log length for randomly selected stems for present species. At least one log within a stem must be at least this long if stem is to be selected as a randomly selected control stem: 1...var361_t20/1..var111_t1 Operator is never notified that it is a control stem until this criterion is met. Criterion in var361_t24 also has to be met before operator is notified. This means that the operator may be notified at a log no higher than set in var361_t24 if var361_t27 is larger than 0.

Var no	Name	Type	Description
			Observe the similarities with var361_t23.
361	SAMPLE	28	Date and time when the random control settings were last modified in any way for present species. Making it possible to track changes in the settings of random selection of control stems: 1...var361_t20/1..var111_t1

It was also decided that var361, type 3 – 9 is given priority 3 in stm- and ktr-files.

It was decided with the minutes to update the description of var361_t4 according to the following table (new text underlined):

Var no	Name	Type	Description
361	SAMPLE	4	Code stating the type of interval between samples for present species: 1 = Number of stems, (<u>one control stem per frequency according to var361_t3</u>) 2 = Time, (<u>one control stem per machine hour according to var361_t3</u>) 3 = Volume, (<u>one control stem per m3sob according to var361_t3</u>)

The following text is suggested with the minutes to be added to the appendix for var361_t9 and var361_t27:

Examples illustrating the use of var361_t9 and var361_t28

Minimum log length is set to 8 m.

Log no when operator is notified (var361_t5) is set to 2nd log.

Below are four different bucking alternatives and the consequences of the new variable:

Example 1.

1st log) 12 m 2nd log) 5 m 3rd log) 3 m.

Operator notified when 2nd log is to be cut

Example 2.

1st log) 5 m 2nd log) 12 m 3rd log) 3 m.

Operator notified when 2nd log is to be cut

Example 3.

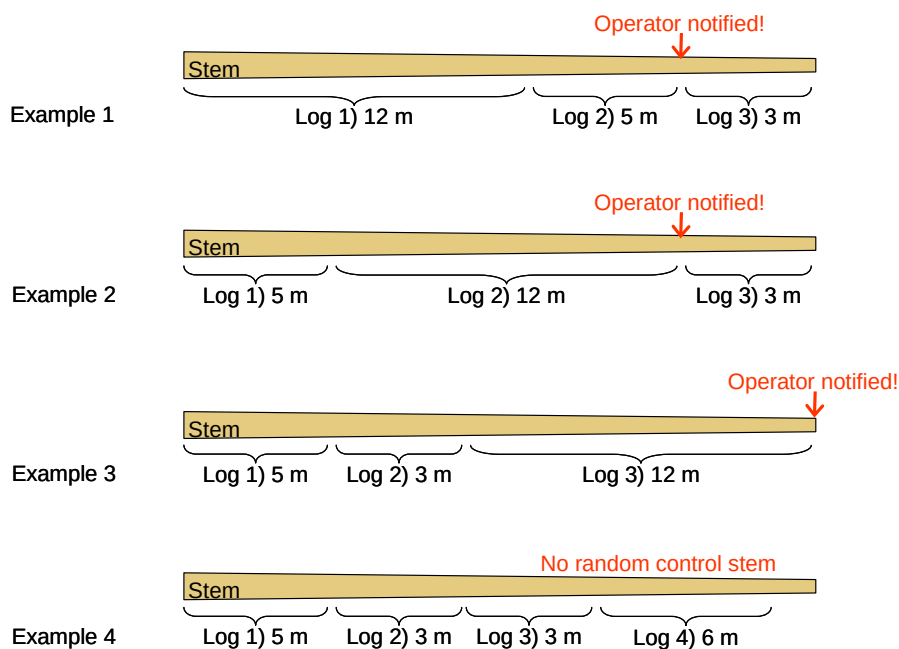
1st log) 5 m 2nd log) 3 m 3rd log) 12 m.

Operator notified when 3rd log is to be cut

Example 4.

1st log) 5 m 2nd log) 3 m 3rd log) 3 m 4th log) 6 m.

No random control stem



§6 Operational monitoring

Proposals from Jon Rudman, StoraEnso, (2009-10-28).

UPDATING PRIORITIES

It was decided that the following variables are to be updated from priority 3 to priority 2 in drf-files:

Var no	Name	Type	Description
448	SAMPLE	1-4	Total forwarded volume (m3sub, m3sob)
330	SPECTIME	4	Specified time, sum of this time equal to to code 10, 12 and 14 in var317 (seconds)
231	STMSINBNCH	3	Number of multi tree processed stems
246	BUNCHED-PROD	6-7	Volume of multi tree processed stems (m3sub, m3sob)

NEW DRF-VARIABLES

It is according to Jon of interest to be able to calculate fuel consumption per E15-hours (terrain travel vs processing/loading) and per m3.

Jon has also expressed an interest in analysing the average hauling/forwarding distance for forwarders.

It was therefore decided that four new variables are added to var448:

Var no	Name	Type	Data type	Unit	Prio	
<u>316</u>	<u>RUNTIME</u>	<u>8</u>	<u>Intr</u>	<u>L</u>	<u>3</u>	Fuel consumption <u>1...var316 t2 / 1...var211 t2</u>
<u>316</u>	<u>RUNTIME</u>	<u>9</u>	<u>Int</u>	<u>Km</u>	<u>3</u>	Covered distance <u>1...var316 t2 / 1...var211 t2</u>

Var no	Name	Type	Data type	Unit	Prio	
448	FRWPROD	9	Int	No	2	Total number of forwarded loads (also reported on load code 2, var446 t1) in prl-file)
448	FRWPROD	10	Int	No	2	Total number of forwarded loads per operator (also reported on load code 2, var446 t1) in prl-file):1...var211 t2

§7 Multi tree harvesting

An open discussion concerning how to continue the development of registration and calculation of multi tree harvesting production.

John gave a brief presentation of the present situation, emphasizing the basic rules that were decided 2010-04-01:

- All stems included, no size limit
- Estimated volumes are to represent estimated merchantable log volumes based on previously single processed stems.
- Several possible methods described.
- Calculation method decided by manufacturers.

Tapio presented some Finnish preliminary requirements based on a discussion in the Finnish pre-StanForD meeting (appendix 1).

Jonas Gustafsson presented the requirements of Sveaskog :

- Number of stems (Average stemvolume decides the harvesting price/m3)
- Volume, calculated as good as it can be done!
- Volume divided into assortment. (pulp or biofuel)

Johan Möller presented project that Skogforsk is planning to carry out during the spring 2010. The following points describe what is planned to done in the project:

- Describe how tree counting and volume calculation work today in different machines
- Demand specification to be written together with forest companies of and other partners:
 - a) calculating MTH stem including stem definitions, stem counting, volume calculation and assortment handling
 - b) calibration of methods/ models
 - c) storing of MTH volumes and stems in StanForD/ StanForD 2010
- Practical test together with 2-3 companies and different machines
- International co-ordination (Finland and Canada)

One issue that was discussed was the possibility of indicating whether a certain price matrix should be used for MTH or not.

§8 New variable for load scale weight controls.

Background

This proposal is based on the discussions in the Finnish StanForD meeting on 6th October 2009.

New variables for reporting forwarders' weight scale control measurements were decided in the last StanForD meeting. This proposal is meant to complete the set of variables.

New variable

A new variable var61_t11 (WEIGHTCONTROL) is proposed to express whether the weighting with a weight scale is done during loading or unloading. The variable could be used both for production reporting of forwarders or for weight scale control measurements. However it was decided to divide this information into one separate variable and one load code.

It was decided to implement a new var61_t11 for weight scale control in prl-file:

Var no	Name	Type	Data type	Unit	Prio	
61	WEIGHT- CONTRL	11	Int	code	3	Forwarder's working type when weighting with weight scale is done. Codes: 1 = loading, 2 = unloading. Variable only weight scale control measurements. See var446 t1 for production reporting

It was suggested at the meeting that that the information in var61 should be per operator in StanForD2010.

It was decided to implement a load code in var446 specifically to be used for production reporting:

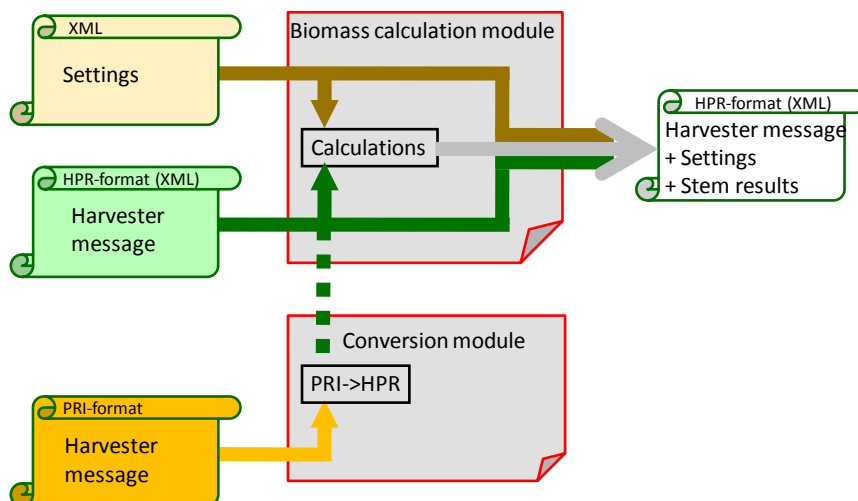
Load code	
499	Forwarder's working type when weighting with weight scale is done. Codes: 1 = loading, 2 = unloading. Only used for production reporting and not for weight scale control measurements.

§9 Items for discussion and information

FOREST ENERGY CALCULATIONS (SKOGFORSK)

Johan Möller presented the ongoing Skogforsk project for calculating available forest fuel amounts after harvesting. The calculation module developed by Skogforsk will be completed in January 2010.

The basic structure of the module is described in the diagram below:



UPDATED LIST OF FINNISH STI/STM/KTR VARIABLE RECOMMENDATIONS

Tapio informed that in the last meeting, the Finnish StanForD group had decided to update the list of StanForD variables that are recommended to be used in sti, stm and ktr files in Finland. There has been a need to update the list since there are some changes of the variables and their priorities. Some machine manufacturers had also checked the list according to what is the state of their implementations at the moment. The updates were not gone through in the meeting. The updated list will be posted later as an appendix to the StanForD website.

SUMMARY REPORT OF MEASUREMENT ACCURACY

Tapio informed about the discussions of the last Finnish StanForD group meeting and decisions made concerning the new summary report of measurement accuracy (based on ktr-files). The specification of the report has been prepared by Metsäteho and it has been handled a couple of times in the Finnish meetings. The decision about the final structure, data to be reported and the form of the printout was taken in February. After that there has been some minor changes to it. Some of them were handled again in October meeting, related to calibration values mainly.

It has been decided in the Finnish group that the report should be ready to take into use from the beginning of 2010 in the new machines and also in those older ones that are possible to be updated. The situation at the machine manufacturers had now changed and none of them are anymore able to implement the report by that date. However, in the meeting the deadline for the implementations was not changed. The users expect that the report will be implemented as soon as possible in the new machines. Updates into the old versions should also be made as widely as possible.

An English translation of the specification document is still lacking and it was asked also in the meeting. Metsäteho tries to provide it as soon as possible. The translation will be sent out to the whole StanForD group when completed.

TRANSLATION OF “DEL-KVISTNING” INTO ENGLISH?

It was accepted by the meeting to use the term “partial delimbing” when describing a processing mode when only part of the branches are delimbed, for example using a technique whereby the knives are not actually touching the stem.

§10 StanForD 2010

Johan presented the progress during the last 6 months.

Activity (type)	Activity	Time	Responsibility
Structure and format	Preliminary structure document	15 Jan 2009	Skogforsk
	Format document “StanForD 2010 – Naming and design rules”	31 Dec 2008	Metsäteho
	Meeting to agree on final structures and format for each message, Uppsala	28-29 Jan 2009	Skogforsk
	StanForD2010Envelope	October 2009	Metsäteho
	Document describing XML technologies and tools with StanForD 2010		Metsäteho
New message for bucking and production	Preliminary xml messages - Production Instruction, Object Instruction and Species Group Instructions	June 2009	Skogforsk/ Metsäteho
	Preliminary xml messages - harvester production and Total Harvester Production	June 2009	Skogforsk/ Metsäteho
	Preliminary xml message-Forwarder Production	June 2009	Skogforsk/ Metsäteho
	Meeting to agree on harvester instructions (bucking)	June 2009	
	Preliminary structure for Harvesting Quality Control message	July 2009	Skogforsk
	Simulations test with new product instruction and production message	July-Oct 2009	Skogforsk
	Preliminary XML-message for control Harvesting Quality Control	Sep 2009	Metsäteho
	Preliminary structure for Forwarding Instruction	Nov 2009	Skogforsk
	Practical test in machines	Nov 2009-feb 2010	Manufactures
	Meeting for decision of final bucking and production message	Mar 2010	Manufactures
	Schema/ Validation tools for bucking and production ready	Apr 2010	Skogforsk/ Metsäteho
New message geographical and operational monitoring	Preliminary structure for operational monitoring	May 2009	Skogforsk
	Preliminary xml message -Operational Monitoring	Oct 2009	Metsäteho
	Preliminary structure for geographical message	Oct 2009	Skogforsk
	Preliminary xml- geographical message	Jan 2010	Metsäteho
	Meeting to agree on geographical and operational monitoring message	March 2010	
	Simulation test with new geographical and operational monitoring message	Oct-Feb2010	Skogforsk

	Practical test in machines	March-May 2010	Manufactures
	Schema / Validation tools for geographical and operational monitoring message ready	March 2010	Skogforsk/ Metsäteho
Final decision	Decision of StanForD xml-version	June 2010	Manufactures/ Skogforsk/ Metsäteho
	Finish for implementation	Dec2010	Manufacturer

§11 Other issues

No other issues were discussed.

§12 Next meeting

Next meeting will take place on Tuesday the 13th of April 2010, at Skogforsk in Uppsala, starting at 10.00 a.m. Proposals for the meeting shall be the secretary by hand preferably not later than March 20th 2010.

§13 End of meeting

Johan J Möller (chairman) closed the meeting.

Secretary

John Arlinger

Metsäteho Oy
Tapio Räsänen

10.11.2009
Draft

MEASUREMENT AND PRODUCTION REPORTING OF MULTI TREE HARVESTED STEMS

Requirements of the Finnish forest companies and forest machine contractors

1. Background

Measurement and production reporting of multi tree harvested stems has been a current topic lately among machine manufacturers and users (forest companies and logging contractors). Questions related to multi tree harvesting have been handled actively in StanForD meetings during a couple of recent years. Procedures and methods of measurement and production reporting together with StanForD variables have been tried to be described, but the implementations by the machine manufacturers are still at the moment quite varied and not on a satisfactory basis from the point of view of the users.

Today multi tree harvesting has become a more common harvesting technique. Machines, MTH harvesting heads and working techniques have been developed by manufacturers, machine owners and forest companies. Increasing harvested volumes and use of diverse assortments of MTH wood have lead to a situation in which the Finnish parties have now expressed that common, practical and applicable procedures for measurement and production reporting are needed and those should be defined soon. The main concern is to have such information from the logging work reported in common form, that it could be used in harvesting payment and cost calculation systems of the forest companies. The question is primarily about reporting the stem numbers of different types of MTH stems. Volume reporting is at the moment secondary, because there are other methods (like weight scales and measurement at the mill) for calculating the quantities for forest owner and transportation payments. From the machine manufacturers' point of view it is very important to develop such general procedures and operations models on the Nordic level that same measurement techniques and production reporting applications could be used both in Finland and Sweden. It is also important to take the needs of the other countries (Germany etc.) using multi tree harvesting technology into account.

StanForD descriptions concerning stem number counting and volume measurement of MTH stems as well as the variables related to them are not on a satisfactory basis according to the machine manufacturers and users. As said, primary concern is to develop the registration of stem numbers to fulfill the needs of the users. This requires also that MTH assortments are defined

with a common way. Agreements on how the assortment information is saved in the measuring systems of forest machines should also be defined. Due to technical restrictions of volume calculation it must be assumed that volume measurement can not be used reliably enough at least in most of the cases. Therefore it is extremely important that well and poorly measured volumes are not mixed in the results. In other words, they should be kept separated in prd and pri files and measurement reports. Harvesting payment systems for MTH are today weight (ton) based in Finland and they do not require any volume information in such. Volumes of average-sized stems can be applied as a cost calculation factor, but those can be estimated based on stem count and total volume information if not any other kind of volume data exists.

Measurement and production reporting of MTH stems was discussed widely in the meeting of Finnish StanForD work group on the 6th of October 2009. It was decided then that Metsäteho prepares a document in which the MTH requirements of the Finnish parties are described based on the discussions and decisions of the meeting. The aim is that the forest companies and The Trade Association of Finnish Forestry and Earth Moving Contractors would agree on the described requirements and the procedures behind them. They are expected to commit to the paper in their own development work too. The meaning of the document is thus to define the guidelines for the machine manufacturers in order for them to rely on those guidelines when decisions of development actions and production investments related to MTH measurement and data management systems are made by them. The objective is also that the description would be a common ground for the discussions with the Swedish partners. That way it would help in preparing the new MTH descriptions in StanForD 2010 as well as in specifying the new data structures and XML schemas of it.

Preliminary comments to the document are requested by the 11th of November 2009 when the next StanForD meeting is taking place. The comments are asked from those member companies of Metsäteho that have their representative in StanForD work group, from L&T Biowatti and from The Trade Association of Finnish Forestry and Earth Moving Contractors. The document will be completed later after the discussions and decisions of StanForD meetings. If necessary, a work group can be established consisting of representatives of machine manufacturers, forest companies and Metsäteho.

2. Requirements

2.1.Number of multi tree harvested stems

Requirements

1. Number of multi tree harvested stems should be registered per tree species and operators at the minimum.
2. If specific timber assortments are used for multi tree harvested timber, the number of MTH stems should be registered per assortments, tree species and operators. Following types of MTH stems could be used for specifying the assortments that should be kept separated in stem number counting:
 - felled, not delimbed stems (whole tree stems which could be used as pulpwood or energy)
 - felled, delimbed stems (could be used as pulpwood or energy)
 - single tree processed stems (could be used as pulpwood or energy)
 - stems of which pulpwood logs are cut from the butt end and tops are delimbed and used as energy wood
 - stems of which pulpwood logs are cut from the butt end and tops are used as energy wood without delimbing

Assortment of a MTH stem is in this sense closer to the concept of a MTH stem type and not a normal timber assortment. This means that stem numbers per assortments could also be registered when an assortment for a single MTH tree and a tree bunch could be selected by the operator. The new Finnish regulations of energy wood harvesting possibly will require that certain amount of tree tops should be left in the forest when energy wood is harvested from young forests. Stem number registration with this kind of grouping would make it possible that the harvesting companies can prove them operating according to the regulations.

3. Tree species that are used for registering MTH stem numbers should be possible for the users to define separately from the tree species used in single tree harvesting. It should be possible for the operator to save the tree species in the measuring system and to select it freely from the list of MTH tree species.
4. It should be possible to define the tree species so that they match with the tree species of general green density tables. In Finland there will be separate green density tables for normal roundwood and energy wood both having their own tree species specifications. It should be possible to have e.g. "softwood", "hardwood" and "mixed species" as tree species.
5. It should be possible to select the tree species for a stem bunch according to the first felled tree. Bunches of mixed species cannot be avoided due to varied working techniques and forests.
6. Stem number counter should be activated automatically when multi tree harvesting mode of the harvester is selected. It should also be used according to the machine manufacturer's instructions. Otherwise the

operating principles of the stem number counter should not be defined by the users.

7. Trees that are only clear-felled and not used for any kind of timber or energy wood should not be counted in the stem numbers.
8. Stem bunches sprouting from only one stump and which could be felled by single sawing should be counted as one stem in the stem number. Other similar types of cases should be counted as one stem also.
9. There are some special cases for which the rules of stem counting should be specified separately. One such case is when the stem bunch is collected from the tops of the trees. The “felling” sawings of the tops must not be registered in stem numbers because of the risk that the stem number then would be doubled.

Changes in StanForD descriptions, files and variables

1. StanForD’s present definition of a stem cannot be applied for multi tree harvested stems. A new definition should be described so that the machine manufacturers could use it similarly in their programming logic of measurement and production reporting.
2. Present variables describing MTH stem numbers should be updated according to these requirements. New variables may be needed for registering stem numbers by timber assortment, tree species and operator.
3. Stem numbers should be saved in prd files and should be presented in measurement report at the minimum.
4. These requirements should be taken into account when the next version of standard (StanForD 2010) is defined.

2.2. Timber assortments and qualities

Requirements

1. At least one user-specified multi tree harvesting timber assortment for each of the tree species should be possible to be defined. There could be also more assortments and they could be based on following types of MTH stems:
 - felled, not delimbed stems (whole tree stems which could be used as pulpwood or energy)
 - felled, delimbed stems (could be used as pulpwood or energy)
 - single tree processed stems (could be used as pulpwood or energy)
 - stems of which pulpwood logs are cut from the butt end and tops are delimbed and used as energy wood
 - stems of which pulpwood logs are cut from the butt end and tops are used as energy wood without delimbing.

See also requirement #2 in 2.1.

It must also be discussed how the users need to use the assortment: is the normal kind of assortment needed together with this stem type?

2. It should be possible to save the assortments and their settings on the measurement system by using apt-, ap1- and oai-files. It should be possible for the operator to save them directly without StanForD files based on the given logging directives, too.
3. A new variable could be defined to express if the assortment can be used for multi tree harvesting or not. The values of this code-based variable would be 0 = not a MTH assortment and 1 = MTH assortment. This variable could be used in order to be certain which of the assortments are allowed to use for MTH stems.
4. Minimum diameter and length values of a MTH assortment should be given in as small values as possible, e.g. smallest diameter being 1 mm and shortest length 1 cm. Maximum values could be given more freely.
5. A user-specified MTH stem quality should be selectable for MTH stems only. The way how the quality is selected during processing is up to machine manufacturers.
6. The assortment of the multi tree harvested stem bunch should be possible to be selected based on the first felled tree.
7. It should be possible to select and register the assortment separately for each of the log bunches.
8. For the forwarder's production reporting the MTH timber assortment names and codes should be possible to be saved in the forwarder's system to be used in creation of prl files and weight scale measurement reports.

Changes in StanForD descriptions, files and variables

1. Descriptions of the new MTH assortment variables have to be defined.
2. The use of the new variables has to be described in StanForD.
3. These requirements should be taken into account when the next version of standard (StanForD 2010) is defined.

2.3. Measurement of diameters

Requirements

1. Accuracy and reliability of diameter measurement of multi tree harvested trees should be improved from the present by developing measuring technology and calculation methods. This is a requirement before the diameters can be applied in volume calculation.
2. Average stem volume of the stems that are kept separated in stem counting should be possible to be calculated based on measured diameters and lengths. This information could be used for harvesting cost calculations and payments for the contractors.
3. If the diameter measurement will be on an acceptable level in the future, the diameters of MTH stems could be saved in pri file or in corresponding data structure of StanForD 2010.

Changes in StanForD descriptions, files and variables

1. The descriptions of diameter measurement in multi tree harvesting should be updated, if the measurement technology can be developed.

2.4. Measurement of length

Requirements

1. Accuracy and reliability of length measurement of multi tree harvested trees should be improved from the present by developing measuring technology and calculation methods. This is a requirement before measured lengths can be applied in volume calculation.
2. Measured lengths of MTH stems and stem bunches should be registered in pri files even if the reliability of the length measurement would be poor. The processed lengths have an impact on the quality of the harvesting work. Maximum lengths of MTH bunches are usually defined in the harvesting directives of the companies and there is a certain need to monitor the lengths.
3. If the length measurement will be on an acceptable level in the future, the lengths of MTH stems and log bunches should be saved in pri file or in corresponding data structure of StanForD 2010 production message.

Changes in StanForD descriptions, files and variables

1. The descriptions of length measurement in multi tree harvesting should be updated, if the measurement technology can be developed.
2. To make a log bunch counting system uniform, definitions of fed lengths should be agreed by the machine manufacturers (??).

2.5. Measurement of volume

Requirements

1. Accuracy and reliability of volume measurement of multi tree harvested trees should be improved from the present by developing measuring technology and calculation methods.
2. Volume measurement based on the present descriptions of StanForD should not be continued to use.

Changes in StanForD descriptions, files and variables

1. The descriptions of the present volume measurement in multi tree harvesting should be updated, if the measurement technology can be developed to acceptable level.
2. Use of the present MTH variables should not be continued. The variables can be updated later if the measurement methods can be developed.
3. It should be prepared for the new volume measurement procedures and reporting requirements in the next version of standard (StanForD 2010).

2.6. Reporting of production and measurement info and data transmission

Requirements

1. The production information and measurement data of multi tree harvested stems should be saved in prd files (summed stem numbers and volumes) and in pri and stm files (specified stem, stem bunch and log bunch data). However, it should be very clearly defined and made sure that measurement results of MTH and single tree harvested stems cannot be mixed in any cases.
2. The production information and measurement data should be presented in the measurement report. It should include the following information:
 - stem numbers per tree species and operators
 - stem numbers per MTH assortments (separately specified), tree species and operators
 - mass of the MTH timber (in kilograms) per tree species and operators (expected that volumes are calculated reliably and can be transformed into mass)
 - mass of the MTH timber (in kilograms) per MTH assortments (separately specified), tree species and operators (expected that volumes are calculated reliably and can be transformed into mass)
 - average volume of the MTH stems per tree species and operators (expected that volumes can be calculated reliably).

3. Production information of the forwarded MTH timber should be saved in prl file similarly with other timber. Management of MTH assortments in forwarder reporting should be described separately if necessary.
4. Forwarder's production report should include following information:
 - mass of forwarder MTH timber in kilograms per tree species and operators (based on forwarder's weight scale measurement)
 - mass of forwarder MTH timber in kilograms per MTH assortments (separately specified), tree species and operators (based on forwarder's weight scale measurement).

Changes in StanForD descriptions, files and variables

1. Definitions of the new variables.
2. Checking of the priorities of variables in different StanForD files.
3. It should be prepared for these requirements concerning reporting and data transmission in the next version of standard (StanForD 2010).