AFoRS

Digital measurement of stacked timber logs via camera phone

AFoRS – Digital measurment of stacked timber logs via camera phone or tablet

The AFoRS system enables you to easily gather data of timber stacks in the forest using a reliable and fully automated process. Furthermore the system allows to provide customers and service providers with the resulting data.

You are being assisted by the AFoRS.measuring-kit which includes a mobile application on one of the pre-calibrated AFoRS. phones, an image processing service as well as access to the AFoRS.service-platform.

- ✓ **the total cubic meters,**
- ✓ **the solid cubic meters,**
- ✓ **the number of logs,**
- ✓ **as well as the distribution of strength classes within the timber stack from the images.**

Apart from the fully automated calculation of the timber stacks the system also stores the GPS-network-position, time, date and cellphone-ID within the stack's data record. Furthermore the AFoRS application allows to add additional information manually, like tree species, assortment, route information, or other customer specific data. The direct upload of the data onto the AFoRS.service platform assures safe and fast access to the data.

The AFoRS.service-platform allows

- ✓ **dynamic structuring,**
- ✓ **management,**
- ✓ **postprocessing and**
- ✓ **export of data sets for you business associates.**

The combination of the AFoRS.measuring-kit, the innovative image processing software and the individual workspace on the AFoRS.service-platform provides an individual IT-toolset for the forestry industry. The digital acquisition of the timber stacks avoids breaks in the flow of information and improves the information exchange between all partners along of the forestry value chain.

The benefits at a glance:

- fully automated & reliable calculation of the key timber parameters
- digital image and location reference data of your stacked timber logs for smooth running sales
- digital data sets replacing cumbersome paperwork
- reduction of labour- and transport costs for forest surveying and transfer of timber
- optimized data exchange between seller, buyer and service providers

Features:

- Structured manual data acquisition using the AFoRS.mobile software system and support tools
- Automated collection of GPS- network position, time, date, etc.
- Real-time data-transfer using secure data interfaces EIP® SSCI
- Fully automated logging of timber using photogrammetric methods and calculation of total volume and solid cubic meters.
- Automated calculation of the number of timber logs and strength class distribution in a stack of timber
- Online result visualization as well as the dynamic structuring, management, processing and presentation of the data using the AFoRS EIP® service-platform
- Result documentation by traceable images
- Interfaces for data export (XLS tables, reports)
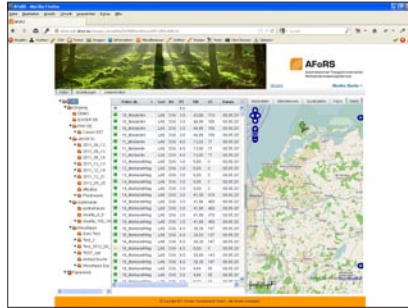- Simple and intuitive operation

AFoRS – system

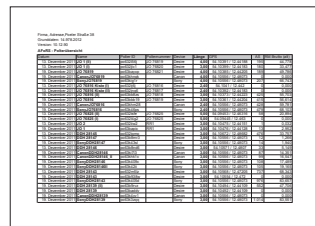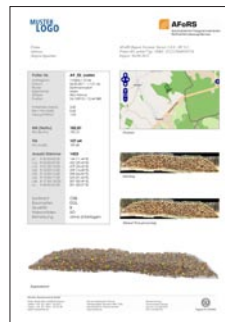**AFoRS.measuring-kit**

+

AFoRS.service-platform license

Individual workspace on the
AFoRS.service-platform

+

AFoRS.credits
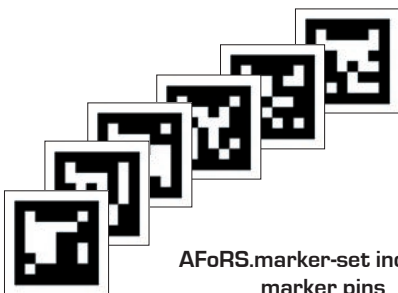
Starting credit for the
AFoRS.image-processing

**AFoRS.phone or tablet (calibrated) including the
AFoRS.mobile-application**

Printable reports

**AFoRS.marker-set including
marker pins**

The AFoRS products can be obtained and ordered on the website www.afors.eu

Digital timber stacks in three-steps

1 Mark stacked timber logs in the forest

2 Take pictures of the stackes timber logs

3 Add manual data and send the data set

Acquisition of timber stacks

Using the AFoRS system one can fast, easily and reliable capture the timber stacks in the forest and calculate its characteristics. This does not only facilitate the administration but also the communication with potential customers.


Measuring-kit

The robust AFoRS.measuring-kit is designed for outdoor use and includes all the necessary measurement materials (cellphone or tablet, marker and marker pins). The calibrated cellphone or tablet and the markers are optimally tailored to each other. This technology transforms the cellphone network into a measurement instrument.
The base of the photogrammetric calculation is the combination of multiple frontal pictures of the wood stacks, which have to be marked with the AFoRS.markers.

System-phone

In addition to the basic timber stack data, like timber stack number, stack pictures and stack depth, the AFoRS.mobile application for Android enables the user to easily add additional information. This additional information includes the tree species, the assortment, the quality, a.s.o.. User and positioning information as well as date and time are being taken from the cellphone library and integrated into the process. The localization of the stacks is being done using GPS- or network-positioning information at the time of the image acquisition. The thereby obtained position can be adjusted manually using a mobile map.

Cloud Services
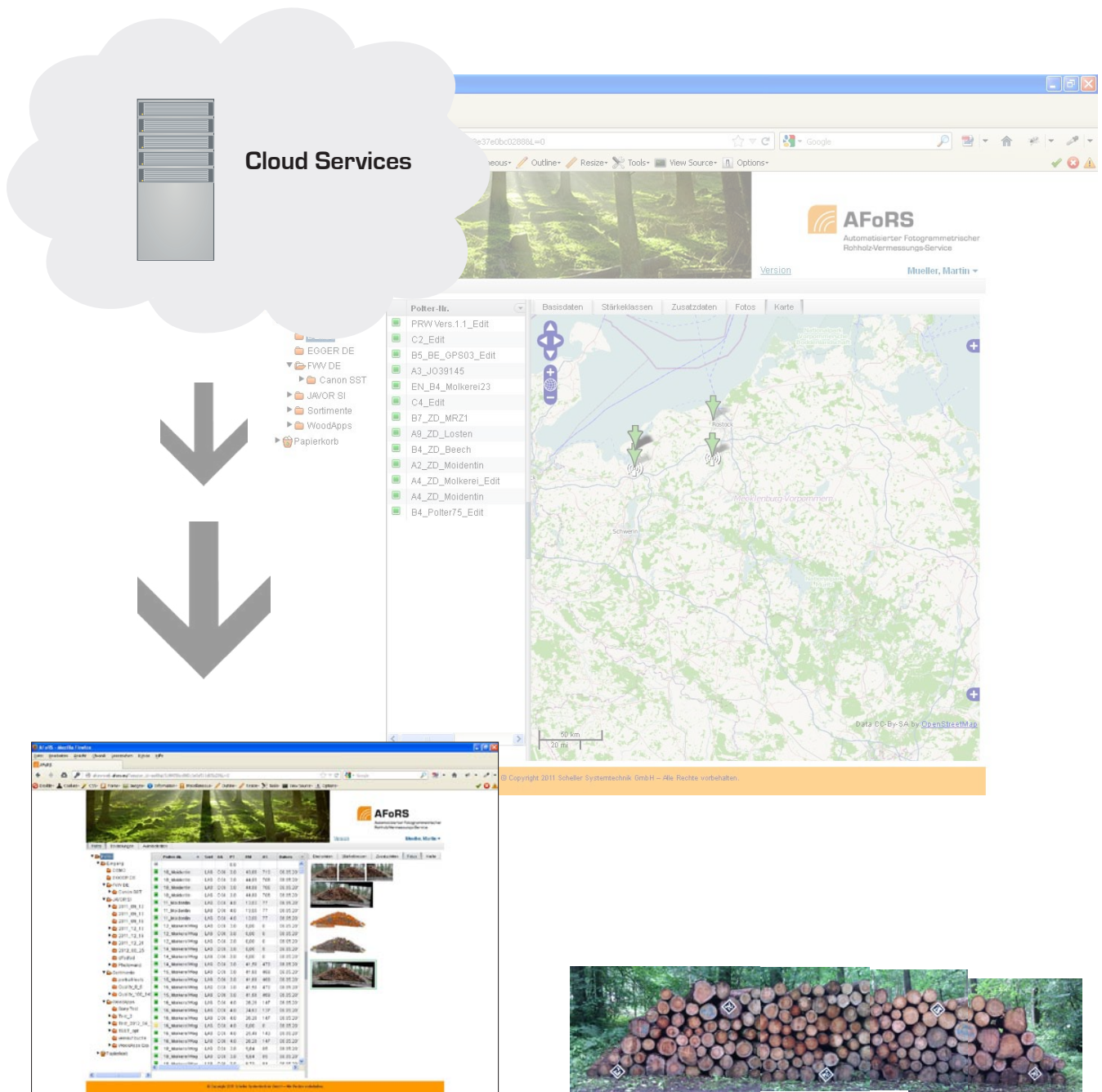
Data-transfer

The AdHoc data transfer vie EIP® SSCI (EIP® Safe Session Communication Interface) permits a direct and secure upload (via GPRS, UMTS, WiFi, a.s.o.) of the acquired data onto the AFoRS.service-platform. The issue of unreliable network connections in remote areas such as the forest is dealt with by a packet based data-transfer. This allows to resume the transfer of data without having to completely restart. Measured stacks and the corresponding calculation results will be available just-in-time on the service platform in the web or outdoor computer.

Image-processing

A specially designed image-processing software calculates the timber stack parameters from the different frontal images of the stack. The pictures are preprocessed, checked and using novel method the surface of the timber is detected. The overall results, the total cubic meters of the stacks, the solid cubic meters of timber, the distribution of strength classes and the number of trees is then provided to the user.

Resulting pictures of a stack

Source images

The series of pictures provide an insight into the resulting data of the fully automated photogrammetric survey service.

In the field, the calibrated cellphone aids the user to correctly align the camera with a grid on the electronic viewfinder. The analysis of the cellphone's velocity sensor checks the image quality (blurring, lack of definition). In order to check the results and provide traceability, the stack images can be accessed.

Resulting image „Stitching"

The "Stitching" phase takes the single images of the stack and creates a combined picture. The software uses the markers in order to provide common points in each image. The markers are clear reference surfaces and allow to compensate for image distortion. In addition they are used to deduct scaling information. Finally the vignetting effect is removed in order to provide an optimal resulting image for the subsequent calculation.

Resulting image „Segmentation"
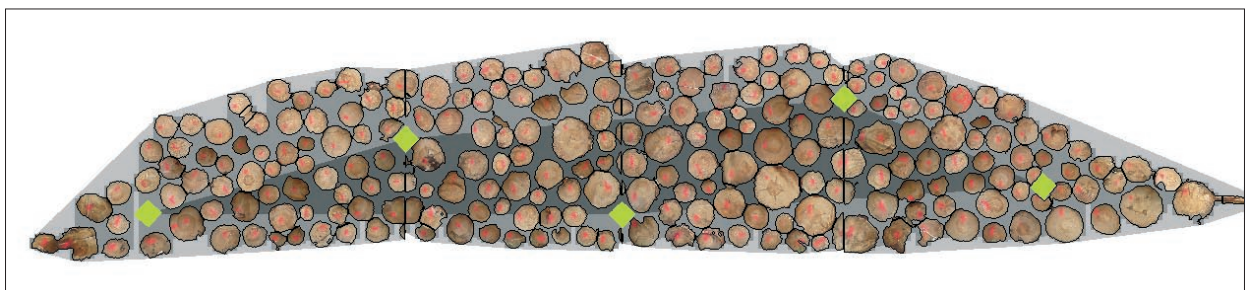
The sequential treatment of the image information separates the contextual information, wood and not-wood. The image processing software was designed to recognize tree logs. As a result the software recognizes the different tree logs and their diameter. An overview of the distribution of strength classes is automatically generated.

Resulting image „Manual Post-processing"

Resulting image „Pile Sections - Yardstick"

Based on the during the stitching phase created combined picture the surveying of the stacks can be conducted. This surveying is being done using a manual sectioning method. In this step the user is capable of interactively determining specific measures for length and height of the stacked timber. The user is being assisted by a virtual yardstick as well as the automatically calculated 3 meter sections of the stack. Furthermore a manual envelope curve can be drawn around the stack in order to determine the total volume.

Result

Stack-Nr.	MOK 23
Job-Nr.	111009-173217
Date	09.10.2011 - 17:32:17
User	FBG Wismar
District	Dettmannsdorf
Position (GPS)	54,116090 / 12,057403
Length of the assortment (m)	4,00
Factor (RV > CM)	0,60
Reduction	1,04
Quality	B
Tree species	GKI
Damages	0 (without Quality)
Assortment	LAS
Comments	Blustered without documentation
Owner	Mueller
IMEI	355302048093166

RV gross (m³)	79,89
RV net (m³)	76,82
Solid cubic meters (m³)	51,09
Solid cubic meters audit (m³)	46,09
Number of tree trunks	234

L0	Radius 00,00>05,00	01 (00,43%)
L1a	Radius 05,00>07,50	01 (00,42%)
L1b	Radius 07,50>10,00	47 (20,09%)
L2a	Radius 10,00>12,50	80 (34,19%)
L2b	Radius 12,50>15,00	66 (28,21%)
L3a	Radius 15,00>17,50	25 (10,68%)
L3b	Radius 17,50>20,00	07 (02,99%)
L4	Radius 20,00>25,00	07 (02,99%)

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made in
Germany