

**Abstract template for the conference “A century of national forest inventories – informing past, present and future decisions”**

<b>Abstract title:</b>		Standing volume and assortment estimation based on stem shape measurement and stem quality assessment
<b>Take-home message:</b>		Standing volume and assortment estimation based on stem shape measurement and stem quality assessment are optional metodological and technological elements improving quality of NFI data and provide qualitatively new NFI output for forestry and wood processing industry
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<b>General topic, see website:</b> <small>(please double click on the check box and activate the relevant one)</small>	<input type="checkbox"/>	Improving future NFIs by learning from the past
	<input type="checkbox"/>	NFIs today and in the future
	<input checked="" type="checkbox"/>	Cutting edge and futuristic inventory techniques and technologies
<b>Preferred presentation form:</b>	<input checked="" type="checkbox"/>	Oral presentation
	<input type="checkbox"/>	Poster
<i>Abstracts will be reviewed by members of our scientific committee and you will be given information on decisions in due time after the submission deadline has passed.</i>		

# Standing volume and assortment estimation based on stem shape measurement and stem quality assessment

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**Introduction:** Volume estimates and valuation of growing stock remain one of the key NFI outputs. To reduce potential estimation bias it is desirable to avoid using external (historical) volume and assortment tables/models. Secondly, it is desirable that NFI provides growing stock valuation and potential assortment structure for practical forestry and wood processing industry. This contribution presents a solution based on ground-based survey and modelling exemplified on data from the Czech Republic.

**Materials and methods:** The approach of standing volume estimate consists of the following steps: *i)* identification of sample trees on NFI plots, *ii)* non-destructive measurement of stem shape of standing trees using laser rangefinder equipped with optical scope and inclinometer, *iii)* modelling of stem/branch shape curve, *iv)* single tree wood volume calculation, *v)* creating species-specific global models at tree level, *vi)* model assisted volume estimation for NFI sample, *vii)* statistical processing of growing stock volume. Verification of volume estimates was conducted for main tree species comparing standing and felled tree samples.

The assortment procedure combines tree stem shape estimate with *i)* statistical sample of stem quality data (e.g. branchiness, curvature, browsing damage) collected in the field by stem sections, *ii)* scenarios of assortment defined by dimensional and quality parameters, *iii)* scenarios of invisible stem damage (stem rot), *iv)* algorithm of stem sorting. Scenario calculations were tested on data of the country level landscape inventory CzechTerra.

**Results:** The presentation shows the results of statistical evaluation of volume estimates comparing non-destructive measurement of standing trees and measurement of the same trees after felling.

The overall method of growing stock value assessment is demonstrated on the CzechTerra survey. It contains *i)* stem shape model parameterized on standing tree measurements, *ii)* empirical data on physical stem quality features collected during the CzechTerra field survey, *iii)* scenario of rot occurrence based on empirical experience, *iv)* scenario of assortment parameters derived from particular wood market preferences.

The aspects of practical implementation in NFI programme including technical feasibility, training and time requirements are discussed.

**Conclusion:** Including the above practically proven methods effectively addresses the issue of modelling error in NFI. At the same time it provides unique and generally requested information on growing stock value for wood processing industry, practical forest management and forest policy.

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