



FORMEC
Hungary / Austria 2019



**COUNCIL
ON FOREST
ENGINEERING**

FORMEC 2019

**EXCEEDING THE VISION:
FOREST MECHANISATION OF THE FUTURE**

52. INTERNATIONAL SYMPOSIUM ON FOREST MECHANISATION
42 EDITION OF THE COUNCIL ON FOREST ENGINEERING (COFE)

6-9 OCTOBER 2019 - SOPRON | FORCHTENSTEIN (HUNGARY | AUSTRIA)



SCIENTIFIC ORGANIZER - HUNGARY

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WELCOME

52. INTERNATIONAL SYMPOSIUM ON FOREST MECHANISATION

The 52. International Symposium on Forest Mechanisation will take place 6-9 October 2019 in Sopron (Hungary), on the last day with a field trip to AUSTROFOMA in Forchtenstein (Austria).

FIRST JOINED CONFERENCE FORMEC & COFE

The 52. edition of the FORMEC Symposium will be held in conjunction with the 42. edition of the Council on Forest Engineering (COFE). This is the first time for a COFE meeting taking place in Europe. 2020 will also be joint meeting COFE/FORMEC, but this time it will take place in Oregon (USA).

Sopron is situated next to the western borders of Hungary at the foot of the Alps. It is one of the oldest gems of the country with a 200-year-old Faculty of Forestry at Sopron University.

The curative and refreshing air of the natural environment, the mountain springs and the proximity of Lake Fertő make Sopron one of the most beautiful and pleasant holiday resorts of Hungary. Besides these attractions Sopron has excellent wines in a Historic Wine Region.

AUSTROFOMA is the only Austrian forestry machine and device demonstration where all the machines on display are shown performing real-life tasks, unlike standard exhibitions where they are only seen while stationary. You only have the opportunity to go to AUSTROFOMA once every four years.

FORMEC 2019 brings you the opportunity to combine science and live demonstrations easily in one event, so do not miss this unique occasion to visit us in 2019!

Bus transfers between Sopron (Hungary) and AUSTROFOMA (Forchtenstein, Austria) will be provided by the organizers. Transportation from Sopron or AUSTROFOMA (Forchtenstein) to Vienna Airport will NOT be provided.



KEYNOTE SPEAKERS



DIGITALIZATION OF FOREST
HARVESTING: THE POTENTIAL
FOR IMPROVED ENVIRONMENTAL
AND PRODUCTION EFFICIENCY

Rasmus Astrup
NIBIO



OPPORTUNITIES IN REMOTE
SENSING OF FORESTS RELATED
TO THE ARRIVAL OF THE
SENTINEL-2 SATELLITE

Clement Atzberger
BOKU



CONDUCTING SUSTAINABLE
FOREST OPERATIONS WHILE
MINIMIZING ENVIRONMENTAL
IMPACTS: A COMPILATION OF
RESEARCH

Chad Bolding
Virginia Tech



FUTURE OF FOREST ENGINEERING
AND ITS SUSTAINABILITY

Woodam Chung
Oregon State University



SMART FORESTRY - SMART
FOREST OPERATIONS
ENGINEERING AND MANAGEMENT

Hans R. Heinimann
ETH Zürich



LIFE CYCLE ASSESSMENT (LCA) IN
FORESTRY

Martin Kühmaier
BOKU



TRACTION VERSUS GROUND
PROTECTION

Josef Primus
PEWAG Austria

GENERAL INFORMATION

VENUE

Liszt Ferenc Conference and Cultural Center

REGISTRATION FEES

	EARLY FEES if paid before 15 June 2019	STANDARD FEES if paid after 15 June 2019
Regular delegate	340 EUR	420 EUR

The registration fees cover catering services (dinners, coffee breaks, lunches). Due to Hungarian taxation regulations the amount of these food cost shall be indicated separately on the invoice.

Please add the correct invoice name and address while registering. Changing of these details is not possible after invoices are prepared.

REGISTRATION FEES INCLUDE

	Regular delegates
Attendance to technical sessions	+
Badge	+
Coffee break	+
Lunch	+
Program book and proceedings	+
Ice breaker (Sunday evening)	+
Conference dinner (Monday evening)	+
Gala dinner (Tuesday evening)	+
Field trip to AUSTROFOMA (Forchtenstein, Austria)	+
VAT	+
Hotel accommodation	-

FIELD TRIP TO AUSTROFOMA 2019

www.austrofoma.at/en

AUSTROFOMA is the only Austrian forestry machine and device demonstration where all the machines on display are shown performing real-life tasks, unlike standard exhibitions where they are only seen while stationary. You only have the opportunity to go to AUSTROFOMA once every four years.

A field trip to AUSTROFOMA is organized for FORMEC 2019 participants on Wednesday (9 October 2019).

Bus transfers between Sopron (Hungary) and AUSTROFOMA (Forchtenstein, Austria) will be provided by the organizers. Transportation from Sopron or AUSTROFOMA (Forchtenstein) to Vienna Airport will NOT be provided.

Bus transfer schedule

- | | |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08:50-09:00 | Meeting for bus transfers, in front of the conference venue |
| 09:00-10:00 | Bus transfer to Forchtenstein, Austria |
| 10:00-16:00 | Visiting the Expo: entrance tickets are issued on arrival, visiting individually, not in a conference group. There are food points in the AUSTROFOMA village and also numerous places to choose from on the site's circuit. Please note that a strict alcohol ban will be in place for the whole of the AUSTROFOMA site. The ban will therefore include the AUSTROFOMA village, the bioenergy village and the circuit. |
| 16:00-17:00 | Bus transfer back to Sopron, Hungary, arrival point is the conference venue |

Please note that transfer between Austrofoma and Vienna Airport will NOT be provided.



PROGRAM OVERVIEW

SUNDAY, 06 OCTOBER 2019

17:00-19:00	Registration
19:00-21:00	FORMEC 2019 Ice-Breaker

MONDAY, 07 OCTOBER 2019

	Room 1	Room 2	Room 3
08:00-08:30	WE Welcome		
08:30-10:00	K01 Keynote 01		
10:00-10:30	Coffee break		
10:30-12:30	S01 Tech4Effect Knowledge and technologies for effective wood procurement	S02 Soil Disturbances Down and Dirty	S03 Human factors It's still hard work out there
12:30-14:00	Lunch & COFE Business Meeting		
14:00-16:00	S04 CTL harvesting optimization Bit-and-Pieces	S05 Bioenergy Final destination?	S06 Wood transportation & Simulation Playing with model trucks
16:00-16:30	Coffee break		
16:30-19:00	S07 Wood transportation & New technologies Roll on	S08 Trafficability Can we get over it?	S09 CTL harvesting & Quality improvement We make it better
20:00-22:30	Conference Dinner		

**52. INTERNATIONAL SYMPOSIUM ON FOREST MECHANISATION
42 EDITION OF THE COUNCIL ON FOREST ENGINEERING (COFE)**

TUESDAY, 08 OCTOBER 2019			
	Room 1	Room 2	Room 3
08:00-10:00	K02 Keynote 02		
10:00-10:30	Coffee break		
10:30-12:30	S10 Steep terrain harvesting Hold on tight	S11 Environmental impacts Not quick and dirty	S12 Supply chains Puzzles to optimize
12:30-14:00	Lunch & IJFE Editorial Board Meeting		
14:00-16:30	S13 Infrastructure & market On the way	S14 The future of forest engineering No borders	S15 Standards, conversion, measurement Speak the same language
16:30-17:00	Coffee break		
17:00-19:00	S16 Machine-Soil- Interaction Digging up the dirt	S17 Decision Support & Virtual Reality Simplify your decisions	S18 Harvesting operations Incremental innovation vs. business revolution
19:00-19:15	CL Closing & Award Ceremony		
20:00-23:00	Gala Dinner		

WEDNESDAY, 09 OCTOBER 2019	
09:00-10:00	Bus transfer to Forchtenstein, Austria
10:00-16:00	Field trip to AUSTROFOMA demonstration in Forchtenstein, Austria
16:00-17:00	Bus transfer back to Sopron, Hungary Please note that transfer between Austrofoma and Vienna Airport will NOT be provided.



MONDAY, 07 OCTOBER 2019

08:00-08:30 Room 1

WELCOME

MONDAY, 07 OCTOBER 2019

08:30-10:00 Room 1

KEYNOTE 01

Chair: Woodam Chung

A-0190 OPPORTUNITIES IN REMOTE SENSING OF FORESTS RELATED TO THE ARRIVAL OF THE SENTINEL-2 SATELLITE

Clement Atzberger
BOKU

A-0191 TRACTION VERSUS GROUND PROTECTION

Josef Primus
PEWAG Austria

A-0192 CONDUCTING SUSTAINABLE FOREST OPERATIONS WHILE MINIMIZING ENVIRONMENTAL IMPACTS: A COMPILATION OF RESEARCH

Chad Bolding
Virginia Tech, USA

Coffee break

MONDAY, 07 OCTOBER 2019

10:30-12:30 Room 1

S01 - TECH4EFFECT

KNOWLEDGE AND TECHNOLOGIES FOR EFFECTIVE WOOD PROCUREMENT

Chair: Dirk Jaeger

- A-0061** ASSESSING CABLE TENSILE FORCES AND MACHINE TILT OF WINCH-ASSISTED FORWARDERS ON STEEP TERRAIN UNDER REAL WORKING CONDITIONS
Thomas Holzfeind, Christian Kanzian, Karl Stampfer, Franz Holzleitner
Institute of Forest Engineering, University of Natural Resources and Life Sciences, Vienna, Austria
- A-0071** PRODUCTIVITY AND FUEL CONSUMPTION OF HEAVY FORWARDERS UNDER DIFFERENT CONFIGURATIONS: BENCHMARKS FROM FLEET-LEVEL LONG-TERM RECORDS (ONE MILLION LOADS)
Raffaele Spinelli^{1,2}, Angelo Conrado de Arruda Moura³
¹CNR IVALSIA, Firenze, Italy; ²University of the Sunshine Coast, Marochoydoore, QLD, Australia; ³Suzano, SP, Brazil
- A-0115** FACTORS AFFECTING PRODUCTIVITY AND UTILISATION OF WINCH-ASSIST MACHINES: SIX CASE STUDIES IN NEW ZEALAND AND CANADA
Cameron Leslie¹, Rien Visser¹, Dominik Roeser², Colin Koszman³, James Hunt³, Hunter Harrill¹
¹University of Canterbury, Christchurch, New Zealand; ²University of British Columbia, Vancouver, Canada; ³FPIInnovations, Vancouver, Canada
- A-0117** PRODUCTIVITY AND ENVIRONMENTAL IMPACTS OF CABLE-ASSISTED LOGGING – A CASE STUDY IN SOUTHERN OREGON, USA
Woodam Chung, Brett Morrissette, Preston Green, Ben Leshchinsky, Kevin Bladon, Jeff Hatten, John Sessions
Oregon State University, Corvallis, USA



- A-0152** A MICRO-CATCHMENT APPROACH TO MONITORING SEDIMENT FLOWS AFTER CABLE LOGGING
Bruce Talbot¹, Omar Mologni^{1,2}, Rasmus Astrup¹, Stephanie Eisner¹
¹Division for Forestry and Forest Resources, NIBIO. The Norwegian Institute for Bioeconomy Research, Ås, Norway; ²Department of Forest Resources Management, The University of British Columbia, Vancouver Campus
- A-0054** FLAT AND WET: CABLE YARDING ON SENSITIVE SOILS IN EUROPE – MOTIVATIONS, CHALLENGES AND POTENTIAL
Gernot Erber¹, Raffaele Spinelli², Giovanna Ottaviani Aalmo³, Dirk Jaeger⁴, Marian Schönauer⁴, Stephan Hoffmann⁵, Bruce Talbot⁶, Karl Stampfer¹, Christoph Pucher⁷
¹University of Natural Resources and Life Sciences Vienna – Institute of Forest Engineering, Vienna, Austria; ²Consiglio Nazionale delle Ricerche - Istituto per la Valorizzazione del Legno e delle Specie Arboree, Florence, Italy; ³Norwegian Institute of Bioeconomy Research – Division of Food Production and Society, Ås, Norway; ⁴Georg-August-Universität Göttingen - Department of Forest Work Science and Engineering, Göttingen, Germany; ⁵University Freiburg, Chair of Forest Operations, Freiburg, Germany; ⁶Norwegian Institute of Bioeconomy Research – Division of Forest and Forest Resources, Ås, Norway; ⁷University of Natural Resources and Life Sciences Vienna – Institute of Silviculture, Vienna, Austria

Discussion

Lunch break & COFE Business Meeting

MONDAY, 07 OCTOBER 2019

14:00-16:00 Room 1

S04 - CTL HARVESTING OPTIMIZATION

BIT-AND-PIECES

Chair: Raffaele Spinelli

- A-0002** CHARACTERISTICS ANALYSIS OF DEFORMATION ABOUT V-HONEYCOMB WITH WING FOR FEEDING ROLLERS OF FOREST HARVESTER
Wang Dong^{1,2}, Wang Dian^{1,2}, Liu Jinghao^{1,2}, Huang Qingqing^{1,2}
¹School of Technology, Beijing Forestry University, China; ²Key Laboratory of Forestry Equipment and Automation of State Forestry and Grassland Bureau, China
- A-0033** MULTI-STEM CTL HARVESTING OF SHORT ROTATION POPLAR PLANTATIONS
Natascia Magagnotti¹, Piotr Mederski², Raffaele Spinelli¹
¹CNR Ivalsa, Sesto Fiorentino (FI) - Italy; ²Poznań University of Life Sciences, Faculty of Forestry, Department of Forest Utilisation, Poznań, Poland
- A-0020** IMPACT OF TREE MARKING AND SILVICULTURAL TREATMENT ON HARVESTER PERFORMANCE IN EARLY THINNING OPERATIONS – AN EXPERIMENT
Franz Holzleitner¹, Magdalena Langmaier^{2,3}, Bernhardt Obermayer¹, Eduard Hochbichler², Christian Kanzian¹
¹Institute of Forest Engineering, Department of Forest and Soil Sciences, University of Natural Resources and Life Sciences Vienna, Austria; ²Institute of Silviculture, Department of Forest and Soil Sciences, University of Natural Resources and Life Sciences Vienna, Austria; ³Austrian Research Centre for Forests, Department of Forest Growth and Silviculture, Seckendorff Gudent Weg 8, A-1130 Vienna, Austria
- A-0086** WORLDWIDE SHARE OF CUT-TO-LENGTH HARVESTING METHOD AND EXPLAINING FACTORS
Mikael Lundbäck, Carola Häggström, Tomas Nordfjell
Swedish University of Agricultural Sciences, Umeå, Sweden



- A-0088** INFLUENCE OF ALTERNATIVE MACHINE RELOCATION OPTIONS ON CUT TO LENGTH LOGGINGS IN EASTERN-FINLAND
Kari Väätäinen, Juha Laitila, Tuula Packalen, Pekka Hyvönen, Hannu Hirvelä
Natural Resources Institute Finland (Luke)

Discussion

Coffee break

MONDAY, 07 OCTOBER 2019

16:30-19:00 Room 1

**S07 - WOOD TRANSPORTATION & NEW TECHNOLOGIES
ROLL ON**

Chair: Ewald Pertlik

- A-0051** HANDLING LABOUR SHORTAGE BY EFFICIENT SUPPLY CHAIN SOLUTIONS - CONTAINER TERMINAL
Robert I Radics, Carel Bezuidenhout, Ginny Christians
Scion Forest Research, New Zealand
- A-0011** LOADING RATES AND COMPACTION FACTORS FOR WOODCHIP VESSELS VISITING AUSTRALIAN PORTS
Glen Murphy^{1,2}, Mauricio Acuna², Michael Berry², Rick Mitchell²
¹GE Murphy & Associates, New Zealand; ²University of the Sunshine Coast, Australia
- A-0030** WIRELESS CRANE SCALE TO IMPROVE ROUND WOOD TRANSPORT EFFICIENCY
Franz Holzleitner, Christoph Santner, Christian Kanzian
Institute of Forest Engineering, Department of Forest and Soil Sciences, University of Natural Resources and Life Sciences, Vienna, Austria
- A-0083** HOW TO DEAL WITH AN UPCOMING SHORTAGE OF WOOD TRANSPORTING CAPACITY IN GERMANY?
Herbert Borchert, Sebastian Gößwein, Marina Schusser
Bavarian State Institute of Forestry (LWF), Freising, Germany

- A-0042** LOGISTICS OF SUPPLYING WOODY BIOMASS LONG DISTANCE USING RAILROAD TRANSPORTATION
Jeff Halbrook, Han-Sup Han
Ecological Restoration Institute, Northern Arizona University, Flagstaff, AZ, USA
- A-0180** OPERATIONAL EVALUATION OF A TIMBER TRAILER WITH THE HYBRID DRIVE
Tomáš Zemánek¹, Jindřich Neruda¹, Radomír Ulrich¹, Ondřej Vítek², Petr Procházka²
¹Department of Engineering, Faculty of Forestry and Wood Technology, Mendel University in Brno, Czech Republic; ²Department of Power Electrical and Electronic Engineering, Faculty of Electrical Engineering and Communication, Brno University of Technology, Czech Republic

Discussion

MONDAY, 07 OCTOBER 2019

10:30-12:30 Room 2

S02 - SOIL DISTURBANCES
DOWN AND DIRTY

Chair: Tomas Nordfjell

- A-0094** ENHANCED SUSTAINABLE FOREST MANAGEMENT OF THE BRAZILIAN SECONDARY ATLANTIC FOREST BY INNOVATIVE AND ADAPTED TECHNOLOGIES
Pedro C. Britto¹, Dirk Jaeger¹, Stephan Hoffmann², Renato C. G. Robert³, Alexander C. Vibrans⁴, Alfredo C. Fantini⁵
¹University of Göttingen, Göttingen, Germany; ²University of Freiburg, Freiburg, Germany; ³Federal University of Paraná, Curitiba, Brazil; ⁴University of Blumenau, Blumenau, Brazil; ⁵Federal University of Santa Catarina, Florianópolis, Brazil
- A-0017** WET AREA MAPPING USING REMOTE SENSING DATA IN LATVIA
Janis Ivanovs, Ainars Lupikis, Andis Lazdins
LSFRI Silava, Salaspils, Latvia



- A-0111** RESPONSE OF SOIL PHYSICAL PROPERTIES FOLLOWING THE APPLICATION OF SOIL RESTORATION TECHNIQUES ON MACHINE OPERATING TRAILS
Siegfried Waas^{1,2}, Eric R. Labelle¹, Herbert Borchert²
¹Assistant Professorship of Forest Operations - Department of Ecology and Ecosystem Management - Technical University of Munich, Freising, Germany; ²Bavarian State Institute of Forestry (LWF) - Department 4 – Forest Technology, Business Management and Timber, Freising, Germany
- A-0150** QUANTIFYING SOIL DISTURBANCE IN A WHOLE-TREE OPERATION METHOD
Alex. K George, Anil Raj Kizha
School of Forest Resources, University of Maine, Orono, ME-04469, USA
- A-0039** SOIL DISTURBANCE FROM TETHERED FORWARDING ON STEEP SLOPES IN BRAZIL
Austin M. Garren¹, M. Chad Bolding¹, W. Mike Aust¹, Angelo Moura², Scott M. Barrett¹
¹Department of Forest Resources and Environmental Conservation, College of Natural Resources and Environment, Virginia Tech, Blacksburg, Virginia USA; ²Suzano Pulp and Paper, Jacareí, São Paulo, Brazil
- A-0103** SOIL DEGRADATION AND WOOD EXTRACTION OPERATIONS: COMPARING SKIDDING AND FORWARDING
Francesco Neri, Elena Marra, Giovanni Mastrolonardo, Andrea Laschi, Cristiano Foder, Enrico Marchi
DAGRI - Dipartimento di Scienze e Tecnologie Agrarie, Alimentari, Ambientali e Forestali, Università di Firenze, Firenze, Italy

Discussion

Lunch break & COFE Business Meeting

MONDAY, 07 OCTOBER 2019

14:00-16:00 Room 2

S05 - BIOENERGY

FINAL DESTINATION?

Chair: Tom Gallagher

- A-0035** QUANTIFICATION OF LOGGING LOSSES RELATED TO BIOMASS SUPPLY OF FOREST RESIDUES CAUSED BY ADDITIONAL DELIMBING OF HARVESTING HEADS
Markus Riebler, Elke Dietz, Herbert Borchert
Bavarian State Institute of Forestry, Freising, Germany
- A-0072** EVALUATION OF SCREENING AND DRYING TO IMPROVE FUEL PROPERTIES OF LOW QUALITY WOOD CHIPS FOR THE USE IN SMALL WOOD GASIFIER CHP-PLANTS
Simon Lesche¹, Daniel Kuptz¹, Thomas Zeng², Anett Pollex², Georg Kuffer³, Jana Mühlenberg², Volker Lenz², Hans Hartmann¹
¹Technology and Support Centre in the Centre of Excellence for Renewable Resources (TFZ), Schulgasse 18, D-94315 Straubing, Germany; ²DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH, Torgauer Straße 116, 04347 Leipzig, Germany; ³Spanner Re² GmbH, Niederfeldstr. 38, 84088 Neufahrn i. NB, Germany
- A-0102** FOREST BIOMASS HARVESTING AND CHIP QUALITY IN MIXED HARDWOOD FORESTS FOR BIOENERGY PRODUCTION
John Vance¹, Jingxin Wang¹, Shawn Grushecky¹, Raffaele Spinelli²
¹Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV, USA jxwang@wvu.edu; ²CNR Ivalsa, Via Madonna del Piano 10, 50019 Sesto Fiorentino (FI), Italy, spinelli@ivalsa.cnr.it
- A-0108** INFLUENCE OF STORAGE ON PROPERTIES OF SCOTS PINE BARK
Johanna Routa, Hanna Brännström, Jarkko Hellström, Juha Laitila
Natural Resources Institute Finland, Luke
- A-0168** MARGINAL COST OF BIOMASS UTILIZATION IN MECHANIZED FOREST RESTORATION TREATMENTS IN THE SOUTHWESTERN USA
Elizabeth Dodson¹, Nathaniel Anderson²
¹WA Franke College of Forestry and Conservation, University of Montana, USA; ²Rocky Mountain Research Station, US Forest Service, MT, USA



- A-0173** SYNERGIES BETWEEN THE NEW BIOECONOMY AND FOREST OPERATIONS FOR FUEL TREATMENT AND FOREST RESTORATION
Nathaniel Anderson¹, Woodam Chung², Elizabeth Dodson³
¹Rocky Mountain Research Station, United States Forest Service, Missoula, USA; ²Oregon State University, Corvallis, USA; ³WA Franke College of Forestry and Conservation, University of Montana, Missoula, USA

Discussion

Coffee break

MONDAY, 07 OCTOBER 2019

16:30-19:00 Room 2

S08- TRAFFICABILITY
CAN WE GET OVER IT?

Chair: Charlie Blinn

- A-0067** INNOVATIVE FOREST WHEEL DESIGN FOR LOW INFLATION PRESSURE
Felix zu Hohenlohe
HSM Hohenloher Spezial-Maschinenbau GmbH
- A-0077** RUTTING ON SKID TRAILS - STATIC AND DYNAMIC PRESSURE ALLOCATION
Bastian Hinte, Katharina Meyer-Schulz
Georg-August-Universität, Göttingen, Germany
- A-0092** MEASURING OF WHEEL RUTS DEPTH IN FOREST TERRAIN WITH DRONE AND DIGITAL STEREO PHOTOGRAMMETRY
Tomas Nordfjell, Rasmus Victorsson
¹Swedish University of Agricultural Sciences, Department of Forest Biomaterials and Technology, Umeå, Sweden

- A-0060** OPERATIONS PROTOCOL FOR ASSESSING TRAFFICABILITY PRIOR TO LOGGING OPERATIONS – KEY FINDINGS FROM THE EFFORTE PROJECT
Jori Uusitalo
Natural Resources Institute Finland (Luke), Tampere, Finland
- A-0096** EVALUATION OF A (THE HSM) TRIPLE BOGIE SYSTEM FOR FORWARDERS
Michael Starke¹, Felix Heubaum², Martin Ziesak¹
¹Bern University of Applied Sciences (BFH) – School of Agricultural, Forest and Food Sciences (HAFL), Bern, Switzerland; ²Public enterprise Sachsenforst, Pirna, Germany
- A-0125** COMPARISON OF DIFFERENT ESTIMATION METHODS TO WHEEL RUTS AND SOIL COMPACTION DURING HARVESTING OPERATIONS.
Elena Marra¹, Martina Cambi¹, Andrea Laschi¹, Fabio Fabiano¹, Francesco Neri¹, Cristiano Foderi¹, Enrico Marchi¹, Tomas Nordfjell²
¹Dipartimento di Gestione dei Sistemi Agrari, Alimentari e Forestali (GESAAF), Università di Firenze, Firenze, Italy; ²Department of Forest Biomaterials and Technology (SLU), Swedish University of Agricultural Sciences, Skogsmarksgränd, Umeå, Sweden

Discussion

MONDAY, 07 OCTOBER 2019

10:30-12:30 Room 3

S03- HUMAN FACTORS
CAN WE GET OVER IT?

Chair: Nike Krajnc

- A-0053** ACQUIRE AND MANAGEMENT OF CHAINSAW TREE FELLING AND BUCKING WORK BY ICT - SMART CHAINSAW AND UTILIZATION
Toshio Nitami¹, Sooil Suk², Yasufumi Maruyama¹, Tetsuya Matsumura¹
¹University of Tokyo, Tokyo, Japan; ²Co-Lab., Daegu, Korea



- A-0073** AGEING WORKFORCE – A CHALLENGE FOR WORK SCIENCE, JOB DESIGN AND HUMAN RESOURCES DEVELOPMENT
Edgar Kastenholz, Andrea Teutenberg, Ute Seeling
Kuratorium für Waldarbeit und Forsttechnik (KWF) e.V.
- A-0130** COMPARISONS BETWEEN BATTERY AND GASOLINE CHAINSAWS IN TERMS OF NOISE EXPOSURE, ENERGY EFFICIENCY, AND CUTTING PERFORMANCE
Christoph Huber, Nikolaus Nemestóthy
Austrian Research Center for Forests - Forest Training Center Traunkirchen, Austria
- A-0161** FORESTRY EDU TRAINER - COOPERATION FOR INNOVATION IN EDUCATION AND TRAINING
Andrea Teutenberg, Joachim Morat, Ute Seeling
KWF e.V. - Kuratorium für Waldarbeit und Forsttechnik e.V., Groß-Umstadt, Germany
- A-0166** MOVEMENT ANALYSIS OF A WORKER IN THE FOREST CLEANING ACTIVITIES
Marin Bačić, Matija Landekić, Marijan Šušnjar, Mario Šporčić, Zdravko Pandur
Faculty of Forestry, University of Zagreb, Croatia
- A-0171** ANALYSIS OF RISKS CAUSED BY VIBRATIONS AND NOISES IN SMALL-SCALE FIREWOOD PRODUCTION
Andrea R. Proto¹, Stefano Grigolato², Salvatore Papandrea¹, Maria Francesca Cataldo¹, Raffaele Cavalli², Giuseppe Zimbalatti¹
¹Department of AGRARIA - University Mediterranea of Reggio Calabria, Italy; ²Department of Land Environment Agriculture and Forestry - University of Padova, Italy

Discussion

Lunch break & COFE Business Meeting

MONDAY, 07 OCTOBER 2019

14:00-16:00 Room 3

S06- WOOD TRANSPORTATION & SIMULATION
PLAYING WITH MODEL TRUCKS

Chair: Hubert Dürrstein

- A-0056** IMPLEMENTATION OF COMPUTER VISION ALGORITHMS FOR AUTOMATED DETECTION AND DIAMETER ESTIMATION OF LOGS ON TRUCKS
Mauricio Acuna¹, Amanda Sosa², Mark Brown¹
¹University of the Sunshine Coast, Hobart, Australia; ²Waterford Institute of Technology, Waterford, Ireland
- A-0012** WOOD TRANSPORTATION PLANNING 4.0
Peter Rauch, Christoph Kogler
University of Natural Resources and Life Sciences, Vienna
- A-0018** MODELING TIMBER TRUCK SPEED AND FUEL CONSUMPTION IN FINLAND BASED ON CAN BUS DATA AND AUXILIARY INFORMATION
Perttu Anttila, Tuomas Nummelin, Kari Väättäin, Juha Laitila
Natural Resources Institute Finland (Luke)
- A-0062** AGENT-BASED SIMULATION IN CABLE YARDING AND TRANSPORT OPERATIONS
Thomas Holzfeind¹, Manfred Gronalt², Christian Kanzian¹
¹Institute of Forest Engineering, University of Natural Resources and Life Sciences, Vienna, Austria; ²Institute of Production and Logistics, University of Natural Resources and Life Sciences, Vienna, Austria
- A-0041** OPTIMAL TRANSPORT SCHEDULING: DEMONSTRATION OF SOFTWARE CAPABILITY AND POTENTIAL GAINS
Mauricio Acuna¹, Glen Murphy²
¹University of the Sunshine Coast, Hobart, Australia; ²GE Murphy & Associates Ltd, Rotorua, New Zealand
- A-0104** INNOVATION IN THE FIELD OF WOOD TRANSPORT IN FRANCE
Thomas Carrette, Christophe Ginét
Technology Institute for the French forest-based sector – FCBA

Discussion



Coffee break

MONDAY, 07 OCTOBER 2019

16:30-19:00 Room 3

**S09- CTL HARVESTING & QUALITY IMPROVEMENT
WE MAKE IT BETTER**

Chair: Natascia Magagnotti

- A-0122** RANGING SYSTEM FOR A FORWARDER AND A CUTTING SLOPE OF A LOGGING ROAD FOR AUTONOMOUS DRIVING
Sho Ono¹, Masahiro Iwaoka², Takeshi Matsumoto², Midori Uenohara³
¹Graduate School of Agriculture, Tokyo University of Agriculture and Technology; ²Institute of Agriculture, Tokyo University of Agriculture and Technology; ³United Graduate School of Agricultural Science, Tokyo University of Agriculture and Technology
- A-0139** TOWARDS UNDERSTANDING THE EFFECT OF TREE SIZE UNIFORMITY ON HARVESTER PRODUCTIVITY USING MACHINE STANFORD DATA IN A SOUTH AFRICAN CONTEXT
Simon Ackerman¹, Rasmus Astrup², David Drew¹
¹University of Stellenbosch, South Africa; ²The Norwegian Institute of Bioeconomy Research, Ås, Norway
- A-0141** ESTIMATING THE POTENTIAL OF TREE SELECTION TUTORIAL SYSTEM OF HARVESTER OPERATOR IN THINNINGS
Mika Vahtila¹, Kalle Kärhä², Heikki Ovaskainen³, Ville Kankare¹, Timo Melkas³, Asko Poikela³, Veli-Pekka Kivinen¹, Markus Holopainen¹, Juha Hyypä⁴, Jarmo Hämäläinen³
¹University of Helsinki, Helsinki, Finland; ²Stora Enso Wood Supply Finland, Helsinki, Finland; ³Metsäteho Ltd, Vantaa, Finland; ⁴Finnish Geospatial Research Institute at National Land Survey, Helsinki, Finland
- A-0143** HARVESTING HEAD CALIBRATION: EFFORTS AND BENEFITS
Daniel Beaudoin^{1,2}, Luc LeBel^{1,2,3}
¹Consortium de recherche FORAC, Université Laval, Québec, Canada; ²Département des sciences du bois et de la forêt, Université Laval, Québec, Canada; ³Centre interuniversitaire de recherche sur les réseaux d'entreprise, la logistique et le transport (CIRRELT)

- A-0145** DEVELOPMENT OF A SMALL-SCALE HARVESTER FOR BIOMASS OPERATIONS
Kleydson Diego da Rocha¹, Thomas Gallagher¹, Timothy McDonald², Dana Mitchell³
¹School of Forestry and Wildlife Sciences - Auburn University, Auburn, United States; ²Department of Biosystems Engineering - Auburn University, Auburn, United States; ³USDA Forest Service - Southern Research Station, Auburn, United States
- A-0149** EVALUATION OF PROCESSING HEAD MEASUREMENT IN MERCHANDIZING SOUTHERN YELLOW PINE IN SOUTHEAST US
Marisa Sitanggang¹, Thomas Gallagher¹, Timothy McDonald¹, Dana Mitchell²
¹Auburn University; ²US Forest Service

Discussion

TUESDAY, 08 OCTOBER 2019

08:00-10:00 Room 1

KEYNOTE 02

Chair: Karl Stampfer

- A-0193** DIGITALIZATION OF FOREST HARVESTING: THE POTENTIAL FOR IMPROVED ENVIRONMENTAL AND PRODUCTION EFFICIENCY
Rasmus Astrup
NIBIO
- A-0194** SMART FORESTRY - SMART FOREST OPERATIONS ENGINEERING AND MANAGEMENT
Hans R. Heinimann
ETH Zürich, Switzerland
- A-0195** LIFE CYCLE ASSESSMENT (LCA) IN FORESTRY
Martin Kühmaier
BOKU Vienna, Austria



- A-0196** FUTURE OF FOREST ENGINEERING AND ITS SUSTAINABILITY
Woodam Chung
Oregon State University, USA

Coffee break

TUESDAY, 08 OCTOBER 2019

10:30-12:30 Room 1

S10- STEEP TERRAIN HARVESTING
HOLD ON TIGHT

Chair: Dominik Roeser

- A-0029** USING CONJOINT ANALYSES TO IMPROVE CABLE YARDER DESIGN CHARACTERISTICS: AN AUSTRIAN YARDER CASE STUDY TO ADVANCE COST-EFFECTIVE EXTRACTION
Martin Kühmaier¹, Hunter Harrill², Mohammad Reza Ghaffariyan³, Manfred Hofer⁴, Karl Stampfer¹, Mark Brown³, Rien Visser²
¹Institute of Forest Engineering, University of Natural Resources and Life Sciences, Vienna, Austria; ²New Zealand School of Forestry, University of Canterbury, New Zealand; ³Forest Industries Research Centre, University of the Sunshine Coast, Australia; ⁴Koller Forsttechnik GmbH, Austria
- A-0105** SHARE OF STEEP SLOPE WORLDWIDE
Mikael Lundbäck, Henrik Persson, Carola Häggström, Tomas Nordfjell
Swedish University of Agricultural Sciences
- A-0107** SKYLINE TENSILE FORCES IN CABLE LOGGING: FIELD MEASUREMENTS VS. THEORETICAL CALCULATIONS
Omar Mologni¹, Luca Marchi¹, C. Kevin Lyons², Stefano Grigolato¹, Raffaele Cavalli¹, Dominik Roeser³
¹Università degli Studi di Padova - Department of Land, Environment, Agriculture and forestry. Padua - Italy; ²Oregon State University - College of Forestry - Department of Forest Engineering, Resources and Management. Corvallis, OR USA; ³The University of British Columbia - Department of Forest Resources Management. Vancouver, BC Canada

- A-0113** WHOLE-TREE HELICOPTER YARDING PRODUCTIVITY ANALYSIS FOR FUELS REDUCTION THINNING IN NORTHERN ARIZONA
Dylan Whitaker, Jeff Halbrook, Han-Sup Han
Ecological Restoration Institute, Northern Arizona University, Flagstaff, Arizona, USA
- A-0136** EXPERIMENTAL TESTS ON TREES USED AS ANCHORS IN CABLE-SUPPORTED HARVESTING SYSTEMS
Luca Marchi, Omar Mologni, Stefano Grigolato, Raffaele Cavalli
Department of Land, Environment, Agriculture and Forestry, University of Padova, Viale dell'Università 16, 35020 Legnaro (PD), Italy
- A-0026** APPLYING THE DELPHI METHOD TO SELECT THE SUSTAINABLE FOREST HARVESTING SYSTEM
Nopparat Kaakkurivaara
Faculty of Forestry, Kasetsart University, Bangkok, Thailand

Discussion

Lunch break & IJFE Editorial Board Meeting

TUESDAY, 08 OCTOBER 2019

14:00-16:30 Room 1

S13- INFRASTRUCTURE & MARKET
ON THE WAY

Chair: Eduardo Tolosana

- A-0007** HEAVY METAL LEACHING FROM FOREST ROADS REINFORCED WITH FLY ASH
Antti-Jussi Lindroos¹, Kira Ryhti², Tomi Kaakkurivaara¹, Jori Uusitalo¹, Heljä-Sisko Helmisaari²
¹Luke, Finland; ²University of Helsinki, Finland



- A-0068** LEGAL, SOCIAL AND ECONOMIC REQUIREMENTS FOR INTEGRATION OF HARVESTER DATA IN LOGISTICS CHAINS IN GERMANY
Julia Kemmerer, Florian Hartsch, Lorenz Breinig, Eric R. Labelle
Assistant Professorship of Forest Operations Department of Ecology and Ecosystem Management Technical University of Munich, Hans-Carl-von-Carlowitz-Platz 2, 85354 Freising, Germany
- A-0084** DETERMINING THE RESILIENT MODULI OF HRB STABILIZED SOILS BY THE CYCLIC CBR METHOD
Péter Primusz, Balázs Kisfaludi, József Péterfalvi
University of Sopron, Faculty of Forestry, Institute of Civil Engineering, Sopron, Hungary
- A-0090** CONSIDERATION OF NEAR OPTIMAL FOREST ROAD DENSITIES FOR SWITZERLAND
Moritz Dreher, Michael Starke, Julia Menk, Christoph Schaller, Lorenz Diefenbach, Patrick Dietsch, Luuk Dorren, Martin Ziesak
Bern University of Applied Sciences (BFH) - School of Agricultural, Forest and Food Sciences (HAFL), Bern, Switzerland
- A-0172** AN AGENT-BASED MODELL OF WOOD MARKETS
Stefan Holm¹, Renato Lemm¹, Lorenz Hilty², Oliver Thees¹
¹Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Switzerland; ²University of Zurich, Switzerland
- A-0176** OPTIMIZING THE LAYOUT OF AN EXISTING FOREST ROAD NETWORK IN HILLY AND FLAT TERRAIN
Leo Bont, Fritz Frutig, Christoph Fischer, Marielle Frafel
WSL, Birmensdorf, Switzerland

Discussion

Coffee break

TUESDAY, 08 OCTOBER 2019

17:00-19:00 Room 1

S16- MACHINE-SOIL-INTERACTION
DIGGING UP THE DIRT

Chair: Ben Spong

- A-0010** HOW DOES SOIL COMPACTION INFLUENCE THE GROWTH OF SPRUCE SEEDLINGS?
Eric R. Labelle, Max Kammermeier
Assistant Professorship of Forest Operations, Department of Ecology and Ecosystem Management, Technical University of Munich, Germany
- A-0063** CONTAMINATION OF WOOD CHIPS WITH MINERAL SOILS – FUEL QUALITY AND COMBUSTION BEHAVIOUR
Carina Kuchler¹, Daniel Kuptz¹, Elisabeth Rist¹, Robert Mack¹, Claudia Schön¹, David Zimmermann², Elke Dietz², Markus Riebler², Uwe Blum², Herbert Borchert², Hans Hartmann¹
¹Technology and Support Centre in the Centre of Excellence for Renewable Resources (TFZ), Schulgasse 18, D-94315 Straubing/ Germany, Tel.: (+49) 9421-300-121, Fax: (+49) 9421-300-211, E-Mail: carina.kuchler@tfz.bayern.de; ²Bavarian State Institute of Forestry (LWF), Hans-Carl-von-Carlowitz-Platz 1, D-85354 Freising/ Germany
- A-0049** NUTRIENT SAVING EFFECTS OF ROUGHLY DELIMBED ENERGY ROUNDWOOD IN COMPARISON TO BIOMASS SUPPLY OF WHOLE CONIFEROUS CROWNS CAUSED BY HARVESTING METHOD AND BUCKING
Elke Dietz, Markus Riebler, Herbert Borchert
Bavarian State Institute of Forestry, Freising, Germany
- A-0155** SOIL FAILURES UNDER TRACKED FORESTRY MACHINES AS A FUNCTION OF SLOPE AND SOIL WETNESS
D H McNabb
ForestSoil Science Ltd., Edmonton, Alberta, Canada



A-0047 MECHANIZED PRE-COMMERCIAL THINNING BY UPROOTING

Karri Uotila

Natural Resource Institute Finland, Kuopio, Finland

A-0156 GROUND-BASED FOREST MACHINERY AND TACTICS IMPROVING
WILDLAND FIRE SUPPRESSION OPERATIONS IN WESTERN NORTH
AMERICA

Chris Bielecki¹, Obie O'Brien²

*¹Supervisory Civil Engineer, USDA Forest Service; ²Logging Engineer
and Owner of Forest Operations Engineering LLC. Retired Logging
Engineer, USDA Forest Service*

Discussion

TUESDAY, 08 OCTOBER 2019

19:00-19:15 Room 1

CLOSING & AWARD CEREMONY

TUESDAY, 08 OCTOBER 2019

10:30-12:30 Room 2

S11- ENVIRONMENTAL IMPACTS
NOT QUICK AND DIRTY

Chair: Janine Schweier

A-0006 MINNESOTA LOGGERS AND INVASIVE FOREST PLANTS:
ATTITUDES, BEHAVIORS AND CONCERNS

Charlie Blinn¹, Stephanie Snyder², Rachel Peterson³

*¹Department of Forest Resources, University of Minnesota, St. Paul,
MN, USA; ²USDA Forest Service, Northern Research Station, St. Paul,
MN, USA; ³Minnesota Logger Education Program, Cloquet, MN, USA*

- A-0023** ENVIRONMENTAL IMPACT OF MECHANIZED HARVESTING IN LARGE-DIMENSION HARDWOODS
Lorenz Breinig, Caroline Bennemann, Peter Aurenhammer, Eric R. Labelle
Assistant Professorship of Forest Operations, TUM School of Life Sciences Weihenstephan, Technical University of Munich
- A-0140** MODELLING FUEL CONSUMPTION IN CUT-TO-LENGTH WOOD HARVESTING OPERATIONS IN NORDIC CONDITIONS
Hanna Haavikko¹, Kalle Kärhä², Heikki Kääriäinen^{1,2}, Kimmo Roininen², Teijo Palander¹
¹University of Eastern Finland, Joensuu, Finland; ²Stora Enso Wood Supply Finland, Helsinki, Finland
- A-0036** INFLUENCE OF THE EXTRACTION LINE'S DISTANCE ON THE VALUE OF THE TREE STAND
Marcus Hennek
Institute of Forest Utilisation and Forest Technology, Chair of Forest Technology, TU Dresden, Germany
- A-0151** WEST VIRGINIA TIMBER HARVESTING ACTIVITIES – LANDOWNERSHIP INFLUENCES ON HARVEST TYPES, COMPARTMENT SIZES, AND BEST MANAGEMENT PRACTICES COMPLIANCE
Ben Spong
West Virginia University, Morgantown, WV, USA
- A-0167** RESIDUAL STAND DAMAGE UNDER DIFFERENT SILVICULTURAL PRESCRIPTIONS
Evan Ross Nahor, Anil Raj Kizha, Libin Thaikattil Louis
University of Maine, Orono, USA

Discussion

Lunch break & IJFE Editorial Board Meeting



TUESDAY, 08 OCTOBER 2019

14:00-16:30 Room 2

S14 - THE FUTURE OF FOREST ENGINEERING
NO BORDERS

Chair: Luc LeBel

A-0031 FOREST MACHINES FOR THE FUTURE – LEARNING FROM NATURE
Richard Parker, Peter Clinton, Brionny Hooper
Scion - NZ Forest Research Institute Christchurch, New Zealand

A-0057 ESTIMATING THE NEED FOR PRE-HARVEST CLEARING BY
MULTISPECTRAL AIRBORNE LASER SCANNING.
Blanca Sanz¹, Jukka Malinen¹, Jussi Heiskanen², Timo Tokola¹
¹University of Eastern Finland, Joensuu, Finland; ²Savonia University of Applied Sciences, Varkaus, Finland

A-0052 PLANTERBOT (PLANTING ROBOT)
Robert I Radics, Linh N. K. Duong
Scion Forest Research, New Zealand

A-0022 A FORECAST OF SILVICULTURE RE-ESTABLISHMENT
TECHNOLOGIES OF THE FUTURE IN PLANTATION FORESTRY
**Muedanyi Ramantswana¹, Michal Brink², Keith Little¹,
Raffaele Spinelli³, Paxie Chirwa²**
¹Nelson Mandela University, South Africa; ²University of Pretoria, South Africa; ³CNR IVALSA, Italy

A-0095 MEASURING LOG PILES WITH PHOTO-OPTICAL MONO CAMERA
SYSTEMS
Hans-Ulrich Dietz
*Kuratorium fuer Waldarbeit und Forsttechnik (KWF); Gross-Umstadt,
Germany*

Discussion

Coffee break

TUESDAY, 08 OCTOBER 2019

17:00-19:00 Room 2

S17 - DECISION SUPPORT & VIRTUAL REALITY
SIMPLIFY YOUR DECISIONS

Chair: Ute Seeling

A-0081 ANALYSIS OF RUT FORMATION USING PARTICLE-BASED TERRAIN SIMULATION

Viktor Wiberg¹, Martin Servin¹, Tomas Nordfjell²

¹Umeå University, Umeå, Sweden; ²Swedish University of Agricultural Sciences

A-0037 MULTICRITERIA DECISION ANALYSIS FOR SELECTING THE SUSTAINABLE LOGGING SYSTEM IN TEAK PLANTATION

Nichmon Plodchum, Nopparat Kaakkurivaara, Wanchai Arunpararat

Department of Forest Engineering, Faculty of Forestry, Kasetsart University, Bangkok, Thailand

A-0116 USING VIRTUAL REALITY TO IMPROVE OPERATIONAL PLANNING AND TEACHING

Dominik Roeser¹, Tim Caldecott², Holger Griess¹

¹University of British Columbia, Vancouver, Canada; ²FPInnovations, Vancouver, Canada

A-0070 MANIPULATING CHAIN TYPE AND FLAIL DRUM SPEED FOR INCREASED PRODUCTIVITY AND VALUE RECOVERY IN CFDDC OPERATIONS

Raffaele Spinelli^{1,2}, Rick Mitchell², Mark Brown², Natascia Magagnotti^{1,2}, Andrew McEwan³

¹CNR IVALSA, Firenze, Italy; ²University of the Sunshine Coast, Marochydoore, QLD, Australia; ³Nelson Mandela University, George, Republic of South Africa



- A-0135** AVATAR: ADVANCED VIRTUAL APTITUDE AND TRAINING APPLICATION IN REAL TIME
Dirk Jaeger¹, Marian Schönauer¹, Bruce Talbot², Rolf Björheden³, Eva Skagestad⁴, Michael Corsano⁵, Gerhard Rinke⁶, Thilo Wagner⁷
¹Department of Forest Work Science and Engineering, Georg-August-Universität, Göttingen, Germany; ²Norwegian Institute of Bioeconomy Research, Ås, Norway; ³Skogforsk, Uppsala, Sweden; ⁴Skogbrukets Kursinstitut, Biri, Norway; ⁵Optea, Oslo, Norway; ⁶Leibniz Research Centre for Working Environment and Human Factors, Dortmund, Germany; ⁷Wald und Holz NRW, Arnsberg, Germany

Discussion

TUESDAY, 08 OCTOBER 2019

10:30-12:30 Room 3

S12 - SUPPLY CHAINS
PUZZLES TO OPTIMIZE

Chair: Hans Rudolf Heinemann

- A-0032** COMPARISON OF THE PRODUCTIVITY AND COST OF FOUR HARVEST SYSTEMS OPERATING IN A EUCALYPT PLANTATION IN WESTERN AUSTRALIA
Martin Strandgard¹, Rick Mitchell¹, John Wiedemann²
¹University of the Sunshine Coast; ²WA Plantation Resources P/L
- A-0050** HARVESTING PRODUCTIVITY, COST, AND TIMBER UTILIZATION IN CONVENTIONAL AND PROCESSOR HARVESTING SYSTEMS IN GEORGIA, USA
Joe Conrad
Warnell School of Forestry & Natural Resources, University of Georgia, Athens, GA, USA
- A-0183** MOTOR MANUAL AND MECHANIZED WTS BIOMASS HARVESTING IN SPANISH QUERCUS COPPICES. PRODUCTIVITY, COST AND ENVIRONMENTAL ANALYSIS
E Tolosana, R Laina, R Spinelli, G Aminti, I López-Vicens

A-0153 APPLYING THE SYSTEM INTEGRATOR CONCEPT TO FOREST
SUPPLY CHAIN

Luc LeBel¹, François Morin¹, Luis de Santa Eulalia², Denise Dubeau³
¹Université Laval; ²Université de Sherbrooke; ³MFFP

Discussion

Lunch break & IJFE Editorial Board Meeting

TUESDAY, 08 OCTOBER 2019

14:00-16:30 Room 3

S15 - STANDARDS, CONVERSION, MEASUREMENT
SPEAK THE SAME LANGUAGE

Chair: Dinko Vusić

A-0014 EUROPEAN STANDARD FOR ROUND AND SAWN TIMBER (METHOD OF
MEASUREMENT OF DIMENSIONS) - INFLUENCE ON VOLUME LOSSES
**Andreja Đuka¹, Tomislav Poršinsky², Tibor Pentek³, Mirna Sertić²,
Dinko Vusić¹**

¹Faculty of Forestry University of Zagreb; ²Croatian Forests Ltd. Zagreb

A-0097 ELEKTRO WZ – ELECTRONIC CONVERSION FACTORS FOR VOLUME
CALCULATION OF STACKED SAWMILL TIMBER

**Piotr S. Mederski¹, Krzysztof Rosiński², Martyna Rosińska¹,
Zbigniew Karaszewski³, Mariusz Bembek¹**

*¹Poznań University of Life Sciences, Poland; ²individual IT contribution,
Poland; ³Wood Technology Institute, Poznań, Poland*

A-0043 DEVELOPMENT AND VALIDATION OF A MEASUREMENT SYSTEM
USED TO CALCULATE THE DEBARKING PERCENTAGES OF
PROCESSED LOGS

**Joachim B. Heppelmann^{1,2}, Eric R. Labelle¹, Thomas Seifert³,
Stefan Seifert³, Stefan Wittkopf²**

*¹Assistant Professorship of Forest Operations, Department of Ecology
and Ecosystem Management, Technical University of Munich, Hans-
Carl-von-Carlowitz-Platz 2, D-85354 Freising, Germany; ²University
of Applied Science Weihenstephan-Triesdorf, Hans-Carl-von-
Carlowitz-Platz 3, D-85354 Freising, Germany; ³Scientes Mondium,
Ruppertskirchen 5, D-85250 Altomünster, Germany*



- A-0118** A PROPOSAL OF NEW FORMULATION ON INVESTMENT AND ACHIEVED COST OR ENVIRONMENTAL LOAD REDUCTION: TRIAL APPLICATIONS ON LOGGING RESIDUE TRANSPORTATION AND INFRASTRUCTURE DEVELOPMENT FOR BROAD-LEAVED TREE HARVESTING
Yasushi Suzuki¹, Tetsuhiko Yoshimura²
¹Faculty of Agriculture and Marine Science, Kochi University, Japan;
²Faculty of Life and Environmental Science, Shimane University, Japan
- A-0164** GLOBAL SENSITIVITY ANALYSIS OF INTEGRATED HARVESTING COST UNDER VARIOUS STAND CONDITIONS AND MACHINE ATTRIBUTES
Libin T Louis, Anil Raj Kizha, Adam Daigneault
School of Forest Resources University of Maine Orono 5755 Nutting Hall, Orono, Maine, United States

Discussion

Coffee break

TUESDAY, 08 OCTOBER 2019

17:00-19:00 Room 3

S18 - HARVESTING OPERATIONS

INCREMENTAL INNOVATION VS. BUSINESS REVOLUTION

Chair: Bruce Talbot

- A-0038** WORK SAFETY IMPROVEMENT FOR MOTOR-MANUAL FELLING OPERATIONS - GENERAL THOUGHTS AND PRESENTATION OF A PROTOTYPE TOOL
Patrick Dietsch, Michael Starke, Martin Ziesak
Bern University of Applied Sciences (BFH) - School of Agricultural, Forest and Food Sciences (HAFL), Bern, Switzerland

- A-0175** ECONOMIC FEASIBILITY OF TIMBER HARVESTING IN LOWLANDS
Alex Kunnathu George¹, Anil Raj Kizha¹, Laura Kenefic²
¹School of Forest Resources, University of Maine, Orono, ME-04469, USA; ²Northern Research Station, U.S. Forest Service, ME-04411, USA
- A-0147** SELECTING SUCCESSFUL HARVESTER OPERATORS THROUGH APTITUDE TESTS AND DEMOGRAPHICS
Kylle Schwegman¹, Raffaele Spinelli², Natascia Magagnotti², Andrew McEwan³, Muedanyi Ramantswana¹
¹Nelson Mandela University, South Africa; ²CNR IVALSA, Italy; ³CMO, South Africa
- A-0178** COMPARISON OF ELECTRIC CORDLESS AND PETROL CHAINSAWS IN TERMS OF EFFICIENCY IN REAL-WORLD CONDITIONS
Matevž Mihelič, Anton Poje
University of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Resources, Ljubljana, Slovenia
- A-0066** HARDWOOD MECHANIZATION: STATE OF THE ART AND PERSPECTIVES BASED ON 20-YEARS EXPERIENCE IN FRANCE
Emmanuel Cacot, Philippe Ruch, Chloé Boldrini
FCBA, Verneuil-sur-Vienne, FRANCE

Discussion



E-POSTERS

- A-0004** MECHANIZATION STRATEGY OF SMALL-SCALE CONTRACTORS IN JAPAN
Akie Kawasaki¹, Katsuhisa Kohroki²
¹Kyushu University, Japan; ²University of Tsukuba, Japan
- A-0005** ESTIMATING AVAILABILITY OF FOREST BIOMASS RESOURCES IN THE WHOLE OF JAPAN
Kazuhiro Aruga¹, Battuvshin Biligt², Yusuke Matsuoka¹, Takahisa Yamamoto¹, Hiroaki Shirasawa³
¹Utsunomiya University, Japan; ²Tokyo University of Agriculture and Technology, Japan; ³Forestry and Forest Products Research Institute, Japan
- A-0008** DOSING OF PHYSICAL LOAD FOR HIKING INFRASTRUCTURE USERS IN THE FORESTS OF THE KRKA NATIONAL PARK
Matija Landekić, Ivan Martinić, Mario Sporčić
Forestry Faculty of Zagreb University, Department of Forest Engineering, Zagreb, Croatia
- A-0015** LOW-COST GNSS APPLICATIONS TO AREA SURVEYING UNDER FOREST CANOPY: POSSIBILITIES AND LIMITATIONS
Tetsuhiko Yoshimura¹, Yasushi Suzuki²
¹Faculty of Life and Environmental Science, Shimane University; ²Faculty of Agriculture and Marine Science, Kochi University
- A-0016** AUTOMATIC GENERATION OF SHALLOW DITCH NETWORK IN FOREST USING LIDAR DATA AND MULTISPECTRAL SATELLITE IMAGERY
Raitis Melniks, Janis Ivanovs, Andis Lazdins
Latvian State Forest Research Institute "Silava", Salaspils, Latvia
- A-0021** SMART SENSING TECHNOLOGY FOR PREDICTING FOREST ROAD'S BEARING CAPACITY
Franz Holzleitner¹, Michael Fritz¹, Wolfgang Sokol², Fritz Zott³, Christian Kanzian¹
¹Institute of Forest Engineering, Department of Forest and Soil Sciences, University of Natural Resources and Life Sciences, Vienna, Austria; ²Institute of Hydraulics and Rural Water Management, Department of Water, Atmosphere and Environment, University of Natural Resources and Life Sciences, Vienna, Austria; ³Institute of Mountain Risk Engineering, Department of Civil Engineering and Natural Hazards, University of Natural Resources and Life Sciences, Vienna, Austria

- A-0024** AN INNOVATIVE TIMBER FELLING SYSTEM BASED ON JAPAN'S TRADITIONAL TECHNIQUE
Yuko Shirai
Keio University, Tokyo, Japan
- A-0025** APPLICATION OF MODERN TECHNOLOGY FOR TREE GROWTH MONITORING
Narongdet Detkong, Nopparat Kaakkurivaara, Roongreang Poolsiri
Department of Forest Engineering, Faculty of Forestry, Kasetsart University, Bangkok, Thailand 10900
- A-0027** NATURAL LANGUAGE PROCESSING AND IDENTIFYING CHARACTERISTICS OF JAPAN'S REGIONAL FORESTS, FORESTRY AND POLICIES
Ryotaro Okada, Yuko Shirai
Keio University, Tokyo, Japan
- A-0028** THE EFFICACY OF CHONDROSTEREUM PURPUREUM IN THE SPROUT CONTROL IN MECHANIZED PRE-COMMERCIAL THINNINGS
Tiina Laine¹, Leena Hamberg², Veli-Matti Saarinen¹, Timo Saksa¹
¹Natural Resources Institute Finland (Luke), Suonenjoki, Finland;
²Natural Resources Institute Finland (Luke), Helsinki, Finland
- A-0034** LOGGING PLANNING VIA AERIAL FOREST SURVEY
Angkana Thongkam, Nopparat Kaakkurivaara, Payattipol Narangajavana
Department of Forest Engineering, Faculty of Forestry, Kasetsart University, Bangkok, Thailand
- A-0048** INCORPORATING STAND PROPERTIES AND BUCKING OBJECTIVES FOR BUCKING-TO-DEMAND HARVESTING
Jukka Malinen, Markus Mennala
University of Eastern Finland, School of Forest Sciences, Joensuu, Finland
- A-0058** THINNING OPTIMIZATION IN BEECH POLE STANDS
Domen Arnič¹, Jurij Diaci², Janez Krč³
¹Slovenian Forest Institute, Department of Forest technique and Economics, Ljubljana, Slovenia, ²Universiti of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Forest Resources, Ljubljana, Slovenia



- A-0059** LOG DETECTION BASED ON DEEP CONVOLUTIONAL NEURAL NETWORKS
Kengo Usui, Masahiro Mozuna, Takumi Uemura, Masahiko Nakazawa
National Research and Development Agency Forest Research and Management Organization Forestry and Forest Product Research Institute, Tsukuba, Japan
- A-0064** BEST PRACTICE HARVESTING PROCEDURES TO MEET NATURE PROTECTION REQUIREMENTS IN GERMANY
Ute Seeling, Hans-Ulrich Dietz
Kuratorium für Waldarbeit und Forsttechnik, Gross-Umstadt, Germany
- A-0065** UNLOCKING THE POTENTIAL OF HARVESTER ON-BOARD-COMPUTER DATA IN THE SOUTH AFRICAN FORESTRY VALUE CHAIN
Marius Terblanche, Simon Ackerman, Pierre Ackerman
Stellenbosch University, Stellenbosch, South Africa
- A-0069** ESTIMATION OF FOREST ROAD NETWORK MAINTENANCE COST CONSIDERING COLLAPSE RISK : AN APPLICATION IN THE JAPAN MOUNTAINOUS REGION
Masaru Watanabe, Masashi Saito, Hiroaki Shirasawa, Tatsuhito Ueki
Shinshu University Graduate School, Ina, Japan
- A-0074** OAK LACE BUG IN EASTERN SLAVONIA (CROATIA), INTEGRATED FOREST PROTECTION IN FSC CERTIFIED FORESTS AND PRECAUTIONS IN OAK TIMBER PRODUCTION
Milivoj Franjević, Antonija Kolar, Andreja Đuka, Boris Hrašovec
Faculty of Forestry, University of Zagreb, Zagreb, Croatia
- A-0075** THE EFFECT OF TREE PLANTATION-MANAGING TECHNOLOGIES ON BIODIVERSITY
Nóra Szigeti, Imre Czupy, Andrea Vágvölgyi
University of Sopron, Faculty of Forestry, Institute of Forests- and Environmental Techniques, Sopron, Hungary
- A-0076** TIMBER HARVESTS DUE TO ABIOTIC AND BIOTIC DAMAGE BY THE EXAMPLE OF EGERERDŐ PLC.
Viktória Papp¹, László Babiczki², Szilárd Gréedics², Dóra Szalay¹
¹University of Sopron, Sopron, Hungary; ²Egererdő Plc., Eger, Hungary

- A-0078** DATENBASIS WALDARBEIT - PLANNING TOOL FOR AVERAGE TIME CONSUMPTION AND COSTS OF STANDARDISED FOREST WORKING PROCEDURES
Markus Dög¹, Andrea Hauck², René Maxeiner³
¹Georg-August-Universität Göttingen, Abt. Forstökonomie, Göttingen, Germany; ²Kuratorium für Waldarbeit und Forsttechnik e.V., Groß-Umstadt, Germany; ³Georg-August-Universität Göttingen, Abt. Arbeitswissenschaft und Verfahrenstechnik, Göttingen, Germany
- A-0080** DEVELOPING AND EVALUATING LOGISTICS CHAINS WHEN USING DEBARKING PROCESSOR HEADS (DEBARKING HEADS II)
Andrea Hauck¹, Jochen Grünberger¹, Bernd Heinrich¹, Joachim B. Heppelmann^{2,3}, Ute Seeling¹, Stefan Wittkopf²
¹Kuratorium für Waldarbeit und Forsttechnik e.V., Gross-Umstadt, Germany; ²University of Applied Science Weihenstephan-Triesdorf, Freising, Germany; ³Department of Ecology and Ecosystem Management, Technical University of Munich, Freising, Germany
- A-0082** FOREST WORK IN THE TROPICS IN THE FOCUS OF WORK SCIENCE
Siegfried Lewark
Chair of Forest Work Science, University of Freiburg, Germany
- A-0085** DENDROMASS4EUROPE (D4E) - SECURING SUSTAINABLE DENDROMASS PRODUCTION WITH POPLAR PLANTATIONS IN EUROPEAN RURAL AREAS
Natascia Magagnotti, Raffaele Spinelli
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¹University of Banja Luka, Faculty of Forestry, Bosnia and Herzegovina; ²University of Ljubljana, Biotechnical faculty, Department of Forestry and Renewable Forest Resources, Slovenia



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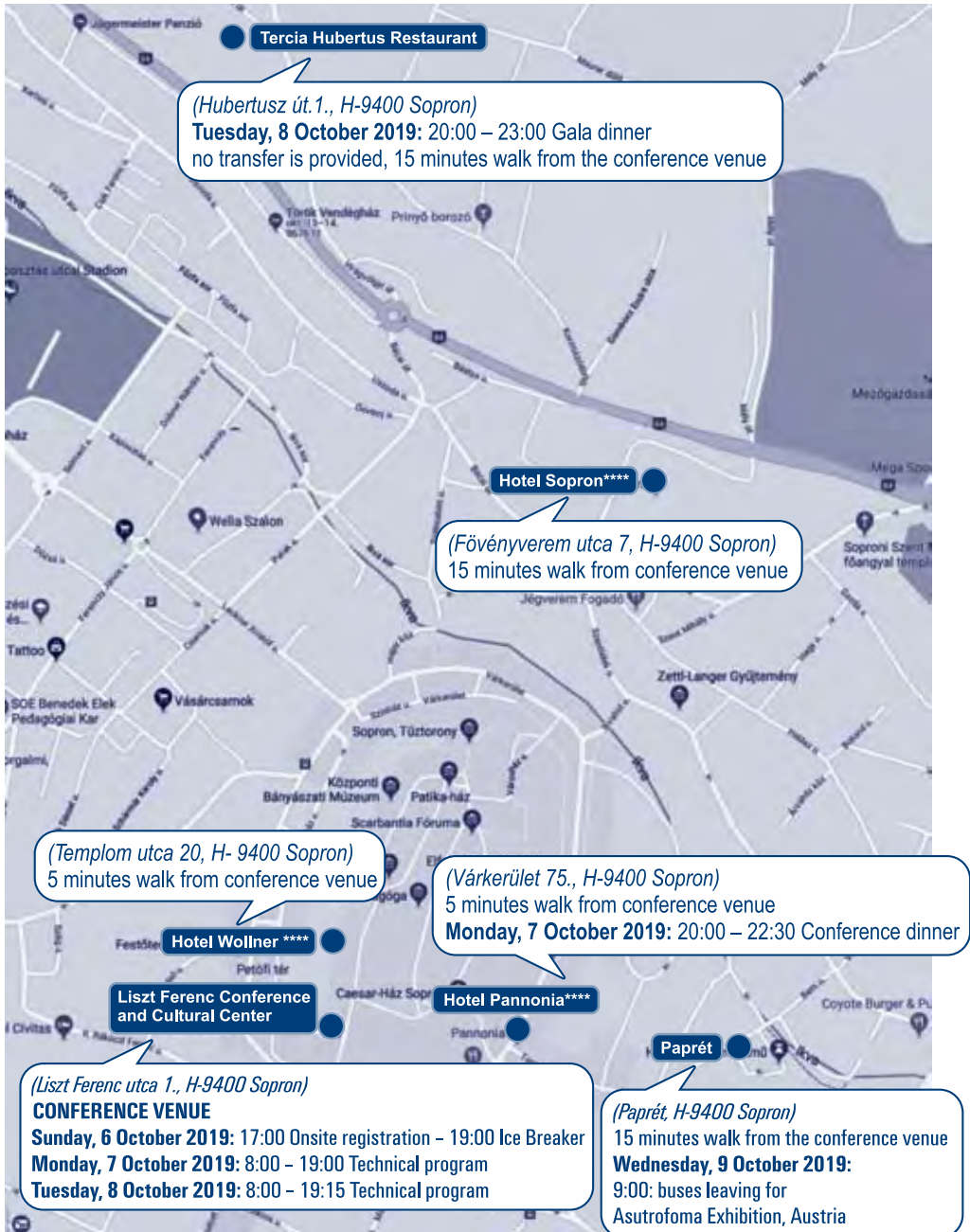
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