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28-29 September 2021

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IUFRO Division 5.04.13
Industrial Engineering, Operations Analysis and Logistics

proudly presents

IUFRO DIVISION 5.04.13 PRESENTATION
&
SPECIAL PRESENTATION ON THE ADOPTION OF INDUSTRY 4.0 IN THE WOOD PRODUCTS MANUFACTURING INDUSTRY

Moderated by

Professor Dr Scott Leavengood
Deputy Coordinator, IUFRO Div. 5.04.13
Oregon State University
Department of Wood Science and Engineering, Oregon State University, USA

Welcoming Remarks by

Ts. Dr Judith Gisip
Coordinator, IUFRO Div. 5.04.13
Universiti Teknologi MARA
Faculty of Applied Sciences, Universiti Teknologi MARA, Malaysia

PARALLEL SESSION 1

28 SEPTEMBER 2021, 22:30-23:30 PM UTC

Time Zone North and South America

28 SEPTEMBER 2021 / TUESDAY 3.30 PM CORVALLIS, OREGON, USA
28 SEPTEMBER 2021 / TUESDAY 6.30 PM BLACKSBURG, VIRGINIA, USA
29 SEPTEMBER 2021 / WEDNESDAY 6.30 AM SHAH ALAM, MALAYSIA
29 SEPTEMBER 2021 / WEDNESDAY 12.30 AM VIENNA, AUSTRIA

OPPORTUNITIES OF HARDWOOD LUMBER IN MASS TIMBER

Professor Dr Henry J. Quesada
Deputy Coordinator, IUFRO Div. 5.04.13
VIRGINIA TECH
Department of Sustainable Biomaterials, Virginia Polytechnic Institute & State University, USA

INDUSTRY 4.0 AND SECONDARY WOODWORKING FIRMS: PERCEPTIONS AND EXPERIENCES IN NORTH AMERICA

Professor Dr Urs Buehlmann
VIRGINIA TECH
Department of Sustainable Biomaterials, Virginia Polytechnic Institute & State University, USA

PARALLEL SESSION 2

29 SEPTEMBER 2021, 03:45-04:45 AM UTC

Time Zone Asia, Asia-Pacific, Oceania

28 SEPTEMBER 2021 / TUESDAY 8.45 PM CORVALLIS, OREGON, USA
28 SEPTEMBER 2021 / TUESDAY 11.45 PM BLACKSBURG, VIRGINIA, USA
29 SEPTEMBER 2021 / WEDNESDAY 11.45 AM SHAH ALAM, MALAYSIA
29 SEPTEMBER 2021 / WEDNESDAY 5.45 AM VIENNA, AUSTRIA

REQUIREMENTS AND CHALLENGES ON DEVELOPING DIGITAL TWINS IN INDUSTRIALISED HOUSEBUILDING INDUSTRY

Professor Dr Manfred Gronalt
Deputy Coordinator, IUFRO Div. 5.04.13
BOKU
Institute of Production Economics and Logistics, University of Natural Resources and Life Sciences Vienna, Austria

THE STATUS OF TECHNOLOGY APPLICATION IN THE MALAYSIAN FURNITURE INDUSTRY AND ITS READINESS TO INDUSTRY 4.0

Professor Dr Jegatheswaran Ratnasingam
UPM Universiti Putra Malaysia
Faculty of Forestry & Environment, Universiti Putra Malaysia, Malaysia

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PROGRAM

PARALLEL SESSION 1

28 SEPTEMBER 2021, 22:30-23:30 PM UTC

28 SEPTEMBER 2021 / TUESDAY 3.30 PM CORVALLIS, OREGON, USA
28 SEPTEMBER 2021 / TUESDAY 6.30 PM BLACKSBURG, VIRGINIA, USA
29 SEPTEMBER 2021 / WEDNESDAY 6.30 AM SHAH ALAM, SELANGOR, MALAYSIA
29 SEPTEMBER 2021 / WEDNESDAY 12.30 AM VIENNA, AUSTRIA

22:30-22:40 pm UTC — ***Scene setting by Prof. Dr Scott Leavengood***
Deputy Coordinator, IUFRO Div. 5.04.13, Director, Oregon Wood Innovation Center, Oregon State University, USA

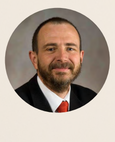
22:40-22:45 pm UTC — ***Welcoming Remarks by Ts. Dr Judith Gisip***
Coordinator, IUFRO Div. 5.04.13, Senior Lecturer, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia

22:45-22:50 pm UTC — ***Photography Session***

22:50-23:05 pm UTC — ***Opportunities of Hardwood Lumber in Mass Timber***

Professor Dr Henry J. Quesada
Deputy Coordinator, IUFRO Div. 5.04.13
Professor, Department of Sustainable Biomaterials
Virginia Polytechnic Institute & State University, USA

23:05-23:20 pm UTC — ***Industry 4.0 and Secondary Woodworking Firms: Perceptions and Experiences in North America***



Professor Dr Urs Buehlmann
Professor, Department of Sustainable Biomaterials
Virginia Polytechnic Institute & State University, USA

23:20-23:30 pm UTC — ***Question & Answer Session***

PARALLEL SESSION 2

29 SEPTEMBER 2021, 03:45-04:45 AM UTC

28 SEPTEMBER 2021 / TUESDAY 8.45 PM CORVALLIS, OREGON, USA
28 SEPTEMBER 2021 / TUESDAY 11.45 PM BLACKSBURG, VIRGINIA, USA
29 SEPTEMBER 2021 / WEDNESDAY 11.45 AM SHAH ALAM, SELANGOR, MALAYSIA
29 SEPTEMBER 2021 / WEDNESDAY 5.45 AM VIENNA, AUSTRIA

03:45-03:55 am UTC — ***Scene setting by Prof. Dr Scott Leavengood***
Deputy Coordinator, IUFRO Div. 5.04.13, Director, Oregon Wood Innovation Center, Oregon State University, USA

03:55-04:00 am UTC — ***Welcoming Remarks by Ts. Dr Judith Gisip***
Coordinator, IUFRO Div. 5.04.13, Senior Lecturer, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia

04:00-04:05 am UTC — ***Photography Session***

04:05-04:20 am UTC — ***Requirements and Challenges on Developing Digital Twins in Industrialised Housebuilding Industry***

Professor Dr Manfred Gronalt
Deputy Coordinator, IUFRO Div. 5.04.13
Professor, Institute of Production Economics and Logistics
University of Natural Resources and Life Sciences Vienna, Austria

04:20-04:35 pm UTC — ***The Status of Technology Application in the Malaysian Furniture Industry and Its Readiness to Industry 4.0***

Professor Dr Jegatheswaran Ratnasingam
Professor, Faculty of Forestry & Environment
Universiti Putra Malaysia, Malaysia

04:35-04:45 am UTC — ***Question & Answer Session***

Ts. Dr Judith Gisip
Faculty of Applied Sciences, Universiti Teknologi MARA, Malaysia

Biography

Judith Gisip joined Universiti Teknologi MARA (UiTM) in 2005 and is currently a senior lecturer of Eco-Technology Program at the Faculty of Applied Sciences, UiTM Shah Alam, Selangor. She worked as a research assistant under the Wood Machining and Tooling Program at North Carolina State University, USA and conducted tool wear research at the Department of Forestry and Natural Resources, Purdue University, USA. Her current research interests are in the areas of automation in wood-based industry and additive manufacturing. She teaches CAD/CAE/CAM Technology for Eco-Products Manufacturing and Technology Entrepreneurship at UiTM. Judith holds a Diploma in Wood Industry from UiTM Jengka Campus, Pahang, B.S. in Furniture Technology from UiTM Shah Alam, M.S. from Purdue University, and a Ph.D. in Forest Biomaterials from North Carolina State University.

Professor Dr Scott Leavengood
Department of Wood Science and Engineering, Oregon State University, USA

Biography

Scott Leavengood is Director of the Oregon Wood Innovation Center at Oregon State University (OSU), USA. The center is a joint initiative of OSU's College of Forestry and the OSU Extension Service. Scott has been with OSU since 1994. His primary job duties are related to industrial outreach which includes providing technical assistance to wood products firms and assisting entrepreneurs. He also teaches a course on advanced manufacturing. Scott has a B.S. in Wood Science from Colorado State University, M.S. from OSU, and a Ph.D. in Engineering Management from Portland State University.

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SPEAKERS & TOPICS

PARALLEL SESSION 1

28 SEPTEMBER 2021, 22:30-23:30 PM UTC

Professor Dr Henry J. Quesada
Department of Sustainable Biomaterials, Virginia Polytechnic Institute & State University, USA

Biography

Henry Quesada, is a Professor at the Department of Sustainable Biomaterials at Virginia Tech. A 2002 and 2004 alumnus of Purdue University, Henry works in the areas of Supply Chain Management, Operations Research, International Marketing, Lean Thinking and Environmental Impact applied to the Forest Products industry. He has been awarded over $4.5 million in grants and contracts as principal and co-principal investigator and has published over 50 peer-reviewed articles. He is currently the Director of the Center for Forest Products Business at Virginia Tech and the president-elect of the Society of Wood Science and Technology (SWST). Henry also provides professional services as a consultant and expert witness.

Professor Dr Urs Buehlmann
Department of Sustainable Biomaterials, Virginia Polytechnic Institute & State University, USA

Biography

Urs Buehlmann works in the area of manufacturing systems engineering and business competitiveness. He practices and promotes Lean as a way to improve business results and assists industry in Virginia and beyond. He holds a Ph.D. and an MBA from Virginia Tech, an industrial engineering degree from Bern University of Applied Science in Switzerland and a cabinet making degree from the professional school in Thun, Switzerland.

Dr Matthew Bumgardner
Northern Research Station, USDA Forest Service, Delaware, OH, USA

Biography

Matthew Bumgardner, is a Forest Products Technologist with the USDA Forest Service, Northern Research Station. He has been a scientist with the Forest Service for 22 years working in Princeton, WV and Delaware, OH. Prior to joining the Forest Service, Matt worked in the plywood industry in Texas. He holds a Ph.D. in Forest Products Marketing from Virginia Tech, as well as degrees in Forestry and Policy from Ohio State. Matt conducts and publishes research addressing markets, trade, and economics for hardwood lumber and various secondary wood products.

Opportunities of Hardwood Lumber in Mass Timber

Henry J. Quesada, Department of Sustainable Biomaterials, Virginia Polytechnic Institute & State University, USA

This presentation will go over the main issues preventing hardwood lumber in the US and Canada access to the mass timber market. In addition, updates on the work conducted at Virginia Tech to overcome these issues will be presented.

Industry 4.0 and Secondary Woodworking Firms: Perceptions and Experiences in North America

Urs Buehlmann, Department of Sustainable Biomaterials, Virginia Tech, Blacksburg, VA, USA
Matthew Bumgardner, Northern Research Station, USDA Forest Service, Delaware, OH, USA

Industry 4.0 could help improve the competitiveness of the North American woodworking industry. Adoption of the principles of Industry 4.0 may challenge the woodworking industry, however, due in part to the relatively small size and scale of many firms in the industry. A study was conducted in late 2019 to assess the perceptions and experiences of secondary wood manufacturers concerning Industry 4.0, or more broadly the digitization/computerization of their manufacturing operations. Digitization is increasing in both large and small wood products operations, but many companies lack a long-term plan or vision on how to integrate Industry 4.0 technology into their businesses. The study was a joint effort by Virginia Tech, the USDA Forest Service, and Woodworking Network/FDMC.

PARALLEL SESSION 2

29 SEPTEMBER 2021, 03:45-04:45 AM UTC

Professor Dr Manfred Gronalt
Institute of Production Economics and Logistics
University of Natural Resources and Life Sciences Vienna, Austria

Biography

Manfred Gronalt, studied Business Administration at the University of Graz and received his doctorate in Production Management from the Vienna University of Economics and Business Administration. During his time as an assistant and lecturer at the University of Vienna, he worked on concepts for production planning and control in electronics assembly. Since 2002, he has been Professor of Business Administration in the Timber Industry at the University of Natural Resources and Life Sciences, Vienna, Institute of Production Economics and Logistics. Current work includes computer-aided layout planning and advanced planning in production.

Professor Dr Jegatheswaran Ratnasingam
Faculty of Forestry & Environment, Universiti Putra Malaysia, Malaysia

Biography

Jegatheswaran Ratnasingam, is currently the Professor of Furniture Manufacturing & Management (FMM) at the Faculty of Forestry & Environment at Universiti Putra Malaysia. He has been in the Asian furniture industry for more than almost 15 years, before making his way into academia. He has published extensively in the field and is regarded as a leading expert in sustainable and competitive wood products manufacturing. He is the advisor to several trade organizations as well as national agencies in the field of wood products manufacturing. His present focus of research is in the areas of sustainable wood products industry, IR 4.0, and the circular economy.

Requirements and Challenges on Developing Digital Twins in Industrialised Housebuilding Industry

Manfred Gronalt, Institute of Production Economics and Logistics, University of Natural Resources and Life Sciences Vienna, Austria

The industrialised housebuilding industry is a steady growing business in the forest-based sector. In order to cope with increasing customer expectations, production must be continuously improved. This applies not only to new materials and components used and new pre-processing, joining and assembly methods applied but also the development of digital tools for production planning and control. Digital twins work with a replica of the real manufacturing. They can analyze a resource bottleneck before they actually occur and reschedule the plan. This presentation will show our works and pathway on developing such a twin. We focus on the following pillars: a) integrated data warehouse, b) simulation-based optimization of production lines and c) real time date-based rescheduling. The results show how digital twins are supporting production and capacity planning in this industry.

The Status of Technology Application in the Malaysian Furniture Industry and Its Readiness to Industry 4.0

Jegatheswaran Ratnasingam, Faculty of Forestry & Environment, Universiti Putra Malaysia, Malaysia

This paper will provide an overview of the current level of automation in the Malaysian furniture industry and assess the readiness of the industry towards the concept of Industry 4.0. It will also reveal the relationship between size of companies and their readiness to invest in technology, and the main technologies that is presently adopted. The presentation will also highlight the development of an M.Sc. program on Industry 4.0 for the wood and furniture industry in Malaysia, through the EU funded Erasmus+ program. The result from the Malaysian survey will also be compared against the results from the regional survey in terms of Industry 4.0 adoption.