

From the Editor

New age of discovery in wood science

Heräjärvi H. (2019). New age of discovery in wood science. *Silva Fennica* vol. 53 no. 2 article id 10216. 2 p. <https://doi.org/10.14214/sf.10216>

Development of aircrafts, driven by the wars and internationalization of trade and travelling, dramatically boosted scientific research of wood a century ago. Proper metals being still under development, airplane fuselage and wing structures were predominantly made of wood – a widely available material with reasonable strength-weight ratio. Unlike the competitor materials of those times, the stiffness of wood was only little influenced by rapid temperature fluctuations of even 80 degrees Celsius. Moreover, the ability of wood to absorb and withstand vibrations, g forces, and other mechanical shocks caused by, e.g., changes in air pressure, made it a material of great interest in the early days of aviation. Wood science pioneers gave their best to develop materials and structures that would meet with the highest possible standards, crucial for the survival of the pilots. This work laid foundations to understand the performance of different wood species in different orthotropic directions and environmental conditions, and to minimize the effects of wood's inherent flaws. In addition, fundamental models were developed on the fatigue and creep behaviour of wood and structures made of it. Wood modification, i.e., property engineering, and wood gluing took substantial steps ahead. Although wood was replaced in aircrafts by other materials with better performance and more uniform properties just some decades later, the fundamental wood science work did not lose its value. The legacy of Mosquito is still visible in everyday use of wood in architecture, civil engineering, and design.

Just now, we are living the new age of discovery in wood science. Instead of physics, the greatest research and development efforts are now allocated in wood chemistry. Bio-refineries, conventionally known as pulp mills, separate and further process more and more compounds out of wood, replacing non-renewable or environmentally problematic materials in the markets. Products other-than-pulp help to stabilize the effects of fluctuation in pulp demand, providing the bio-refining industries with wider shoulders to face the challenges of business cycles. Expectations on some wood chemistry products are based on their small volume yet extremely high unit value, others on huge volumes with moderate unit value. Replacing fossil oil-based plastics in packaging, or cotton-based fabrics by cellulose-derived materials, represent volumetric magnitude of markets that would instantly fill the gap caused by the decrease in paper demand, and much more. In the huge modern bio-refineries, each of the hundreds of different products of a single factory is produced not only cost-effectively but also with extremely low environmental impact per unit produced. Every new bio-refinery, in fact, potentially reduces the global environmental load by lowering the bar to close

down the less efficient but more polluting old production elsewhere. Wood science is, however, not limited to chemistry in bio-refining. Protecting solid wood products against biological organisms, fire, sunlight, and water has been topical for centuries. Ecologically sound yet still effective wood protection methods – a combination full of challenges – need to be developed because the environmentally harmful chemical protection agents have been or will soon be banned. Thermally modified wood, an innovation of Finnish origin, represents an inspiring success story in this field.

Wood products stand tall in the frontline of the megatrend of sustainability. Normative guidance is one way to change the consumer behaviour towards more sustainable choices. The other one relies on voluntary changes driven by growing environmental consciousness among the young consumer generations, in particular. The change towards more sustainable consumption indicates surprising power and speed both in developed and developing countries. Eventually, it is the information with scientific quality assurance that makes the real changes in both normative guidance and voluntary consuming habits. Silva Fennica counts on that and welcomes submissions of wood science and technology related manuscripts to save the planet!

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