NEXT GENERATION OF WOOD CONSTRUCTION IN BRITISH COLUMBIA

Guido Wimmers¹

ABSTRACT: This presentation will explore the 4 most influential trends in wood construction in British Columbia over the last 5 years and introduces some important examples as well as describes the upcoming developments including a new academic program to support the industry.

KEYWORDS: Passive House, Energy Efficiency, Solid Wood, Prefabrication, Tall Wood Structures

1 INTRODUCTION

British Columbia’s wood products and forestry industry has had certainly their ups and downs over the recent years. Weaker phases in the economy and the mountain pine beetle took their toll but new products such as CLT and truly high performance buildings such as Passive House have also created a new market and pointed the way into the future. After the first Passive House in Canada and also the first solid wood construction, the Austria House for the Olympic Games was built in Whistler in 2009, slowly but surely a new branch of the industry immerged. Today BC has a CLT manufacturer, currently the tallest wood building in Canada with 7 floors built with CLT only, the currently highest density of the most energy efficient buildings, so called Passive Houses, in the country including single family houses, larger residential and even commercial buildings. Furthermore a significant interest in wooden high-rises was sparked and prefabrication lifted to the next level.

2 NEW TRENDS IN BC’s WOOD CONSTRUCTION INDUSTRY

The new trends and developments in BC’s Wood Construction Industry can summarized in 4 major fields:

2.1 PASSIVE HOUSE

Passive House is the most ambitious internationally recognized Energy Efficiency Standard, established about 25 years ago in Europe and since then scientifically well evaluated and developed. Energy Consumption of Passive House Buildings are generally 70-90% lower than Canadian average. Passive House was introduced to Canada with the Austria House for the Olympic Games and has since then developed into a movement from coast to coast, with BC as the incubator for this new level of quality. Today Passive Houses in BC are already build as single family, multifamily and production facilities, high-rises, schools and office buildings are currently in process.

2.2 NEW MATERIALS AND COMPONENTS

To achieve generally higher performance levels new materials and components are needed. Increasing the insulation values and airtightness of the envelope significantly influences vapour diffusion. High drying out potential is crucial for a durable high performance envelope and vapour diffusion open wood fibre boards as the last layer before the ventilation cavity of the façade are currently the material of choice for most high performance buildings.

From an energy efficiency perspective excellent performing windows are crucial as well since the windows are usually the main source of heat losses in the façade and only with those Passive House can be achieved or Net-Zero buildings can be built in a cost efficient way.

¹ Guido Wimmers, University of Northern British Columbia, 333 University Way, Prince George, Canada. Email: guido.wimmers@unbc.ca
2.3 PREFABRICATION

To build cost efficient and reduce construction time on site and to reduce risks and damages due to moisture during the construction period as well as to increase the necessary accuracy for higher performing buildings prefabrication is lifted to a new level. With the positive side effect that waste is drastically reduced in the entire process the complete envelope of smaller buildings can be installed in a matter of a few days. That increases cost efficiency, durability and overall quality as well as performance of the buildings.

2.4 Tall Wood Buildings

Different methods of solid wood panels were introduced to BC in the Austria House in Whistler, diagonal doweled panels as well as CLT. Solid wood panels have several advantages such as thermal mass, structural capabilities, noise reduction etc. CLT in particular becomes recently more popular to be used for tall wood buildings. One important example is the Wood Design Innovation Centre in Prince George.

3 MASTER OF ENGINEERING IN WOOD DESIGN

To foster and support these new trends and developments a new engineering program at the University of Northern British Columbia is currently in the start-up phase. The “Master of Engineering in Wood Design” Program, base in the Wood Innovation enter in Prince George, will focus on newest developments in the timber and wood product industry and contribute through a variety of research projects in the field of tall wood structures, prefabrication and advances materials to support the engineering and construction industry as well as the producers of materials and components. The program will not only focus on wood design but as it comes naturally with the material and the motto of UNBC we will also focus on sustainability, advanced envelope design and highly energy efficient buildings. The worlds most advanced energy efficiency standard “Passive House” will be part of the curriculum as well. To create this kind of leading edge academic program a quite unconventional approach was chosen by offering lectures and courses by international experts in their field in block seminars and condensing the program into a very intensive tri-semester frame over 12 consecutive months including a strong focus on laboratory work as well as research and project related content.

The program itself will be based in the new Wood Design Innovation Centre which is with 7 floors currently the tallest wood building in Canada. The WDIC is entirely build with cross laminated timber, includes beside numerous offices several lecture rooms as well as a lecture theatre but most importantly a laboratory to work with and research new materials and types of connections and constructions. This all together offers a perfect incubator for creativity and innovation and will contribute to Canada’s forestry and wood product industry.

4 CONCLUSIONS

The next generation of Wood Construction in British Columbia will be much more energy efficient and some of them taller than anything before. Over the next 5-10 years we will probably see the industry transforming and a leap towards sustainability will be taken. To accomplish that also much more research and education has to be offered.