

Contemporary timber-frame construction systems in Poland.

KATARZYNA MYDLARZ

Department of Economic and Wood Industry Management, Poznan University of Life Sciences

Abstract: *Contemporary timber-frame construction systems in Poland.* The article presents basic information concerning directions of the wooden building development during the ages. There were presented modern technological solutions used in wooden building in Poland.

Keywords: Timber framing, modern technologies

INTRODUCTION

Timber is a raw material which has been used by man for hundreds of years. Due to adequate technical parameters, easy processing and general accessibility it has also been used as construction material. First shelters built some 70 thousand years ago were built based on timber frame (*Pudlis 2005*).

Despite sustained technological development and new materials timber is still widely used. It is popular and appreciated. Although it is one of the oldest raw materials in the world it still inspires. It is used in traditional constructions and its huge potential facilitates creating ever new solutions also in unconventional timber building.

HISTORY OF TIMBER FRAMING

The use of timber dates back to Paleolithic times. The range of its use depended mainly on the type of climatic zone. As the raw material with very good insulation, it has been used mainly in northern geographic zones as well as places of mild climate (*Mielczarek 1999*).

Due to its technical parameters timber was used in construction. It has been used to create whole towns, defense walls, as well as bridges, gates and road surface. First shelters some 70 thousand years ago were built based on timber frame (*Pudlis 2005*).

Using timber for house construction was also popular in German carpentry. That technology was very characteristic for the region. Its beginnings date back to the 7th century and its popularity stems from the very economical timber management. The feature characteristic for this type of construction was filling the timber skeleton with cheaper and more common materials e.g. clay mixed with chaff or fascine, and from the 17th – 18th century bricks (so called Prussian wall). That type of construction, also called brick nogging wall or brick and stud work, developed mainly in Germany and England, and the period of its main glory in Central Europe falls on the 16th and 17th centuries. Still in 18th century special administrative regulations forced timber usage in East Prussia. From the late Medieval times few brick nogging constructions from the West commonly known as half-timbering, started to appear in Poland as well (*Trocka-Leszczynska 2001*).

Timber construction has been forming throughout the centuries. Timber was used to erect various types of buildings: temples, houses and farms. In Poland, originally, the most popular and characteristic was log construction. In the second half of the 19th century buildings in so called vertical-post log construction appeared and during the interwar period the first notes on using Canadian and American techniques could be found (*Czajkowski 1987*).

Despite its significance for construction timber was replaced in time by other materials. It was the consequence of technological development which resulted in recognition of all novelty appearing on building market as more interesting and useful. In the fifties of the 20th century as the result of forest damage caused by the first and second World Wars the then state authorities implemented strict regulations, limiting timber usage especially in

building industry. Those sanctions as well as contemporary fire regulations to a large extent weaned both the builders as well as the buyers away from timber resulting in a visible decrease in its usage (*Drewno dla budownictwa* 1996).

Only the beginning of the eighties of the former century witnessed again a gradual promotion of timber and construction methods based on timber. Especially light timber framing created by an Englishman William Manning was widely propagated. He was the one who in the thirties of the 19th century described the idea of a timber-framed house. This technology at the beginning of the 20th century was brought by English settlers to North America. The thirties due to an intensive economic growth saw its rapid development. As a consequence size standards for construction elements have been introduced and the distance between wall posts to which the size of filling materials have been adjusted. An American construction system called timber-frame have been created (*Historia budownictwa szkieletowego* 2003).

Another figure who played a key role in the development of timber-frame construction was Swedish architect and professor of The Academy of Fine Arts Frederik Bloom, who approximately 10 years before William Manning described the idea and the rules of manufacturing timber-frame houses. Joining both concepts (Bloom's and Manning's) was the beginning of a new industry based on prefabrication of timber-frame houses. Manning's concept dominated North American countries while Bloom's system developed mainly in Scandinavia. Both ideas started intensive work aimed at developing and improving light timber-frame technology. They facilitated creating its numerous variations, due to which the technology is still popular and developed across the world (www.budownictwo.info.pl – 2010).

MODERN TECHNOLOGIES IN TIMBER-FRAME CONSTRUCTION

In Poland quite apart from typical ways of constructing timber house innovative technologies are also implemented. Taking into consideration current trends in houses construction numerous producers of timber homes use new building ideas. They are most often the result of the urge to improve technical and heat parameters. Those initiatives are the response to the ever growing energy costs and the need to come up to buyers expectations concerning energy efficient buildings. Not only clients needs but also shortage of wood as well as its ever growing prices are taken into consideration while searching for new technological solutions. Therefore for the last few years one may observe not only new technologies emerging on Polish market but also the trend for improving traditional timber construction systems.

One example of such solutions is Kronopol system, which has been created based on traditional technology of timber-frame construction. The system launches modern constructing solutions simultaneously using contemporary wood materials. It has been created to be used in prefabricated building systems where massive wood has been replaced by so called I-beam. This beam becomes the major building load-bearing element, which complies with certain technological requirements at the same time facilitating using the cheaper material. Kronopol system also uses modern insulation material drawn up by the company called - kronotec MDF. Both construction and insulation material as well as ready-made product that is prefabricated houses are manufactured within the same company which from the economic side of production process is very cost efficient not just for the company itself but as a result also for the clients (www.kronopol.pl. – 06.07.2010).



Picture. 1 House construction using Kronopol system.
Source: www.kronopol.pl – 06.07.2010

Yet another innovation is launching onto the market so called mobile homes. They are made using the technology of light timber frame. In such case building frame is put onto special metal construction set on wheels. Such solution makes possible the transport of the building and placing it in the site selected by the investor. What is important here from the point of view of building regulations is that there is no need for obtaining any building permission, which greatly speeds up and facilitates the moment of putting the building in place. Since transport of the house significantly limits its dimensions in certain situations regarding special size requirements it is possible to assemble a few buildings to form one entity (www.domymobilne.pl – 02.07.2010).



Picture. 2 Examples of mobile houses.
Source: www.abrex.pl – 06.07.2010

Another interesting concept is modular system also called spacious, creating the most advanced method of buildings' pre-fabrication. Intensive development of that technology, mainly in western European countries and the USA, is the result of ever growing trend to move all possible work out of the building site - Off-Site Construction. In Poland the potential of this technology is not yet used however the opportunities it creates makes its full development very likely. In less advanced modular building individual elements form separate rooms while in the most advanced ones modules embrace half of the building or even the whole storey (www.apexhomesusa.com - 06.07.2010).



Picture. 3 Examples of modular houses built by Apex company
Source: www.abrex.pl – 06.07.2010

Also interesting and modern solution is HBE technology that uses gluelaminated timber for building houses. Until recently such wood was used mainly for large-size constructions. Now it is being used as the construction element of ceilings, roof and walls or as in case of HBE technology for building whole houses. The companies which use gluelaminated timber to build houses are most often also the producers of such timber.

Therefore their aim is to combine both profiles of their production to form one efficient system and use the potential given by streamlining their production capacity. An important factor here is also using the cheaper raw material. All those aspects have a vital impact on improving production efficiency which results in a lower price of the completed house.



Picture. 4 Building home using HBE technology
Source: www.konsbud.com – 06.07.2010

Aforementioned systems of building timber houses, despite their small share in the overall number of all construction activities, belong to the most popular innovative solutions in our country. They are not the only new technologies used in Poland and the opportunity of getting familiar with them is possible mainly due to the information distributed by the producers themselves.

CONCLUSION

Conventional timber construction created strong and stable foundation for the development of modern building technologies. Therefore one may observe contemporary technologies using solutions from the previous centuries. Skillful combination of for-centuries-reliable timber construction with contemporary building techniques facilitates using modern finishing materials in carefully selected building design.

However timber construction does not belong to the most popular means of building in Poland its steady improvement may be the proof of consumers' demand for innovative solutions. Despite the fact that the latest trends very often differ from methods used centuries ago still special unique character of traditional timber construction determines compulsory directions in the development of modern technologies in timber construction.

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Streszczenie: *Współczesne systemy budownictwa drewnianego w Polsce.* W pracy przedstawiono ogólne informacje na temat historii budownictwa drewnianego, które ewoluując na przestrzeni wieków stworzyło stabilne fundamenty dla rozwoju nowoczesnych technik budowy. Zaprezentowano współczesne rozwiązania technologiczne dla budownictwa drewnianego stosowane w Polsce, zwracając jednocześnie uwagę na kierunek ich zmian i nowe trendy.

Corresponding author:
Katarzyna Mydlarz
Poznań University of Life Sciences,
Department of Economic and Wood Industry Management,
ul. Wojska Polskiego 38/42,
60-627 Poznań,
Poland
e-mail: kmydlarz@up.poznan.pl