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PART 1 - Construction history and survey of historic timber roofs

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Cover illustration: Lattice roof trusses in the nave of Jät church, Småland, Sweden, 1225–1226 by Robin Gullbrandsson.

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HISTORIC TIMBER ROOFS IN BELGIUM: OVERVIEW OF MATERIALS AND STRUCTURES (1150-1960)

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Louis Vandenabeele

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Abstract

Belgium has a remarkable heritage of historic timber roofs that can be traced back to the 12th century. This contribution provides a review of 60 years of research on Belgian timber roofs and outlines their developments from 1150 to 1960. The focus is firstly put on wood resources, a crucial parameter for roof construction in a scarcely forested landscape. Then, the evolution of structural concepts over 800 years is discussed based on illustrations of remarkable roofs. Moreover, this broad overview raises several questions that open up new prospects for future investigations.

Keywords

Historic roof construction, Timber, Historic woodlands, Trade, Wood qualities, Carpentry, Heritage, Belgium.

Louis Vandenabeele
Institute for Preservation and Construction History (IDB)
ETH Zürich, Zurich (Switzerland)

e-mail: vandenabeele@arch.ethz.ch

1. INTRODUCTION

From the late middle ages to the creation of a modern state in 1830, the Belgian territories passed successively under the ruling of Burgundy, Spain, Austria, France, and the Netherlands. In modern history, this small strip of land descending steadily from the Ardennes forest towards the North Sea went from a forerunner of the industrial revolution to a colonial empire and a battlefield of two World Wars. The turbulent history of Belgium has inevitably swept away a significant share of its built heritage, with wooden structures on the front line. Yet plenty of timber roofs have survived arsons and bombings and provide a tangible testimony to a fragmented history.

This contribution provides a broad overview of timber roof construction in Belgium between 1150 and 1960, based on a review of the research carried out on this topic in the last 60 years. To summarize this long period in a comprehensive way, this review focuses on two key aspects in light of the most recent findings: the supply of timber and the evolution of roof types. Additional topics are introduced along with these two aspects, opening the path for further explorations through the bibliography.

1.1. PRINTED SOURCES

The interest in historic timber roofs grew during the 19th century with the Gothic revival movement and the construction of national identities. New light was shed on medieval timber structures in neighboring countries through publications by architects such as Augustus W. N. Pugin, Eugène E. Viollet-le-Duc, and Friedrich Ostendorf. In Belgium, architect Pierre F. Langerock compiled several volumes on important Flemish buildings in the 1880s, with particular attention to roofs (Fig. 1) [1]. In daily practice, the Gothic revival encouraged numerous Belgian architects to document and copy "national" medieval roofs, as exemplified by the works of Henri Beyaert and Pierre V. Jamaer in the second half of the 19th century.

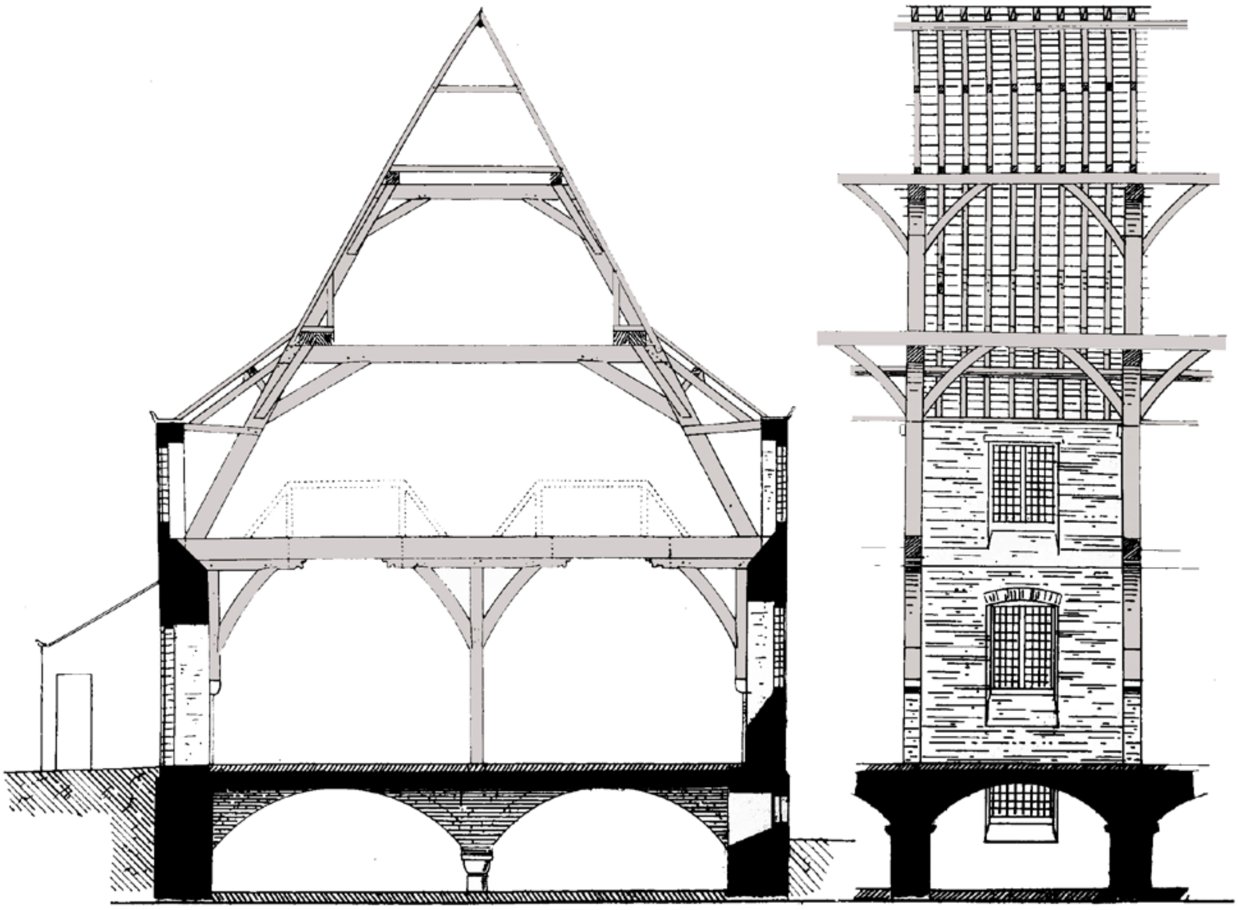

Fig. 1. *The roof of the Groot Vleeshuis in Ghent (1408-1417). (Image source: Langerock (1887) [1], adapted by the Author).*

Furthermore, a valuable source of information on carpentry typically lies in treatises aiming at theorizing and divulging this craft. These books emerged in 17th century France with authors like Mathurin Jousse (1627); two centuries later, their number soared with Johann K. Krafft (1805), Amand-Rose Emy (1837), Paul-Joseph Ardant (1840) [2], and many others. In 19th century Belgium, authors like Armand Demanet (1847) [3] and Eugène J. D. Roffiaen (1858) [4], both engineers and professors at the Military Academy of Brussels, published detailed insights into local construction. Unfortunately, illustrations of Belgian roofs are rare in such publications, as these engineers mostly copied French and British examples.

1.2. HISTORICAL RESEARCH

In 20th century Belgium, publications on Romanesque and Gothic architecture by Lemaire (1906) [5] and Brigode (1950) [6] brought to light numerous medieval timber structures in the provinces of Brabant and Hainaut. However, a thorough analysis of timber roofs in the vein of French architect Henri Deneux (1927) emerged only later with a study on medieval roofs in the old county of Flanders by Janse and Devliegher (1962) [7, 8]. Despite difficulties in dating some structures accurately, the authors proposed the first documented evolution of roof types and carpenters' marks. After years of field work, Janse further contributed to documenting some Flemish cases in his monumental publication on historical timber roofs in the Netherlands [9].

The obstacle of precise dating was brought down by dendrochronology (i.e., the analysis of tree rings), revolutionizing the study of historic timber structures following its wider use in the second half of the 20th century. In Belgium, the possibility to date precisely wooden elements was first applied on a large number of roofs by Hoffsummer (1989) [10] to establish a typological evolution in the basin of the river Meuse, Belgium's main timber trading route. This work paved the way for two further publications on the evolution of roof types supported by absolute dating – thereby establishing new dendrochronological curves and dating numerous historic buildings – which extended the study area successively to Wallonia [11] and Northern France and Belgium [12, 13]. It is worth underlining that the later works provided the first nationwide overview of roof types from the 12th century onwards.

In the last two decades, a renewed interest in the documentation and the rehabilitation of historic timber structures led to a large number of studies. To name but a few, researchers have focussed on specific buildings [14–17], building techniques [18, 19], on cities [20, 21] and regions [22]. These works focused mostly on the middle ages and, to a lesser extent, on the early modern period. They contributed not only to the detailed description of hundreds of roofs but also to broaden the scope of research from building archaeology to the history of trade and construction, with growing attention to timber supplies and building contexts. Further investigations have extended the research scope to timber structures of the 19th and early 20th centuries [23, 24]. Moreover, since 2013, a multidisciplinary team of experts has undertaken a research project on timber roof frames from the 12th to 19th century in the Brussels region [25–27].

As can be seen, research on historic timber roofs is rather active in Belgium. Universities and heritage agencies play an active role in documenting this type of built heritage, as shown by the steady number of publications, reports, and colloquiums in the last decade. Since the elevation drawings of Langerock, the field has evolved to encompass a broad context: forestry, supply networks, knowledge, tools, marks, use of iron, etc. The increasing use of dendrochronology has undeniably contributed to this development, making roofs a key element for the documentation and dating of the built heritage.

2. MATERIAL SUPPLY

The Belgian territories, independently from their ruling power, have always faced unequal access to wood resources, resulting in intricate supply networks. As there can be a considerable distance between a roof and its supply woodlands, the documentation of ancient trade routes and the identification of woodcutting areas rely on two strategies. On the one hand, in the last two decades, the application of dendroprovenancing (i.e., the use of dendrochronology to locate the origin of trees based on similar growth conditions) on roof structures has considerably advanced the understanding of timber supplies since the middle ages, providing unprecedented insights into the evolution of trading and forest management. On the other hand, with the potential of narrowing down the origin of trees to specific places, archival material can provide crucial evidence in this area of research, especially in light of on-site findings like shipping marks.

2.1. LOCAL FORESTS

The deep Ardennes forests, described by Petrarch as «inhospitable and wild woods where men at arms go at great risk» (Original text: «boschi inhospiti et selvaggi onde vanno a gran rischio uomini et arme») in 1333, have provided a chief source of hardwood as far as one can trace. For example, early archaeological evidence is given by the tie beams of the roof of the Church of St-Denis in Liège, cut in 1012-1019d, from oaks that grew for more than 300 years in a dense forest [15]. In the middle ages and through the early modern period, the vast majority of roofs erected in Southern Belgium consisted of locally-sourced oaks, which were floated on the river Meuse and its tributaries [11].

North of the Meuse basin, woodlands were scattered as early as the 12th century, although some have subsisted, such as the Sonian Forest near Brussels (Fig. 2). In this part of Belgium, woods were generally less dense than in the Ardennes forests, resulting in shorter and knottier trees that characterize traditional carpentry in Brabant [22]. Towards the end of the middle ages, increasing clearings led to the production of trees showing a faster growth rate, a trend clearly visible not only in Hainaut and Brabant but also in the Ardennes region [28]. In the vicinity of Brussels, although oak from the Sonian forest or the Meuse basin was always preferred for the largest spans until the turn of the 19th century, ongoing investigations have shown that its

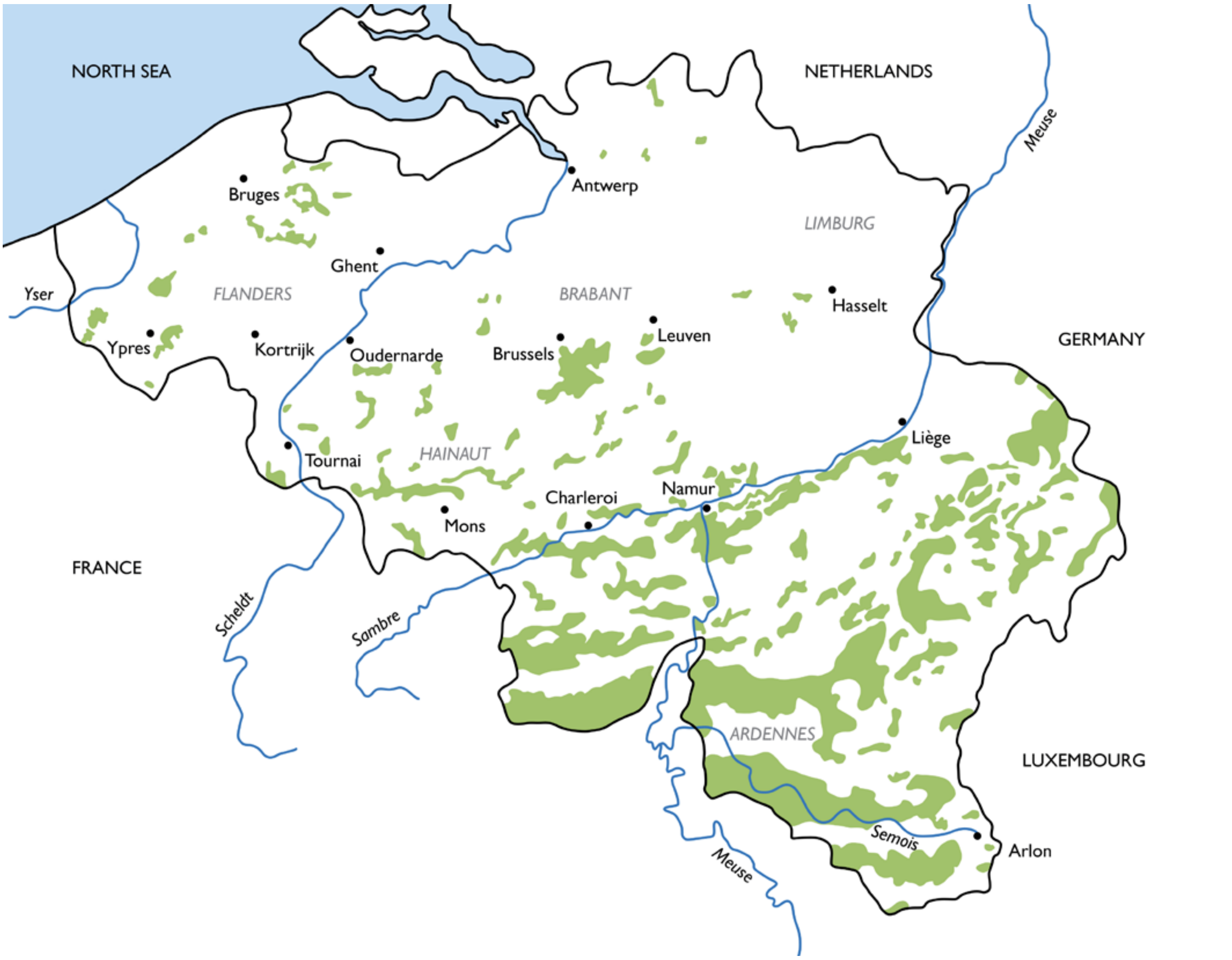

Fig. 2. *Schematic map of Belgium showing its woodlands in the 1770s according to the maps of Joseph de Ferraris. (Drawn by the Author).*

scarcity forced the introduction of many other species in vernacular architecture, such as elm, alder, and poplar [25].

2.2. URBAN FLANDERS

The supply of wood was more precarious in Flanders, one of the most urbanized parts of Europe, where intensive deforestation had already occurred in the 10th century. Towns like Ghent, Bruges, Ypres, Oudenaarde, and Antwerp required large quantities of long and straight grain timbers that could hardly be found in the immediate surroundings. Therefore, from the 13th century onwards, these cities turned towards Dordrecht, where merchants could purchase high-quality timber [29]. Strategically situated in the delta of the Meuse and the Rhine, the Dutch city received rafts descending from both the Ardennes forests and the woody Rhine basin. From there onwards, timber could be floated along the coastline towards Flemish ports. Dendrochronological and archival evidence attest to this trade, highlighting the predominant use of oak from the Meuse basin. The oaks used in the prestigious Flemish roofs of St John's Hospital in Bruges (1226-1241d), in the Bijloke Hospital in Ghent (1251-1255d), and in the Church of Our Lady in Damme (1283-1298d, 1299-1337d) were all sourced from Southern Belgium [20, 30, 31]. Furthermore, clear traces of floating squared timbers on the Meuse have been recorded in many Flemish roofs, with timbers having holes that enabled the assembly of rafts with ropes and marks affixed by merchants (Fig. 3) [29].

2.3. BALTIC TIMBER

As early as the 13th century, high-quality oaks were shipped from Gdansk to Bruges for shipbuilding and art objects [32, 33]. This long tradition of overseas timber trade proved crucial when local woodlands dwindled to unprecedented levels in the first decades of the 19th century. Indeed, only the immense forests of the Baltic Sea region could meet the rising demand of early-industrialized countries like Great Britain, France, and Belgium. Over the course of the century, there was a tenfold increase in foreign timber imports into Belgium, the majority of which did not consist of oak but Scots Pine (*Pinus Sylvestris L.*) [24]. After being floated on rivers, wood was squared or sawn and shipped by boat to Antwerp (predominantly) from the coastline of the Baltic Sea and Norway. After breaking with the traditional use of oak, softwood became more common in Belgian carpentry. The inversion of traditional timber flows was facilitated by the development of railways from the 1830s onwards, enabling the transport of wood from Antwerp to all parts of the country, including its most southern provinces.

The depletion of Belgian woodlands initiated in the middle ages was brought to a halt around 1850. Indeed, despite a growing population, the century-old trend was reversed in the second half of the 19th century by a combination of factors: the transition from charcoal to mine coal, plantation campaigns (mostly pine and spruce), stricter forestry regulations, and a tremendous increase in foreign timber imports [34].

In Belgian buildings, the ubiquitous use of Baltic timber is not only characterized by a change in wood species but also by records of shipping marks (Fig. 3). These widespread marks were scribed, hammered-stamped, or painted (as still the case today) on timber passing through Norwegian and Baltic ports. The interpretation of these signs referring to wood qualities, dimensions, merchants' names, and ports of shipment can provide straightforward information about the sourcing of the material and its properties [35]. Furthermore, the Baltic origin of modern Belgian roofs has also been established by dendroprovenancing, a first example being the sheds of an industrial site in Brussels (1835-1851d) which were linked to forests in central Sweden [36].

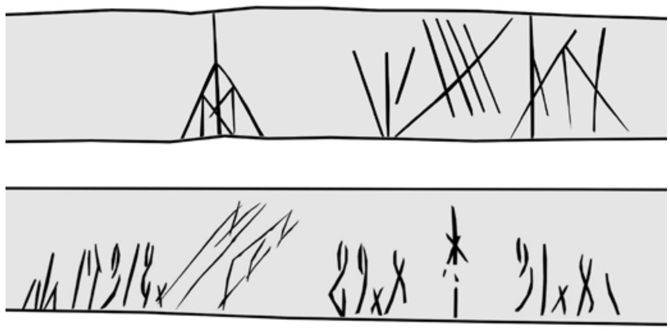

Fig. 3. *Transport marks recorded on timber roofs in Belgium. Top: City hall of Bruges (1278-1288d), local oak [29]. Bottom: St Peter's Church in Jette (1878-1880), Pinus Sylvestris shipped from Gdansk [24]. (Drawn by the Author).*

3. ROOF STRUCTURES

From a structural point of view, the most direct access to Belgian timber roofs from the medieval and early modern periods lies in the typological classification of Hoffsummer [12, 13]. In this general overview, Hoffsummer has offered 45 sections of Belgian roofs among 300 cases. The dissertation of Vandenabeele (2018) [24] covers the modern period, with a hundred structures built between 1800 and 1914. Besides these nationwide overviews, in-depth insights are provided for particular regions and cities through the works of Hoffsummer (1995) [11] in Wallonia, Nuytten in Brabant, Van Eenhooge, et al. (2018) in Bruges and Broothaerts (2021) [21] in Vilvoorde. In the near future, these studies will be completed by an inventory of roof frames in the Brussels region [27].

3.1. COMMON RAFTER ROOFS, ALSO CALLED "SINGLE-FRAMED ROOFS"

The oldest-known timber roofs in Belgium cover the Cathedral of Our Lady in Tournai (1138-1148d) (Fig. 4A) and the Church of St Barthelemy in Liège (1141-1151d) (Fig. 4B) [12, 16]. In Liège, the tie beams of the Church of St Denis (1012-1019d) show mortices indicating the shape of a previous roof replaced at the end of the 12th century [15]. These early structures found in Romanesque churches are common rafter roofs; they are formed by a dense array of identical oak frames spaced about 1 m apart so that the common rafters directly support the roofing battens without the need for intermediate supports. Each frame consists of a tie beam supporting a series of struts, reaching up to the rafters, which are inclined at about 30°. This simple system presents the disadvantage of consuming a lot of wood, which was increasingly hard to supply.

Around the turn of the 13th century, in the north of France and Germany, a distinction appears between main frames resting on a tie beam and secondary frames without tie beams but only one or several collars in the upper part of the rafters. In Belgium, early examples of these lighter roofs inclined at about 45° can be seen in the churches of St Laurentius in Ename (1170-1180d) and St Vincent in Soignies (1185-1200d) (Fig. 4C) [12]. While this system saves timber and gives room to raise vaults between the tie beams, the common rafters of the intermediate frames are poorly supported – a problem later solved with the introduction of purlins. Visually, the absence of closely arranged tie beams drastically changes the appearance of the roof, which can be turned into a vaulted ceiling interrupted by just a few beams. This solution became frequently applied in 13th century Gothic buildings such as the Church of St Anthony in Liège (1247-1255d) (Fig. 4D) and the Bijloke Hospital in Ghent (1251-1255d). If the horizontal stability of the walls is allowed, the tie beams could also be completely dismissed, as one can see in the chapel of the Bijloke Hospital (1260-1265d) or the Church of Our Lady in Damme (1283-1298d, 1299-1337d) [30, 12].

3.2. PURLIN ROOFS, ALSO CALLED "DOUBLE-FRAMED ROOFS"

The intermediate support of the rafters was improved during the 13th century with the introduction of purlins, or horizontal timbers spanning from frame to frame, which support the secondary frames. With Gothic architecture and the increasing use of slates, the inclination of roofs commonly reached 60° from the mid-thirteenth century onwards. Since such roofs were subjected to larger horizontal wind loads, the purlins helped limit the deflection of the secondary rafters. By connecting the frames and the gable walls, purlins also significantly improved the longitudinal bracing of these structures. In Belgium, proto-purlin roofs can be observed in St John's Hospital in Bruges (1226-1241d) (Fig. 4E) and in the quite similar roof of the Bijloke Hospital in Ghent (1251-1255d), where two couples of plates support the rafters [20]. However, the introduction of these horizontal elements was likely an attempt to provide "raised wall plates" on which to erect the upper part of the roof. Therefore, "real" purlins resting directly on main rafters are found shortly later, also in Flanders, on the roof of the Church of St Walburga in Veurne (1265-1275d) (Fig. 4F). The new arrangement of purlins on rafters, but also the use of diagonal struts transferring the concentrated loads to the king-post, make this roof type a breakthrough. In France, an early example of this system is the roof of the Cathedral of Amiens (1284-1305d) [12]. Moreover, the main frames are connected by a system of crosses which provide an efficient longitudinal bracing.

Later on, the purlin roof also made its way into rural architecture, as exemplified by the imposing barn Ter Doest in Lissewege (1370-1385d) [39]. Whereas these examples still exhibit a combination of purlins and secondary frames, the intermediate structures became increasingly lighter in later developments. In the 15th century, the upper collars connecting the common rafters started to be removed, paving the way for roofs only consisting of main frames, purlins, and simple rafters [12].

3.3. TRAPEZOIDAL PORTAL FRAMES

In the 13th century, trapezoidal portal frames appeared in Flanders, as firstly observed on the roof of St John's Hospital in Bruges (1226-1241d) (Fig. 4E). This characteristic portal frame, called *schaargebint* in Dutch, resembles the English base cruck roof and the later German *Liegender Stuhl*. The *Liegender Stuhl*, which appeared in the late 14th century, differs essentially in the connection between the portal frames and the longitudinal plates, which do not support common rafters (like a purlin) but rather the collar beams or the collars of the secondary frames. Unlike other systems, it requires relatively short pieces of timber as several trapezoidal frames can be piled up on top of each other without in-

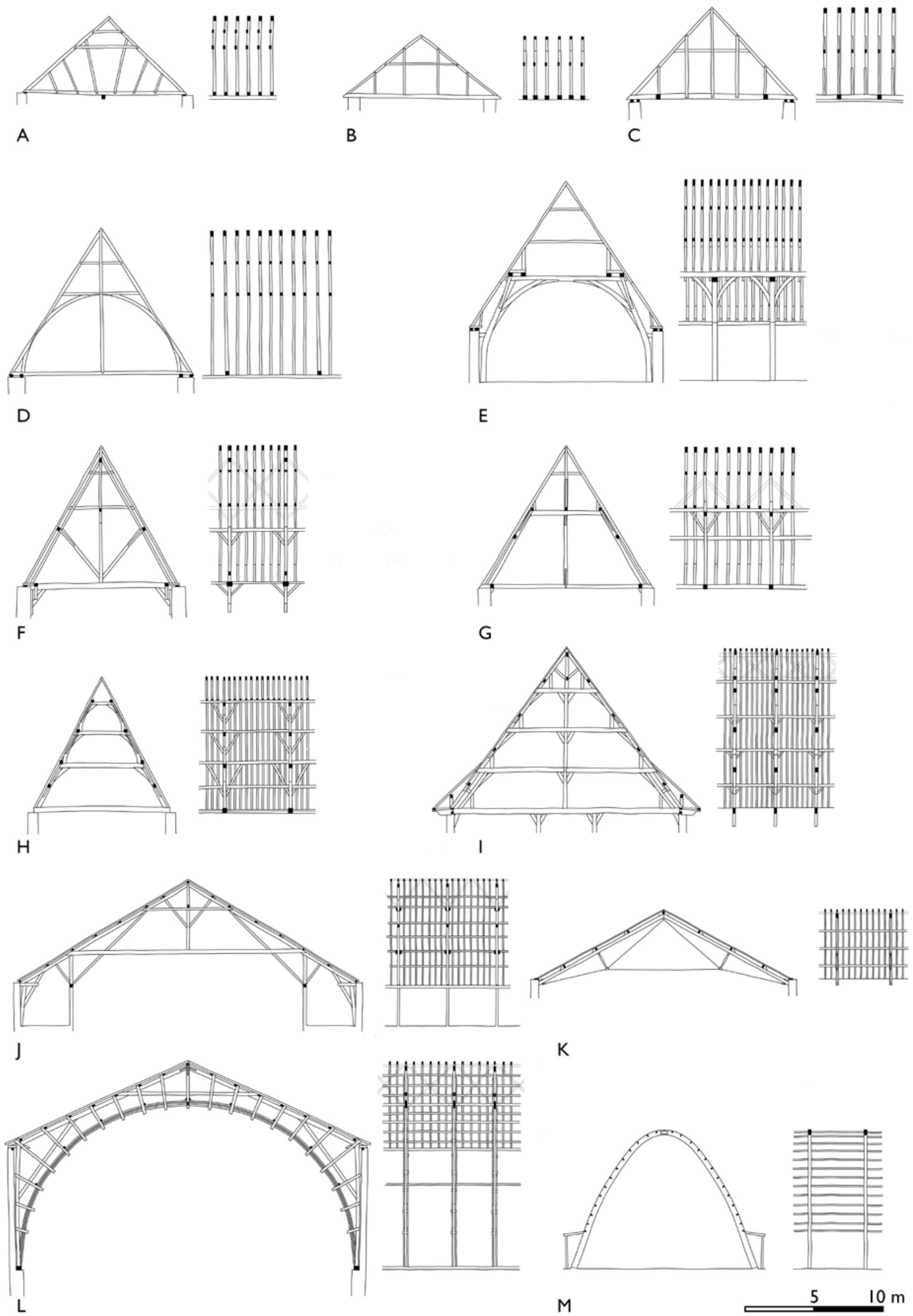

Fig. 4. *Evolution of historic timber roofs in Belgium (1150-1960) illustrated by 13 preserved examples. (Drawn by the Author).* ***A.*** *Cathedral of Our Lady in Tournai (1138-1148d),* ***B.*** *St Barthelemy Church in Liège (1141-1151d),* ***C.*** *St Vincent's Church in Soignies (1185-1200d),* ***D.*** *St Anthony's Church in Liège (1247-1255d),* ***E.*** *St John's Hospital in Bruges (1226-1241d),* ***F.*** *St Walburga's Church in Veurne (1265-1275d),* ***G.*** *St Paul's Cathedral in Liège (1251-1252d),* ***H.*** *Sablon Church in Brussels (1452-1487d),* ***I.*** *Grand Curtius in Liège (1599-1600d),* ***J.*** *Bourla Theatre in Antwerp (1829-34),* ***K.*** *Riding hall in Hermalle-sous-Huy (1856),* ***L.*** *Riding hall in Liège (1837),* ***M.*** *Chapel N-D Reine des Cieux in Watermael-Boitsfort (1956).*

creasing the required length of timbers. In Belgium, the use of this system was particularly well adapted to the shortage of long pieces of oak. After St John's Hospital in Bruges, other early examples of trapezoidal frames covered the Bijloke Hospital in Ghent (1251-1255d), the Cathedral of Saint Paul in Liège (1251-1252d) (Fig. 4G), and the Cathedral of St Michael and St Gudula in Brussels (1274-1275d). The ward of John's Hospital in Bruges (1270-1285d) provides the first example of two stacked levels of trapezoidal portals, opening the way for up to three or four levels in the following centuries. From barns to palaces, this system remained ubiquitous until the modern period. To cite just a few remarkable examples, oak roofs based on this system can be found in the Church of Our Lady of the Sablon in Brussels (1391-1393d, 1452-1487d) (Fig. 4H), in the Groot Vleeshuis in Ghent (1408-1417) (Fig. 1), in the Grand Curtius in Liège (1599-1600d) (Fig. 4I) and the Minimes Church in Brussels (1706-1713d).

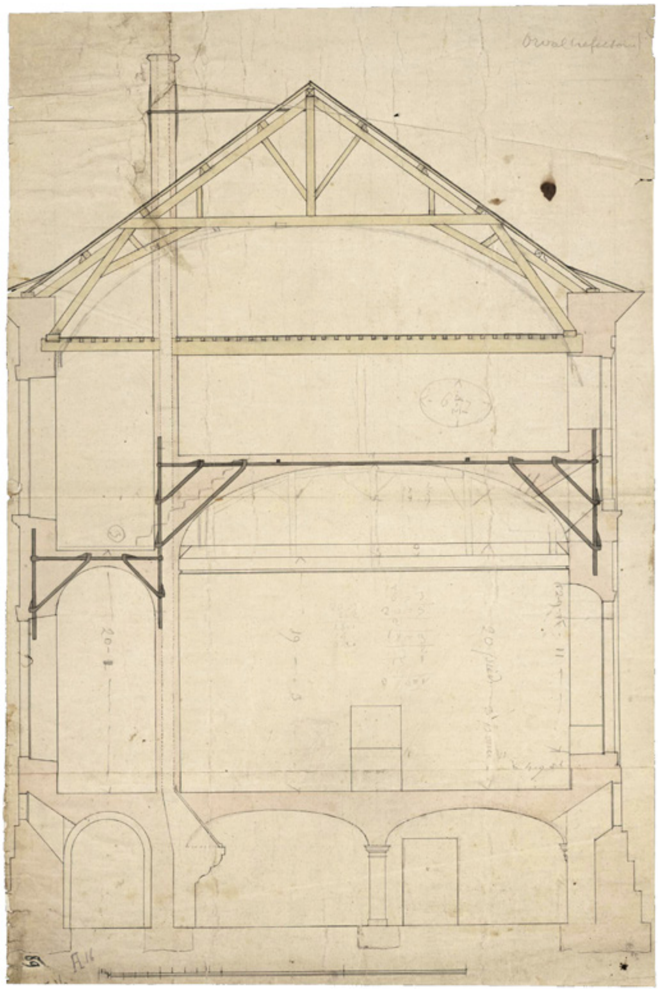

Fig. 5. *Refectory of the Orval Abbey (1768-1776) by Laurent-Benoît Dewez (1731-1812). Iron is not used in the roof but in the masonry vaults. The abbey was destroyed in 1793. (Image source: Algemeen Rijksarchief/Archives générales du Royaume, T006 -89).*

18th century carpentry could certainly deserve further research in Belgium, but at present, there is no indication that major changes occurred during this period. This remarkable stability has been confirmed by recent investigations in Brussels, Bruges, and Vilvoorde [21, 20, 37]. The archive of one of the most successful architects in the Austrian Netherlands, Laurent-Benoît Dewez (1731-1812), provides dozen of plans of Belgian roofs predominantly relying on a trapezoidal portal frame topped by a simple king-post truss (Fig. 5). Despite his observations of queen-post roofs in Italy and his classical influences, the 18th century architect did not apparently introduce new roof types into his homeland. Hence, although many variants can be distinguished, the Belgian "roofscape" is undeniably dominated by trapezoidal portal frames from the 14th to the 18th centuries. The control of carpenters' guilds certainly contributed to this constancy until their organizations were banned under French rule in 1795.

3.4. MODERN ROOFS

The turn of the 19th century marks a break with previous carpentry traditions in Belgium. The Italian king and queen-post trusses, which had started to spread to the rest of Europe during the 17th century, were extensively applied in neighboring countries in the second half of the 18th century to construct theatres with flatter roofs (25-30°). After the Napoleonic wars, French examples provided the inspiration for the roofs of the Monnaie Theatre in Brussels (1818-1819) and the Royal Theatre in Liège (1819-1820) (Fig. 6). While these two roofs were still built in oak, the architect of the Bourla Theatre in Antwerp (1829-34) (Fig. 4J) decided to combine oak and softwood for the short pieces and the longest elements, respectively. As such, in the first decades of the 19th century, the influx of Norwegian and Baltic timber into Belgian harbors initiated not only the gradual replacement of oak with softwood but also the discontinuation of the trapezoidal portal frame suited for material from local forests. These decades of rapid changes also correspond to the fame of French engineers such as Amand Rose Emy (1771-1851) and

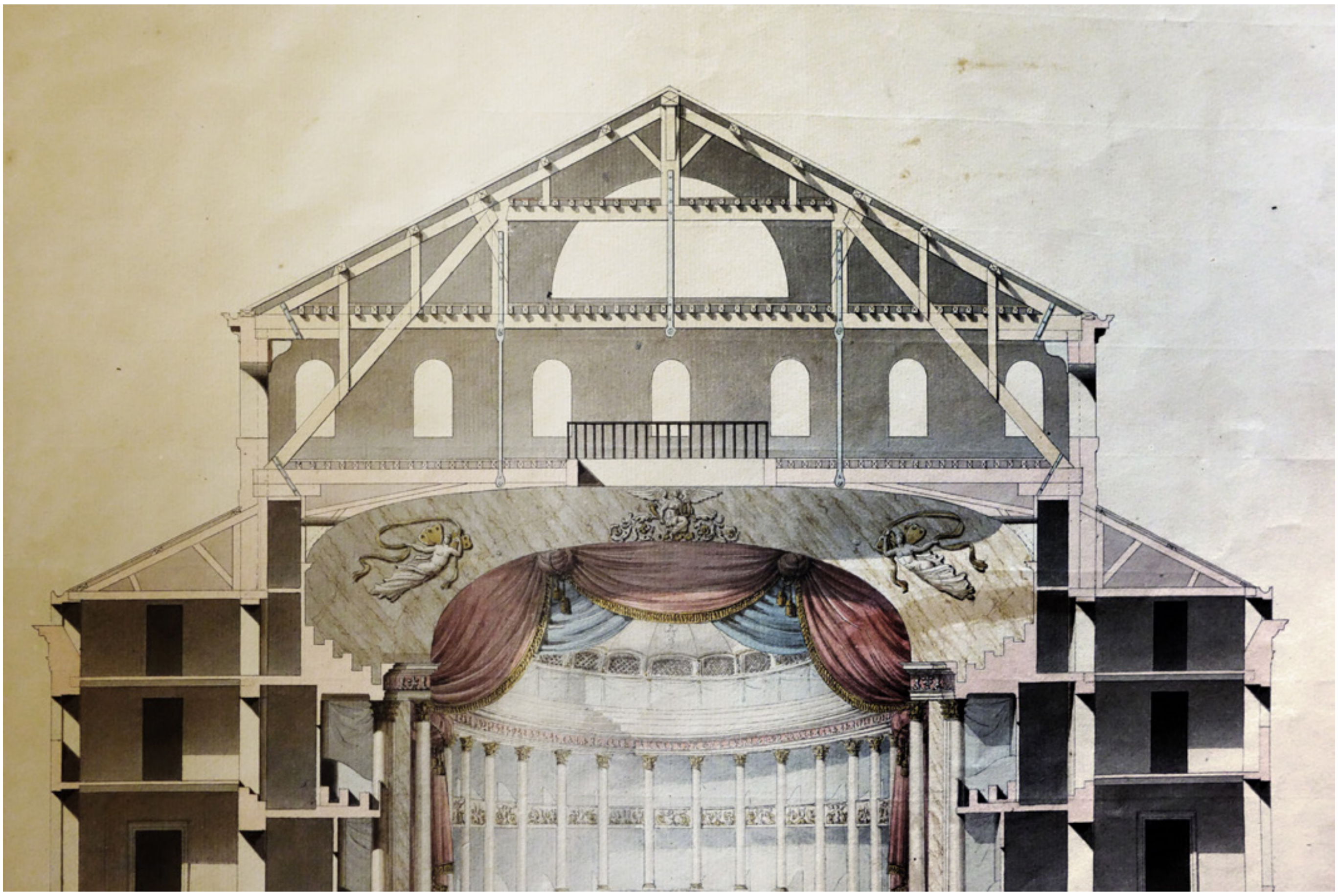

Fig. 6. *Roof of the Royal Theatre of Liège (1818-1820) by Auguste-François-Joseph Dukers (1792-1831). This original roof was demolished only recently. (Image source: Musée de la vie wallonne, Liège).*

Paul-Joseph Ardant (1800-58) [2], who developed and publicized innovative systems for military riding halls. A rare example of this early phase of timber engineering is preserved in the Fonck barrack in Liège (1837) (Fig. 4L), which closely reproduces the system of Emy. Although other wide-span laminated roofs have been lost, smaller examples can still be seen in the Grand Hospice in Brussels (1824-27) and the Hospice des Indigents in Tournai (1842). This second roof faithfully reproduces the system of French architect Philibert de l'Orme (c. 1514-1570) [24].

In the 1840s, iron was introduced to Belgian roof construction. An early example is the Church of St Joseph in Brussels (1842-1849), covered by an entire iron roof [40]. In the second half of the 19th century, timber was not abandoned in roof construction but instead combined with iron to take advantage of the properties of each material. The famous composite system of French engineer Jean-Barthélémy Camille Polonceau (1813-59) was widely applied, for example, in a riding hall at Hermalle-sous-Huy (1856) (Fig. 4K) and in the Centrale Werkplaatsen in Leuven (1863-64). Innovative uses of slender softwood elements and iron ties did not occur without collapses or the need for reinforcements. For example, one collapse occurred shortly after the construction of the Marché du Parc in Brussels (c. 1855), while the roofs of the Bourla Theatre (1829-34), the Fonck barrack (1837), and the Wiertz Museum in Ixelles (1855) were all reinforced. Nevertheless, these unsuccessful designs could be understood and corrected owing to structural analysis.

The second half of the 19th century is consequently characterized by a great variety of roof structures: king-post trusses, queen-post trusses, trusses with timber rafters and iron ties, and trusses inspired by iron structures, among others. Next to the mainstream use of foreign softwood, oak was practically only used when exposed in prestigious buildings, such as the Gothic re-

Fig. 7. *The roof of a chemical factory in Willebroek (1926) built with the German system Kübler. The collapse started in 2013, and the building was torn down in 2017. (Photo by the Author).*

vival Broodhuis in Brussels (1873-95). The introduction of steam-powered sawmills in Northern Europe around 1850 and the increasing standardization of timber formats in the following decades led to faster construction methods relying heavily on iron connectors. Yet, besides simpler joints, no major innovation occurred in Belgian timber construction around the turn of the 20th century, as exemplified by the roofs of the institute St Jean-Baptiste de la Salle in Saint-Gilles (1908) and the panorama of the Battle of Waterloo (1912).

During this time, novelty came from abroad, starting with the German railway hall at the Brussels International Exhibition of 1910. This hall included a 43-meter-long roof built with glued laminated (glulam) arches according to the patent of Otto Hetzer (1846-1911). Although still poorly investigated, it seems that some German systems were imported in the interwar period, such as the roof of a chemical factory in Willebroek (1926) based on the patent of Karl Kübler AG (Fig. 7) [24]. However, it was only in the 1950s that glued laminated timber was produced in Belgium by the firm De Coene in Kortijk. The chapel Notre-Dame Reine des Cieux built by the company in Watermael-Boitsfort (1956), is seemingly the last standing example from this period (Fig. 4M). Two years later, modern timber engineering was truly put forward on display at the Brussels International Exhibition in 1958. De Coene and the Dutch company Nemaho contributed to the construction of numerous temporary structures in glued laminated timber, while the firm SAZ (Scieries Anversoises/Antwerpse Zagerijen) built pavilions according to a system of nailed profiles patented by the Swedish engineer Hilding Brosenius (1905-2004) [23].

4. CONCLUSION

In spite of its turbulent history, Belgium has preserved a remarkable amount of timber heritage that shows the evolution of carpentry at the crossroads of Europe from the 12th century onwards. As highlighted in this contribution, the current state of research allows us to trace an overarching sequence of developments from 1150 to 1960. Starting from dense rafter roofs built with local oaks in the 12th century, the ensuing shortage of wood resulted in an early transition to lighter purlin roofs and the use of short elements in trapezoidal portal frames around the mid-thirteenth century. Regardless of ruling powers and foreign influences, the traditional Dutch portal frame remained deeply rooted in local carpentry practices until the end of the 18th century. The industrial revolution opened a new chapter of timber construction, characterized by replacing local oak with foreign softwood and abandoning traditional roof types. Novel wide-span timber structures were introduced under French influence in the first half of the 19th century, after which Belgian roofs receded from the forefront of innovative timber construction. Engineered timber structures, such as glulam, were imported sporadically from abroad (especially Germany) in the early 20th century and later fully adopted by Belgian builders only in the 1950s.

In the last decades, the undeniable interest in Belgian timber construction has led to a large body of knowledge and growing attention to the preservation of old roofs. However, remarkable modern roofs are still frequently demolished or replaced due to poor recognition of their heritage value. Thus, there is still much to be done in terms of research and preservation, especially regarding roofs erected in the last 300 years. As highlighted in this broad overview, interesting topics for further research could be the early challenges to traditional types in the 18th century and the introduction of foreign systems in the 20th century. Moreover, as many important roofs have been destroyed – the French Revolution and the two World Wars bear a large part of this responsibility – further research could include reconstructions from archival material, as recently initiated in Germany [38]. Hence, the growing interest in timber construction and the many historic roofs still discovered each year in Belgium highlight a promising future for this area of research.

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