Remarkable historic timber roofs. Knowledge and conservation practice.

PART 1 - Construction history and survey of historic timber roofs

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Abstract

The article deals with the timber structures of the Clock Tower in Castle Bruntál (Czech Republic). In the text, the development of the Clock Tower is explained, and timber structures are described and classified. Presented knowledge is based on the partial historic building investigation of the roof truss of the castle and the Clock Tower, which was achieved with the help of art history and architectural methods. The constructional solution is explained in the context of towers built at a similar time and the purpose of which was similar as well.

Keywords

Castle Bruntál, Tower, Renaissance, Half-timbered structure, Timber-framed structure.

1. INTRODUCTION

Renovation of the castle Bruntál (Fig. 1) started to be prepared in 2020. Atelier 38 worked out a design “No. A382013 Renovation of the roof of an object of Muzeum in Bruntál” that had been ordered by the Muzeum in Bruntál, a state-funded organization. Even if the castle has been a national cultural heritage since 2002, there is only minimal knowledge about its construction development. Performing partial historic building investigation of the castle focused on the roof truss of the castle, and the Clock Tower was part of pre-design work [1].

2. METHODS

New knowledge of the castle Bruntál was achieved with a set of methods of historic building investigation. These are, first of all, archival search, history of structures, and history of art methods. Employing natural science analyses was principal, especially dendrochronology for dating elements of castle and tower roof truss. The AR-CHICAD images were used, and proficiency in historic building projecting was utilized to mediate obtained knowledge of the structure [18].

3. CASTLE BRUNTÁL

The town of Bruntál was established as the king’s town, probably at the beginning of the 13th century. The precursor of the castle, the town castle Bruntál, dates back
to the first half of the 15th century [2]. From the second half of the 15th century, Bruntál was in the pledge of Lords of Vrbno, who moved their seat there and started to call themselves the Bruntal family of Vrbno. Jan Brunktal of Vrbno the Younger participated in a rebellion of the Bohemian nobility against the Habsburg monarch. After the resistance movement was defeated at the Battle of White Mountain (Schlacht am Weißen Berg, Bitva na Bílé hoře), he left the country, and his property, including Bruntál demesne, was confiscated. In 1621 Bruntál became the property of the Order of Brothers of the German House of Saint Mary in Jerusalem (the Teutonic Order), the Grand Master of which at that time was the brother of the winner of the Battle of White Mountain, the brother of the Roman Emperor and the Czech king Ferdinand II, the Bishop of Wrocław, Charles of Austria (Carl von Österreich) (1620-1624). The demesne was in property of the order on a modified scale until 1848; afterward, the order owned the castle until 1939 [3].

At the end of the Middle Ages, the town castle Bruntál developed into a three-wing building, the northeastern, northwestern, and southern. In the Renaissance period, the town castle was converted into a castle [4], and four pillar arcades were built in the castle courtyard (Fig. 2). In 1764, the castle was destroyed by fire. From 1765 to 1768, a new roof truss was installed [1]. Construction conversion of the castle in the second half of the 18th century is proven by a set of historical designs from Deutschordszens-Zentralarchiv [5].

During the conversion of the central part of the southern wing into a stair hall at the end of the 18th century, proven by design documentation, the roof truss of this wing was converted. In the second half of the 19th century, the ceramic roof covering of the castle was to be replaced by a roofing slate.

When the Grand Master of the order was the archduke Eugen of Austria (Eugen von Österreich), an extensive repair of the castle was performed. Corbels were installed in the roof truss; these corbels served as auxiliary structures and helped to operate scaffolding or platforms for façade conversion. The condition is evidenced by historic photographs of 1913.

Renovation in the Modern age was performed in the second half of the 20th century. The roof of the castle and tower was repaired in 1963. The roof truss was significantly renovated in the first half of the 1990s [1].

4. CLOCK TOWER IN BRUNTÁL – STRUCTURE CHARACTERISTICS

The Clock Tower (Fig. 3) is part of the northwestern wing of Castle Bruntál. It extends the ground plan of the wing into the castle courtyard. The ground plan of the bottom part of the tower is rectangular, while the top part forms an octagon. The roof of the tower is formed by two onion domes and a lantern located between them. The bottom onion dome continues into the plated lantern and the top onion dome. In the lantern, there is a fixed bell in a static position and a bell of 1672 with colored relief of Our Lady, cast by Johan Grosch in Nysa [8]. The top onion dome continues into a finial with a circular tin case. The bottom part of the tower is lined with stones mostly; the upper floors are usually lined with bricks. There is a half-timbered structure in the top part of the tower, the timber parts of which are made of spruce, fir, and larch [6]. The timber framework is located on two top floors of the brick part of the tower and was placed on the inside face (Figs. 3 and 4). The structure is formed by wooden frames and St. Andrew’s crosses between them (Fig. 5). The bottom part of the structure is composed of standard beams. The St. Andrew’s crosses are located in the top part, below the roof truss. The elements are connected with woodworking joints with pegs. Thus, the half-timbered structure can be seen inside only. On the top floor of the brick part of the tower, the timber framework con-
Fig. 3. Castle Bruntál, Clock Tower elevation, the roof of the Clock Tower, Bell with the bas-relief of Our Lady in the Clock Tower. (Photos by the Author, 2020).

Fig. 4. Clock Tower, construction scheme of timber structure. (Drawing, Jakub Sollich, Atelier 38).
of the onion dome is made up with the help of timber sprockets as it was commonplace then. On the roof truss of the tower, there are a few initials and the date “1927” written with paint there. The top onion dome was not accessible when the historic building investigation was performed.

The communication scheme of Castle Bruntál is quite simple. The central vertical communication axis is the Clock Tower. The roof truss of the castle is accessible from two staircases. The first one is located in the tower, and the other leads to the entrance closed with a trap door in the central part of the southern wing. The roof space is divided by gable walls into several fire zones. A timber spiral staircase from the tower can access the roof space.

A right-angled portal into the tower is in the bottom arcade, therefore, at the level of the first floor of the castle. Above the portal is a stone relief with a coat of arms of
Commander Heinrich Karl Alois von und zu Werdenstein (1739-1770). The relief was placed there secondarily.

5. THE RENAISSANCE TOWER IN CENTRAL EUROPE

Timber was common building material applied in the construction of towers in the past. The upper parts of towers were timber-framed or half-timbered from the Middle Ages. In the Early Medieval Period, timber structures of upper parts of habitable towers were recorded, especially in Western Europe [9]. Timber-framed or half-timbered structures were usually used in fortifications to build hoarding (brattice, brattice).

Timber towers can be seen very rarely in European sacral architecture nowadays. They might be compared to bell towers from Western and Southern Europe [19]. An example of such towers can be a recently renovated bell tower in Pembridge in Herefordshire; dendrochronologically dated back to 1207-1223 [17]. Timber-framed towers with slab shuttering were constructed in the Late Medieval Period, mainly in churches [14]. Towers were either timber-framed in their full heights (St. Catherine’s Church, Ostrava - Hrabová), or the timber-framed structure was installed on upper floors only (Štramberk, the tower of a former parish church which was also a tower of a town wall) [11].

There were many towers with various purposes constructed in the 16th century. The amount of available information on the architecture of towers in the 16th century is influenced by a large number of these structures that have been preserved, at least in Central Europe. They are mostly church towers or town towers that served as guard towers or watchtowers as well. These towers might be constructed similarly. Towns often paid for the construction of the church towers since they served as watchtowers and guard towers afterward and were owned by the town. By the Church of St. Thomas of Canterbury, the town had built a tower still in its property. In 1587 the non-Catholic patricians in Nový Jičín paid for the construction of a church tower that served as a guard and watchtower. The Church bought the tower from the municipality in the first half of the 20th century.

Only two objects of similar age have been documented in the Moravian-Silesian Region; the city tower called Hláska (former watchtower) in Opava [15] and the Church of St. Nicolas tower in Bílovec [16]. The upper floor of Hláska in Opava from 1614 was, as well as in Bruntál, constructed with the help of a half-timbered structure on the inside face. The inside structures on the upper floors of the tower are similar to the ones in the tower of the Church of St. Nicolas in Bílovec from 1614-1615. Although the tower has been rehabilitated, the timber framework has not been preserved.

Baroque towers offer interesting structural parallelism. The half-timbered structure was also used in the tower of the Former City Hall in Moravian Ostrava (nowadays Ostrava Museum). This structure was placed on the outside face of the tower; therefore, it was visible from the outside [11].

The development of tower roof trusses is similar to other roof truss structures. Traditional Gothic roof trusses were commonplace in tower roofs by the mid-16th century, as well as in other roofs. The Renaissance brought a new element – Onion domes (structures by Baldassare Maggi in Southern Bohemia). The round shape of these towers is formed by a set of timber centering supported by supporting structures with posts into which the timber centering was fixed afterward [14].
6. RESULTS - THE DEVELOPMENT OF THE CLOCK TOWER IN CASTLE BRUNTÁL

There is no information about the roof of the town castle. The oldest mention of the castle’s roof comes from the 16th century. The principal pictorial source is a map of Bruntál demesne of 1579 [7]. On this map, there is a veduta of the aristocratic seat in Bruntál depicted in quite a simplified form; even then, it had the character of a castle. The age of the hipped roof, with reference to the veduta and the battlemented parapet, is unknown.

Researcher Samek dated the construction of the Clock Tower to the end of the 16th century or the turn of the 16th and 17th centuries [3]. However, the construction of the tower consisted of more phases of building development. The disposition of the tower indicates that the bottom part of the rectangular ground plan, covered with sgraffito work nowadays, is much older than the arcades of the inner courtyard. The bottom floors of the masonry part of the tower date back, according to the disposition analysis, before the 1550s. No tower is depicted on the veduta of the map of Bruntál demesne of 1579 (Fig. 7). However, the veduta might be significantly simplified, and the tower is not necessarily depicted there. Dendrochronological dating confirms that. Since the dendrochronological dating of the timber ceiling on the bottom floors of the octagonal tower failed, its age cannot be defined. The bottom level of the timber framework was constructed after 1577 [6], i.e., when the castle was still the property of the Bruntál family of Vrbno. It might have been built by Hynek Bruntal of Brno the Elder (1559-1596). Above mentioned dating relates to the tower up to the height of the bottom cordon in the octagon. There is no evidence of the appearance of the upper floors or the roof in those days. We may speculate about it being damaged or destroyed by fire; on two posts of this bottom half-timbered, the 4th floor of the octagon, there are signs of burning [1].

The half-timbered structure of the two top floors of the tower indicates that there have been two building phases of the construction. The posts of the framework are doubled; on some plates, there are noticeable mortise holes left by a structure that had been removed; this can be seen in the entry to the upper floor. The top level of the timber framework, i.e. the 5th floor of the octagon with the St. Andrew’s crosses, was added after 1618. We do not know whether it was when the castle was the property of Jan Bruntál of Vrbno and in Heraltice the Younger (1617-1621) or the property of the Teutonic Order.

The age of the tower’s roof, comprising of two onion domes and the lantern, is not certain, either. The construction might relate to the report of 1667 from the Teutonic Order archive, mediated by Ph.D. Niesner. The roof of the castle, covered with ceramic tiles, was repaired then [10]. In the tower’s lantern, a bell was still cast by Johan Grosch in Nysa in 1672 [8]. The bell is fixed in the static position (only the clapper moves) in the tower, as well as another bell in the static position. The age of the roof of the tower can be dated back to the end of the 1660s or the beginning of the 1670s. Two vedutas by Friedrich Bernhard Werner from the first third of the 18th century are a precious source of information on the development of the castle (Fig. 8). These vedutas have been preserved in the form of hand-drawn replicas from 1763 [12]. The time relationship between the shape of the roof truss and Werner’s vedutas is not very straightforward. The drawing has red roofs of the castle and green tower domes. The report from the Teutonic Order archive defines the roof covering as made of fired ceramic; the tower might have been covered with either copper plating with patina or painted shingles.

The fire of the town and castle in 1764 did not threaten the Clock Tower. However, given the three wings of...
In the neighborhood, i.e., in Moravia and Silesia, that are of similar age. It is, especially the city tower Hláska beside the city hall in Opava. The tower is a bit older, its upper floors are also half-timbered, or more precisely, they are timber replicas of the original timber framework from 1614. 

The purpose of the tower in Bruntál seems to be mixed, at least in the Renaissance period. The mortise holes in posts and marks left by round timber might indicate the existence of an inner timber structure. The use of the structure, with regard to good visibility of the courtyard and its neighborhood from this floor, might be defensive and also guarding. I think that this structure was designed only for crossbowmen. The using of the firearms leave traces – blackening caused by smoke. In the mid-seventeenth century, the tower got its current appearance, with two onion domes and a clock, and it served as a bell tower as well. The tower in Bruntál is an exciting example of a polyfunctional tower modified in the 16th and 17th centuries.
8. REFERENCES