Museum Institutions in Monuments - Positive and Negative Aspects of Adaptation: The New Amber Museum and Museum of Science in Gdansk, Poland

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Museum Institutions in Monuments - Positive and Negative Aspects of Adaptation: The New Amber Museum and Museum of Science in Gdansk, Poland

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Abstract. The issue of the creation and location of new museums is a current topic. The decision of where and how to create new museum facilities will impact successful function in the future. Museums are either located in newly designed buildings or in existing buildings. In general, existing buildings adapted for museum use are either formally under conservational protection or not. With regard to museum location in preserved monuments, the author notes that the true impact on authentic monumental building structure still needs intense research. The adaptation of the Great Mill and St. Catherine's Church - two preserved medieval objects located in the historical city center of Gdansk - provide case studies to investigate positive and negative aspects. In both cases, the author carried out architectural projects for the functional purposes of museums: The New Amber Museum and Museum of Science. The author concludes that mutual benefits of adaptation result from: the financial means of the museum institution to invest long-term; the institutional respect of the museum towards heritage, which translates into respect for conservational protection; and the competitive advantage created by the monumental features of the building and the privileged location in a well-established, branded space. Negative aspects result from: space limitations of monuments that disable the museum from extending its exposition and thus prevent institutional development; the overly restrictive requirements of restoration that take priority over the museum mission; and the lack of technically functional space required for contemporary museum technologies, which forces unconventional engineering solutions that are more expensive than the location of the museum in a newly constructed building.

1. Introduction

The issue of creating new museums is a current topic. The interest in museum institutions has probably grown thanks to the redefinition of institutional mission in relation to the public, which significantly increases attractiveness in respect to new users. Improvement to the image of museums is a continuing process that involves discussion on how museum institutions can vastly influence the development of culture and progress at the local, social and economic levels. Aspects of this influence may be both intended and unintended. The decision of where and how to create the facility of a new museum also has an impact on the success of its future function. From an architectural point of view two general directions for the creation of new museums can be observed. A part of museums finds

their seat in newly designed buildings, which are constructed in a way that the structure fully meets the requirements of the museum institution. However, over the last decade, the tendency has grown stronger to locate museum institutions in existing buildings where structural adaptation is required for the implementation of specific functions. In general, existing buildings adapted to museum function fall under two main groups of objects: those not subject to conservational protection and those under lawful protection. The author focuses attention on adaptation processes where the impact of the museum function becomes of special concern, e.g. in cases where the protection of historic value must be accepted as superior to all other activities. To remodel historical buildings according to the educational, research and leisure functions associated with museum use and still comply with conservation is a challenge that generates heated debate among those involved in the process. Concerning the transformation of historical buildings into museums, international participants of the 2011 workshop in Havana, which was organized by the UNESCO Regional Office for Culture in Latin America and the Caribbean, with the support of the Norwegian Embassy in Cuba, noticed that *though this is not a new issue, and we frequently have to deal with refurbishing old buildings that will be devoted to a cultural use, not always do actions match the abovementioned interest, that is, to preserve the building and comply with its museological function and mission*. [1] The author shares this skepticism and notes that the issue concerning impact on the authenticity of monumental building structure when museum function is implemented still needs more in-depth research. Therefore, the author investigates the nature of coexistence between preserved buildings and facilities of museum institutions, and highlights both the positive and negative effects that the contemporary museum location might have on the historical structure of the monument.

The research was conducted on the Great Mill and St. Catherine's Church - two examples of preserved medieval objects located in the historical city center of Gdansk. In 2016, the author prepared architectural projects for adaptation purposes for both of these monumental buildings. Two museum institutions were to be implemented: the new seat of the Gdansk Amber Museum in the Great Mill and the new Museum of Science in the attic of St. Catherine's Church. The design works were carried out in close cooperation with municipal conservation services, the museum governing board, museologists, representatives of the local amber jewellers, a technologist and environmental scientists. The intensive cooperation and practical experience gained in decision-making and carrying out the final design documentation became the basis for the author's intention to define limitations of the adaptation process and also suggest activities that would facilitate achievement of optimal architectural solutions in compliance with imposed preservation conditions. State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

2. Research

The Great Mill

The Great Mill was built in Gdansk around 1350 by the Teutonic Knights. It was the greatest medieval walled industrial facility in Europe. It was located in the center of the old town on an island created at the fork of the main water channel Radunia, which was supplying drinking water to the city. Around 1407, the Great Mill received the spreading, one-storey brick building body with a length of 41m, width of 26m and height of 26m, and which expanded it into the form we know today. A gabled roof (wooden roof structure overlain with ceramic tiles) covered the mill, which had contained a six-level warehouse for grain and milled flour, supported by oak pillars embedded in the stone foundations. The mill had eighteen overshot waterwheels of 5m diameter each - nine on the north and nine on the south facade. Each wheel was connected with transmission rollers moving two millstones (figure 1). In the twentieth century, water turbines were replaced by electric motors. In 1894 the brick walls were restored. At that time the mill was producing over 200 tons of flour a day [2]. Until March 1945, excluding a few short outages, the object was an active mill and served its original function. In 1945, as a result of carpet-bombing by Russian troops, the mill suffered serious damage. Only the circumferential brick walls and gable ends survived.

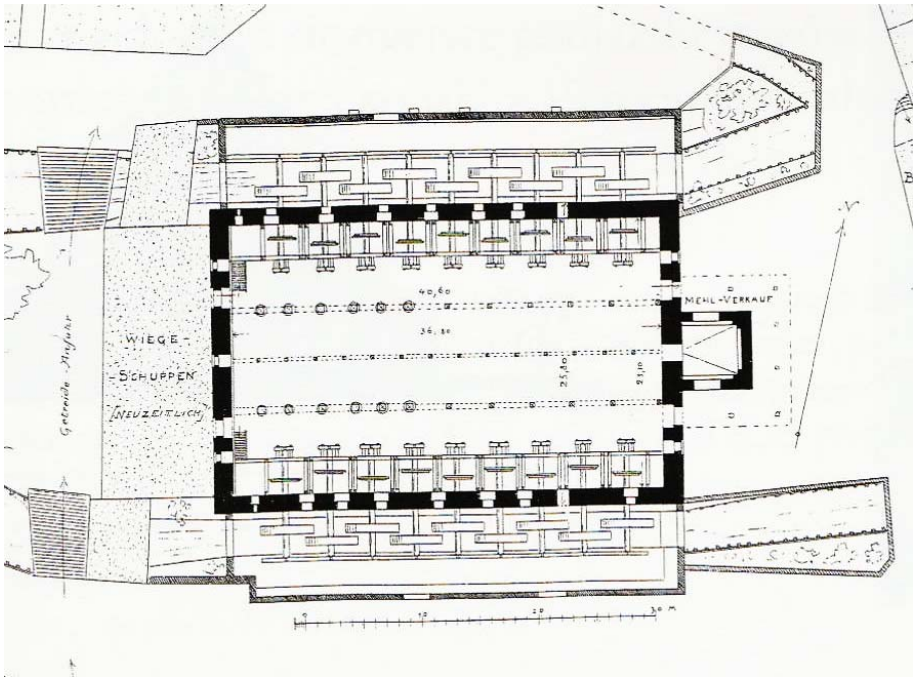

Figure 1. The Great Mill plan around 1410 with its eighteen overshot waterwheels by Steinbrecht. (Source: Steinbrecht, C., Die Ordensburgen der Hochmeisterzeit in Preussen, Berlin, Verlag von Julius Springer, 1920)

It was rebuilt in the period of 1962-1965: a steel roof truss was installed, and new concrete slabs were constructed to divide the open-space interior into smaller sections. Then the object was used for different purposes such as storage, a disco, and theater space (e.g. In 1980 Gdańsk Municipal Theatre, *Wybrzeże,* staged the play *Danton's Matter,* which was written by Stanislawa Przybyszewska and directed by Andrzej Wajda). In 1992, a Pewex shop and an amusement arcade were located there. In 1993, the Association of Private Trade and Services in Gdansk took possession of the Great Mill. After architect Elzbieta Ratajczyk-Piatkowska adapted it for a three-level department store with an open-spaced patio (with area: 2,300 m², sales area: 1,489 m², and 72 stalls), it became one of the most famous shopping centers in Gdansk at that time. The new steel structure of floors was designed to be independent; it was separated by the circular dilation from the existing brick walls. In 2016, the department store located there went bankrupt. The building went back under management of the city, and the city authorities began to search for a new lessee for the monument. There were different parallel proposals: lease the facility to a private entrepreneur and create another Gdansk brewery, arrange a boutique hotel in the mill's interior, or hand over the object to the Historical Museum of the City of Gdansk to be used for museum purposes under museum management. The transformation of the Great Mill for commercial purposes already had opponents. Specific opinions highlighting the dangers resulting from teaming up historic tissue with mainly profit-oriented function appeared: *The canons of the commercial function, its dynamic character and subjection to competition and rules of the free market, may - in extreme cases - be a danger for historical values, or even for the existence of the monument, and are in contradiction to the conservation doctrine assumptions* [3]. Finally, the city authorities, supported by multidimensional consultation, decided to entrust the Great Mill to the hands of the museum. The investment described in this paper includes both the adaptation of the Great Mill for the new seat of Gdansk Amber Museum and the remodeling of the public areas around the monumental building. As usual, in the case of alternatively adapting the function of historical objects of significant structural value, the priority in the initial phase of project preparation was to formulate guidelines and conditions for architectural solutions that require compliance. Accordingly, the authorities of the municipal conservation service, in recognizing that the Great Mill serves as a unique,

medieval monument of industrial architecture in the world, maintained the need to protect its readability in terms of all remaining historical building elements, and exclude the possibility of interfering with the structure. With respect to the monumental building, requirements for the presentation of museum exhibits and the function of the scientific and administrative offices of the museum were considered as subordinate to the demands of protection and conservation. The potential cost of the adaptation was also one of the most important factors the design project should optimize. Such a restrictive approach to the issue of protecting historical tissue while minimizing investment costs extremely hindered the design process. To correctly apply design to installations with relevant technology and to ensure standards of fire safety in the monumental building, the designers posited the necessary minimum of indicators prescribed to guarantee the proper function of the museum. First, the maximum amount of object users was set and divided between the number of permanent employees and museum visitors. These numerical indicators became the basis for dividing the existing usable area inside into zones with various functions needed to reflect the contemporary mission of the museum. A definite program for usage emerged: exhibition area, education zone, commercial zone with a wide range of uses (conference rooms, thematic shops, certification services for amber, etc.), restaurant and cafe, offices, amber research workshops, and service areas for visitors (info point, cloakroom, toilets) (figure 2).

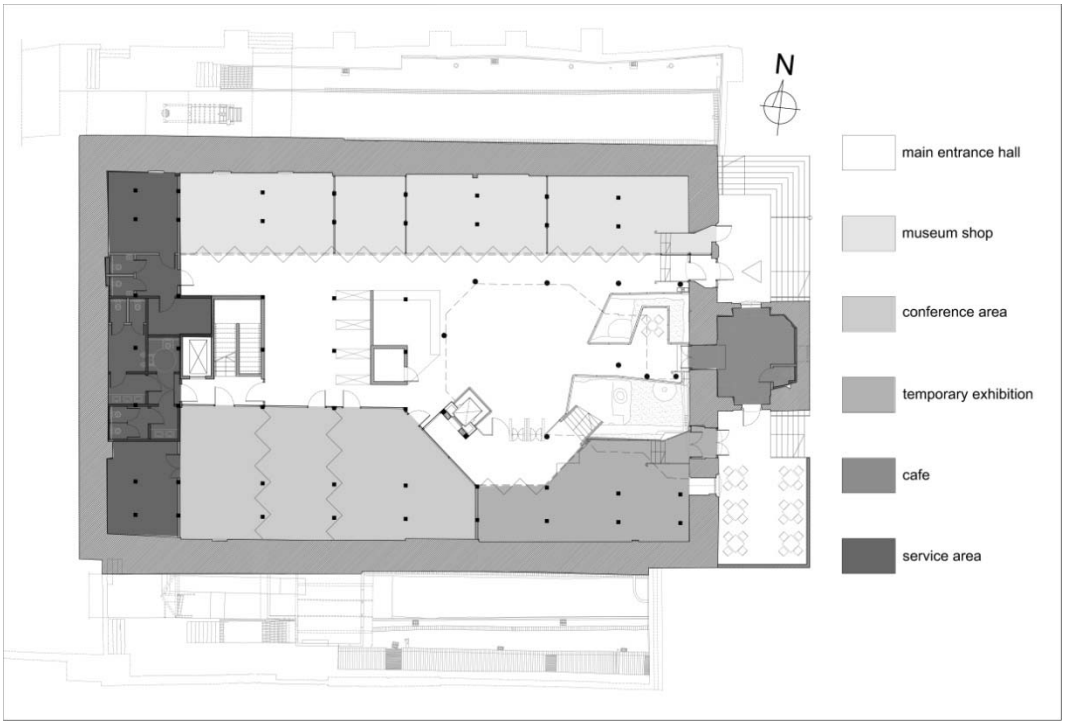

Figure 2. The ground floor plan of The New Amber Museum in the Great Mill.

However, the lack of space required for the technical equipment would have made the modern day function of the museum conditional. So it was decided to build an additional fifth floor above the highest existing level of the building for technical purposes. The new floor was located in the attics of the building. It covers only half of the mill's plan, which results in 400 m² of additional space for warehouses and technical facilities. This solution, however, imposed the need to strengthen the steel columns supporting the existing construction under the newly designed technical slab. In contrast to the majority of cases involving adaptation in monumental buildings for public purposes, it was fortunately not an issue for the bearing capacity of floors in the Great Mill. The existing construction of the former department store consisted of reinforced concrete slabs based on an independent steel structure that was designed for 5kN load per m², which was comparable with the load assumed for

exhibition surfaces in the design of the contemporary museum. For the new museum structure to comply with current safety and proper usage regulations, one of two concrete staircases was demolished and replaced with a new one accompanied by a lift connecting all levels of the building. Concerning the accessibility of the future museum and user safety in case of fire, all historical door openings originally located in the circumferential brick walls were reinstated to increase the number of fire exits from four to seven. The adaptation project guaranteed the optimal conditions required for preservation and the exposition of amber exhibits, namely: maintenance of temperature ranges between the limits of 18-22 degrees Celsius, humidity of 50%, and pale lighting with low heat emission. Regarding fire control devices, innovative fire-extinguishing systems using HI-FOG (water mist fire protection) and carbon dioxide were suggested instead of water sprinkler systems. This is because water used as a fire-suppression liquid could seriously damage the museum's collection. Of considerable difficulty in distributing the planned installation was the height of the mill's existing floors, which foreclosed the planning of suspended ceilings under the entire surface of the existing slabs. This imposed on the designers the need to dispose of the piping only where the height of the space could be reduced locally. No permission to locate technical equipment beyond the contour of the existing building hampered the placement of air intake ports; air launchers; smoke vents; the mechanical and IT systems; and ventilation. Finally - with the consent of the municipal conservation services - the designed solution made use of all dormer windows existing in the mill's roof surface. While the project seems to have used all the spatial and structural capabilities offered by the Great Mill, at the same time it indicates the exhaustion of adaptability for museum purposes according to the currently binding conservation guidelines.

St. Catherine's Church

Dating from the twelfth century, the parish church of the Old Town dedicated to St. Catherine is recognized as the oldest church in Gdansk and the second most important church in the city. The church in its present form dates from the fifteenth century [4] (figure 3). The church is located in the center of the old town, vis-à-vis the Great Mill described above. The church is three-aisled, with a relatively low, five-arched hall on the plan whose contour closely resembles a square. The sanctuary also has three naves, and three arches. The main naves are topped with one gable roof, and the sanctuary with three gable roofs. A four-storey tower (76m) with a square plan stands on the west entrance facade of the church. Above the massive tower rises the helmet composed of a high, central part accompanied with three, tapering upward onion roofs. The church is 57.5 meters long, 23.3 to 29.3 meters wide (37 together with chapels), and the vaults are 13 meters high. Inside the church one can find the crypt and epitaph of the famous Polish astronomer Johannes Hevelius from 1687, the inlaid wooden baptistery from 1691, and the reconstructed carillon carrying on the rich carillon tradition, which had started in St Catherine's in 1736. The idea to create a Museum of Science in Gdansk comes from the new initiative of a local group of dynamically operating scientific associations who wish to collect and showcase the greatest scientific achievements and history of the city under one roof. Owing to its rich history as a vibrant Baltic Sea harbor and hanseatic city, Gdansk had been a place of residence and research for many internationally recognized scientists, researchers and thinkers like: Johannes Hevelius (1611-1687), Daniel Gabriel Fahrenheit (1686-1736), Arthur Schopenhauer (1788-1860), Daniel Gralath (1708-1767) and Günther Grass (1927-2015). Unfortunately, preserved memorabilia illustrating the scientific achievements of scientists associated with Gdansk are now scattered. Since the beginning of the twenty-first century, the search for a building to house the new science museum has been carried out. At the same time, the city and museum authorities have been analyzing the idea of erecting a new seat for a new museum. In 2006, fire completely destroyed the roof of St. Catherine's Church. Mutilated objects required immediate intervention, and reconstruction of the roofs above the naves and sanctuary was necessary. Project documentation for reconstruction of the church roofs assumed the restoration according to the shape of the church prior to 1905: it included the pinnacle and dormers that had remained unreconstructed after the Second World War. The roof over the main naves of the church was made using laminated wood construction technology. The three

roofs over the sanctuary naves were built as a steel structure. As a result of all the roof reconstruction, 1800m^2 of usable floor area was created in the new attics of the church.

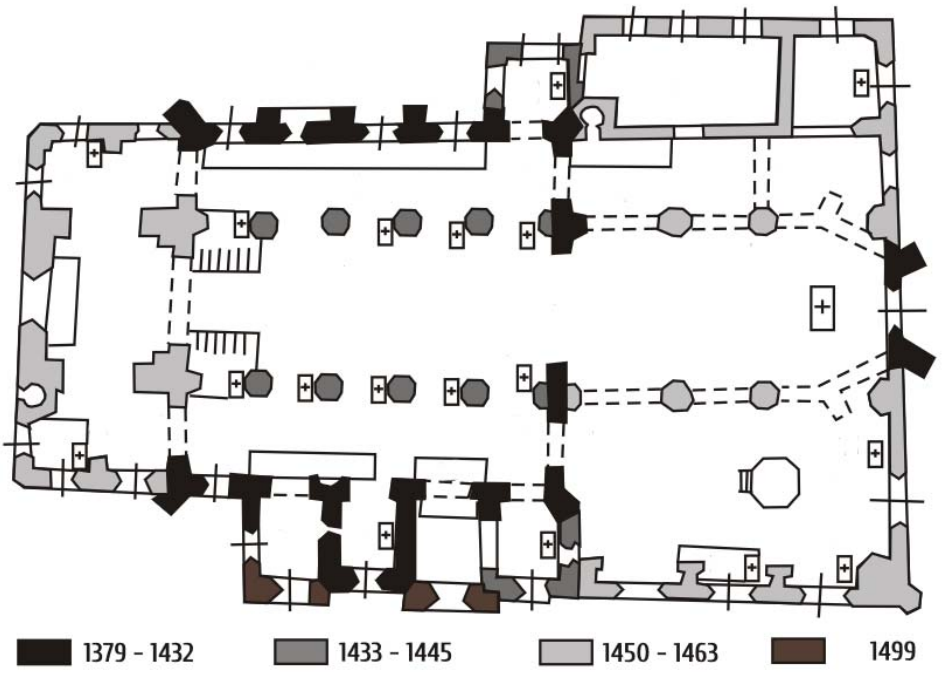

Figure 3. The phases of St. Catherine's Church development. (Source: http://www.gdansk.karmelici.pl/kosciol-224/architektura-kosciola-236/architektura-226#1)

According to canon law [5] because the zone located above the vaults of the naves is not regarded as sacred it could be granted for public use. Thus the opportunity arose and the owners of the church, the Carmelites Convent, agreed to give this area to the Historical Museum of the City of Gdansk for public purposes. The Mayor of Gdansk, the Carmelites Convent, the Historical Museum of the City of Gdansk, and Gdansk University of Technology took on the initiative to create the new Museum of Science in the reconstructed attic of St. Catherine's Church. The architectural project for adaptation of the attics of St. Catherine's Church for museum requirements was based on a functional conception program. The mission of the future museum was prepared by the Historical Museum of the City of Gdansk. Here, unlike the case of the Great Mill described above, conservation guidelines were primarily related to the protection of the church interior below the attic, and readability of the exterior shell of the church itself. Due to the secondary nature of the roof structure in the attic area, the subjects of preservation were only the brick gables of the main naves and sanctuary naves, and the brick walls of the tower, which had survived the fire in 2006. The project assumed that the:
1/ the exterior shell of the church will be fully exposed from the streets: Great Mills, Catherine and Profesorska; 2/ new features will not violate the historic structure of the church; 3/ the museum function will not interfere with the sacred one; 4/ the reconstructed form of the roofs with a pinnacle and dormers (which was based on the existing state prior to the 1905 fire) will not be disturbed; 5/ the restored interior of the attic will preserve the historical value of original elements of the church; 6/ the project will comply fully with the current construction law, including fire protection and evacuation conditions; 7/ the investments related to the implementation of the Science Museum should not violate or infringe on the interests of third parties and the Carmelite Convent.
In St. Catherine's Church, adaptation of the attics required the design of new access from street level to the level of the attic. Because the existing gothic staircase leading to the attic failed to meet current

requirements for the museum's public function, a lift and appropriate staircase were required to ensure standards for public safety and evacuation, especially for people with disabilities. A number of options connecting the attic of the church with the level of street were analyzed. One analysis considered the possibility of adding on a glass-escape staircase in front of the church wall on Catherine Street, exactly on the site where the historical extension had existed. This staircase would lead to the rooms of the tower. Another analysis considered the option for implementing an evacuation staircase and lift shaft in the various chapels of the church. All the analyzed variants would involve a significant violation of the structure of the monument, so they could not be approved for further design work.

After more detailed study of the historical and scenic surroundings of St. Catherine's Church, a new concept for the functional and spatial adaptation to the attics was presented. It was proposed to erect an entirely new building, which would include all the necessary functions to support the museum: lobby, information area, offices, public restrooms, evacuation staircase and lift. The architectural project posits that the attic area will contain only exhibition and media rooms. The new entrance building is connected to the attic by a glass catwalk driven into the existing dormer roof. It was decided to join the two attic zones - above the naves and the sanctuary - to expose the spatiality of this zone and to refer to the open space of the church below. As in the case of the Great Mill adaptation, there was the same lack of surfaces for storage area and technical facilities in St. Catherine's. However, in the case of the church, since there was no option to construct extra slabs, all the superstructure technical equipment had to be located under the floor of the designed museum, in areas called 'armpits' of the gothic vaults. Additionally, all necessary installations were distributed in the area under the floor and in the laminated layers of the roofs. The strict limitations of conservation that minimized hole drilling in the historical tissue causally led to the implementation of innovative technical solutions and installations. Unfortunately, the bearing capacity of floors above the sanctuary was too low for the purpose of exhibition: therefore, the design anticipates reinforcement of the supporting structure of the roofs to allow suspension of the floors (figure 4).

The implementation of a museum facility in the attics of a fully functioning catholic church was only possible due to the unconventional approach to the design problem. Remarkably, it is the only such facility in Europe that combines both sacred and secular function under one roof. One additional complication in the case of St Catherine's Church relates to its location in the city center with a lack of space for new architectural objects.

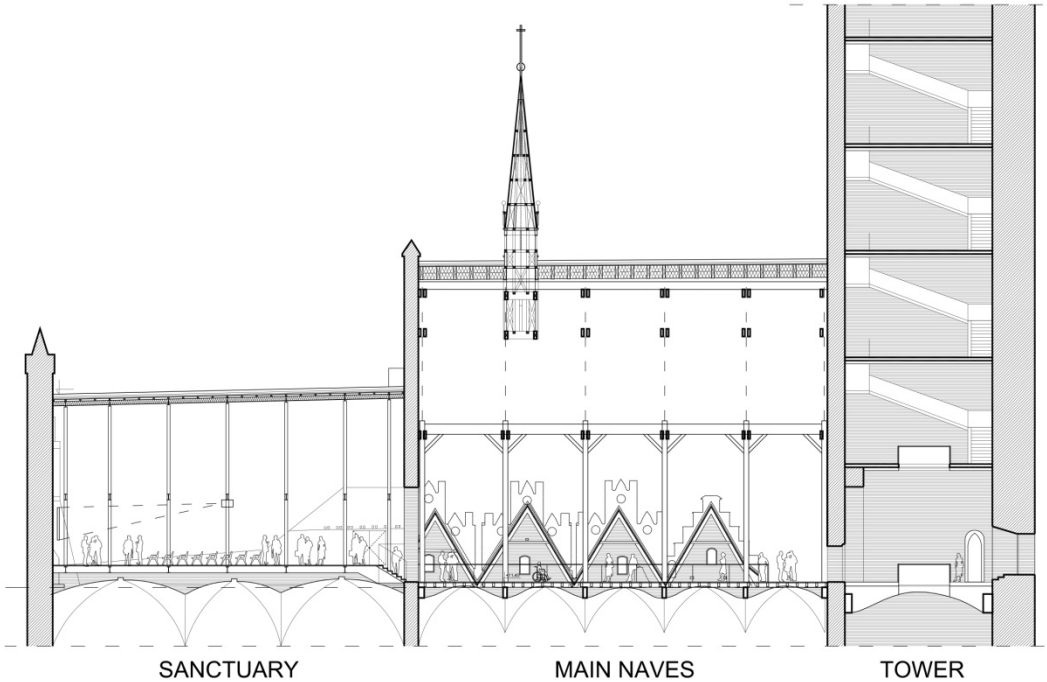

Figure 4. The section through the attics of St Catherine's Church.

3. Conclusions

Over the last two decades, the tendency to locate museum institutions in existing buildings might well be associated with the more intense re-urbanization processes occurring in city centers [6]. At the same time, it is observed that an increasing number of monuments are abandoned by commercial tenants, who resign from the location due to the excessively high cost of operation when compared to actual income from commercial activity. Commercial investors who use historical buildings to derive great benefits from their central location and touristic value, commonly do not care about the state of the property, and do only temporary repairs to keep the commercial facility correctly functioning. Managers of private institutions who apply usufruct to historic buildings must still follow the changing requirements of a market economy. However, this can generate a higher risk of changes to the historical tissue of the monument. Each change initiated by users of the historic object causes a potential threat.

Monumental buildings of great historic and cultural value require a stable manager to guarantee long-term object management based on well-thought-out strategy. In this respect, museums as public cultural institutions would seem to provide the right kind of manager in the case of preserved buildings for a number of reasons:

1) Operation of the museum is partially or fully financed by the state budget, which is a financial guarantee for longer-term operation;
2) Museums' institutional respect for heritage translates into respect for the historical building in which they are established;
3) Location of the museum in a building with monumental features and a privileged location in the urban city center provides the institution a well-established brand of space, which attracts visitors and increases competitive advantages among other museum institutions.

This is not a new issue, for frequently when dealing with refurbishment of old buildings to be devoted to cultural use, actions do not always match interest; preservation of the building does not comply with museological function and mission.

However, these case studies also indicate that the creation of a contemporary museum in a historical building may have the following negative effects:

1) Museums are still developing institutions, so a gradual increase of exhibition space is needed. The historical object is an existing structure with limited space for development. When the need appears to widen exhibition area, not all monumental buildings may be extended. This may be due to the urban context (physical lack of space for new volume) or to the conservation restrictions (no volume can be added, because it will interfere with the clarity of the building's historical body). As a result of the restrictions and the inability to ignore the need to develop the exposition, the museum will opt to leave the historical building and move to a new seat. This action exposes the historical object to changes effected by a new user, which - as stated above - is not a good solution for the monument.
2) Too restrictive restoration requirements in the process of adapting the monumental building for museum purposes may lead to the unwanted situation when the monument - not the museum mission - takes priority and in the end, the monument becomes the most expensive element of the collection [1].
3) Operation of modern museums is based on complex technologies requiring significant technical surface solutions in the monuments. In historical buildings, the existing structure being dealt with is most frequently inviolable because of conservation restrictions. If the desire is to synergistically reconcile optimal conditions for contemporary museum function and the preservation of the monumental building, it will force the use of unconventional construction and engineering, making the adaptation many times more expensive than locating the museum in a newly constructed building.

Any attempt to introduce museum institutions into historical objects always demands creating a balance between the selection of architectural activities in compliance with preservation (sometimes

with exposition of historical values of the monument) and the specific requirements for the museum's collection, research, exhibits and educational function. Any architectural restoration and adaptation requires a certain intervention [7]. The ideal outcomes are almost impossible to achieve. Assumptions that were made at the start of the project for adaptation of the Great Mill spoke to the issue of superiority in protection of the historical object. To guarantee the perfect realization of the museum's mission, it was necessary to rescue the historical object absolutely. This meant the imposition of many unconventional architectural and technical solutions. The work restored the visibility of all original circumferential brick walls, both from the inside and outside of the mill, and guaranteed the lack of need for additional earthworks at the mill, further protecting potential archaeological remains. Nevertheless, due to the limited space for development within the mill, the threat of the museum leaving the monument in the future cannot be eliminated.

In the case of the adaptation of attics in St. Catherine's Church, the unique combination of sacred and secular function existing under one roof on a European scale should be acknowledged. Probably, because it is a cultural institution that enjoys similar social regard as the Catholic Church, the public function of the museum in St. Catherine's offers a solution that generates fewer conflicts in respect of religious feeling. Here, the specific character of the space located under the newly designed attics and certain provisions of canon law, together with strict conservation guidelines, just as in the case of the Great Mill, imposed on the adaptation unconventional design solutions and the use of innovative engineering.

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