THE NEW BUILDING FOR WILD HOPS BREWERY
The wooden architecture of small-scale factories

Master’s thesis
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ABSTRACT

The thesis aims to create an example design of a small-scale food production factory to demonstrate a personalized architectural approach to spaces with strict functional organization and technical requirements. The objective of the design work is a new building for the Wild Hops Brewery company in Russia. Located in the typical countryside of the Ural region, the factory resides in a former bar building, which does not satisfy the production needs anymore. Thus, this thesis proposes the improved functionality, materiality, and communication with the context of the building and its area. The primary construction for the design is wood, which reflects both localism and the crafty character of the company.

As a background for the work, the brewing process is explained with the illustrative material on equipment. The environmental issues and possibilities of the industry are discussed. The part of the research is dedicated to the cultural and social phenomena of beer. The functional and flow analysis of the current situation led to a flexible plan solution with the production space placed in the center, exposed to the rest of the functions and public as an exhibition hall. The circulation of raw materials, ready products, staff, and the visitors' experience were considered during the design process.

The load-bearing constructions of the new building are glulam columns and trusses, wooden supporting joists, and purlins. The partitions are lightweight wooden frame constructions, with finishings of tiles, wood, and gypsum boards.

The result is a barn-like structure with a developed functional program, optimal spatial organization, and architectural qualities reflecting on the local context, brand's image, and stimulating community life.

Keywords: food production, brewery, local materials, natural resources, wood construction, wood architecture
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INTRODUCTION

This graduation work happened to be an opportunity to satisfy personal interest outside the architectural field and evolve my design skills and knowledge at the same time. For years, I have been thinking how unusual it is to pursue such a different professional path from my family, who, including my father as an owner, run a brewery. Created by my father and a small group of enthusiastic colleagues, Wild Hops Brewery still to this day has a crafty character, favoring local materials and family and friends connections at work over everything else. Numerous members of my extended family and friends have worked there as brewing masters, quality managers, mechanics, and even lawyers. Through the years, I have learned about the everyday challenges of beer production and how difficult it is to settle a brewery in a non-industrial building. How much great effort and enthusiasm it requires to grow and sustain the competition in the industry.

I could not help but wonder how the brewery might appear if there is a chance to completely rethink the current situation with all the staff hopes, values, local peculiarities, and general trends. That is how the thesis topic came into being.

To understand the field from a more profound view, the research part of the work covered production technology, its possible environmental impact, and the culture of beer consumption. Considering the scarce architectural context of the village where the brewery is, the research and the discussions with staff members helped to define the main key points and values for the future design. Among them are production transparency, localism, and integration of public functions.

While studying the environmental challenges of the production and the rural surroundings, wood was chosen as the construction material for the brewery. The character of the wood is also suitable for personalizing industrial design to be more welcoming and comfortable for both employees and visitors.

The design goal was to create a building with clear functional organization, which satisfies all of the brewery’s needs, from manufacturing to selling and promoting the product. The accessibility and openness of the factory was another priority to eliminate the feeling of marginalization that often surrounds the industrial buildings and their areas.

The thesis work is an example solution for a small-scale brewery in a rural area with wooden constructions.
1. BACKGROUND
11. BREWING PROCESS

Today brewing is a whole science by itself, big companies have their research groups, and universities establish breweries on campus to learn more. While brewers continue to experiment with ingredients, spices, and adjustments in the production, the basic brewing principle stays the same for hundreds of years. Below is the typical brewing description to become acquainted with its character.

**Materials.** The only ingredients for many beer styles are malt, water, hops, and yeast. Malt bags are stored on the wood pellets to provide air circulation in a dry space at 15 °C or below. Meanwhile, both hops and yeast stay in the freezer to sustain their qualities. Breweries usually use a drinking water supply and filter it before production to get rid of disinfectants. Other treatments can also take place to adjust the water’s alkalinity and hardness.

**Production.** The first step is malt milling: kernels turn into the ground and milled substance, called grist, with a roller mill. Next, in mash vessels, the ground malt is mixed with water to activate malt-derived proteins. In the lautering, or filtering, the liquid part of the mash called wort is separated from all insolvable parts, i.e., spent grains. In lautet tun, a vessel with a double bottom, a layer of the left grain particles filters the wort through itself. Wet grains usually are transferred in the silos outside of the brewery or other storage.

Afterward, the wort is boiling with added hops to maintain the distinctive bitterness and aroma and sanitize the liquid. The boiling takes place in brew kettles heated with steam boilers. The hot wort is clarified and separated from hops pellets and trub, or sediment, in the whirlpool kettle. If the equipment type allows, boiling and whirlpooling can proceed in the same boiling kettle. Before fermentation, the hot wort cools through the plate coolers.

In fermentation vessels, the yeast cells are added to the wort, converting sugars into ethanol, CO2, and different flavor compounds. For lager beers, which are produced in a case brewery, the fermentation process occurs at 7-13 °C. The result is green beer, which needs conditioning, also called lagering, at low temperatures from -1 to 5 °C for up to a couple of weeks. Beer flavor matures, and the liquid clarifies when yeast and proteins precipitate in the lagering tank. The last step of the production is filtration through the sheet filters to remove yeast cells and other compounds that make beer look haze, adjust color and bitterness.

**Packaging and storage.** The beer is ready to be packed, and the case brewery uses exceptionally kegs for distribution in local bars and tap beer stores. To prevent fast spoilage of the product kegs are going through pasteurization at 71-74°C. After the product is sold, all kegs are returned to the factory, washed, and used again.
Conditions. Typically, all modern brewing equipment is closed and well-insulated, and the ambient temperatures of the production spaces should stay comfortable for staff room level, 16-24 °C.

The scheme illustrates the brewing steps, materials and by-products circulation, and the exemplary appearance of the main equipments.
into biogas in a small anaerobic digester on-site (Brewers Association, n.d.). Produced energy can be used in a brewery or sold back to the local distributor. Both methods require financial investment and decent vacant space on site, which is not always available for small productions.

**By-products.** Most brewing waste constitutes solid by-products such as spent grains, spent hops, trub, and spent yeast (Brewers Association, n.d.). Spent grains, milled and grounded wet malt left after wort mashing, account for 85% of solid waste (Mussatto et al., 2006). Still rich in nutrients, grains are sold or donated to local farmers for cattle feeding.

The strategy that brings more public attention to a brewery is to use grains for baking goods on-site or selling them to local bakers (Brewers Association, n.d.), as an act of supporting small businesses. Cookies, bread, snacks, even dog biscuits can be served alongside beer in a tap-room or brewery restaurant for customers and their pets. The same goes for utilizing the spent yeast. To be used after the brewing, by-products should be properly sorted and stored in a cold space away from the production areas to avoid any contamination. If the storage is not possible, the waste can be composted in special tuns (Brewers Association, n.d.) on a brewery courtyard and used for growing vegetables and mushrooms.

**Alternative energy.** The same compost can be used for producing energy recovered by thermal engineering systems, for heating the bar area. Same works with the heat recovered after the beer cooling.

*Water consumption.* Brewing is a highly water-consuming process: to produce 1 liter of beer, the average brewery uses 15 liters of water (Neven, n.d.) and an efficient factory 4-7 liters (Olajire, 2011). The most amount goes for cleaning, heating, and cooling of the equipment. Wastewater can be purified through water filter stations for reuse in cleaning and rinsing the vessels (Neven, n.d.) or converted
1.3. BEER: SOCIAL AND CULTURAL PHENOMENA

Compare to huge chain food manufacturers, small and local productions, such as wine, whiskey, or cheese, often have a direct and transparent relationship with their clients. The customer trusts its well-established philosophy, traditions, and even whims. Beer is the fifth most consumed beverage after tea, soft drinks, milk, and coffee (Olajire, 2011). The Brewers Association distinguishes 150 beer styles, while home and craft brewers continue experimenting with ingredients and methods, creating more variations.

Localism. The main socio-economic characteristic of small breweries is neo-localism (Holtcamp et al., 2016). Like many other small businesses once created by passionate non- and professional craft admirers, breweries pay great attention to their roots. Neolocalism involves regionally-oriented brand image, environmental sustainability, and social and cultural engagement (Holtcamp et al., 2016). This focus is not only natural for breweries but also evolved to the clients’ demand. It is well-known that craft beer is popular among millennials; they account for 57% of individuals who drink craft beer weekly (Reid, 2018). Millennials are known for their values and consumption behavior, including an expectation to give back to society, willingness to pay more for an environmentally sustainable product, and boycotting mass production (Reid, 2018). At the same time, they ask for a production variety, local uniqueness, and high quality, which drives breweries to develop creatively to sustain high competition.

Position. For economic benefit, new breweries prefer to settle in distressed neighborhoods or underdeveloped rural areas. Consequentially, companies become engaged with reuse and revitalization practices in the area (Reid, 2018). An example of an area benefitting from the new brewery is Cleveland’s Ohio City. After the Great Lakes brewery opens in the 1980s, the area became ethnically diverse and full of locally owned businesses, including restaurants, bike shops, and glass blowing studios. The crime rate has dropped by 25% over the past decade, and the area became the second most accessible neighborhood in the city (Reid, 2017). More businesses are willing to settle near the already successful example, forming a flourishing cluster.

Another example is a Russian craft brewery called Jaws, located in my hometown of Zarechniy, 50 km east of Yekaterinburg. Partly, it resides in a group of former laundry buildings, including the brewery, small bar, and even a hotel. In the summertime, the courtyard becomes the festival area where small breweries sell and promote their products. As the town is also well-known for its nuclear power plant, one of the most famous beer styles is Atomic Laundry, an example of the successful use of local background in a brand.
Contribution. Small and craft breweries are famous for is non-profitable activism. It includes charity projects, community events, and the support of young local professionals. For instance, a group of Minneapolis craft breweries sponsors a non-profit group Brewing a Better Forest: to join the project person should adopt a newly planted tree in a city and water it for one year. In return for the effort, the participants get free beer tokens (http://www.brewingabetterforest.com). Same breweries participate in community kitchen projects, support cancer societies, provide indigent children with bicycles, and do other volunteer work.

Mass culture. Today beer culture manifests in countless forms: numerous festivals, beer tourism, beer blogs, podcasts, books, merchandise, and more. While not always socially altering, they demonstrate a special relationship between beer and its consumers. For instance, a beer label aesthetics became a separate art by itself, and magazines compile lists of the best works every year, evaluating cover even more than content. Compare to other drinks, beer consumption culture is simple, and therefore, open to everyone at any time. It gathers all people while more expensive products can draw a line between different social groups.
While the above research might seem off the topic of architecture, the intention was to find both inspiration and starting points for design in the industry first, rather in the surrounding context. The early personal conversations and discussions with staff members from the case brewery Wild Hops in Beloyarskiy, Russia, and from Olarin Panimo in Otaniemi, Espoo (https://www.olarinpanimo.fi), showed the difficulties in understanding each other without me being immersed in production and its culture. The issues of efficiency, utilizing space, and staff well-being are often more critical for owners than aesthetics. Simultaneously, the benefits of appealing or value-driven design are self-evident for every part. Thus, the whole approach to the brewery design should evolve from the inside out.

First, knowledge of the production technology allows creating a clear and logical functional organization of the building. Its simplicity, pace, and transparency are an inspiration for establishing a relationship between the production spaces and the rest of the factory. It is also crucial to have an overall image of the equipment and its processes to know what might be interesting for visitors to see.

Secondly, environmental challenges of the industry raise the question of how an architect or anyone else involved in the design can affect it or at least balance it out. The most obvious is to make sure the spaces are efficient, have plenty of daylight, and propose ways to integrate renewable energy sources into the design. The next question is the materiality of the building, and wood came as a perfect solution for a factory with a significant impact on the environment. Wood is renewable, long-lasting, hygienic, and local material abundant in the area. Moreover, conscious design is already a statement of a brewery’s values by itself, a part of the brand image.

And last but not least, the cultural and social significance of brewing is an answer to why to design a brewery in the first place. The brewing industry already has established values and a social platform interesting for many people. The relatively small size of the production allows breweries to evolve in different urban settings, including residential. This immediate connection to the environment, community, and customer is an opportunity to improve and enrich local life, including supporting the local business. It became clear that the case brewery needs public functions, such as a taproom or bar, exhibition or workshop areas, appealing architecture, and an accessible environment to become competitive in the field.
2. DESIGN SCOPE
2.1. WILD HOPS BREWERY: THE STORY

The Wild Hops Brewery was founded by my father, Albert, in 2009. Although he specialized in Nuclear Engineering, my father always dreamed of his own business. Luckily, besides the atoms, he had a passion and interest for beer. The studied brewery is already his second project, as the previous production closed after more than ten years of prosperous work due to the economic crisis in the country.

To start a new brewery, he purchased the 1970’s brick building of a former bar in 2007 in a small village Beloyarskiy in the Ural region of Russia. The bar located right next to the bus station was a popular place among locals who reminisce about it up to this day. After two years of renovation, the nearly ruined place without any windows, doors, and partition walls, was turned into a microbrewery. The initial goal was to produce only 30,000 liters of beer per month, equivalent to 256 barrels. In May 2009, the first batch of classical lager beer was successfully brewed by a team of only eight people, setting the start for rapid production growth.

Later the company expanded its production spaces from 300 to 1500 m² by adding extensions to the existing building. Nowadays, the team of 58 people makes and distributes to local bars and tap beer stores a maximum of 600,000 liters of beer monthly. The factory capacities are no longer fall into the microbrewery definition (described by Brewers Association). However, compared to other neighboring Russian companies, it is still a small and crafty business.

Today the brewery produces eight beer styles packed only into kegs as a part of the “live beer concept”; thus, it is consumed only within a limited time, fresh and clear just from the filtration.
1. old brick part of the former bar building
2. lager hall, view from outside
3. waste grain silo
from left to right:
1. brewhouse tanks
2. keg packaging and storage hall
3. brewery, view from the outside
4. malt storage and roll mill
The local abundance of timber is one of the reasons to use it in the proposed design. However, wood architecture in Russia is still present mostly in residential one-family houses, despite the availability of resources. In 2016, only 10% of all newly built residential buildings were made with wood (Construction expert, 2020). Such low rates can be explained by the lack of regulating documentation on wooden constructions and building processes, which have been under development in the past years. This work is also an example of the possible use of wood in a different building typology.

Construction. Considering localism as one of the main brewery’s values, the availability and origin of building materials in the region are crucial. Thus, the closest to the site factory that can provide all load-bearing structures, such as glulam beams and columns, is located only 22.5 km away in Verkhneye Dubrovo village (1 on the map). The rest of the components, such as sawn wood, plywood, and insulation, can be delivered from the manufacture 170 km from the brewery, in the city of Chelyabinsk (2), still within the region borders (darker grey on the map).

Raw materials. All brewing equipment and ingredients used in production are from Russia as well. Thus, malt grows in the southern city of Kursk (3) and hops in The Republic of Chuvashia (4). Such by-products as spent grains and yeast, the company sells to the neighboring poultry farm to ensure the natural circulation of materials.

Wood. Out of all world amount of forest, twenty-two percent is concentrated in Russia, more than 80 billion cubic meters in total with the half of it suitable for industrial purposes. Siberian and Ural regions, where the brewery is, are one of the most abundant. Forty percent of the Ural region are covered with forest, predominantly pine, fir, spruce, and larch, actively used in the construction field.
2.3. SITUATION

1. Existing brewery building
2. Bus station

The existing one-story building is located on a plot of 1951 m². The site is connected to the bus station by a stair leading up the natural hill of 2 m height to the brewery. The overall urban context is low density and consists primarily of one-family houses and surrounding gardens.

The brewery has resided in a former bar building for the past 12 years. After the brewery growth, several extensions were built blocking natural light into offices and staff areas. The building has relatively low ceilings, making the equipment installation almost unmanageable without significant interventions into the structure and production process. Due to insufficient insulation, some of the areas tend to overheat during the summertime and freeze in winter. Temperature fluctuations lead to a constant fight with mold and moisture, threatening the product quality and personnel health. The building has clearly reached its limits for renovation.

Besides the technical disadvantages, the current building is not appealing enough to mirror the brewery’s values. As the research above showed, the growing interest in beer culture requires brewing companies to provide their customers with more than a high-quality product but the whole experience of consumption and communication with production or brand. The building should be transparent and welcoming and includes public functions to sustain the competition. Successfully adapted into the rural context, a factory can be even a local landmark for a small village as this one.

In frames of the thesis work, the existing building is disregarded instead of proposing its revitalization. Although the reuse or renovation is common for small and middle-size breweries for economic reasons and can be a great start for the brand development, the overall state of the factory and level of personnel dissatisfaction is high enough to deny this idea.

The new building is a clear investment into the brewery’s efficiency, brand, and life of the area. The characteristic flexibility of the industrial architecture and well-considered aesthetic qualities ensure the building’s reuse after its initial purpose might come to an end.
2.4. FUNCTIONS AND FLOWS

Net internal floor area: 794.8 m²
Gross floor area: 939.4 m²

Production. Production areas are spread all over the building, with the malt storage and milling area located separately in a different block. This solution can be reasonable considering specific storage conditions for the malt, but milling the kernels away from the brewhouse forces staff to go outside in the courtyard and back. It raises questions about the sanitary conditions and overall efficiency of the working flow. The lagering space is cold to provide the needed environment for the conditioning process of the beer, which is not necessary if the used equipment is sufficient. It is optimal to place all production centrally to each other to avoid a complicated system of the pipes between the equipment.

Support. Storages are placed in between the production spaces but entirely separated from each other, making the delivery or sorting process of material and product inefficient. The CIP room, which stands for a clear-in-place system for beer tanks, is currently empty. The brewery is missing a sorting station or storage for the by-products of the brewing, such as used yeast or malt kernels, which should be stored at specific conditions to be reused or recycled later.

Staff. The amount of space for the personnel is insufficient, and such an essential element for any production with sanitary requirements as changing rooms is missing. The existing rooms are small and lack natural light. According to the personnel, employees tend to enter the production spaces from the outside through the laboratory. It both disturbs the work and the clearness of the room. At the moment, the place for lunch or coffee break is also missing. The administrative block has its entrance and no connection to other areas, making communication between workers more complicated.

Technical. Technical rooms are located on the best part of the plot, facing south. The spaces tend to overheat due to the poor insulation, which puts the equipment and thus the production at risk of a collision.
100 Production 433,3 m²
101 malt st.+milling 55,8 m²
102 brewhouse 96,6 m²
103 fermentation 100,0 m²
104 lagering 105,8 m²
105 filtration 36,2 m²
106 keg filling 20,2 m²
107 keg washing 18,7 m²

200 Storage + support areas 168,2 m²
201 equip. storage 26,9 m²
202 cold storage 4,0 m²
203 storage 9,6 m²
204 ready product 95,4 m²

300 Staff areas 86,0 m²
301 entrance 5,9 m
302 laboratory 12,5 m
303 office 8,0 m²
304 shower 3,1 m²
305 laundry room 7,5 m²
305-308 office 41,0 m²
309 wc 2,0 m²

500 Technical areas 100,3 m²
501 boiler room 54,5 m²
502 control room 5,7 m²
503 control room 3,6 m²
504 compressor 29,5 m²
505 electricity room 7,0 m²
3. SITE ANALYSIS
Beloyarskiy village, aerial view, 2017
3.1. SURROUNDING CONTEXT AND CONNECTIONS

Location. The site is located in the small town-like settlement, Beloyarskiy village, in the Urals Federal District of Russia, 50 km east from its administrative center, Yekaterinburg city. The map (a) shows the position relative to Helsinki. Rich in forest, valuable ores, and minerals, Ural is historically an industrial backbone of Russia. Its mountains range forms the conventional border between Europe and Asia. The regional climate is continental, with summer temperatures of +20..25 °C and -20..30 °C in the winter.

Context. The Beloyarskiy village was founded in 1687 on the banks of the river Pyshma (b). The scale of the settlement can be seen from the aerial photo above. Today it has a population of 11 500 people. The functions are following: dark grey indicated administrative and public buildings, light for residential buildings, and middle for industrial constructions such as factories or storage spaces. The brewery building is showed in black.

The designing plot is surrounded by one-family houses adjacent to the gardens, and fields (c). On the west side of the brewery is a bus station (1), on the east is a private house, and an office building (2). Numbers 3 and 3a indicate the cafe and a small hotel.

Connections. The brewery has a strategic location. The European traffic route E22 (b) crosses the village and connects it to the main cities. To Asbest City with 62 285 people (28 km) on north and Kamensk-Ural’skiy with 174 998 people (50 km) on the south of the region. The most important cities for the business are Zarechny City (7.5 km) with a population of 28 171, and Yekaterinburg (50 km), the center of the region, with a total population of 1 495 066 people.
Beloyarskiy village church, aerial view, 2017
4. PROCESS
1. concept 1, two roofs merging into one
2. concept 2, series of folded roofs
3. concept 3, series of sticks
4. concept 4, intersecting roofs
The idea of the thesis came first at the end of 2020, starting with discussions of the current situation with my friends, Elena and Alex, who have been working on the Wild Hops Brewery for the past four years. From the very first conversation, it was clear how different languages we speak. The dialog was always going back to various technical issues, equipment, or the professional behavior of the colleagues. The idea of wood constructions was also received with surprise and disbelief, but it only boosted my curiosity.

In February this year, the work on the thesis started. The first month was dedicated to the research, with an attempt to dig deeper into industrial architecture and its ideology. Quickly it became apparent that the topic is too broad for the scale of my design and does not fit anymore in today’s culture. Thus, the research shifted to the brewing process, its environmental challenges, and the beer culture only. Simultaneously I was studying the examples of small-scale production factories and their architectural expression.

The design process started in March. After the series of sketches, models, functional diagrams, the concept with intersecting pitched roofs, number 4, was chosen for further development. Regardless of the appealing mass, the design had constructional and functional issues that made it weak. It was also not communicating enough with the surroundings, turning the most engaging facades away from the public.

Instead of forcing some unusual mass playing with roofs, I concentrated on creating a clear functional plan with a flexible structure. The production sequence became the inspiration with the centralized production hall, and the rest of the functions revolving around it. Such scheme is typical of a museum, with a big closed hall divided into smaller parts with partitions, creating an intriguing path around the exhibition, with a difference of exponents being just the beer tanks.
5. DESIGN PROPOSAL
site model, plywood, oak and balsa, 1:500
5.1. SITUATION

Site plan. Rectangular in plan building is adjoining the plot border on the east side, leaving more space in front of the west facade for pedestrian connection. The asphalted area on the north side is reserved for service access, wide enough for trucks to rotate around. Next to the access is also placed waste bins. Further the road there is the turn to the parking both for guests and staff in front of the main entrance on the south. Parking lots are covered with grass stone as well the pedestrian pathways.

The concrete support wall goes along the plot border on the west side, separating the access to the brewery from the cliff. Behind it, trees and bushes are filtering the view from the brewery to the station.

The width of one barn-like segment of the brewery is the same as the residential house in front of it, adjusting the brewery mass to the surrounding scale. Comparing to the original solution surrounded by a fence, the new brewery area is open, except for the waste bins. It helps to eliminate the usual marginalized character of the production buildings in the area.
1. metal roof sheeting, black
2. larch cladding boards, 30°, painted green
3. larch cladding boards, vertical, painted green
4. glass
5. ice breaker
6. plinth, concrete
7. parapet, concrete

West and east facades. Three pitched roofs divide the long mass of the building facing the bus station and the private houses. It mimics the scale of one-family houses surrounding the brewery, appearing as a series of frames, friendly and welcoming to those arriving by public transport or passing by. From the main road, the roof shape helps the brewery to merge with the surrounding building landscape. The vegetation in front of the factory assists in creating a pleasing view for the visitors. The west facade is glazed and partly covered with cladding boards rotated according to the roof angle, leaving a long ribbon window open and revealing the spacious interior behind. The cladding with a spacing filter the excessive sunlight and creates a more shaded and cozy atmosphere, characteristic of bars. The angle also reminds of a rustic pattern. Vertical larch boards finish the lower part.

The east facade facing the residential building is closed compared to the west (see the axonometry on p. 56) to avoid any disturbance of the neighbors.
1. WILD HOPSBREWERY
2. +24.020
3. +21.000
4. +19.400
5. +24.020
6. +25.700
7. +23.320
8. +26.397
9. +17.400
10. +18.600
11. +21.800
South and north facades. The end facades of the brewery have the main access points both for visitors and staff, materials, and products. The series of diagonal cladding continues with alternating directions after each one meter of the cladding creating braid-like pattern. Vertical wider larch boards cover the lower three meters height part of the facades around the whole building perimeter.

The typical painting for wooden residential buildings in the area inspires the cladding green color. It also reminisces the green color of the beer bottle glass used for protecting the liquid from UV rays or can be interpreted as a presentation of a company’s name, green as fresh and wild hops plant. The color is not dark to feel heavy in the surroundings but lively enough to attract and stand out.

Concrete stair and the ramp leads to the entrance on the south side. Next to it are placed metal letters of the brewery name spelled in Russian. The plinth is concrete, with the lowest height of 150 mm above the ground level to protect the cladding.

The windows from staff areas have wooden shutters both to support the barn-like and rustic character of the building and as a means to protect from overlooking if desired. The gates and exit doors on a north facade are covered with boards aligned to the facade cladding. The storage gates can be opened up to 4,5 meters to ensure comfortable delivery of the equipment and its parts inside.

On the north side of the roof are placed skylights under the production and storage spaces for comfortable working conditions. Thus, on the side facing south, it is possible to install solar panels.
5.2. FUNCTIONS AND FLOWS

The logic of the brewery’s organization is simple: it follows either the sequence of production, circulation of the material and product inside the factory, or the flow of the staff. Production is the core and the heart of the building, organizing the rest of the functions around. All storage spaces are placed on the northwest corner of the building, away from the direct sunlight and overheat. It also takes advantage of the natural landscape of the plot, allowing the loading from and into trucks right to the platform. The southeast corner of the brewery is reserved for staff and public areas, opening it to the sun and directing towards the local bus station. The result is a compact building plan with a minimum of corridors.

The post and truss system fulfills both main design goals, to create flexible open space with minimum bearing structures and adjust the scale of the building mass to the surroundings. The longitudinal span of columns is 14 m, and the cross is 7 m, which created three parallel pitched roofs. Due to the larger span, additional columns and supporting structures for trusses are needed in the middle of each part. However, the system ensures enough space for easy maintenance inside. A flexible and simple constructional solution that can bear all the possible modifications is a key for such changing industries as brewing, and a guarantee for easy reuse of the building in the future.

The production space division follows to the sequence of the brewing. An exception is the milling room due to the dusty nature of the process. After filtration, partly beer goes to the cooling tanks (107) behind the bar to be served later for visitors, and most go for packaging into kegs (106). Open to the public from the taproom, the production hall nevertheless hides the rest of the hard work in the back of the house, exposing appealing equipment and occasional workers’ manipulations instead. Although production spaces are not seen easily from the outside, the way how it appears behind the rows of tables and stools boosts the curiosity of passers-by to go inside and try the beer instead of simply peeking in.

‘Hugging’ the production hall from one corner, the sequence of storage spaces completes the material-and-product loop. Starting from the delivery center (201), which also serves for receiving raw material, storages rooms are organized along the production hall. The sorting station (205) is used for collecting production waste, such as used yeast or hops, to avoid contamination in production, and safely recycle it later. Along the longitudinal side of the production hall, is the ready-product (207) and keg storage (206) with the direct connection to the keg-filling area. A small forklift vehicle is assumed to move the full kegs around the storage hall and into the delivery trucks.

First floor (+ 21.020):
Net internal floor area: 1037.8 m²
Gross floor area: 1269.3 m²
Basement (+ 17.420):
Net internal floor area: 174.7 m²
Gross floor area: 233.6 m²

The post and truss system fulfills both main design goals, to create flexible open space with minimum bearing structures and adjust the scale of the building mass to the surroundings. The longitudinal span of columns is 14 m, and the cross is 7 m, which created three parallel pitched roofs. Due to the larger span, additional columns and supporting structures for trusses are needed in the middle of each part. However, the system ensures enough space for easy maintenance inside. A flexible and simple constructional solution that can bear all the possible modifications is a key for such changing industries as brewing, and a guarantee for easy reuse of the building in the future.

The production space division follows to the sequence of the brewing. An exception is the milling room due to the dusty nature of the process. After filtration, partly beer goes to the cooling tanks (107) behind the bar to be served later for visitors, and most go for packaging into kegs (106). Open to the public from the taproom, the production hall nevertheless hides the rest of the hard work in the back of the house, exposing appealing equipment and occasional workers’ manipulations instead. Although production spaces are not seen easily from the outside, the way how it appears behind the rows of tables and stools boosts the curiosity of passers-by to go inside and try the beer instead of simply peeking in.

‘Hugging’ the production hall from one corner, the sequence of storage spaces completes the material-and-product loop. Starting from the delivery center (201), which also serves for receiving raw material, storages rooms are organized along the production hall. The sorting station (205) is used for collecting production waste, such as used yeast or hops, to avoid contamination in production, and safely recycle it later. Along the longitudinal side of the production hall, is the ready-product (207) and keg storage (206) with the direct connection to the keg-filling area. A small forklift vehicle is assumed to move the full kegs around the storage hall and into the delivery trucks.
The taproom (403) is stretched along the whole brewhery length and open to the production spaces on one side and the little tree garden on the other. The manufacturing background makes the beer consumption a whole different experience. The small workshop (402) in the entrance hall (401) boosts the curiosity of those approaching the factory, and can be used for a temporary exhibition telling about the brewery’s story or values. At the end of the taproom is the stage (404) for local bands to entertain guests at night. Behind the stage are the public restroom (406) and wardrobe (407).

All technical spaces are placed on the basement level of the factory. The boiler room (502) is needed for the steam boiler, widely used in brewing for heating the ingredients, as well as for cleaning and sterilizing different tools, including beer kegs. Compressor room (504) includes air compressor devices necessary for cleaning, washing, piping, and even fermentation. All of the electric operating panels and systems are located in the control room (503). Next to the stair (highlighted with darker grey) leading to the basement is the evacuating exit.

The series of simple pitched roofs create the barn-like character of the building. The north slopes have skylights to provide staff with comfortable and neutral lighting, while the south side is suitable for installing solar panels.
Section a-a. The section shows the possible installation of the equipment and its relation to the constructions heights.

Section b-b. The section illustrates the sequence of the spaces after entering the brewery. The visitors see the whole depth of taproom, appealing roof constructions, and openings to the production hall on the right side and the trees garden on the left. The staff area is organized as a separate block inside the building with the sloping ceiling construction. The rooms are separated by lightweight frame walls and supporting steel constructions. Independent from the load-bearing structure the block can be easily rebuilt or eliminated. The same goes for the storage block on the other side of the production hall. Above the ceiling are placed HVAC communications.
hand sketch
5.3. STRUCTURE

The glulam columns are based on concrete plinths through the cast metal plate connection, 1 m height above the floor level to protect the construction form influence of the water and cleaning sub-sentence.

The exterior walls, as well as partitions have lightweight wooden frame structures with wood-fiber insulation, and covered with larch cladding.

The building’s foundation is made out of the concrete.
YP
metal roof sheet, black 0.7 mm
wooden slats, 25 mm
ventilation gap with slats, 70 mm
waterproof layer + 3-plywood panel, 27 mm
ventilation gap with slats, 80 mm
waterproof layer + plywood panel, 15 mm
thermal insulation, wood-fiber 240 mm
vapor barrier layer + 3-plywood panel, 27 mm

US1
cladding boards, larch 145x48 mm
horizontal battens, 25x45 mm
vertical battens + space for downspout, 160x45 mm
waterproof layer + plywood panel, 15 mm
thermal insulation, wood-fiber 240 mm
vapor barrier layer + plywood panel, 18 mm

AP1
concrete casting, 150 mm
thermal insulation, polystyrene 150 mm
concrete casting, 300 mm
thermal insulation, polystyrene 100 mm
drainage layer, min 300 mm

VS1
gypsum board, 15mm
thermal insulation, wood-fiber 150 mm
gypsum board, 15mm
1. Concrete column and four dimensional supporting joists connection
   a. ring connection with bearing plates, steel, cast into the concrete column (d = 500 mm)
   b. screws, steel
   c. supporting joists, glulam 250x150 mm

2. Glulam trusses ridge connection
   a. nailed sheet, steel
   b. screws, steel
   c. trusses, glulam 500x150 mm

3. Glulam column and concrete base connection
   a. plate connection, steel, cast into the concrete column base (150x500 mm)
   b. screw, steel
   c. column, glulam 150x500 mm
5.4. MATERIALS

1. metal roof sheeting, black
2. larch cladding boards, 30°, painted green
3. larch cladding boards, vertical, painted green
4. glass
5. plinth, concrete
6. gypsum board, white
7. ceramic tiles, white
8. wooden window frame
9. stainless steel

Compared to the rather dark exterior finishings, the interior materials are bright and clear. The production hall floor and the partition walls are covered with tiles to ensure easy maintenance of the space, while the roof constructions, trusses, joists, and purlins are left as natural wood, creating a pleasing contrast. Wooden surfaces create a warm and home-like atmosphere, and the stainless steel tanks add the typical industrial brutality and coldness into the interior.

The taproom floor is concrete, and the walls are covered with white gypsum boards. While the brewery’s exterior carries the rural character, with interesting cladding patterns and windows shutters, the interior appears modern with typical for production spaces clearness.
interior section view, 1:100
view from the taproom into the production hall
REFLECTION

The thesis work has been a challenging experience in many different ways. Regardless of the personal connection to the brewery and its area, including the village and the region as a whole, it was hard to find inspiration in the surroundings. The village architecture that used to be completely wooden is constantly changing nowadays, losing its unique face. As a result, my primary focus shifted to the production technology, requirements, and challenges. It was not always easy to balance obsession over the production needs and the design aesthetics.

While discussing my work with friends from the brewery, my father, or other professionals, they appeared confused about most ideas or aspirations of mine. It reminded me that not all buildings should turn into local landmarks as long as they fulfill their primary functions. Thus, instead of forcing the creation of something outstanding, I concentrated on developing a strict structure that can nevertheless ensure the flexible functional organization inside. The result is indeed a simple solution, but well-functioning, which is the most important for the production efficiency.

The simple post and truss structure ensure the possibility to rebuild the spaces inside and even change the whole purpose of the building. The barn-like appearance of the brewery is quite rural and playful, which also expands the possibilities of building to be used for something else but beer production.

It was also unusual to work on the thesis during pandemic times, feeling rather isolated from the university life and peers’ support and review. However, it taught me to look more critically at my work, take time to reflect, and suggest new solutions as someone else could do from the outside.
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And thanks to my family, who believed in my endless determination all these years going through the architectural school. I would not be where I am now without you in the first place.

Now it is the time to have some Graduation IPA.
RESOURCES

Courses:


Literature:

Beer industry and environmental impacts:


Cultural and social phenomena of breweries:


Reid, N., Gatrell J.D. (2018). Creativity, Community, and Growth: A Social Geography of
Urban Craft Beer. Region Journal, 4 (1), DOI: 10.18335/region.v4i2.144

Wood constructions:

Images: