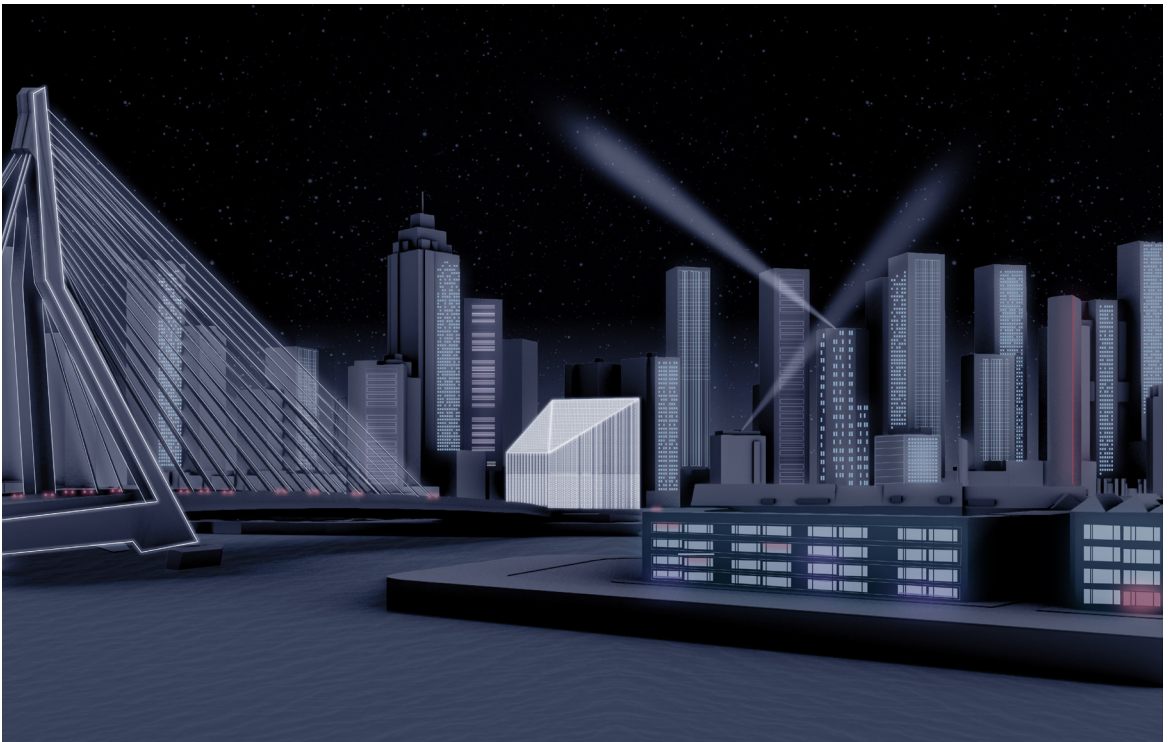


BANK OF MAAS

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Abstract

The project of the *Bank of Maas* was initially a response to a strong fascination with the Port of Rotterdam, as a node in the global transportation network. The Port of Rotterdam is the biggest seaport in Europe, and among the biggest seaports worldwide. It operates as a logistical node in the supply chain of goods and raw materials, and acts as a gate connecting European countries to the rest of the world.

Since its establishment in the 14th century, the port has continuously expanded its operations, and is today handling a growing amount of dry bulk, liquid bulk and container goods.

According to the Port of Rotterdam annual report, container shipping is the one increasing most rapidly among them. In 2018, the Port of Rotterdam had a throughput of 149.1 million metric tons of goods in containers, which is 22 million more than in 2016. Looking at the port statistics, together with sources such as the Market Access Database from the European Commission, we can see that the number of goods that are produced abroad and transported to Europe and the Netherlands is growing rapidly each year. This raised a few questions:

Will the numbers continue to rise at this pace? If so, what does this mean for a city and its organization? What does this mean for local production and waste disposal. What does this mean for local resources, such as raw materials, skills and knowledge? Are cities nowadays entirely powered by remotely produced goods?

These questions are, of course, very broad and not within the scope of this graduation project. However, they served as a starting point in the thought process, leading to the project of the *Bank of Maas*.

Introduction

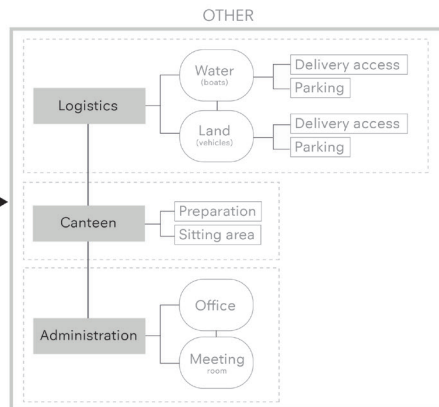
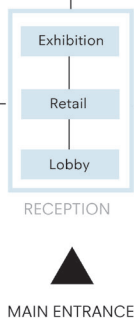
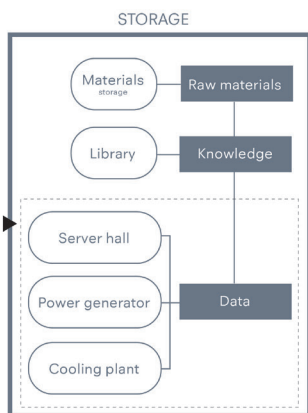
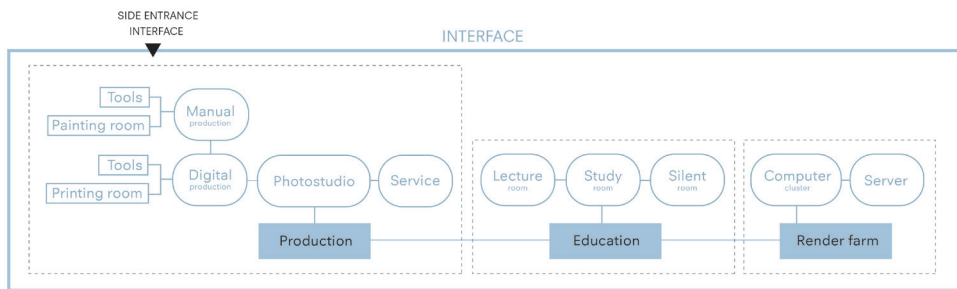
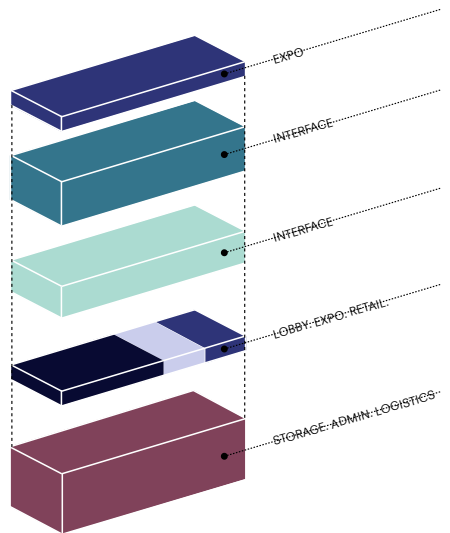
The *Bank of Maas* is a project that explores the changes in the built environment, occurring as a result of technological developments. The project looks at these developments, and utilizes them in order to create a condition for urban production to take place.

The *Bank of Maas* is a project which provides Rotterdam with the productive resources necessary to the functioning of a modern-day city. It does that by creating spaces for production and storage, supported by smart production tools and an innovative storage technology.

The *Bank* production explores the relationship between the industry 4.0 (production based on automation and smart technologies), and dense urban environments. By bringing production back into the inner city, the *Bank of Maas* aims to consolidate industry 4.0 with local skilled labor (i.e. people, knowledge, skills..) and local raw materials.

The project is an experiment, imagining a future in which cities exist as productive, well connected bodies in itself, facilitated with a network of productive resource banks.

The *Bank of Maas* doesn't have the intention to replace existing systems of centralized production, but rather to offer a more sustainable alternative, and act as a catalyst in shaping future trends.



Research

The Complex Projects graduation studio aims to look at the way in which economical, political and societal changes take shape in the built environment. This year's graduation topic was related to the notion of migration. In this project, the focus was put on physical migration of primary resources, and migration of production. Among others, the project dealt with issues of economy, consumerism, ecology and ethics.

The research focused on productive resources and the way they relate to the city. Cities today rely heavily upon systems of centralized mass production (e.g. factories) and corresponding transport infrastructure (e.g. ports). From the 70s onwards, cities worldwide have been witness to radical de-industrialization. Production processes that used to play a central role in every urban environment, now started moving out of the city, towards the suburbs, remote countries and continents. This happened due to various reasons. On one hand, production facilities started expanding, requiring more space. Whatsmore, production processes were also becoming increasingly hazardous, both for people and the environment and were therefore starting to be seen as incompatible with urban life. At the same time, in cities land prices started to rise, and many existing production facilities were no longer able to afford the rent. Consequently, production plants were forced to leave the inner city, and make space for high yielding functions such as offices and housing.

On the other hand, developments in transportation and information technologies have opened up new possibilities of remote production. Data could be easily shared, and goods easily transported. The newly established contexts provided companies with cheap workforce, and loose environmental regulations. Together, these were some of the causes leading to the relocation of production and the deindustrialization of cities.

The de-industrialization of cities had various consequences, of political, economical and social nature. As production relocated abroad cities were left without productive resources,

such as raw materials and production tools. At the same time, this also affected waste disposal, as waste couldn't be treated anywhere near the city, and was therefore rendered redundant.

Did urban life become fully dependent on remote production and long distance transportation?

Within the context of an increasingly globalized world, this question is rarely put forward. However, it gained attention recently, when due to the Covid 19 pandemic borders were suddenly closed, and countries recognized they have no means to produce basic goods independently. Previously, the importance of primary resources has been addressed by the European Commission in the "Raw materials initiative". Here it is claimed that "Technological progress and quality of life rely on access to a growing number of raw materials." However, no fair and sustainable solution has been formulated nor implemented so far.

Research question: How can productive resources return to the inner city and reestablish urban production?

Production in Rotterdam

Rotterdam is one of the fastest growing cities in the Netherlands. Due to the Port, it has been historically seen as the productive engine on national level. Nowadays, Rotterdam employs a high-rise strategy, aiming to densify the city, and bring living functions back into the city centre.

Within the Complex Projects graduation studio, a vision for the city is created. The vision enforces the existing high rise strategy while also responding to global trends. It does that by planning the social and functional infrastructure of the city, in a way that ensures that Rotterdam becomes, and remains, a liveable, diverse and productive city.

Within this strategy, the project of the Bank of Maas addresses the topic of economic productivity.

As the city's economy enters a new phase the city has to adapt through a diversification of functions, creating a productive network of working and living communities. As the center of Rotterdam shifts towards the south, the waterfront becomes the new face of the city, while the introduction of new urban production techniques will return to the waterfront its role as an urban resource.

Design brief

The research was finalized by formulating a design brief, which is seen as a continuation of the graduation research. It builds on the knowledge acquired, and tries to offer a practical response.

The design brief describes a storage space for primary resources (raw materials + data) and a production space (physical + digital production) supporting it. The production space acts as an interface between the primary resources and the city of Rotterdam.

The storage contains primary resources: material (raw materials) and digital resources (data). The raw materials are used for physical production while digital resources are used for digital production

The interface of the building is the production area. It is named that way, as it accommodates the interaction between the primary resources (material and digital) and the user. It does that by providing working spaces and tools, needed for manipulating the raw materials and data.

The interface is also divided into the physical and digital section.

The physical production area contains innovative manufacturing tools (such as 3d printers and laser cutters) and equipped working spaces such as an equipped photo studio, painting booth, printing area. In addition to this, manual tools are provided, such as the one needed for processing wood, ceramics, textile..

When it comes to digital production, the bank contains high capacity computer hardware, and other necessary equipment. This hardware can be used for various kinds of digital production, such as the production of video games or computer generated images for websites, mobile applications, advertisements.

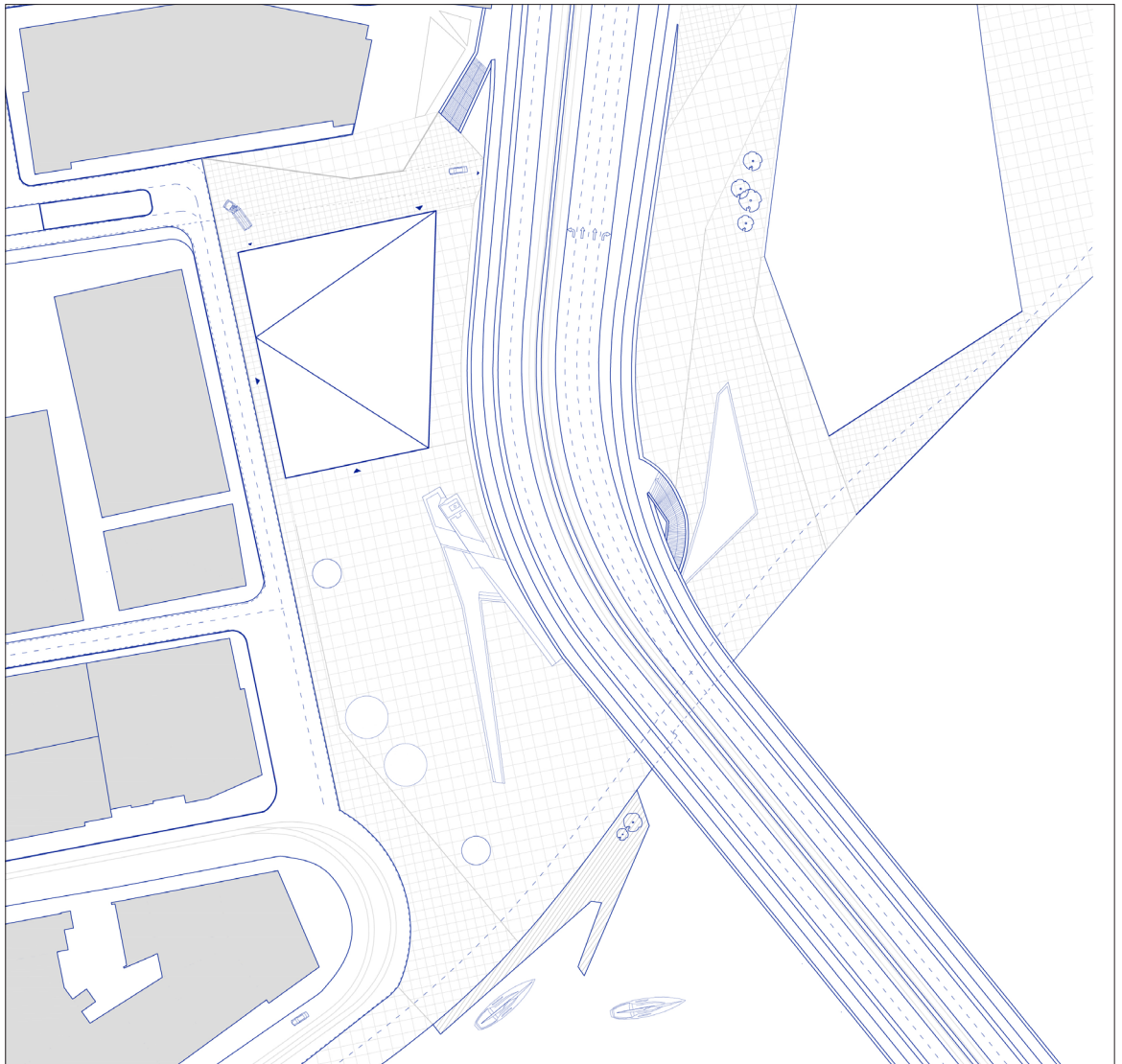
Both the storage and interface have a section dedicated to the preservation and spreading of knowledge. The storage contains a book depot, with books on different production techniques, or instructions on the usage of tools (manufacturing tools, hardware, software). The interface houses study and lecture spaces, suitable workshops, lectures and group work.

Project site

The project is situated at the north riverbank of the river Maas, in close proximity to multiple architectural landmarks, such as the Erasmusbrug, De Rotterdam, Zalmhaventoren and the Leuvehaven. It is positioned at the interaction between the cities North-South axis, and the river Maas. The North-South axis is connecting Rotterdam Noord with Rotterdam South, by way of the Coolingsel, Schiedamsedijk and Erasmusbrug. Through history it hosted multiple major public institutions, such as Stadhuis Rotterdam, Centraal Postkantoor, ABN Amro Bank, Beurs WTC and the Rotterdamsche

Bankvereeniging. The river Maas, on the other hand, is crossing the city in the East-West direction, and due to various port related activities used to be the carrier of the city's economic production.

By choosing this location, the Bank of Maas reactivates the institutional character of the Coolsingel, strengthening it towards the south, while at the same time embracing the productive character of the waterfront.





Site concept

Maas boulevard

While the Erasmusbrug was very effective in connecting the north part of the city to the south, it did create a certain discontinuity on the small scale. The project addresses the issue of fragmentation of public space along the Maas riverfront, through planning a new pedestrian bridge at the entrance to the Leuvehaven, connecting the Willemskade and the Boompjeskade. The overpass directs pedestrian flows and creates continuity in public space along the Maas waterfront, while creating a safe and comfortable public space.

Public square

The project introduces a public square in front of the Bank of Maas, facing the riverfront. The square serves as a space for gathering, leisure and events. It is a civic space: a place which enables citizens to organise, participate and communicate freely. The square is planned as an empty space containing moveable urban furniture, power sockets and shading. In that way, a flexible space is created, suitable for temporary programs.

Marina

The project embraces the existing dock, by redesigning it to fit the needs of three different kinds of traffic:

Water taxi for the local people (connecting to the Wilhelminapier and other places along the Maas)

Tourist boats

Logistics of the Bank of Maas.

Partially, the Marina is designed as a leisure space, and can be used as urban furniture at the water.

Building concept

The Bank of Maas is a building that combines the monumentality and authority that are associated with institutions and the openness and immediacy of spaces of production. The building gives form to the public square in front of it, and adds value to the waterfront.

The Bank is shaped in a way to adjust to and keep distance from the Erasmusbrug. It has an ascending building height, bridging multiple height differences of the surrounding buildings, and is sloping towards the river. The building was planned to have an approximate height of 70m, mediating between the Rotterdam layer (15m) and the Rotterdam highrise strategy (70-150m).

Inverting the Bank

Programatically, a bank used to consist of two parts:

- 1.0 Storage space (e.g. gold storage) - enclosing and protecting the stored value
- 2.0 The interface (e.g. counter) - facilitating the interaction between the stored value and the outside world.

In the traditional bank, the interface is occupying the ground floor, which results in the user being able to encounter the interface, but never the storage itself.

In the Bank of Maas, the storage is occupying the lower levels of the building, and forms a base on which the lobby and interface are placed. The users are ushered through the storage before reaching the interface, and in that way get informed and educated about the resources that power their daily lives. In addition to this, an experience is created, which promotes the novel institution and its role.

Access

By analysing existing pedestrian flows, it was concluded that there is no single main direction from where the building is approached. Therefore, multiple entrances are planned: main entrance, secondary and two logistic entrances. Logistics is an important aspect of the project. It is divided into land logistics used by road transportation vehicles (to the north), and water logistics used for goods arriving at the marina (to the west). Both logistical entrances lead to the distribution center on the ground floor, from where goods are sorted out and loaded into the storage, by means of the automatic, smart vertical core.

The main entrance is facing the river to the south, and is visible from the opposite riverbank. It can be approached from the square in front of it, by people walking/cycling along the waterfront or arriving by water taxi. The secondary entrance is positioned to the north-east, and is oriented towards the Erasmusbrug. This entrance is used by those approaching from the North-South access, and those arriving by public transport, from the railway station at Beurs. By placing the main entrance towards the river and square, the building acknowledges the importance of the river in urban life.

Routing and experience

Escalators

Once in the building, the visitors are ushered to the escalators.

The escalators are transparent glass tubes, piercing through the automated storage and datacenter, revealing its interior. The routing through the storage has an educational and experiential quality, as it informs the user about the storage, but also acts as an attractor for new visitors.

The escalators were designed in a way to contribute to the building's expression of monumentality. The escalators, and the building as a whole, were inspired by the form and logic of the Sumerian ziggurat in Ur, built in the 21st century BC. In the ziggurat, similarly to the Bank of Maas, visitors are by means of stairs invited onto a platform, where the building's main entrance is located.

Square 2.0

After being ushered through the storage, the user reaches an open, public space - the square 2.0. The square 2.0 functions as an elevated ground floor, with a view over the river Maas. In its function of a gathering and leisure space, it is complementary to the public square in front of the building. Additionally, it contains a cloakroom, shop and canteen. This is also where the entrance to the interface is located. The Square 2.0 together with the preceding entrance route are publicly accessible. In contrast to this, the Interface is a closed and controlled area.

Interface

The interface is the area where users can access various innovative manufacturing tools (such as 3d printers and laser cutters) and equipped specialized production areas, such as a photo studio, painting booth, printing room, workshop spaces for working with wood, metal, textile, ceramics... Two of the floors are dedicated entirely to digital production, and are equipped with high capacity computer hardware, and other necessary tools and equipment. This hardware can be used for various kinds of digital production, such as the production of video games or computer generated images for websites, mobile applications etc.

The interface is designed as an open space, divided with furniture and light partition walls. In this way, the building will stay open and adaptable, to the needs of novel technologies and the continuously changing production tools.

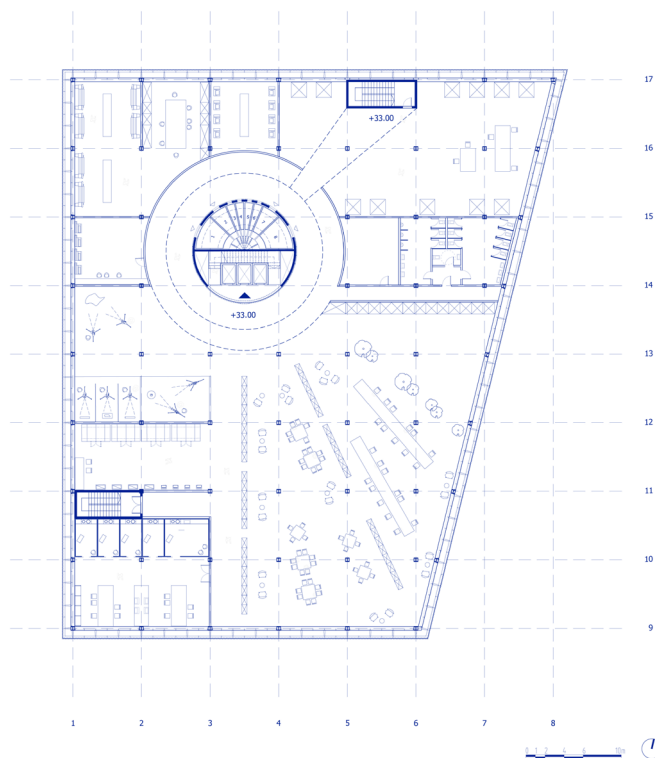
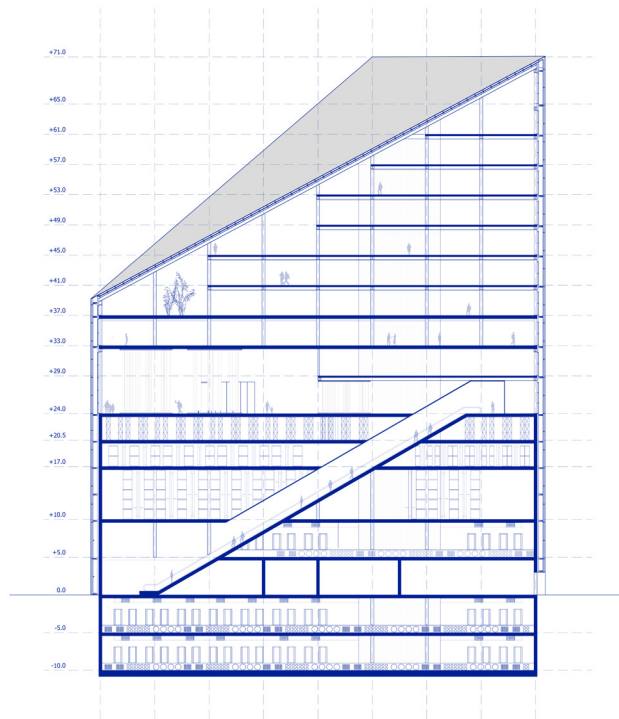
Human-to-Machine

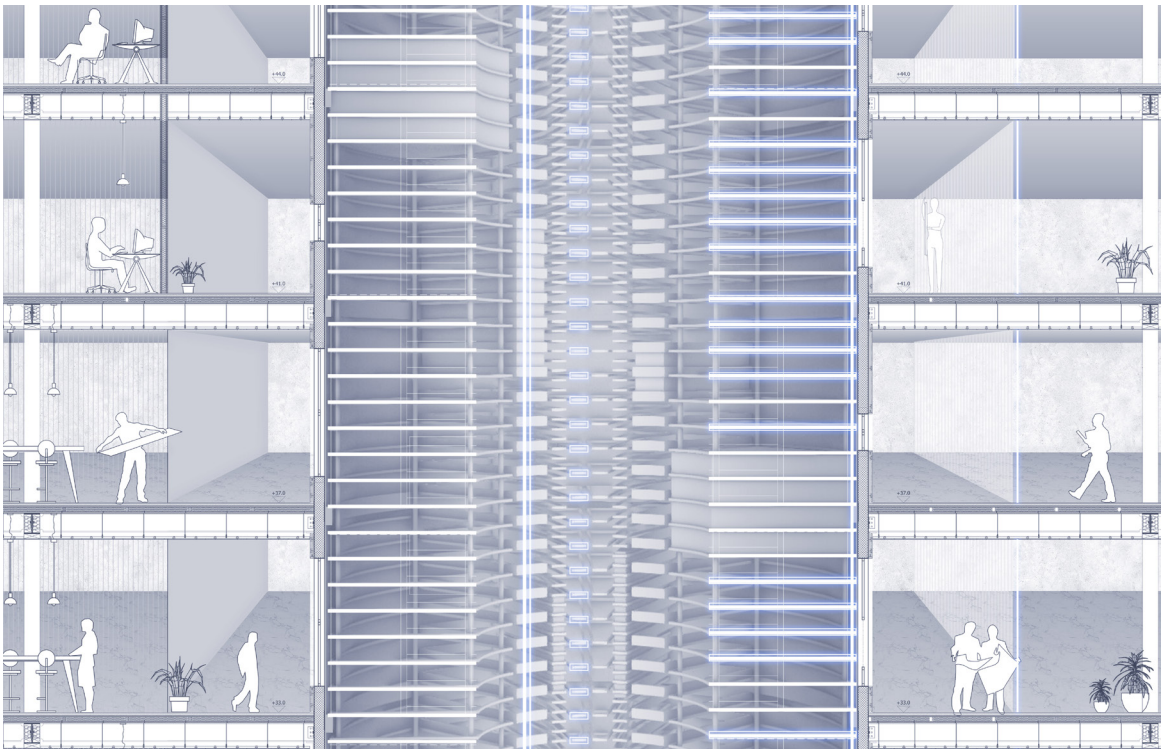
At the heart of the building, a vertical core is situated, with a double function:

Facilitating vertical circulation through the interface and storage.

Enabling the interaction between the human user and the storage machine.

From the interface, the users can browse the Bank of Maas digital database and order items from the storage. As the core is directly connected to the automated storage, the order is delivered through the core to the interface. The building operates with the logic of an over-sized vending machine.





Structure and Climate

Structurally the building is divided into three zones. The storage, occupying the base, has a concrete load bearing structure, as its main function is to protect the stored resources. The lobby, placed above the storage has a steel load bearing structure, with a one floor high vierendeel truss. In this way, a large span is bridged, and the lobby has the quality of an open, flexible space. The interface, occupying all the stories above, is supported with a steel load bearing structure.

The climate concept is grounded on the function of the building, with its specific energy potentials. As both the datacenter and the production tools generate heat throughout the year, a surplus is created. This surplus is partially stored in an underground reservoir and used for the purpose of heating the building throughout the winter months. The remaining heat is fed into the municipal heatgrid and can help the neighboring buildings in meeting their energy demands. To achieve this, the existing pipeline, transporting heat from the port of Rotterdam towards the south part of the city has to be extended towards the north.

Materialization and Facade

The building facade is covered in a double skin facade, with a white metal mesh as second skin. As the second skin is perforated, it reveals partially the layers behind. Therefore, the base of the building where the storage is placed seems opaque, while the interface is more open and transparent, especially in the evening hours.

The materialization of the building reflects the authority and monumentality of the bank as an institution, combined with the openness and transparency of a space of production. In the interior this is seen through the usage of natural stone, semi transparent stone and glass. The materialization of the storage has the main function of being robust and protective, which resulted in concrete load bearing walls canceling out the surrounding.

Conclusion

The Bank of Mass is a project which explores the changes in the built environment, occurring as a result of technological developments. The project looks at these developments, and utilizes them in order to create the right condition for urban production to take place. The project does that by providing Rotterdam with the productive resources necessary to the functioning of a modern-day city.

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