Forward to the Past:
Redesigning the form and flow of C2C Marketplace

by
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ABSTRACT

The nature of luxury is multifaceted and deeply intertwined with our society and culture. It is not just about exclusivity and high cost, but also about experiences and values. Luxury can be found in a bespoke suit tailored to fit your every curve, in a lavish and secluded resort nestled in the heart of the jungle, or in a simple yet perfectly crafted piece of furniture that tells a story. It is a feeling of indulgence, of being able to fully appreciate and enjoy the finer things in life. It is a state of mind, a way of living, and a celebration of the human spirit.

This thesis proposes a particular design model, or a prototype of architecture that both embodies and facilitates the transaction of secondhand luxury goods, or pre-owned luxury goods by individuals, in a form of consumer-to-consumer marketplace. The prototype is a special type of warehouse store that integrates numerous design elements that address the characteristics of luxury and its interrelationship to human, machine, and the built environment. In a way, the thesis bring luxury and architecture together as in a delicate dance, each enhancing the other in a way that is both subtle and profound. At their core, both luxury and architecture seek to evoke a sense of wonder and desire, drawing us in with their beauty and craftsmanship. They are mutually reinforcing, each elevating the other to new heights of splendor and exclusivity.

In the end, this thesis attempts to reconstruct material form and built environment in the specific context of human interest and behavior that is, what captivates us, what we buy and we live for. It recognizes the profound impact that the built environment has on the human experience and the ways in which it shapes and defines our actions and behaviors. In this way, the built environment becomes a reflection of who we are and what we value, and has the power to shape and enhance the human experience in meaningful and enduring ways.

Thesis Advisor: Xavi Aguirre
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Chapter 1. Market Research: Second-hand Luxury

Luxury

The second-hand luxury goods market has seen significant growth in recent years due to an increase in consumers looking to purchase pre-owned, high-quality items at a lower cost than new ones. In 2021, the global luxury resale market was valued at $16.23 billion, and It is projected that the market for second-hand luxury goods could reach $68.53 billion by 2028, with a compound annual growth rate of 15.53% from 2021 to 2028.

Fig 1. Luxury Resale Market Size And Forecast
(Source: https://www.verifiedmarketresearch.com/product/luxury-resale-market/)

Factors of growth of the second hand luxury market

Lucrative nature of reselling luxury goods

Luxury goods are often made in limited quantities, making them more exclusive and desirable. This exclusivity can drive up demand and prices, which can make reselling them more profitable. Also, luxury goods often retain their value well over time. While many non-luxury items depreciate quickly, luxury goods tend to hold their value or even appreciate in value due to their high quality and exclusivity. This means that reselling luxury goods can be a good way to make a profit, as you can often sell them for more than you paid for them.

The overall growth of the overall luxury market

While the exclusivity and prestige associated with luxury brands can be appealing to some consumers, the high cost of these items can be a barrier for others. As a result, many people turn to the second-hand market in order to access luxury goods at more affordable prices. This has led to an increase in the number of luxury resale websites and stores, as well as a growing interest in pre-owned luxury items among consumers.

The increasing availability of online marketplaces

The emergence of platforms such as Poshmark, Depop, and The RealReal have made it easier than ever for individuals to buy and sell pre-owned luxury items, and have helped to democratize the luxury resale market by making it accessible to a wider audience. These marketplaces have also made it easier for buyers to discover and purchase unique and hard-to-find items, which has further contributed to the growth of the luxury resale market.

The growth of online marketplaces has also made it easier for individuals to research and compare prices for luxury resale items. In the past, it was difficult to obtain accurate pricing information for pre-owned luxury items, but now there are numerous resources available online that provide up-to-date market value estimates. This has helped to increase the transparency of the luxury resale market, making it easier for buyers and sellers to make informed decisions.

In addition to increasing convenience and transparency, online marketplaces have also helped to expand the reach of the luxury resale market. Prior to the internet, it was difficult for individuals in remote locations to access luxury resale items. However, with online marketplaces, anyone with an internet connection can browse and purchase items from anywhere in the world. This has helped to bring the luxury resale market to a global scale, increasing its overall growth.

The rise of social media and influencer marketing

Many luxury resale retailers and individuals have turned to social media to promote their products and have often enlisted the help of influencers to do so. Influencers, who have large followings on platforms such as Instagram and TikTok, have the ability to reach a wide audience and can help to generate interest in luxury resale items. As pre-owned luxury items can be hard to come by and may not be as well-known to the general public as new, in-season items, influencers, who often have deep knowledge and passion for luxury goods, can help to showcase the unique and high-quality nature of the products being sold, and can help to create a sense of exclusivity and desirability.

Social media has also helped to create a sense of community and connection within the luxury resale market. Many individuals who buy and sell pre-owned luxury items have found like-minded individuals through social media and have formed online communities where they can share their passion for luxury goods. This sense of community has further contributed to the growth of the luxury resale market by creating a supportive and engaged group of buyers and sellers.

Social media and influencer marketing have also helped to drive the trend of sustainability in fashion, which has further contributed to the growth of the luxury resale market. With the increasing awareness of the environmental impact of fast fashion, many consumers have turned to purchasing pre-owned luxury items as a more sustainable alternative. Social media has played a role in spreading information about the benefits of purchasing second-hand and has helped to make sustainable fashion more mainstream. Influencers, who often have a large following of environmentally conscious individuals, have been particularly effective in promoting the sustainability of the luxury resale market.

C2C Marketplaces

One of the most significant recent changes in the economic system is the growth of the sharing economy and consumer production. The Consumer-to-Consumer(C2C) trade has been expanding significantly in the COVID-19 era, especially in new social commerce marketplace platforms with the help of digital technologies. In addition to the conventional platforms, including Craigslist and eBay, the number of users and transactions in new services, including Letgo and Offerup, is rapidly increasing. Focusing on fashion items, Poshmark is estimated to have a gross merchandise volume of $1.8B in 2021. A popular handmade or vintage item market, Etsy is connecting 7.5M artists and craft makers with 96.3M buyers.

Despite a better value and an abundance of choices, existing C2C marketplaces have some issues. For example, consumers may worry about fraud and scams. Security concerns when meeting with a stranger at an unsafe location and the inconvenience of making a meetup appointment and waiting are barriers against the expansion of these markets. In addition, inventory, packaging, and shipping could be a burden for frequent sellers. This project aims to provide a fulfillment system to help resolve the problems mentioned above in C2C trades. More than a simple sorting and storage, this facility provides services including drop-off and pick-up with both walk-in and delivery using trucks and drones, intelligent scanning and evaluation of accepted items using AI technology, item display for visiting customers, and labeling and packing shipping-out items.

Existing fulfillment center or warehouse have been constructed in a large-size box shape for a bulky space filled with stacks and mechanical equipment for a movement of goods, located in a low density area. Architectural organization for an efficient and convenient use of space has been ignored under these conditions. The suggested facility in this study is assumed to be built in an urban environment because of its purpose for C2C transactions. The limitation of space and iconic role as a commercial marketplace requires each part of the structure to have a unique architectural design according to its functions and the combination and relationship of these parts should be optimized for better performance of the facility.

Fig 2. Amazon warehouse located in Bondurant, Iowa
(Source: https://www.costar.com/article/349442843)

Existing Warehouses and Fulfillment Centers

Typical major warehouses are usually located far from urban centers. Large-size storage and concentrated item process cost less and the land cost for those large size facilities mainly determines the location of the warehouses. Well-developed highway and railroad system help reduce the transportation cost from those warehouses to demand centers.

The design of the warehouses has been focused on the layout design within the large box-shaped structure. The layout usually includes space utilization, storage options, and productivity equipment to aisle layout and production area workflows. Among those, especially, the floor plan design is limited to the alignment of racks and mechanical equipment like conveyors, packing tables, cranes, and folk lift etc. in a rectangular-shape area.

Urban warehouse projects have mostly focused on a renovation of old facilities. Those project usually maintained the original structures like roof, walls, beams, and columns and converted the inner space into shopping places or recreational area. Good example is the Philadelphia Pier project that developed the new place for events, art installations and exhibits from an outdated waterfront storage. (Drueding, 2020)

Fig 3. Philadelphia Pier project
(Source: https://savingplaces.org/stories/an-old-philadelphia-pier-goes-from-defunct-to-delightful)

Those projects has comparably less space restrictions because they use the existing inner space of original structures, which is mostly large even in an urban environment. The number of available facilities are limited and there is no option of changing the locations to a high demand area for C2C social marketplaces.

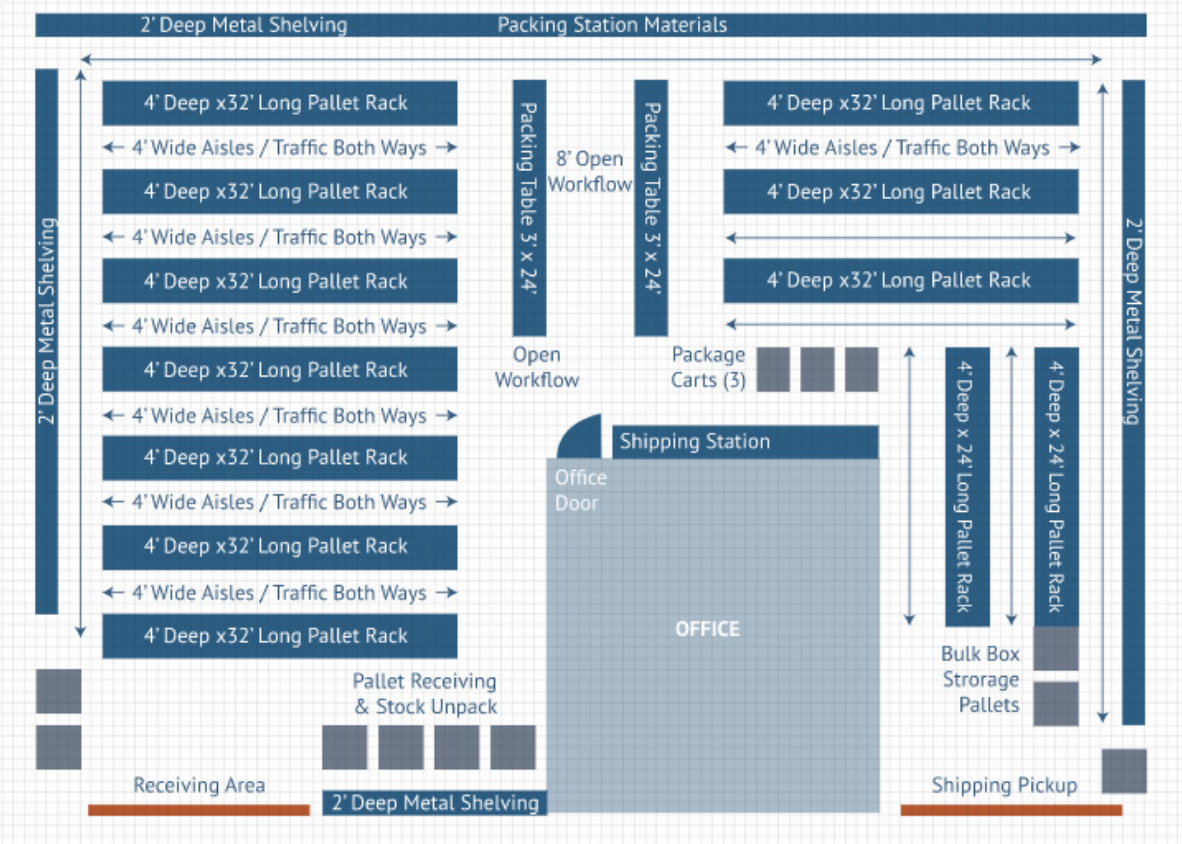


Fig 4. Example of warehouse layout floor plan
(Source: https://fitsmallbusiness.com/warehouse-layout)

Consumer Production and Sharing Economy

The social C2C marketplace is a good example of consumer production and sharing economy.

Dellaert (2019) has suggested a two- layered conceptual framework of consumer co-production networks and the individual consumer production journeys. The social C2C marketplace can be categorized in the high extent of network-level consumer co-production. In this category, the digital technology plays an import ant role because it supports disentangling complex value creation systems into smaller activities (or transactions) and a rapid and accurate matching of the supply and demand across many different consumers participating in the system. (Dellaert, 2019) These are the exact ways how the current social C2C marketplace apps like Offerup and Letgo are working.

According to Wu and Zhi (2016), the sharing economy promotes social, economic and environmental sustainability in different ways. It can help solve unemployment problem. Interaction between strangers can establish the social trust. It is believed as sustainable consumption that decreases the search and transaction cost, provides extra income for sellers and costs lesser for consumers. Sharing economy has resource-saving potentials and optimizes resource disposition.

David et al. (2016) said that the sharing economy rises from mistrust of institutional actors in the traditional capitalist system and is placed in an economic crisis context. It is helped by the use of new technologies to improve collective/ sharing creativity and productivity. It is also a reflection of the demand for green practices and more friendly social relations.

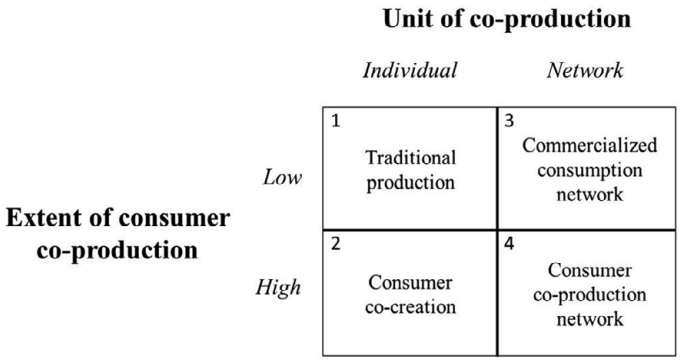


Fig 5. Consumer co-production framework: from traditional production to consumer coproduction networks (Dellaert, 2019)

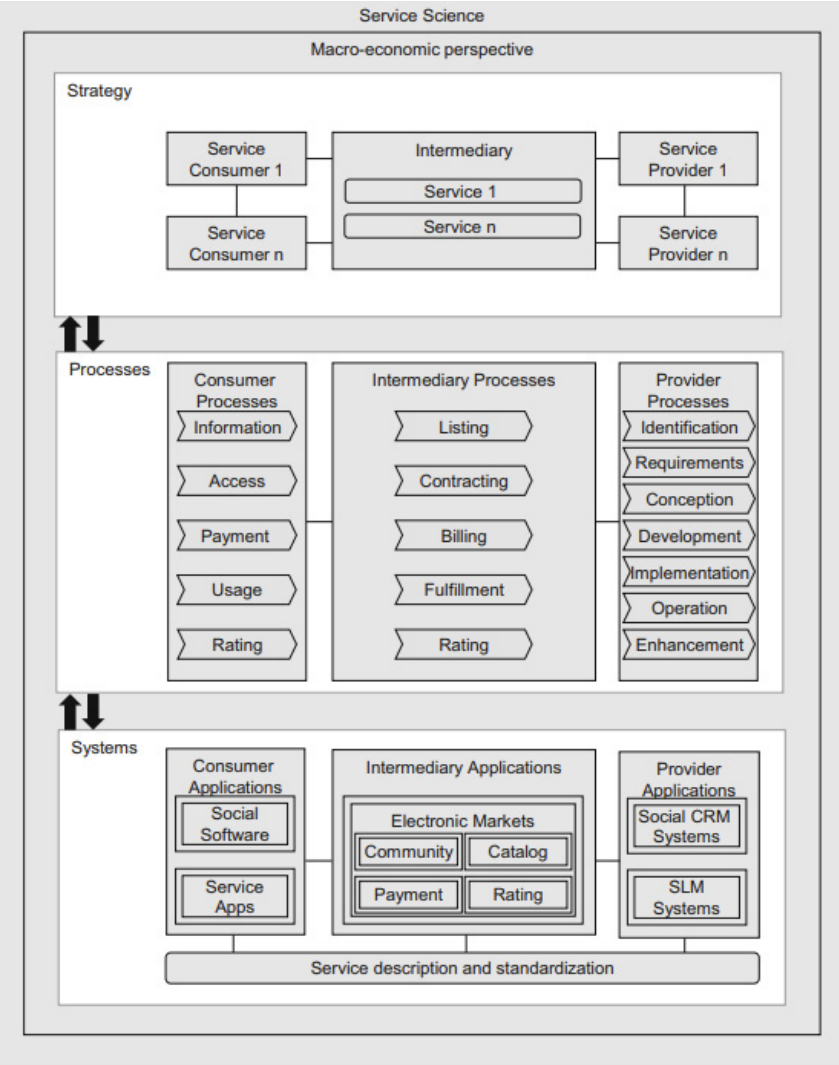


Fig 6. Framework for the sharing economy (Puschmann, 2018)

Drone is the Future of Transportation

Drone is a technology with great social and economic influence as various potential markets. Many countries around the world are expanding the use of drones in the public and private sector, and the number of companies that produce drone aircraft and parts and develop convergence technologies is exploding.

Especially, In the private sector, drones have recently been widely applied to the logistics service sector. Many drone companies and logistics companies have been piloting drone delivery with approval from the Federal Aviation Administration (FAA) by the Unmanned Aircraft Systems Integration Pilot Program in the United States.

Amazon announced its plan to deliver drones less than 5 pounds (about 2.3 kilograms) within 30 minutes, and released a video containing drone delivery scenes for the first time in November 2015. (Soper, 2015) In addition, in June 2019, 'Prime Air', a delivery drone with a new design, was announced at 'Amazon re: MARS' in Las Vegas, USA. The hybrid drone can fly more than 15 miles (about 24 km) and can fly at 55 mph (about 88 km/h). It flies by sensing the surroundings through images, thermal images, and ultrasonic sensors. (Wilke, 2019)

UPS partnered with CVS and Matternet to test drug delivery. The drones used in this delivery flew autonomously, but were remotely monitored to allow pilots to intervene if necessary, hovering about 20 feet above the delivery destination and slowly unloading the drugs with cables. (McFarland, 2019) UPS also carried out on-site tests in which drones were loaded into delivery trucks and moved near destinations to fly to deliver goods to homes. The drone can fly for up to 30 minutes and can load up to 10 pounds (about 4.5 kg). (Kastrenakes, 2017)

In 2019, Wing Aviation, a Google-affiliated drone operator in the United States, began testing drone delivery in Christiansburg, Virginia. Wing is working with FedEx, Walgreens Sugar Magnolia. Wing's drone is 3.3 feet tall and has 14 propellers in two rows to reduce noise. The payload weighs 3.3 pounds. (Kumparak, 2019)

FedEx announced that they will start testing a 1,900-pound drone for hauling packages. Their plan includes a hybrid-electric and uncrewed aircraft that can be tested in 2013. (Verger, 2022)

Fig 7. Drone package delivery by Amazon
(Source: https://www.usatoday.com/story/tech/2013/12/01/amazon-bezos-drone-delivery/3799021/)

Chapter 2. In Need of Physical Warehouse Store

Trust and Credibility

In a world where online shopping has become increasingly prevalent, the need for physical stores that specialize in secondhand luxury goods is greater than ever. While online shopping offers convenience and a wide range of options, it can also be impersonal and lacking in credibility. A physical warehouse store that specializes in secondhand luxury goods offers a sense of trust and credibility that is difficult to replicate online. By having a physical location, the store is able to establish itself as a legitimate business with a real presence in the community. This can help to build trust with customers, who can see firsthand that the store is a reputable and reliable source for high-end items.. This is especially important when it comes to luxury goods, which often come with a higher price tag and may require a greater level of investment.

One of the main reasons why a physical store is needed is the ability to examine the products up close and in person. When shopping online, customers are often reliant on photographs and descriptions to understand the condition and quality of the products being sold. This can be inadequate, as it is difficult to fully assess the condition of an item without seeing it in person. In a physical store, customers can inspect the products up close, examining them for any imperfections or signs of wear. They can also try on clothing and accessories to ensure that they fit properly and meet their expectations. This level of personal interaction with the products helps customers make more informed and confident purchasing decisions.

Interactive Experience

A physical presence of a warehouse store allows for a more personal and immersive experience that cannot be replicated online. A physical store also allows customers to see and try on a wider selection of items in person. This can be especially important when it comes to luxury goods, as the fit and feel of a piece can be just as important as its appearance. By being able to touch and try on items, customers can get a better sense of which items are the best fit for them and make more informed purchases.

Also, in a physical store, customers can ask questions and receive personalized recommendations from staff members who are well-versed in the world of luxury. They can get a sense of the different brands and styles available, and find out more about the materials and craftsmanship that go into each item. This level of expertise can be invaluable for those who are interested in investing in high-end goods but are unsure of where to start.

Curation

When shopping online, customers are often faced with an overwhelming selection of goods. This can make it difficult for them to discern which items are the best quality, and it can be overwhelming to sift through pages and pages of products. A physical store, on the other hand, allows for a more curated selection of goods. The store can carefully select only the highest quality and most desirable items to display, making the shopping experience more efficient and enjoyable for customers.

In addition to a carefully curated selection of goods, a physical store allows for the creation of a visually appealing shopping environment. Online stores do not have the ability to physically display items in a way that is aesthetically pleasing. A physical store, however, can use lighting, props, and other design elements to create a cohesive and attractive shopping experience. This can be especially important for luxury goods, as the aesthetic appeal of the store can add to the prestige and exclusivity of the items. The store can carefully select items that align with its brand identity and use the physical space to reinforce this image. This can help to establish a strong and memorable brand presence, which can be difficult to do solely through an online presence.

Unexpected Surprise

There is something undeniably alluring about the idea of stumbling upon a treasure in a physical store. The thrill of the hunt, the possibility of finding something truly unique and special - these are all part of the appeal of shopping for secondhand luxury goods in a physical store. Indeed, customers are not constrained by the algorithms that often govern online shopping experiences. When we shop online, we are often shown products that are based on our past browsing and purchasing history, as well as the preferences of similar customers. While this can be convenient, it can also be limiting. We may never come across products that are outside of our usual interests or that challenge our expectations. In a physical store, however, customers have the opportunity to browse and discover products purely by chance. They may come across something they had never considered before, or find a hidden gem that they never would have found through online search algorithms. This element of serendipity can add a level of excitement and surprise to the shopping experience that is hard to replicate online.

Chapter 3. Prototype
3.1 Key Characteristics

Urban

One of the main advantages of building a secondhand luxury warehouse store in an urban area is the greater population density. Urban areas tend to have a larger number of people living in a smaller geographic area, which means that there is a greater potential customer base for the store. This can help to make the store more viable and ensure that it has a steady stream of foot traffic. Since urban areas tend to have a higher demand for luxury goods due to the higher income levels and greater prestige associated with living in the city. The warehouse store can take advantage of this demand and provide urban residents with a convenient and affordable way to access these goods. Also, urban residents are typically more likely to live close to the store and have easy access to it via public transportation or by walking. This can make it easier for people to shop at the store and can also reduce the environmental impact of transportation.

In addition, building a secondhand luxury warehouse store in an urban area can also provide the opportunity for partnerships with other local businesses. For example, the store could work with a nearby consignment shop or estate sale company to source its inventory. This could be a mutually beneficial arrangement, as the consignment shop or estate sale company would be able to sell its goods to the store, and the store would have a steady supply of high-quality second luxury goods to offer its customers. The warehouse store in an urban area could also work with other local businesses to cross-promote each other's products or services. For example, the store could partner with a nearby boutique or salon to offer discounts or promotions to customers who make purchases at both businesses. This can help to drive traffic to both businesses and create a sense of collaboration and community.

Fig 8. New York skyline silhouette
(Source: https://www.vecteezy.com/free-vector/new-york-skyline)

Vertical

In many urban cities, space is at a premium, and it may not be possible to find a suitable lot for a traditional warehouse store. By building vertically, the store can maximize the use of the available land and still provide a large space for displaying and storing its inventory. This would reduce the amount of land it needs to purchase, which can help to lower the overall cost of construction.

By using multi-level shelving or racks, the store can store a larger number of items in a smaller footprint. This can be especially useful for a store that specialized in secondhand luxury goods, as it can allow the store to showcase a wide variety of items without taking up too much floor space. Additionally, by using vertical storage solutions for larger items, the store can free up even more floor space for smaller items.

Another advantage of building a warehouse store vertically in an urban area is the increased visibility it can provide. A store that is built on a multi-story building will be more noticeable to passing traffic and pedestrians, which can help to increase foot traffic and sales. Additionally, a vertically built store may be more visible from a distance, which can help to attract customers from a wider area. This increased visibility can be especially beneficial for a warehouse store that specialized in secondhand luxury goods, as it can help to attract customers who may not have been aware of the store's existence or who may not have thought to look for secondhand luxury goods in a traditional warehouse setting.

Vertical structure could also enhance the shopping experience for customers. By using multi-level shelving and vertical storage solutions, the store can make it easier for customers to browse and access its products, as everything will be at eye level or within easy reach. Additionally, by using clever design techniques to create the impression of more space, the store can make the shopping experience feel more open and inviting.

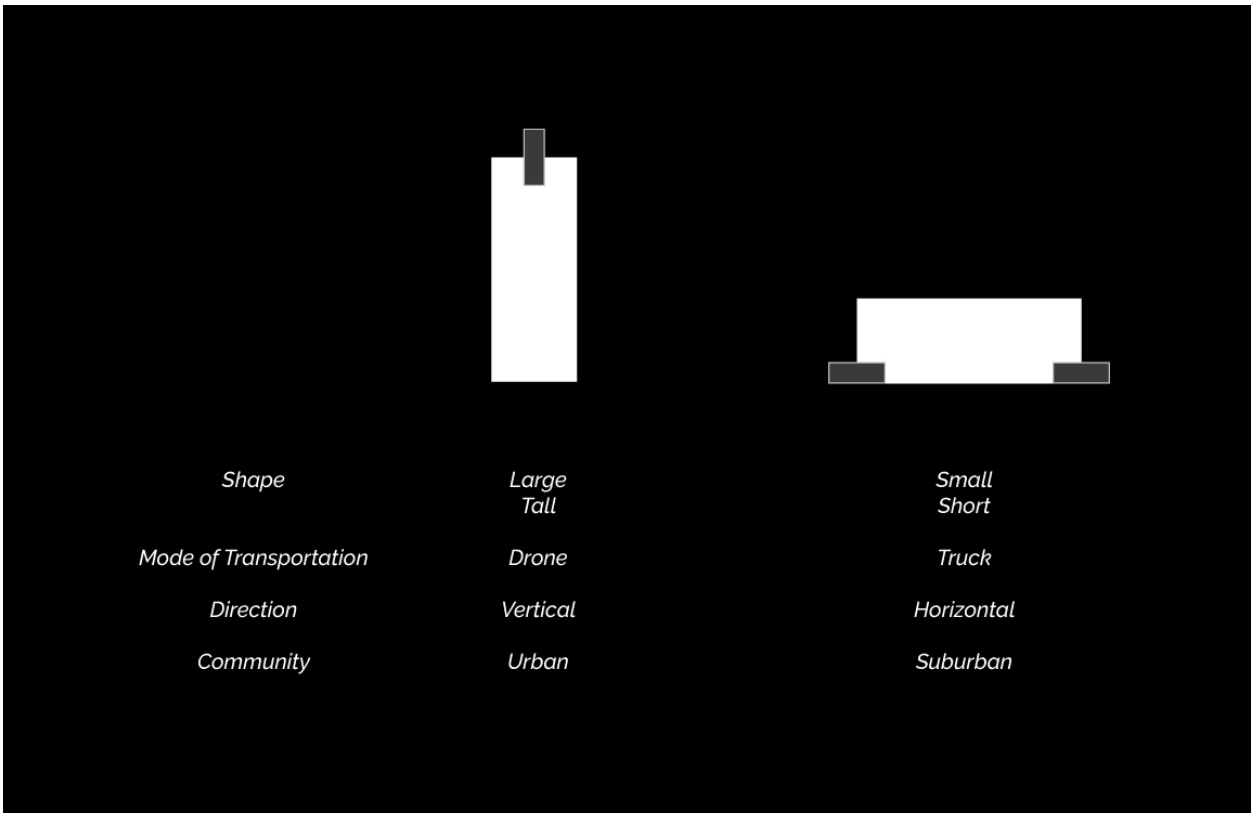


Fig 9. Diagram to compare structure of warehouse

Transparent Material Outer System

Building the warehouse store with transparent can improve the shopping experience for customers. When customers can see the luxury goods on display and what is happening inside the store, it can make the visiting experience more engaging and enjoyable. This can be especially important for a store that specialized in secondhand luxury goods, as it can help to build trust and confidence with customers by allowing them to see the quality and condition of the goods on offer.

Building a warehouse store with transparent materials can also enhance security by allowing customers and staff to see what is happening inside the store at all times. This can help to deter potential thieves or vandals and can make the store a safer place to shop and work. Additionally, by using transparent materials, the store can create an open and welcoming atmosphere, which can help to build trust and confidence with customers.

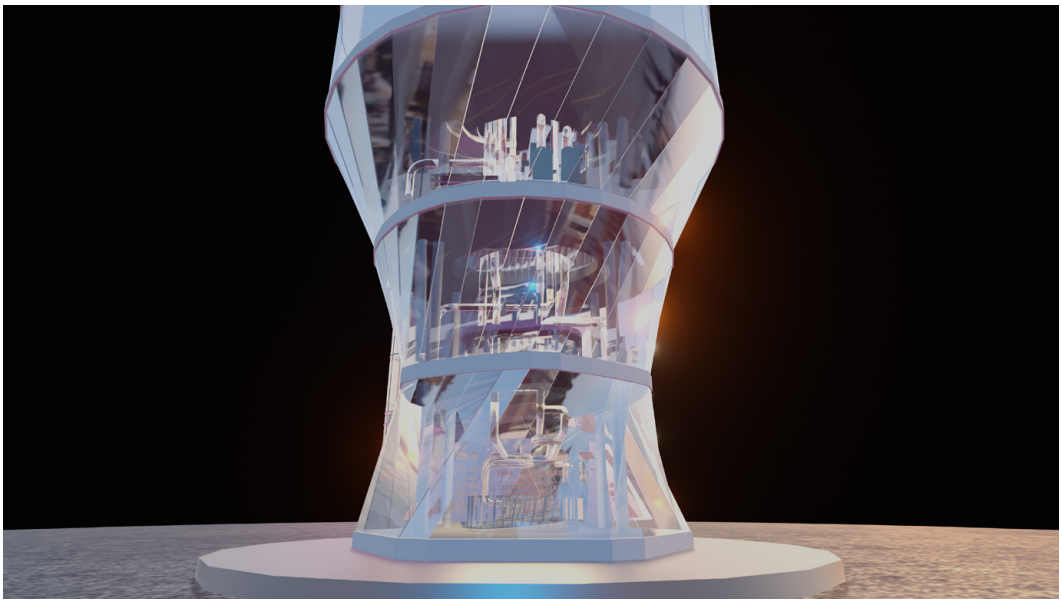


Fig 10. Rendered Image of the prototype (inside)

Fig 11. Rendered Image of the prototype (outside)

Pneumatic Tube Inner System

Using a pneumatic tube system for the transfer of luxury goods brings the benefit of high speed at which the goods can be transported. These systems use air pressure to quickly move small items from one location to another within a warehouse, which can help to increase efficiency and productivity. This can be especially important in a warehouse that handles high-value items, as every minute of delay can result in a significant loss of revenue. These systems can reduce the need for manual handling of goods, which can lead to a reduction in labor costs. This can be especially important in a warehouse that handles high-value items, as the cost of labor can be a significant portion of the overall cost of handling and storing these items.

In addition to speed, pneumatic tube systems can also help to ensure the accuracy of the transfer of goods. When items are sealed within the tube, there is a reduced risk of them being misplaced or lost. This can help to reduce the risk of errors and ensure that the right items are delivered to the right location at the right time. Also, the system can help to reduce the risk of damage to luxury goods during transport. When items are protected within the tube, they are not subject to the wear and tear that can occur with manual handling. This can help to ensure that the goods arrive at their destination in the same condition as when they left the warehouse.

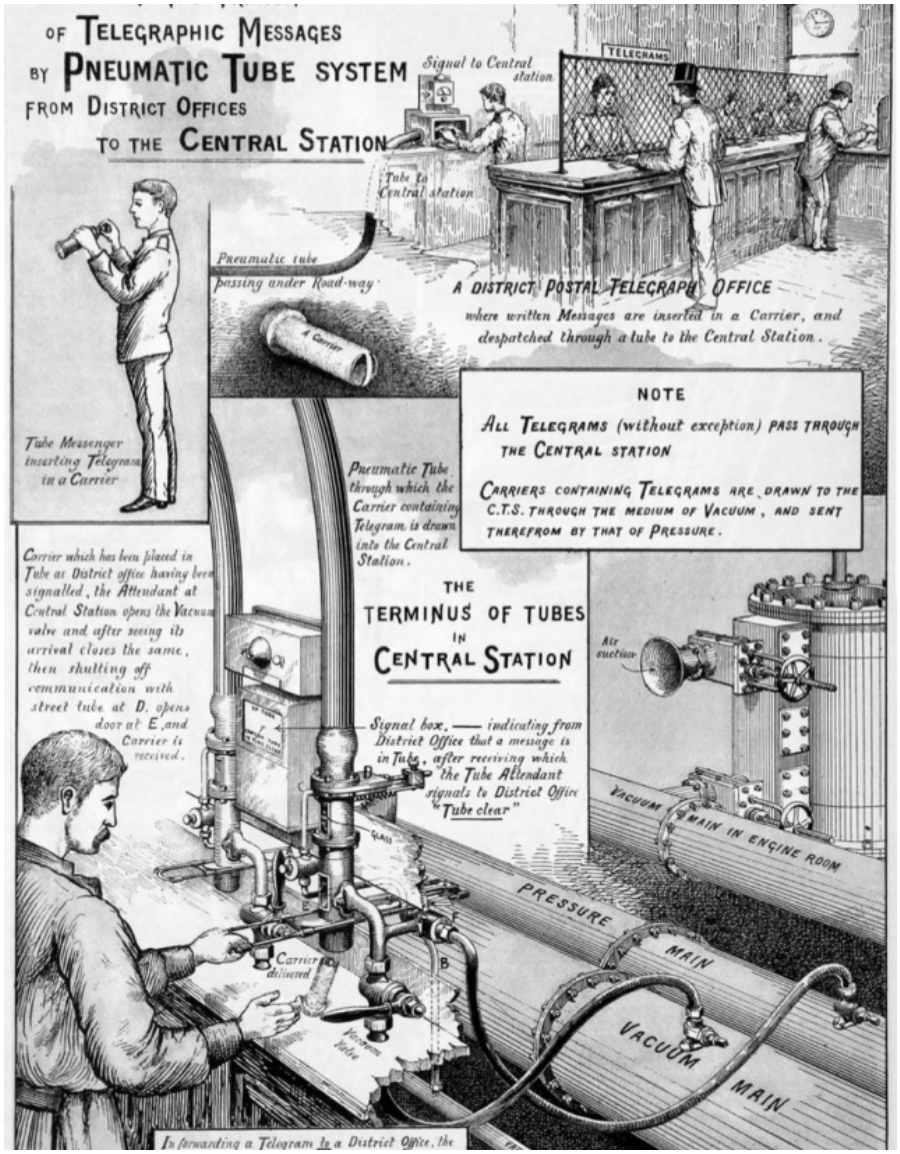


Fig 12. Illustration of pneumatic tube, 1899
(Source: https://www.messynessychic.com/2021/02/05/a-love-letter-to-the-lost-world-of-the-parisian-pneumatic-post)

On an aesthetic level, the use of pneumatic tube systems can bring to mind the early days of modern automation, when the use of machines to perform tasks that had previously been done by hand was a relatively new and exciting development. These systems can give off a sense of nostalgia, recalling a time when the future seemed full of possibilities and the potential for technological advancement was limitless. The retro mood created by the use of pneumatic tube systems in a secondhand luxury warehouse store can be especially appealing to customers who are looking for unique and unusual shopping experiences. Customers may find it interesting and engaging to see goods being transported through the tubes, and this can help to create a memorable and enjoyable shopping experience. Such a system can add an element of surprise and novelty to the shopping experience, and they can help to create a sense of intrigue and mystery.

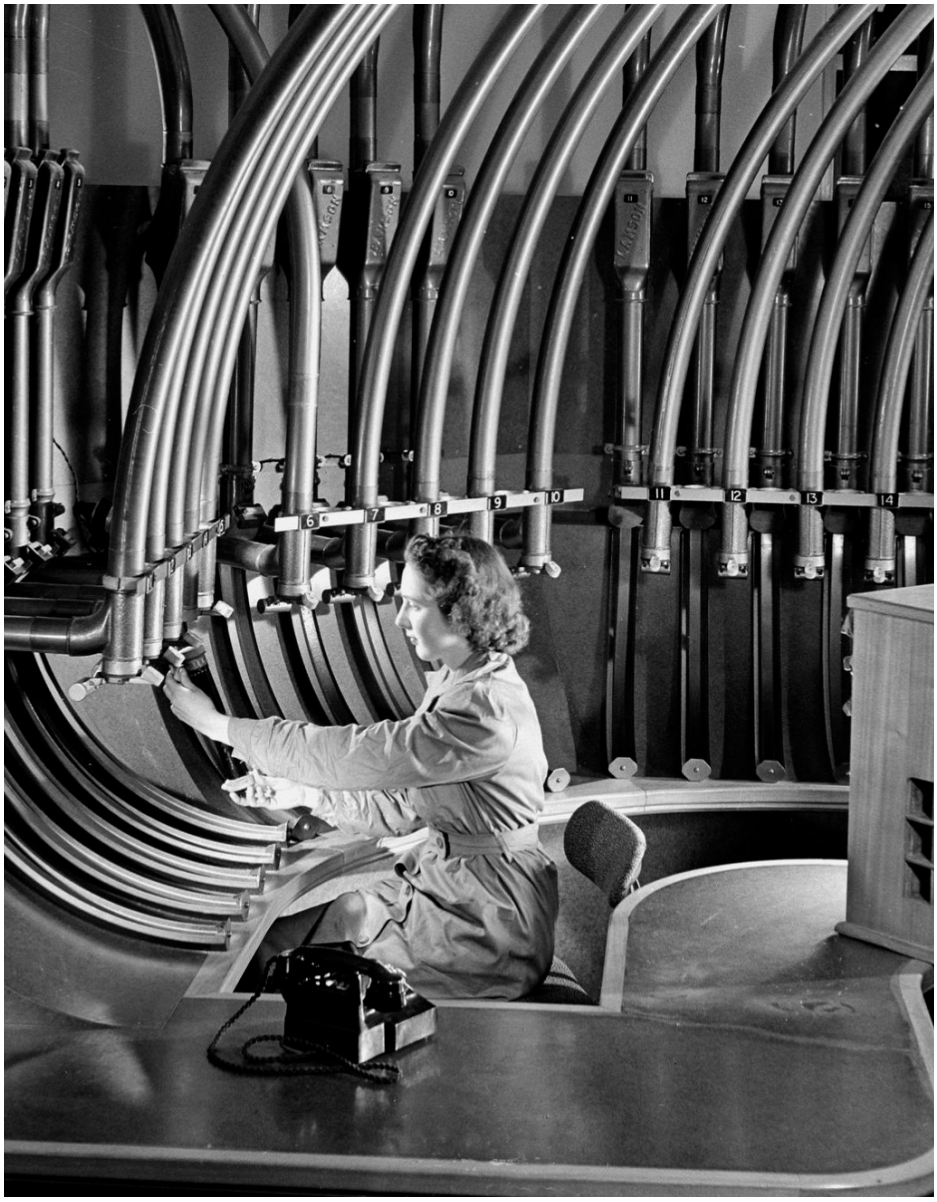


Fig 13. Pneumatic tubes at a typewriter factory, circa 1954
(Source: https://www.vox.com/2015/6/24/8834989/when-the-pneumatic-tube-carried-fast-food-people-and-cats)

Two-Building System (Human / Machine)

One of the main benefits of using machines in a secondhand luxury warehouse store is the increased efficiency and productivity they can provide. Machines can be programmed to perform tasks quickly and accurately, and they can operate continuously without the need for breaks or rest. This can help to increase the speed at which goods are processed and stored within the store, which can in turn help to increase overall efficiency and productivity. Since machines can be used to perform tasks that would otherwise be done by hand, this would help to reduce the need for human labor. This can be especially important in a secondhand store, where the cost of labor can be a significant portion of the overall cost of handling and storing goods.

In addition, the use of machines in a secondhand luxury warehouse store can also improve the accuracy and security of the store's operations. Machines can be programmed to perform tasks with a high level of precision, which can help to reduce the risk of errors and mistakes. Machines can also be used to provide an additional level of security for valuable items, as they can be programmed to only allow authorized personnel to access certain areas or items.

Fig 14. Lee Sedol playing against AlphaGo in 2016
(Source: https://time.com/4257406/go-google-alphago-lee-sedol/)

Still, humans are necessary in this setting. Machines may not have the same level of expertise and knowledge as humans when it comes to identifying and valuing luxury items. While machines can be programmed to recognize certain brands or features, they may not be able to fully understand the value or quality of an item in the same way that a human could. This could be especially important in a secondhand luxury store, where items may be rare or have a complex history.

Also, machines may not be able to provide the same level of customer service as humans. Customers may appreciate the opportunity to speak with a knowledgeable and friendly salesperson who can answer questions and provide recommendations. Machines, on the other hand, may not have the ability to engage in conversation or provide personalized recommendations.

In addition, humans could perform tasks that machines are not capable of. For example, machines may not be able to repair or restore items, or handle delicate or fragile items with the same level of care as humans. Additionally, machines may not be able to handle certain tasks that require a human touch, such as sorting through donations or organizing items on the sales floor.

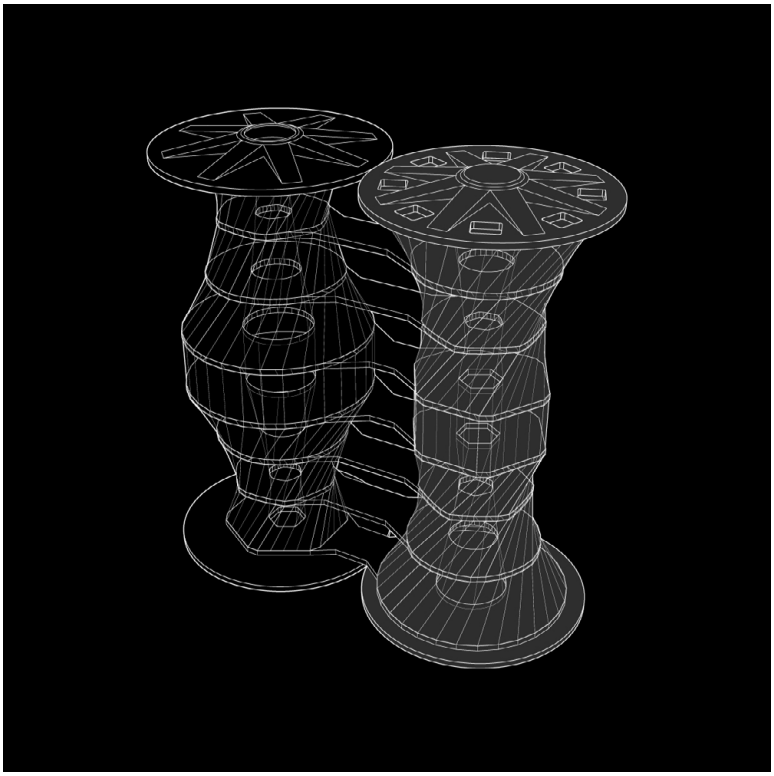


Fig 15. Diagram of the prototype (human-machine collaboration)

Design Based on Simple Forms

Design based on simple forms is beneficial to creating multiple applications because simple forms can be easily adapted and modified to suit different applications. Simple forms are flexible and versatile, and they can be manipulated and transformed to fit the needs of different projects. This can make it easier to create multiple applications using the same basic forms, as the forms can be easily modified to suit the specific requirements of each application.

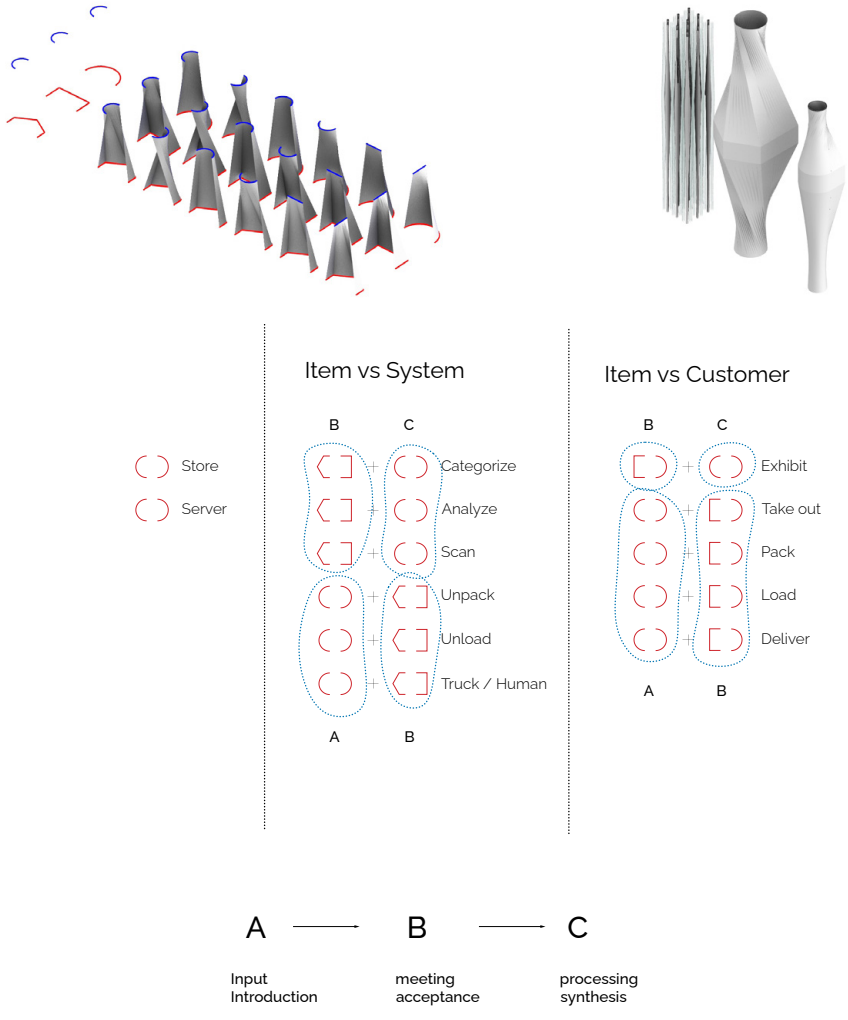


Fig 16. Design based on simple forms

Offline-Online Integration

First, online-offline integration allows the business to reach a wider audience. With an online presence, the business can attract customers from beyond the local area, potentially increasing the customer base and revenue. Customers can browse and purchase items from the comfort of their own homes, which may be more convenient for them than traveling to a physical store. Additionally, an online presence allows the business to reach customers on a global scale, further expanding the potential customer base.

Second, online-offline integration can improve the customer experience. Customers may prefer the convenience of shopping online, but they may also value the opportunity to see and touch products in person before making a purchase. By integrating online and offline channels, the business can offer customers the best of both worlds. For example, customers could browse and purchase items online, but also have the option to visit the physical store to try on clothes or see furniture in person before making a final decision.

Lastly, online-offline integration can increase efficiency and reduce costs. By integrating online and offline channels, the business can streamline processes and reduce the workload for staff. For example, customers could make purchases online and pick up their items in-store, eliminating the need for shipping and handling costs. Additionally, the business can use data from online sales to better understand customer behavior and preferences, which can inform inventory management and other operational decisions.

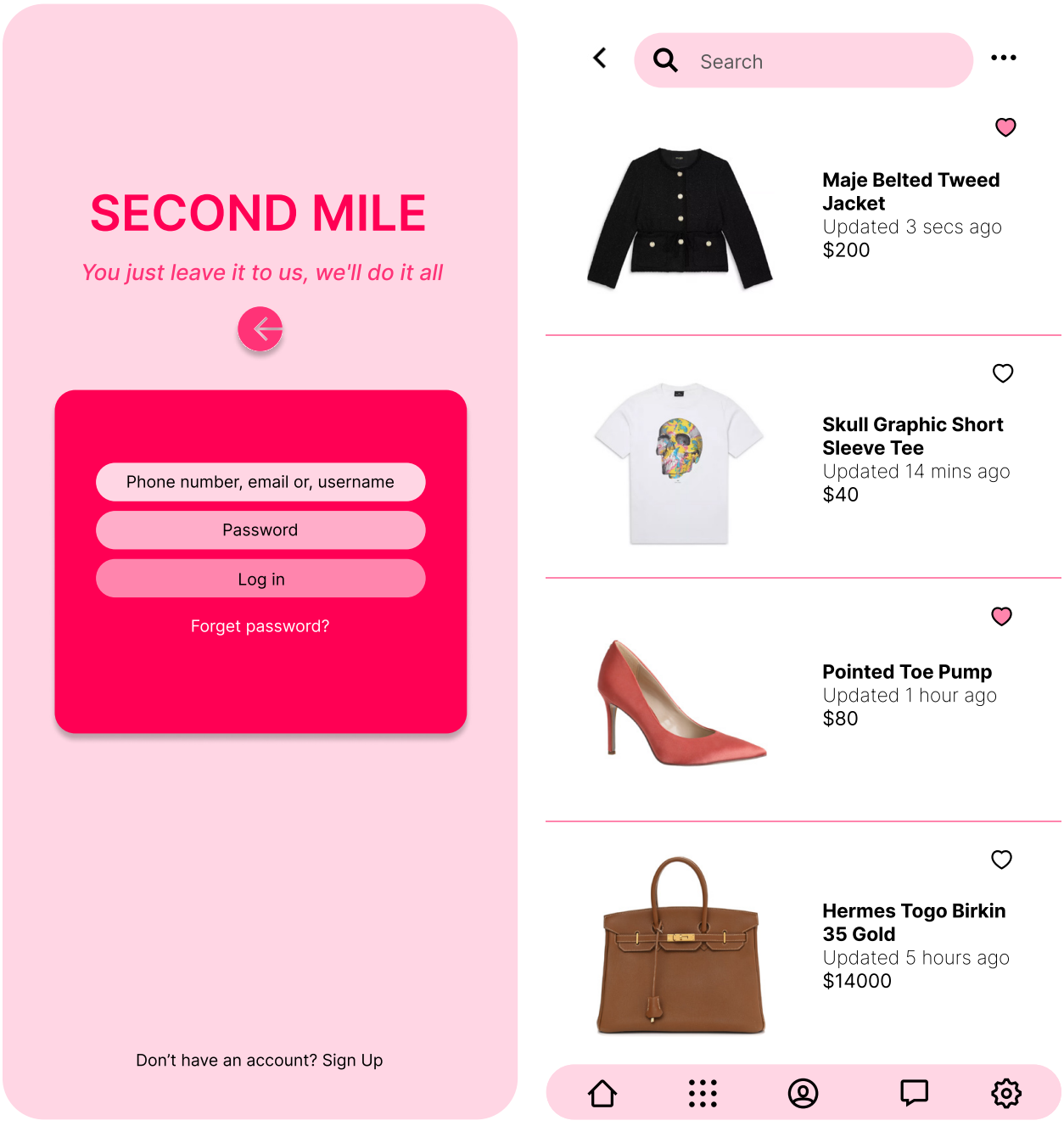


Fig 17. User interface suggestion for secondhand marketplace app (1)

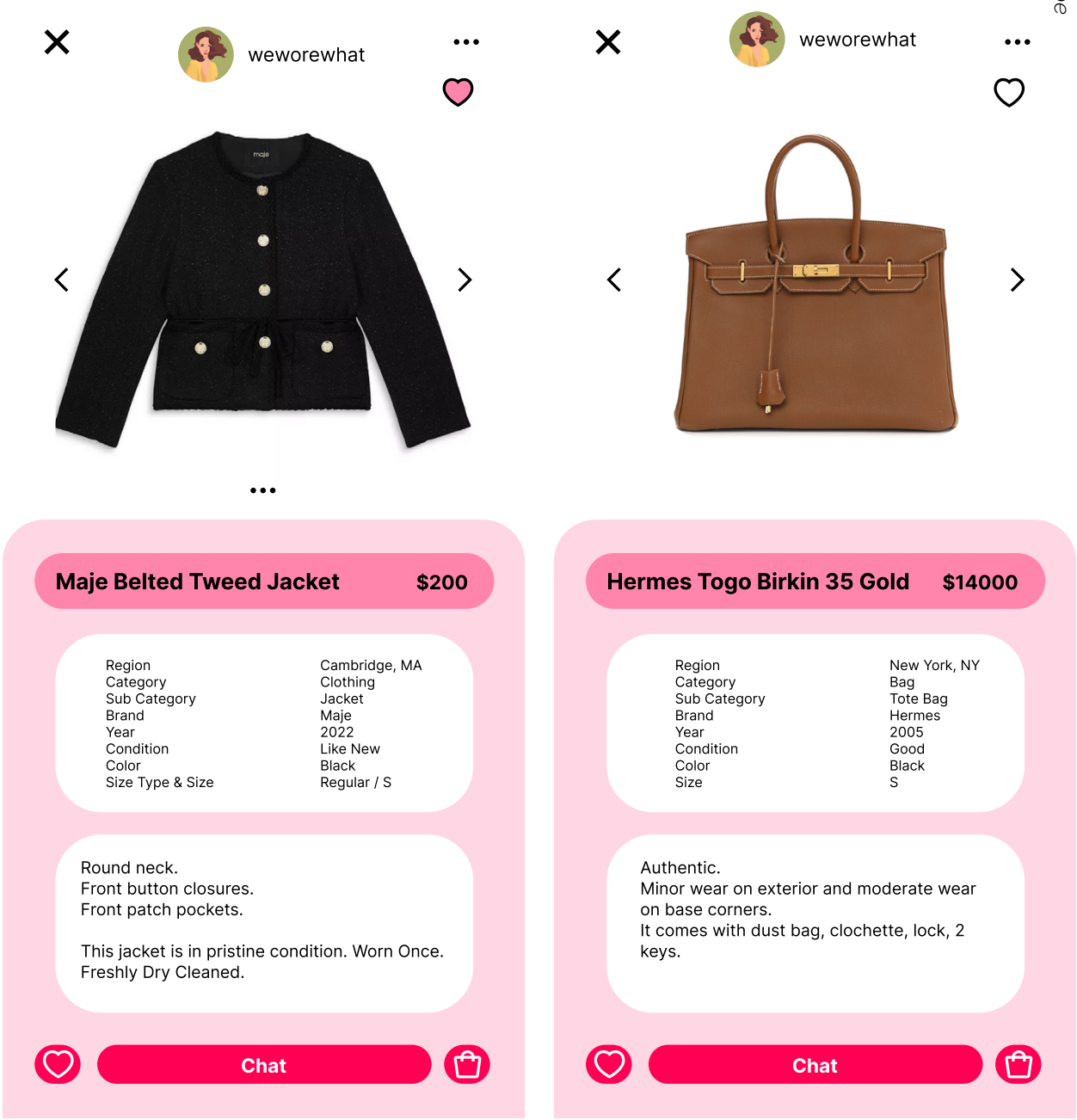


Fig 18. User interface suggestion for secondhand marketplace app (2)

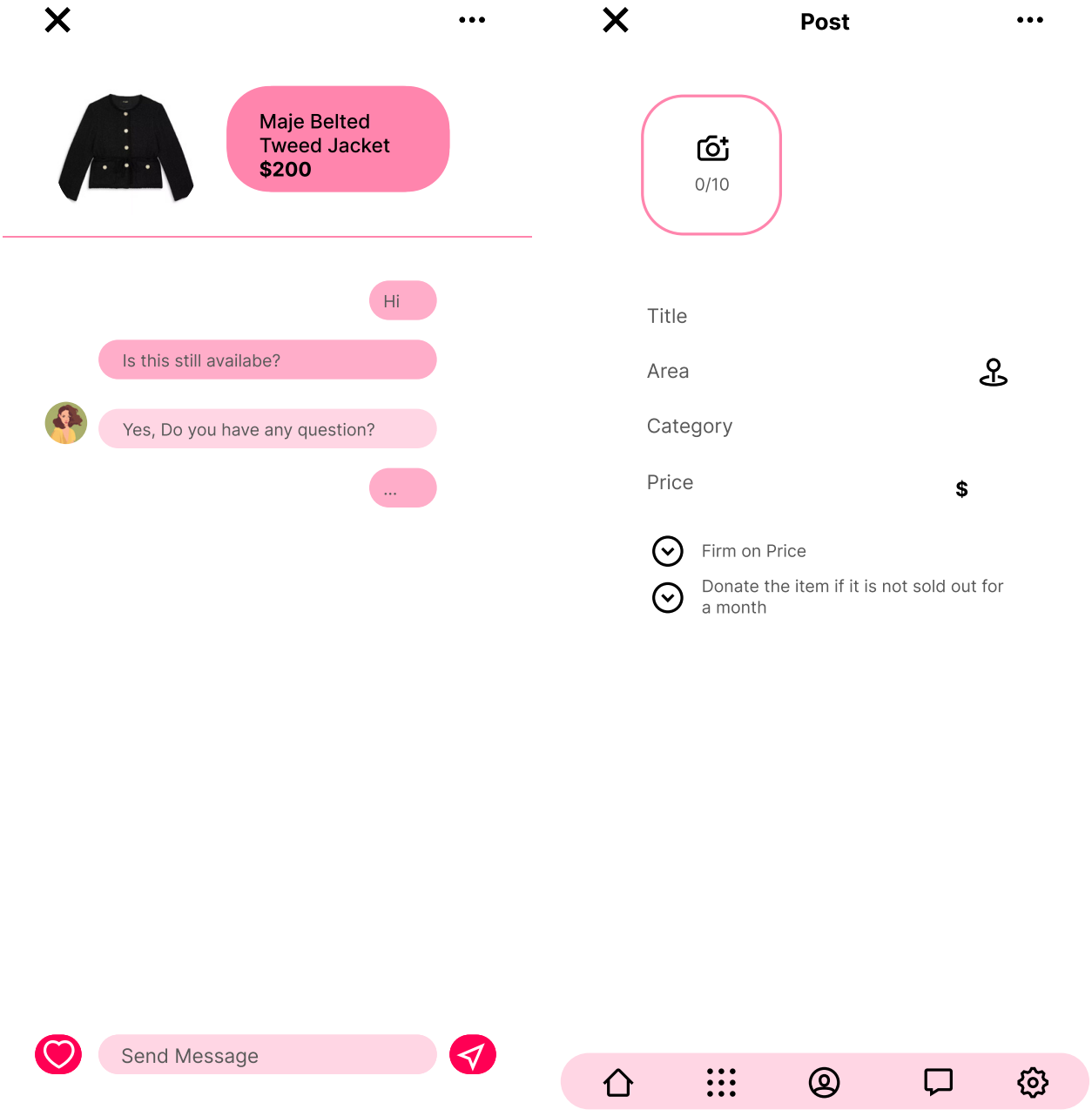


Fig 19. User interface suggestion for secondhand marketplace app (3)

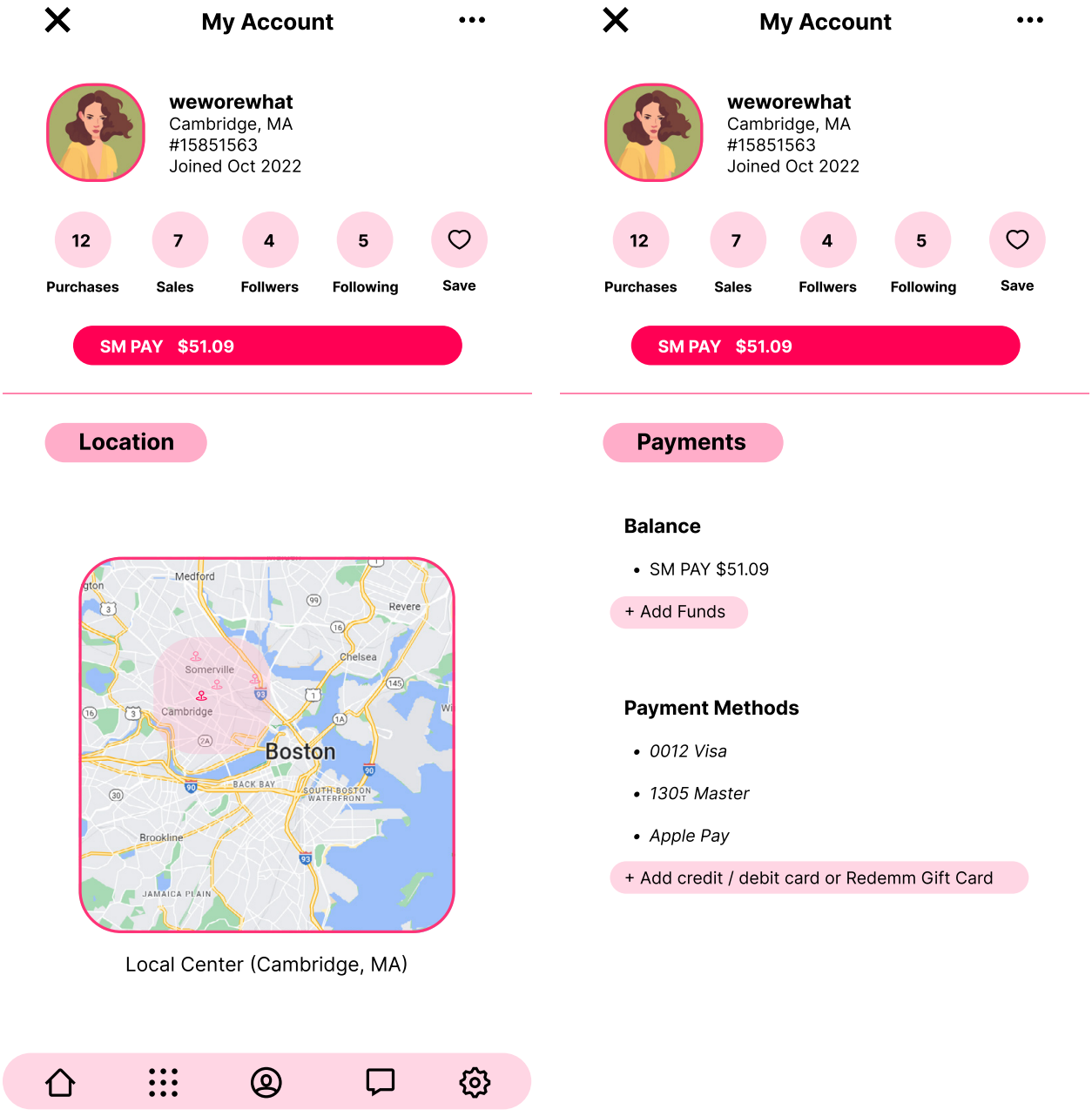


Fig 20. User interface suggestion for secondhand marketplace app (4)

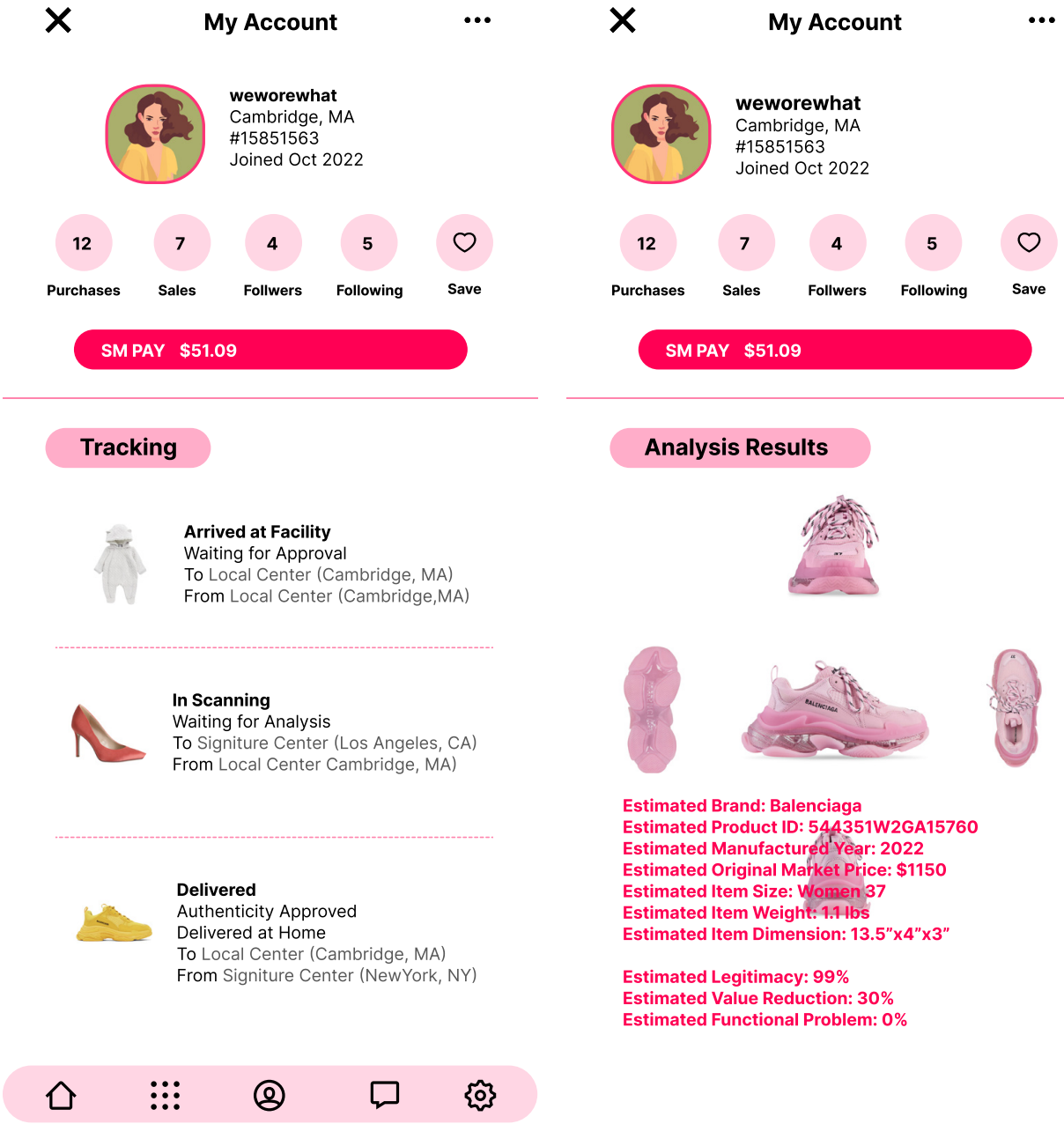


Fig 21. User interface suggestion for secondhand marketplace app (5)

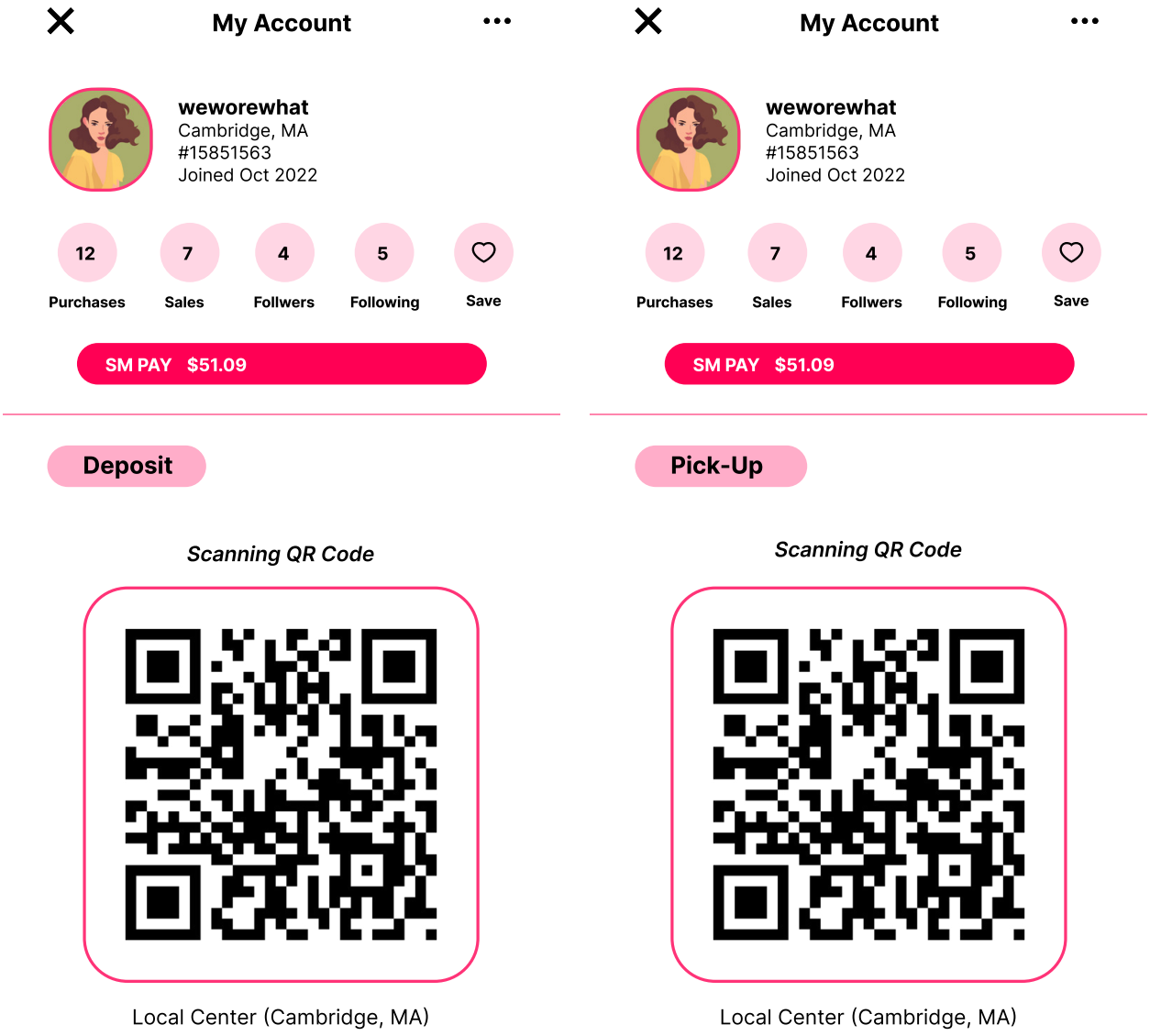


Fig 22. User interface suggestion for secondhand marketplace app (6)

3.2 Design

Flow Chart

Processes at the facility has 4 main steps as deposit, analysis and storing, preparation, and pickup. All of these processes are monitored and controlled by the transaction center server connected to the app server that governs the overall buy-and-sell interface.

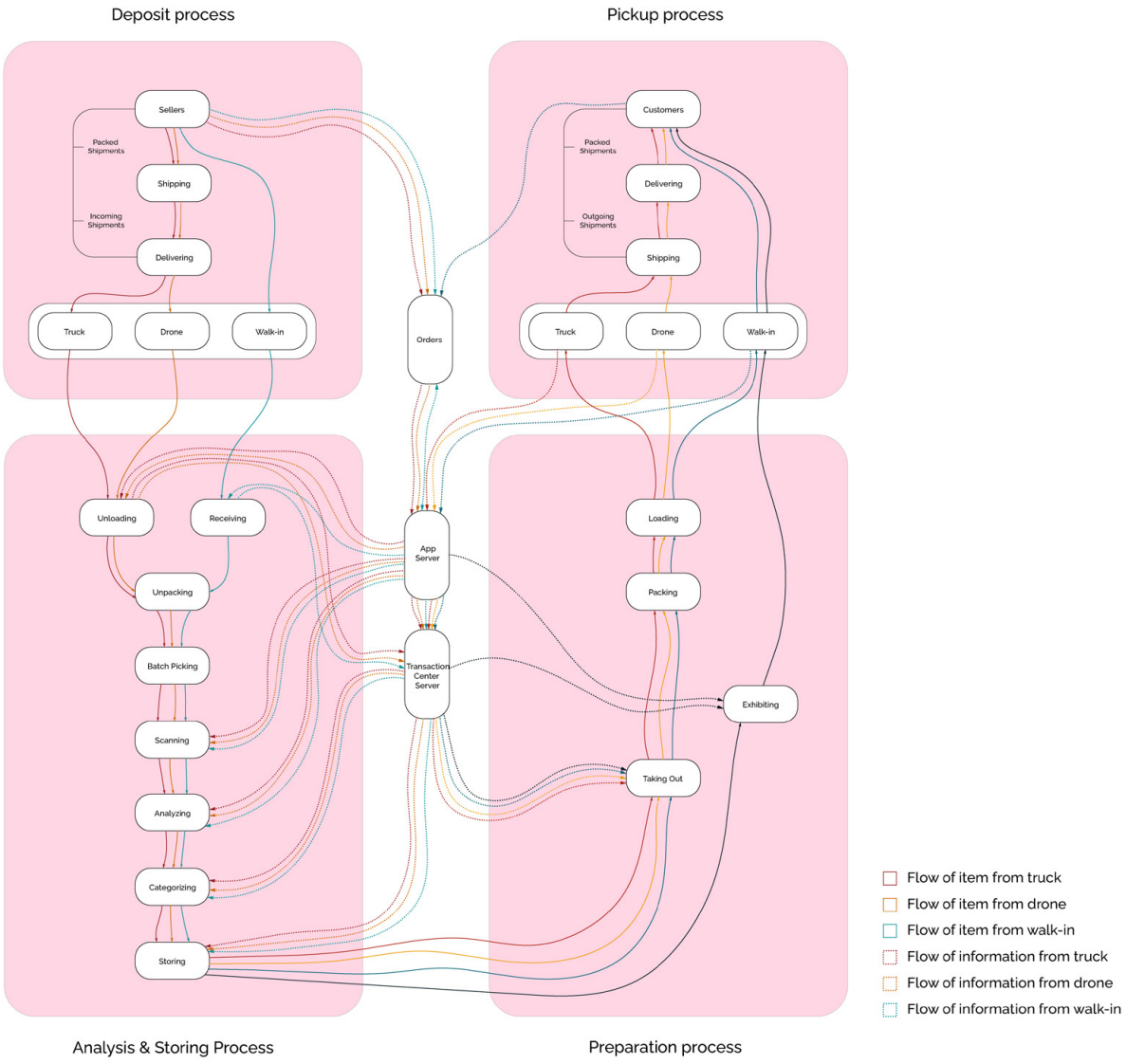


Fig 23. Flowchart

Robot Units

The movement and the storage of item in this facility is operated by robots. Automated machine can be categorized by type of units, functions, spatial morphology, and program.

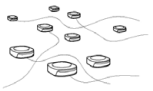
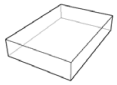
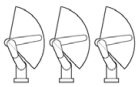
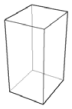
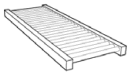
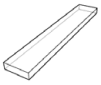
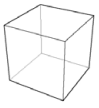
Robotic Units	Functions	Spatial Morphology	Program
			Horizontal Movement (Variable Route)
Autonomous Mobile Robots	Mobile	Clustered Organization	
			Vertical Movement (Small and Fixed range)
Robot Arm	Linear (Vertical)	Linear Organization	
			Vertical Movement (Large and Variable range)
Drone	Flying	Orbital Organization	
			Horizontal Movement (Fixed Route)
Conveyor Belts	Linear (Horizontal)	Linear Organization	
			Automatic Storage and Retrieval System
Dynamic Rack	Grid	Grid Organization	

Fig 24. Robot Units

3.3 Catalog

Deposit and pickup items are packed in a box and delivered by drones. Drone can carry the boxes up to 5km range directly to consumers, or to logistics centers. Once arrived, the boxes are unpacked and capsulized to pneumatic tubes with various sizes for the internal process within the facility.

Type of products can be processed at the facility consists of clothing, handbags, shoes, accessories, jewelries, and watches. These can be organized with the size and the value of products.

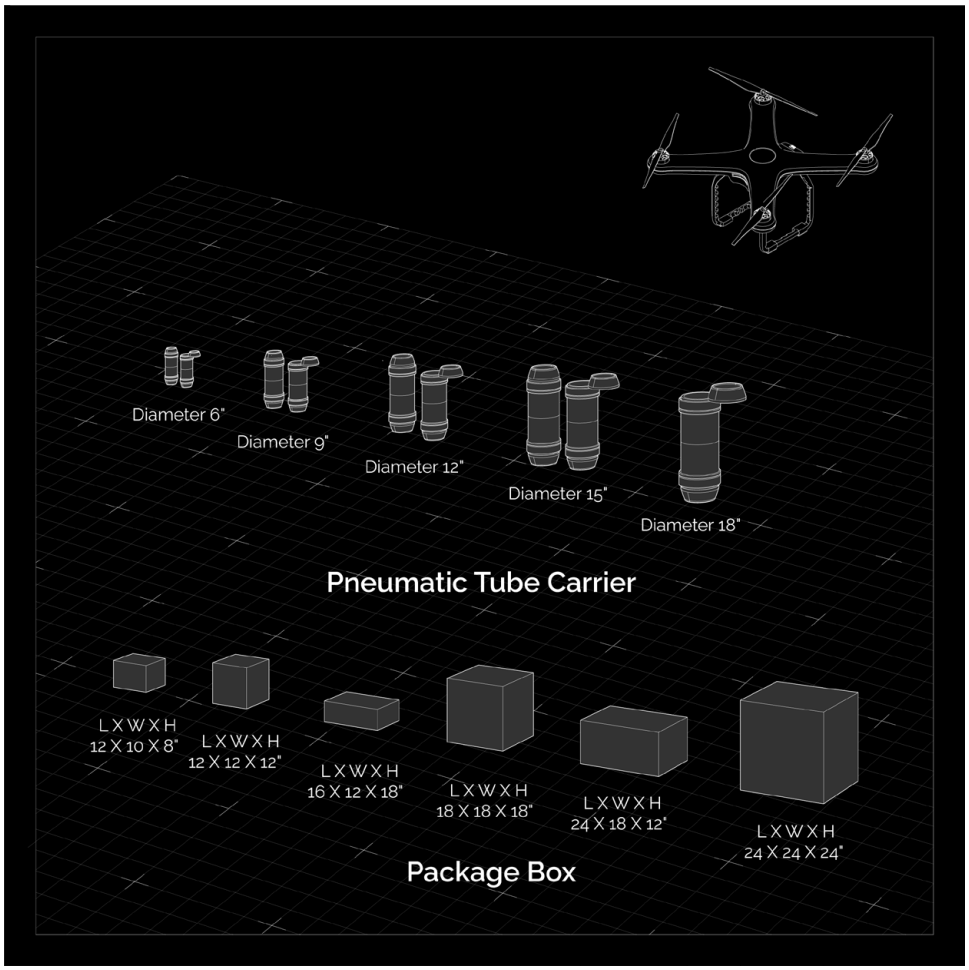


Fig 25. Pneumatic tube carrier and package box for drone delivery

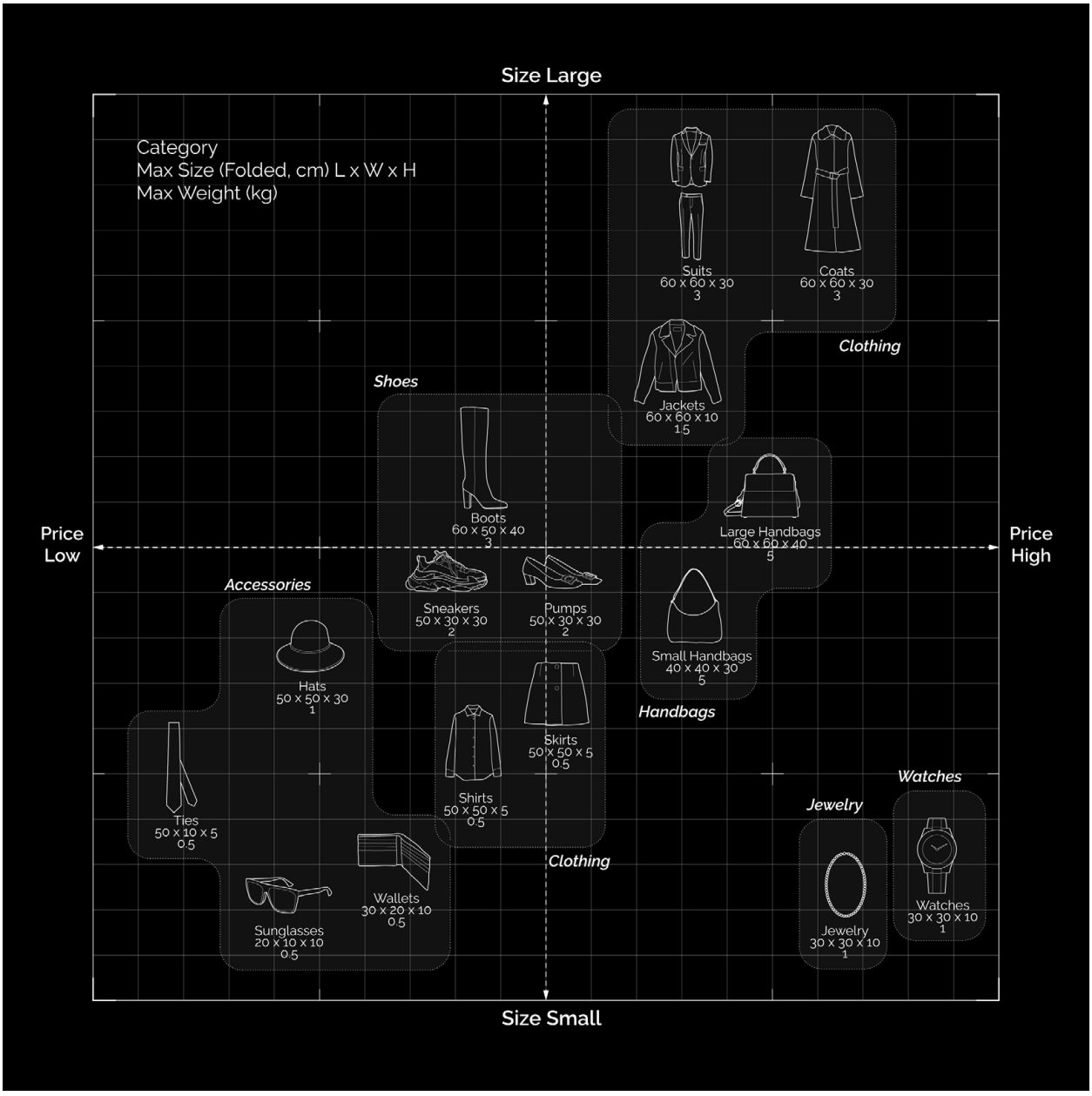


Fig 26. Type of products that can be processed at the facility

3.4 Applicability

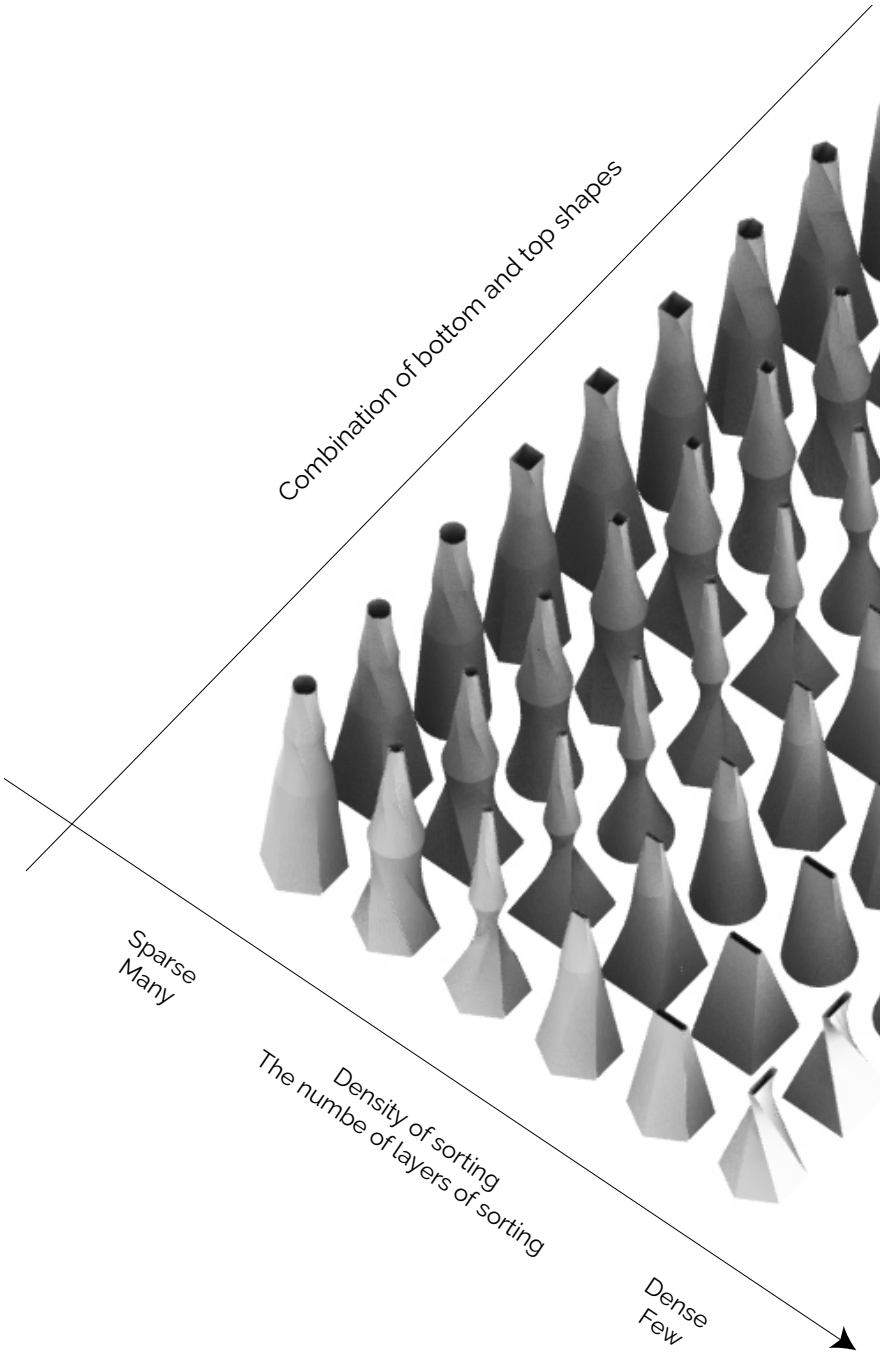
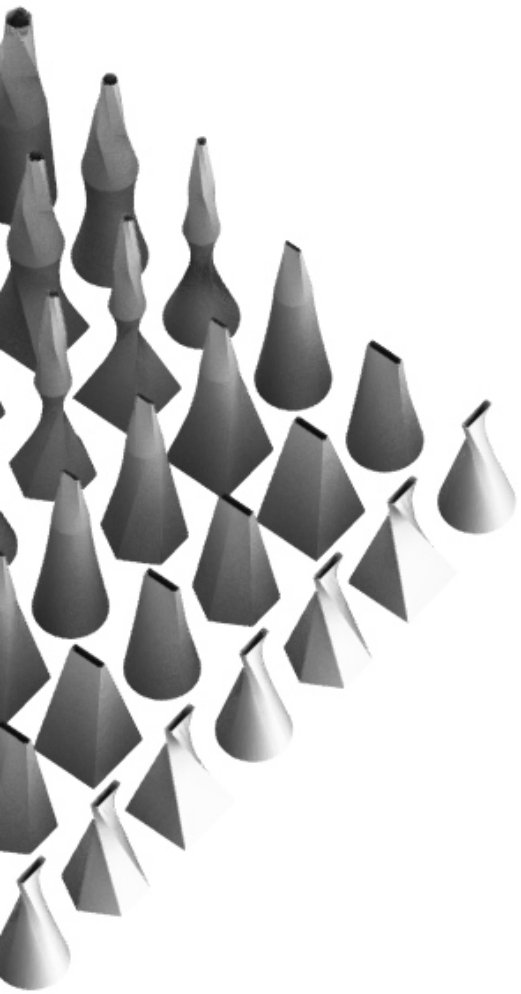
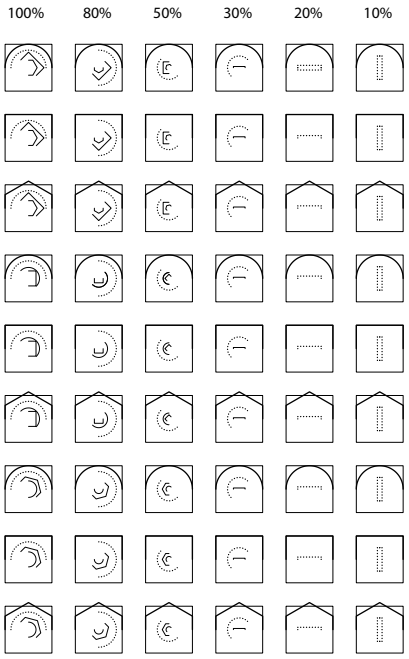


Fig 27. Combination of shapes

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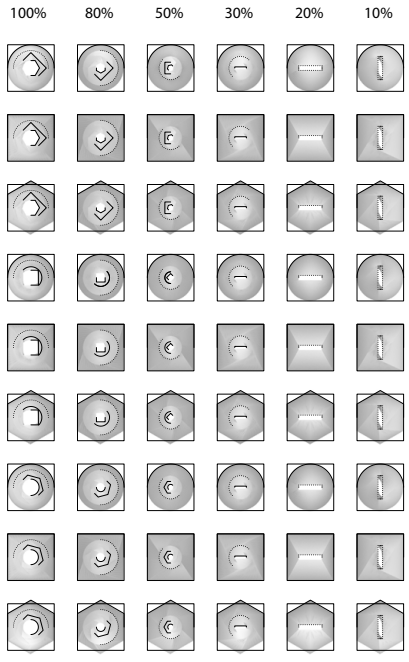
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Chapter 4. Application: Prototype in Boston
4.1 Architectural Strategy

Site

The Seaport District is home to the Port of Boston, which is one of the largest ports on the East Coast. It is located in close proximity to several major markets, including New York, Philadelphia, and Washington, D.C., which makes it an ideal location for distributing goods to these markets. The Seaport District has good transportation infrastructure, including highways, airports, and public transportation, which makes it easy to get goods in and out of the area. It is a rapidly growing area with a number of new businesses and developments being built, so building a warehouse in the area could potentially benefit from this economic growth. Also, it is a highly visible location with a number of major thoroughfares running through the area. This could be beneficial for a warehouse operation, as it could potentially increase the visibility of the business and make it easier for customers to find.

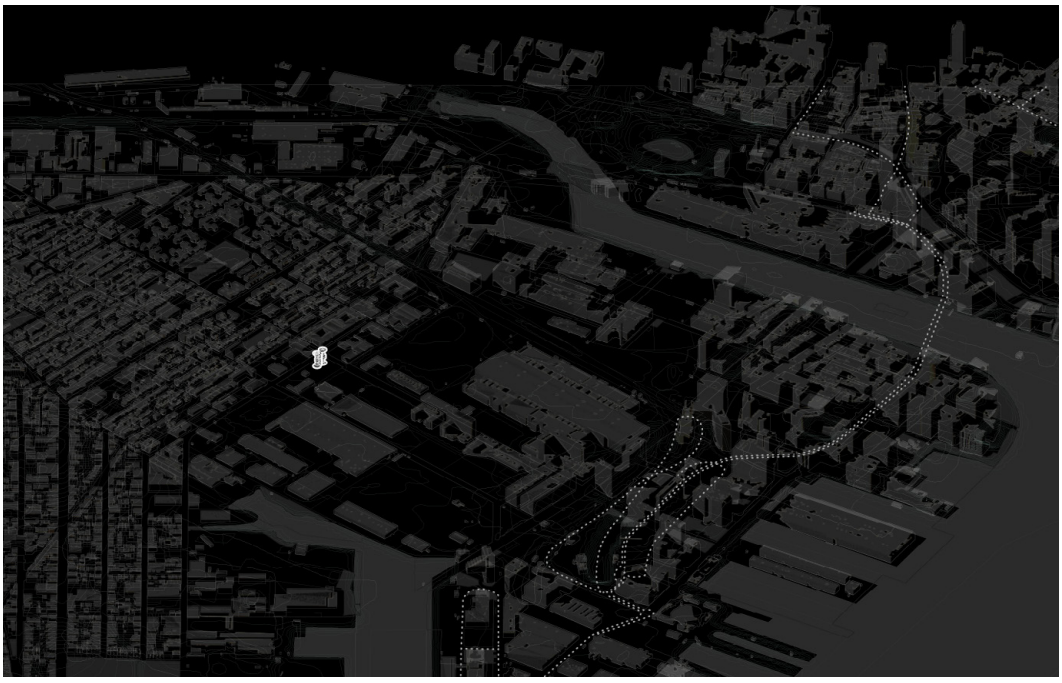


Fig 28. Site plan

Design

The integration of human and machine labor, also known as "human-machine collaboration" or "human-machine teamwork," is a growing trend in the era of automation. It involves the use of technology, such as robotics and artificial intelligence (AI), to augment and enhance human work, rather than replacing it. This approach has many potential benefits, including increased efficiency and productivity, as humans and machines can complement each other's strengths and weaknesses. Machines can handle tasks that are repetitive or physically demanding, freeing up humans to focus on tasks that require creativity, problem-solving, and decision-making. This can also lead to better working conditions for humans, as they are relieved of certain hazardous or strenuous tasks.

To incorporate such an approach, the proposed structure is divided into two buildings: the served and serving buildings. In the served building, machines receive, analyze, categorize, and store second-hand goods. In the serving building, humans complement the machines by minimizing machine errors and supporting technological and administrative tasks. Even in the era of rapidly developing technology, humans are crucial in this system. One reason is that these tasks often require specific skills and expertise that machines cannot replicate. This may include tasks such as refinishing furniture, repairing electronics, or restoring antiques, which often require a high level of precision and attention to detail. Another reason is that these tasks often require the use of tools and equipment that are difficult or impossible for machines to operate. This may include hand tools, power tools, or specialized equipment that is used to repair or restore specific types of goods. In addition, these tasks often require a level of creativity and innovation, as humans have the ability to think outside the box and come up with creative solutions to problems.

In this system, flying drones are the primary mode of transportation. The center has a vertical structure to move the items down from the drone port at the top of the building. Starting from the top, the sorting and analyzing process of the incoming and outgoing items are metaphorically in the form of an hourglass. This project aims to align transparency between the design and handling process. The flow is reproduced by the architectural program. Just as the sand on an hourglass goes down from top to bottom, items are screened in order and sifted out through proper analysis steps. The pipes used for sorting and moving items may be extended, angled, or filtered, with the adaptability of the characteristics of items and context.

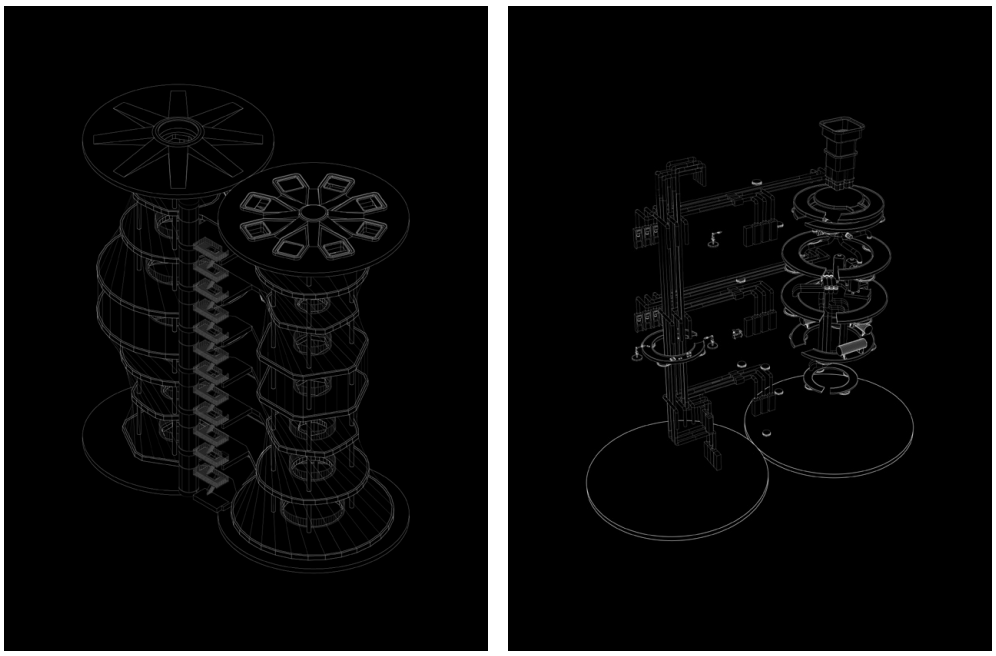


Fig 29. Inside and outside of the facility

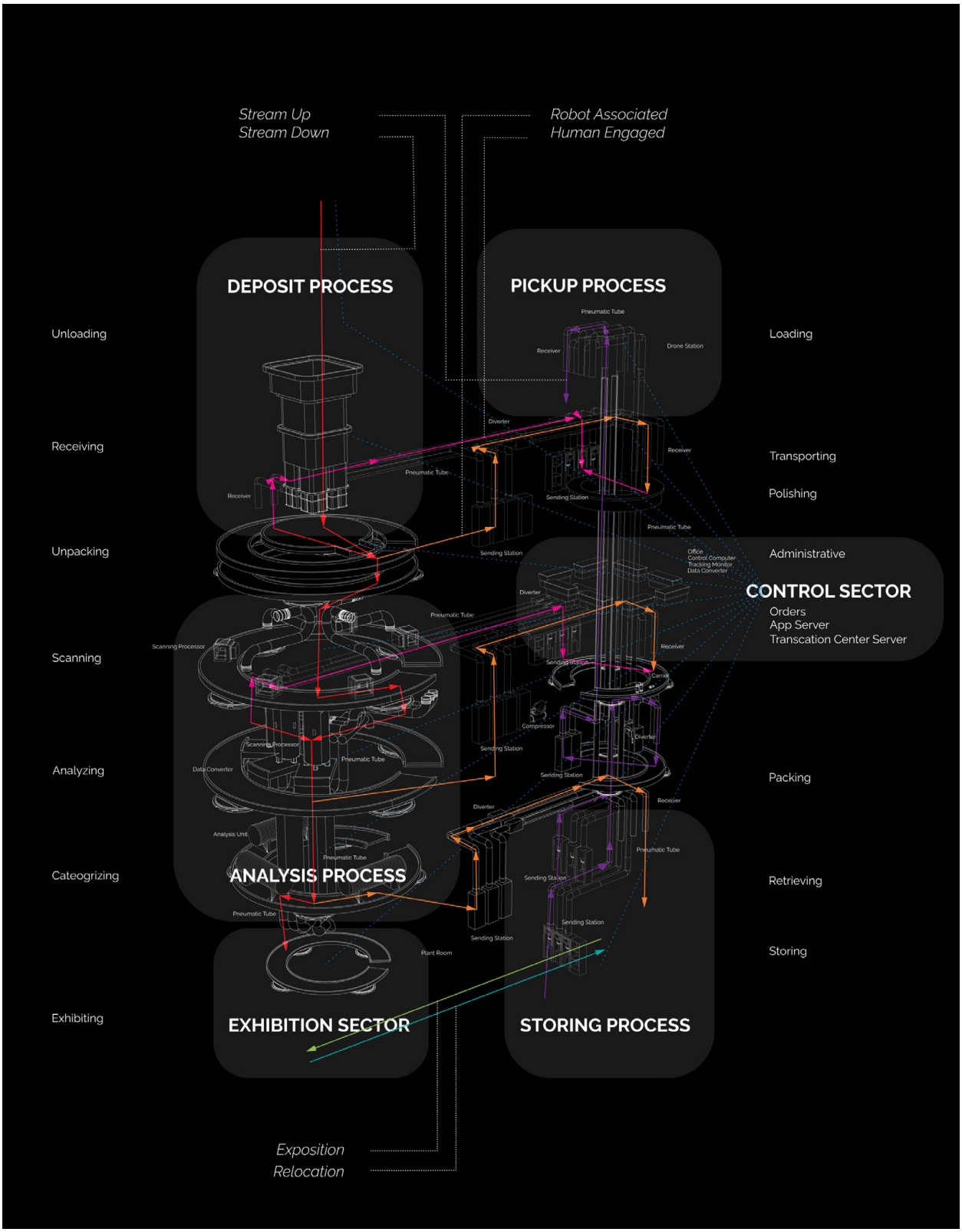


Fig 30. Programs and processes

4.2 Architectural Representation

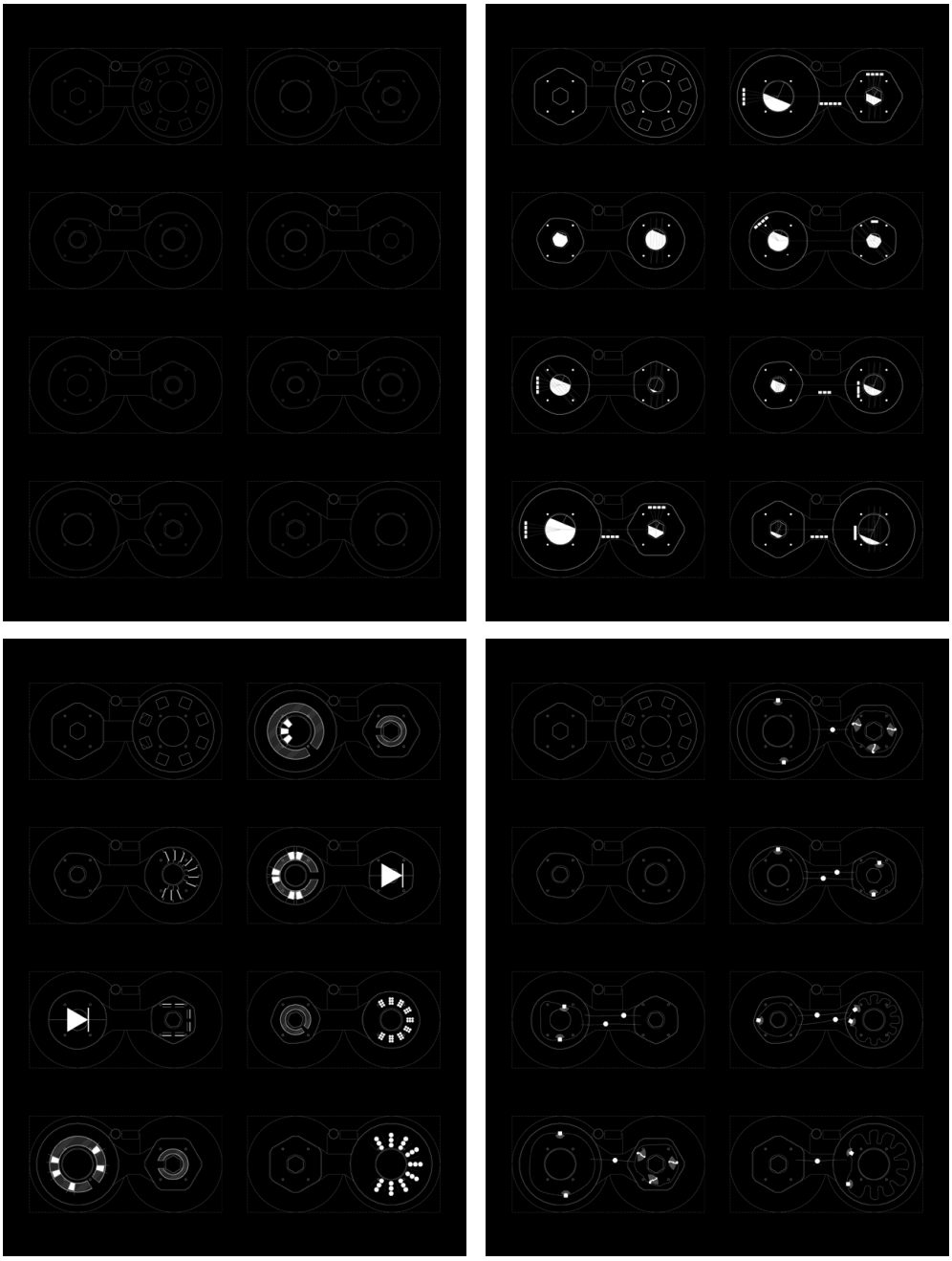


Fig 31. Machine diagram

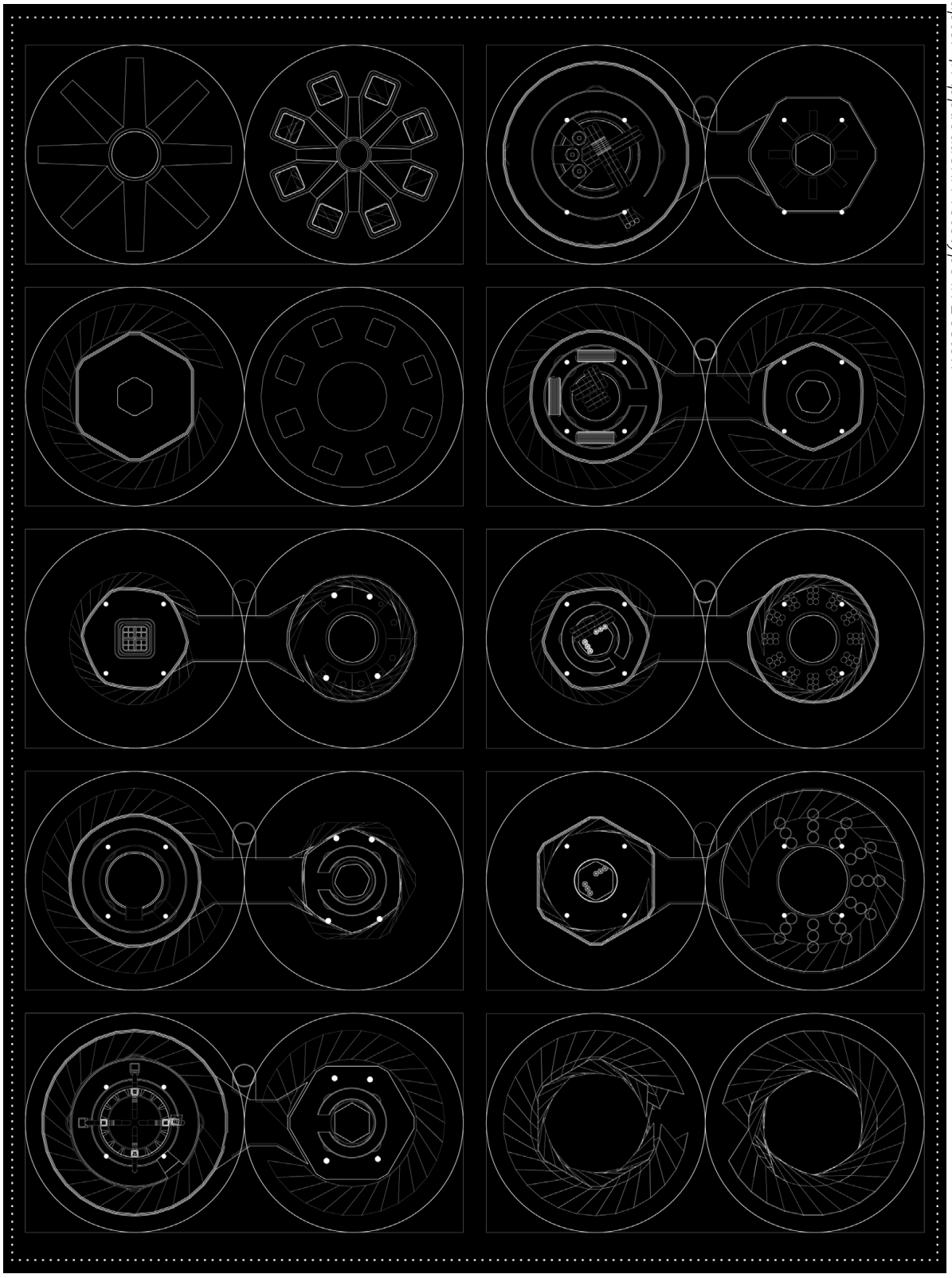


Fig 32. Plan

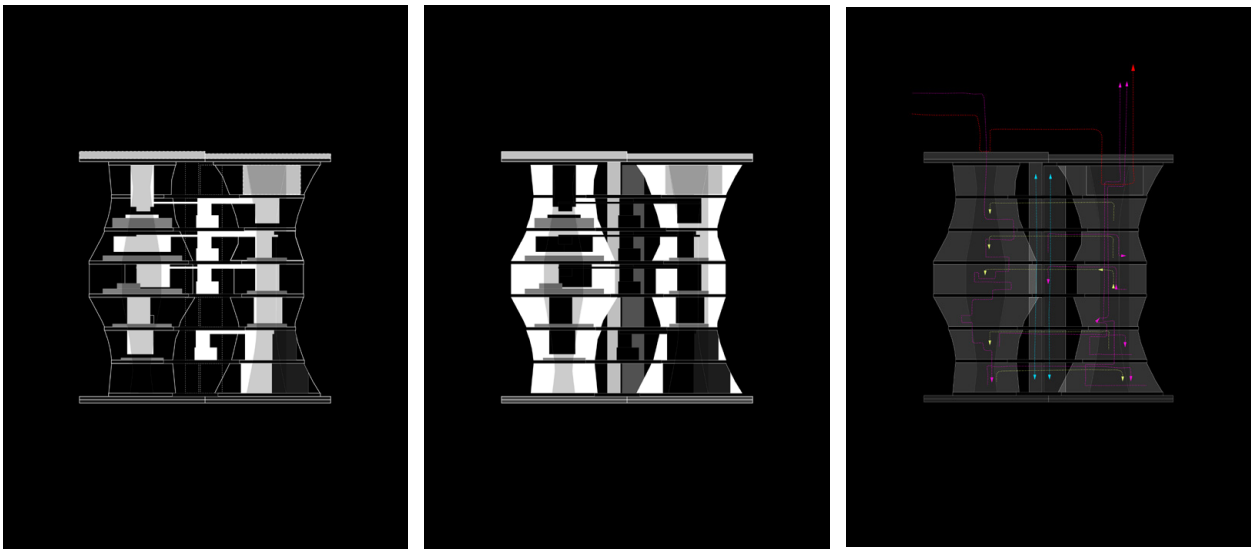


Fig 33. Program and flow diagram

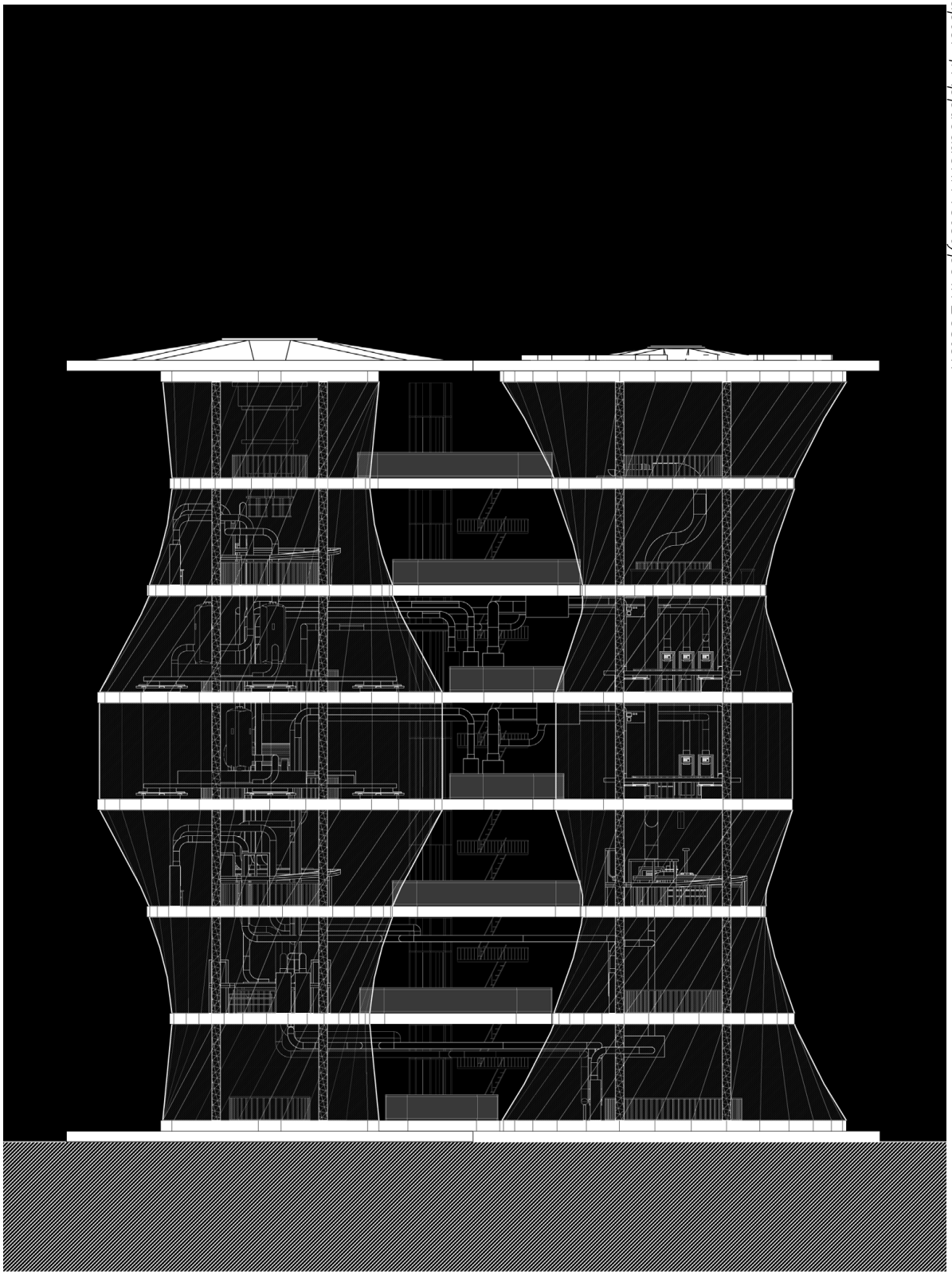


Fig 34. Section

This thesis is an act to re-establish the relationship between humans and machines in the context of the rapidly developing technological era. The thesis sets a prototype of a unique industrial complex that mainly processes, stores, and exhibits secondary-market goods, and its characteristic composition of dual buildings apparently embodies the hierarchical relationship. From the outset, it seems that a building occupied by machines, receives, analyzes, categorizes, repairs and stores goods is the served space, while the other building, occupied by humans, which minimizes machine errors and supports technological and administrative tasks. In other words, human works at the back end to operate the front-end robot system.

This structure introduces a prototype of a new form of urban processing and storage facility combining future transportation represented by drones and retro technology of the pneumatic tube system.

The journey of the second-hand good is a play in the self-seeking process. It is easy to buy and sell things in the era of consumerism. The more options you have, the shorter the relationship with the goods. And then it is thrown away. On the other hand, the second-hand good is an item that holds the memory of the owner. It can be said that the second-hand good is damaged in some manner. Nevertheless, we buy second-hand goods because of their uniqueness. Unlike online markets where the preference is reinforced by algorithms, there are goods that are found by coincidence when wandering around the offline space. An object discovered by chance adds a new meaning to multiple layers of memory and redefines the inherent possibility of the items. In this way, here we propose a coincidence encountering within a structure of the marketplace.

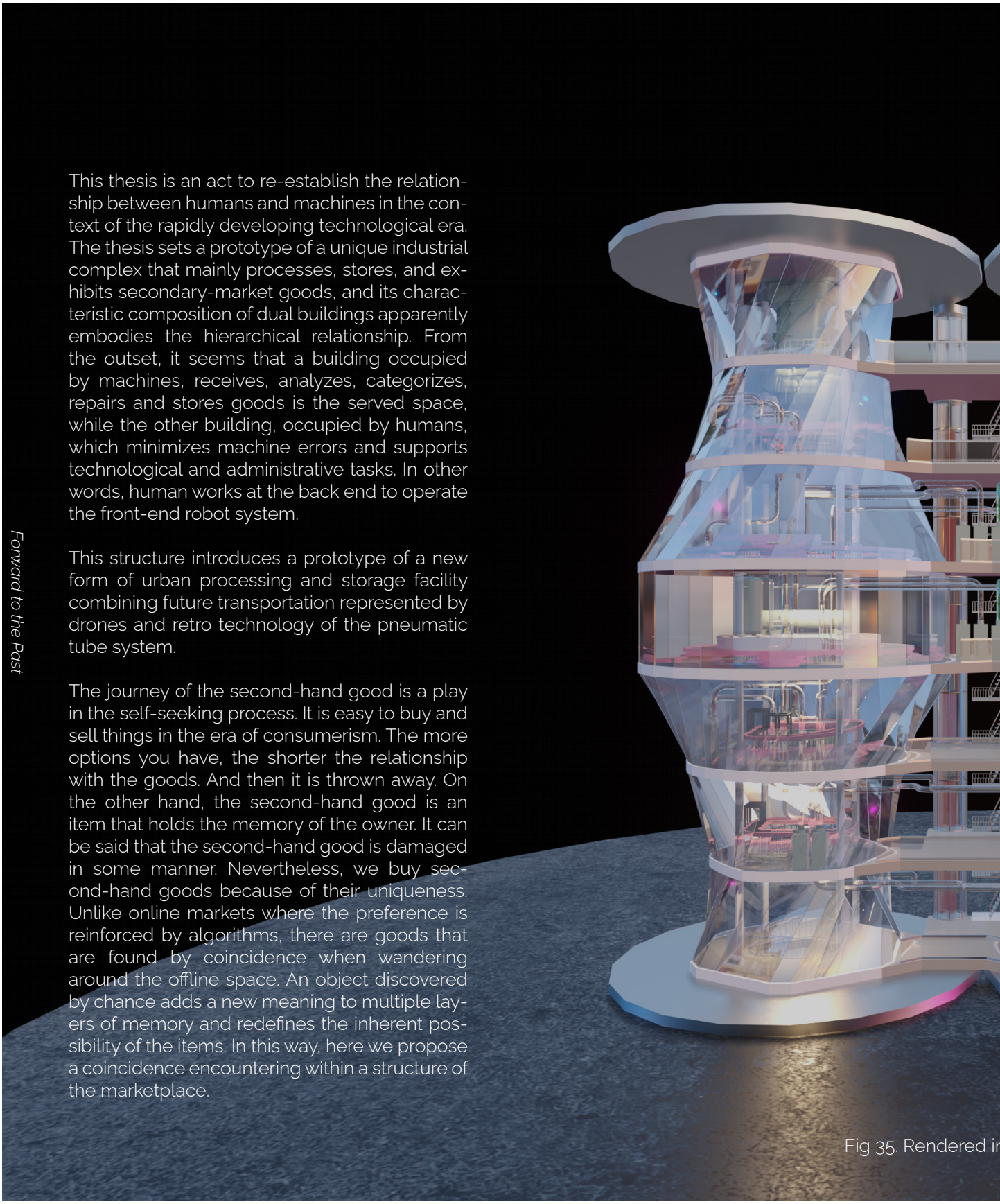


Fig 35. Rendered ir

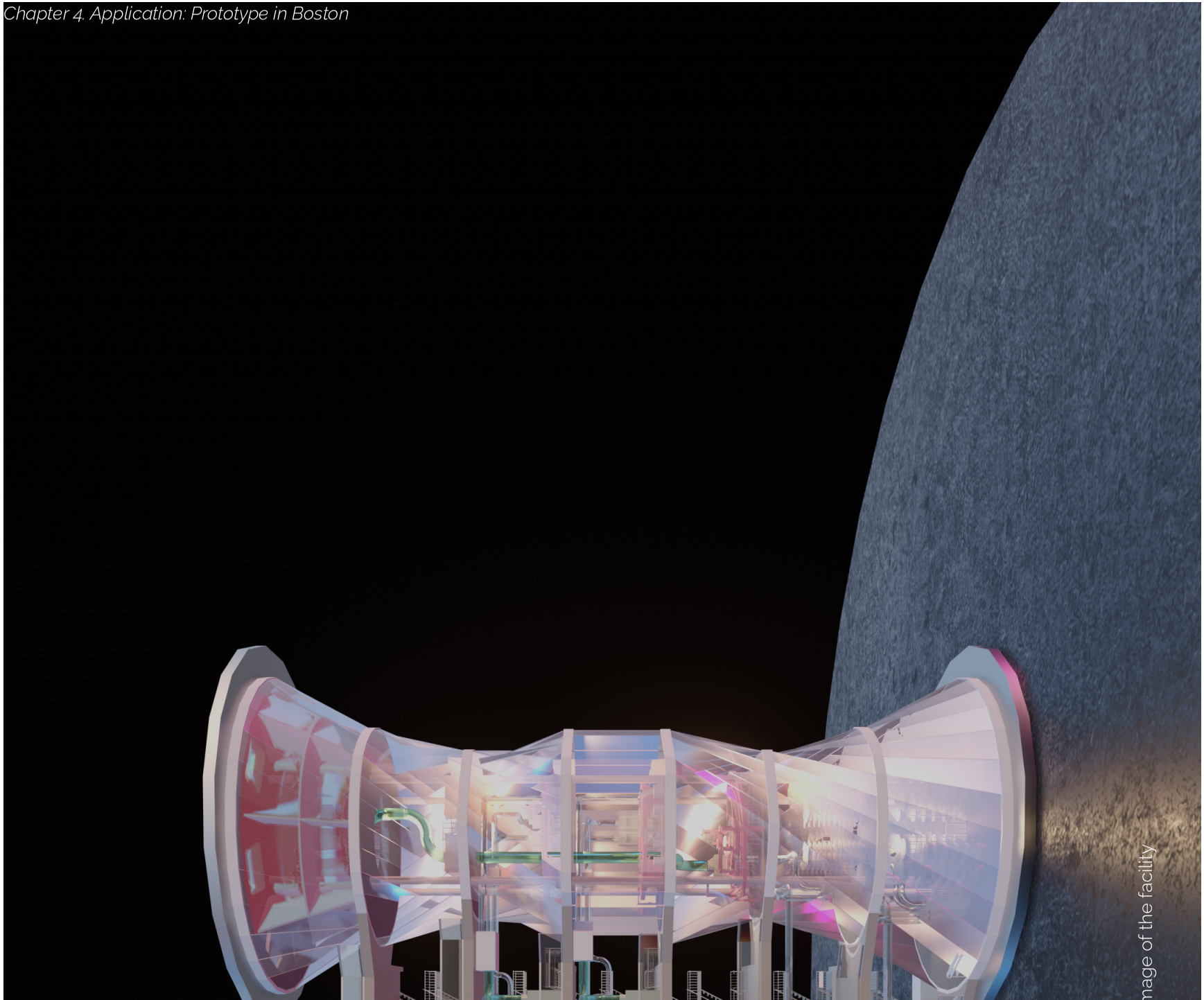


Image of the facility

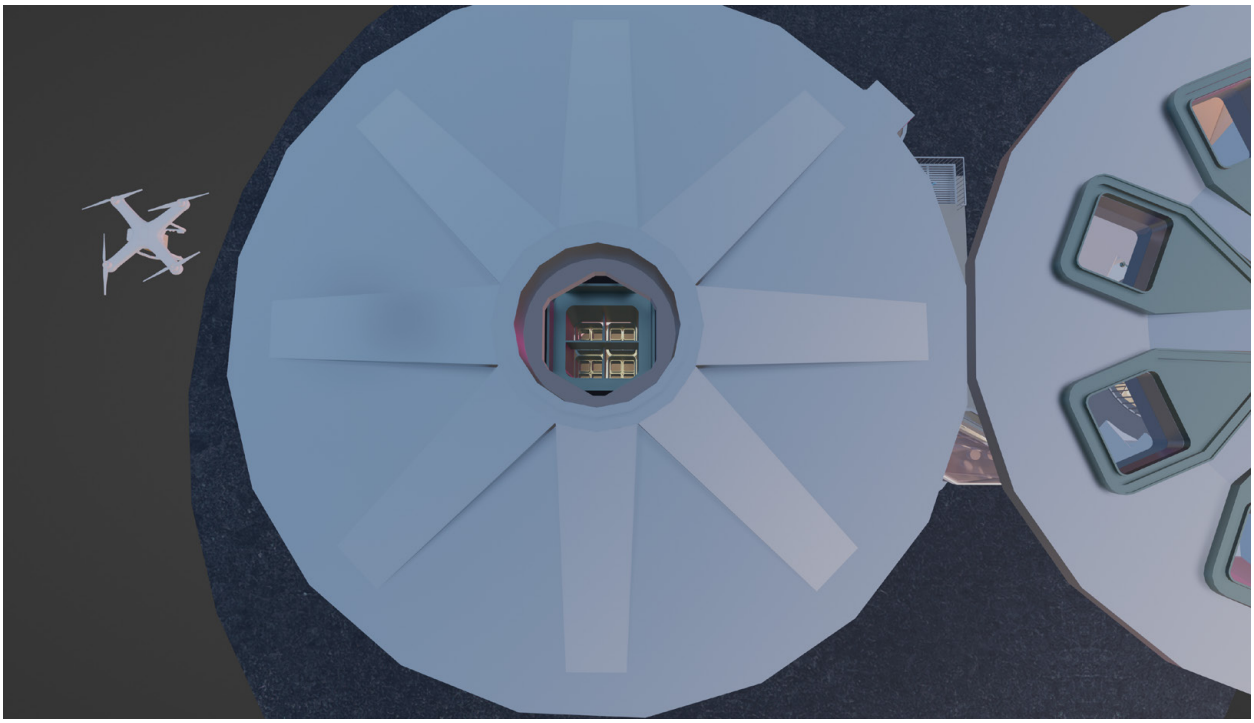


Fig 36. Drone Arriving at the Building(1)

Prototype Facility

The drone arrives at the building.

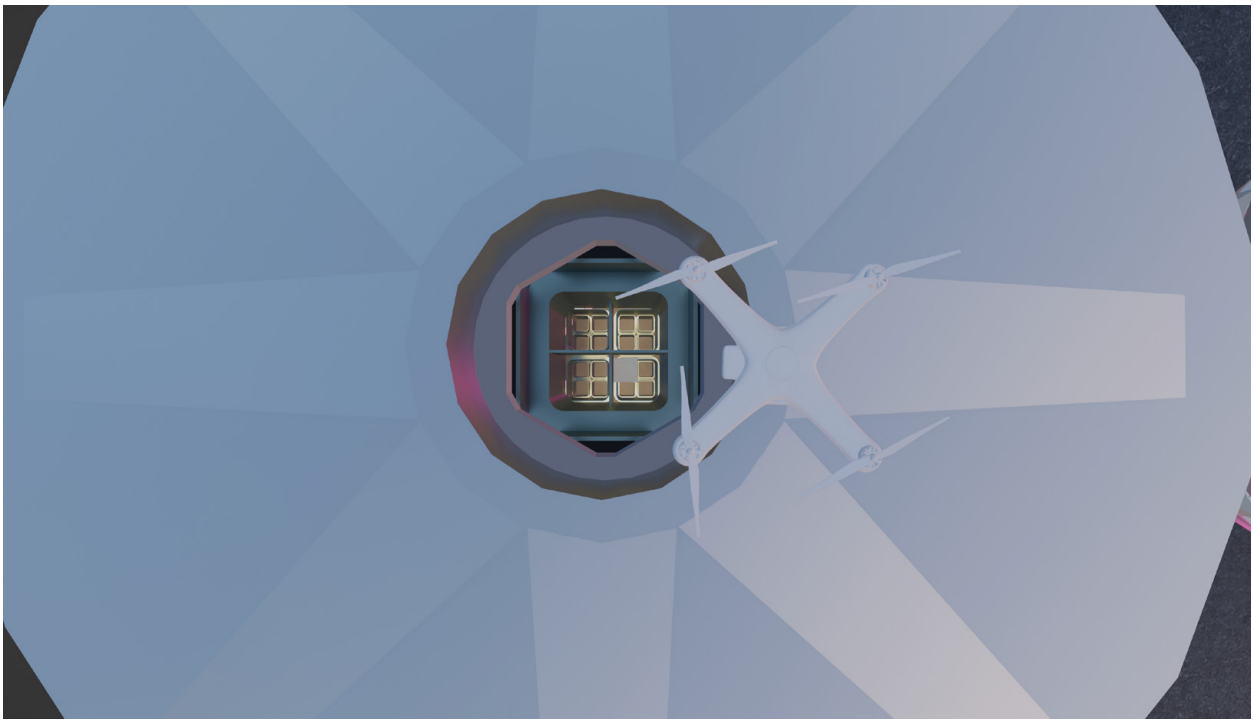


Fig 37. Drone Arriving at the Building(2)

Unloading Deck

The top of the building is punctured with holes for drones to drop off the packages.

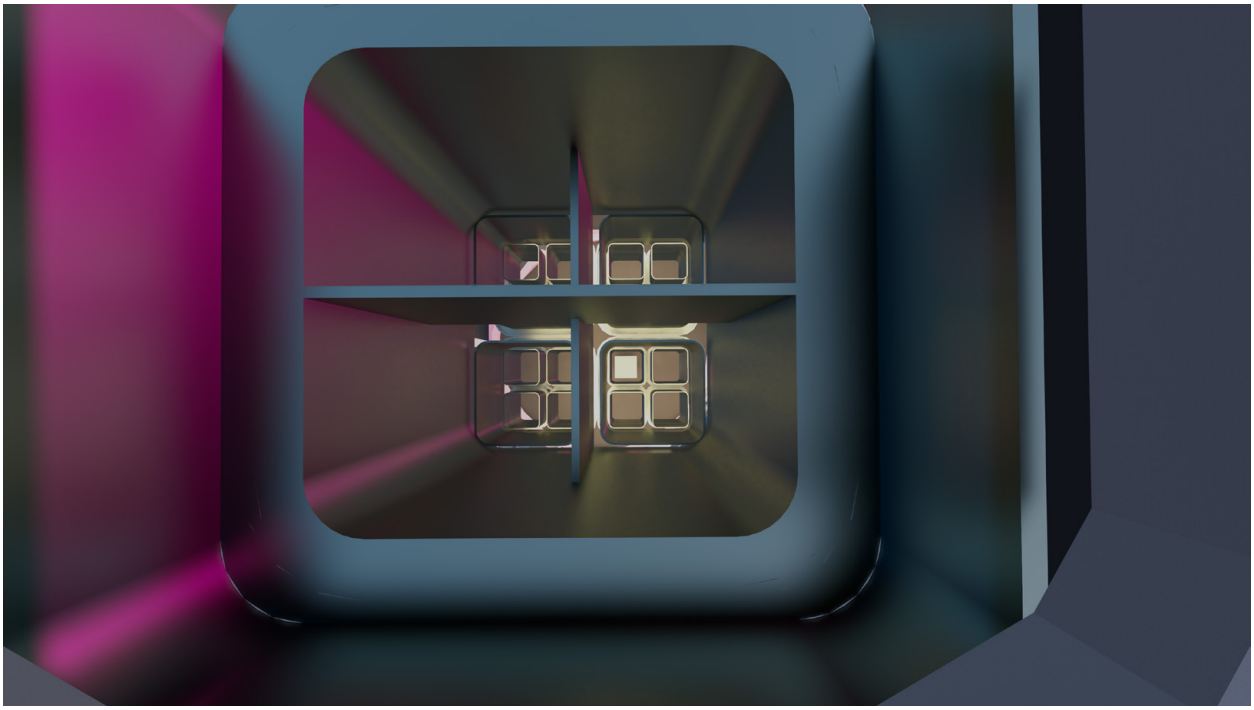


Fig 38. Receiving Area(1)

Receiving Area

The drone drops off the parcel.

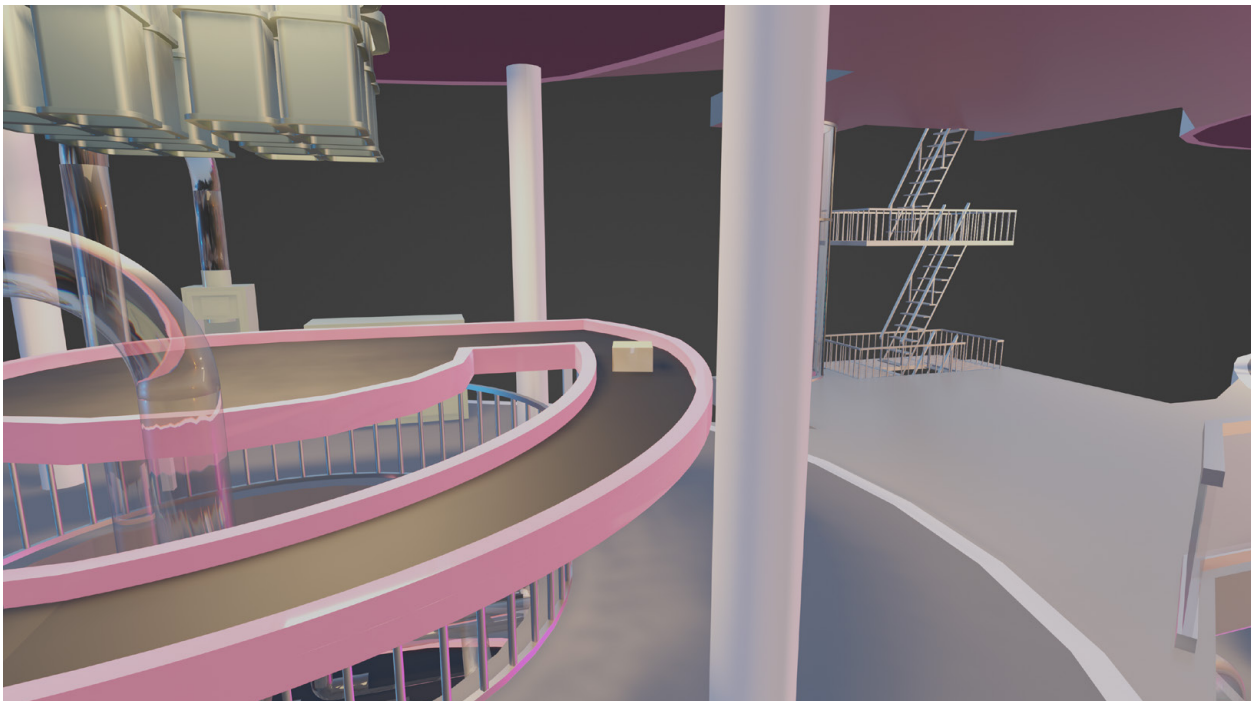


Fig 39. Reiving Area(2)

Receiving Area

It receives the drop-off items and transfers them safely to the unpacking process.

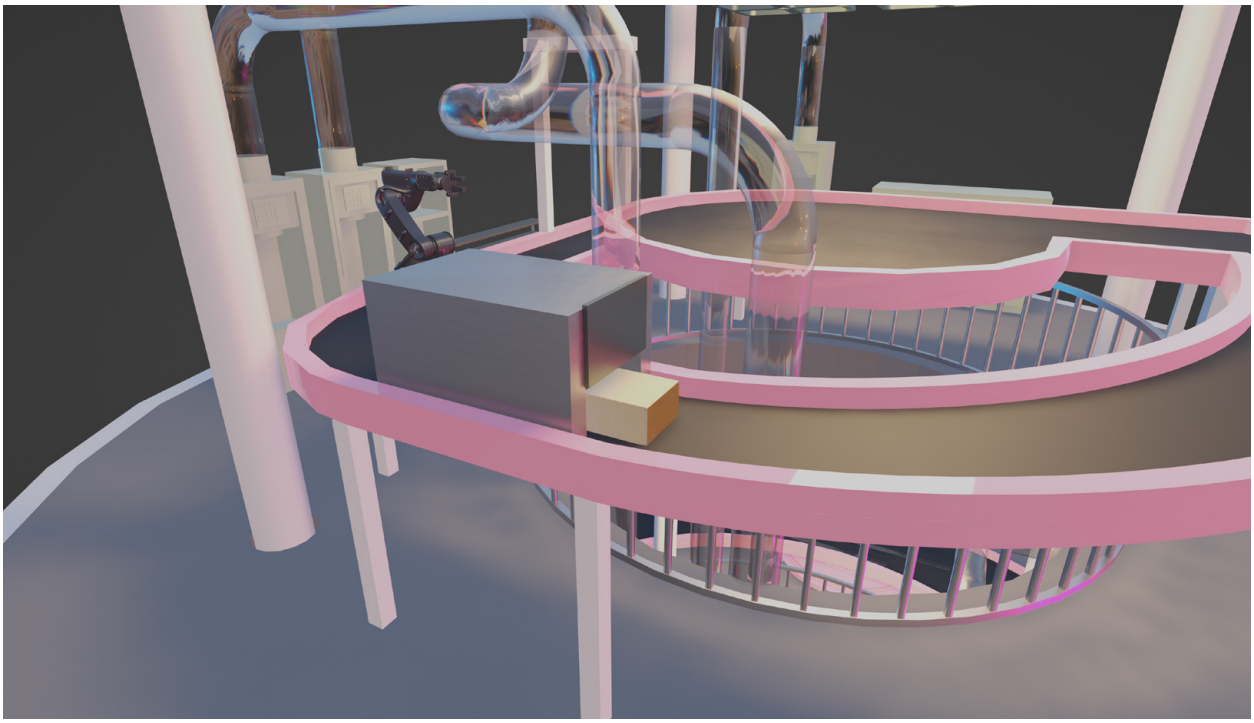


Fig 40. Robot-based Unpacking System(1)

Unpacking System

Robot-based unpacking system is designed to unpack the drop-off items from the original boxes or packages.

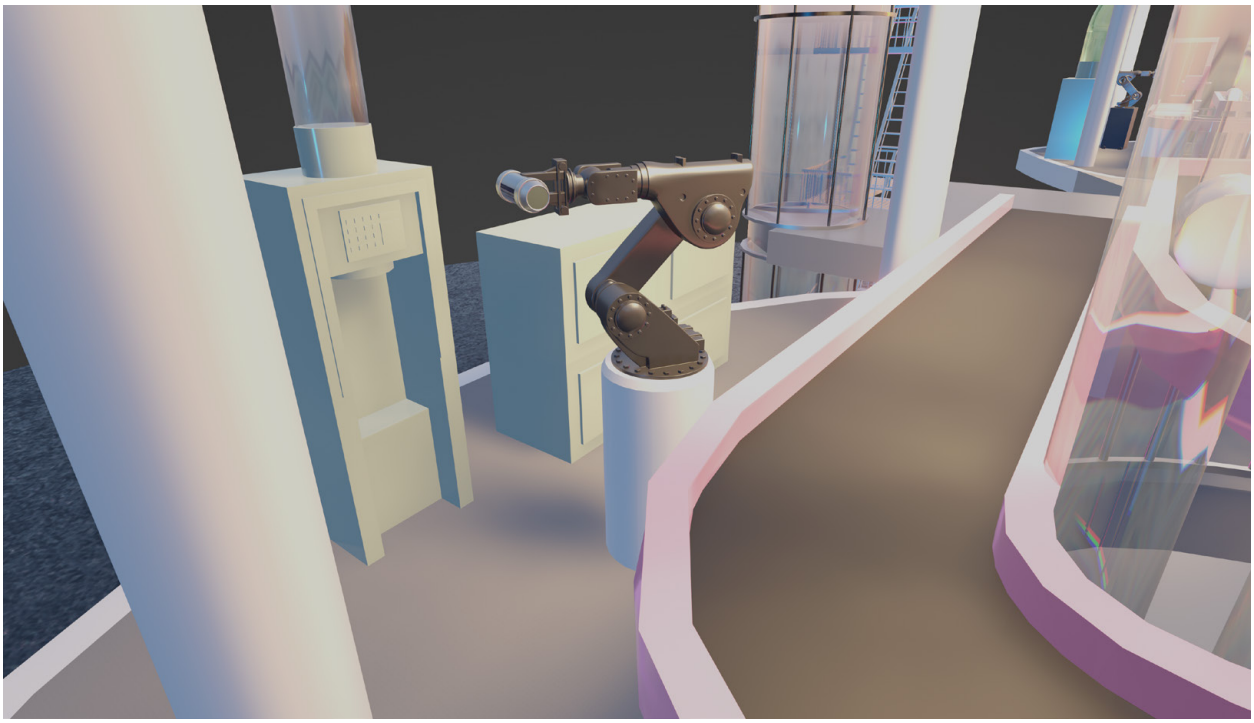


Fig 41. Robot-based Unpacking System(2)

Unpacking System

The scanners read the bar code on the outside of the box. The automated machine gently handles the unpacked items and moves them into the carriers.

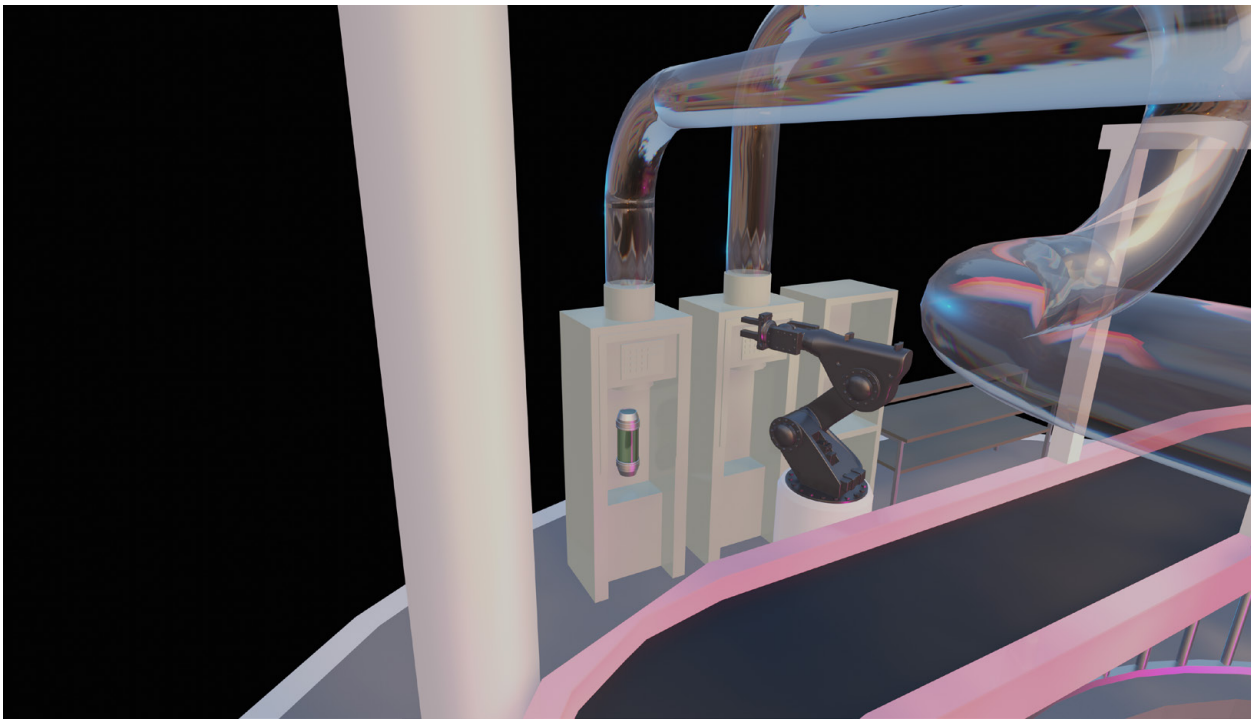


Fig 42. Robot-based Unpacking System(3)

Unpacking System

Carriers move to the next process through pneumatic tubes. Robots send the carriers to the scanning area.

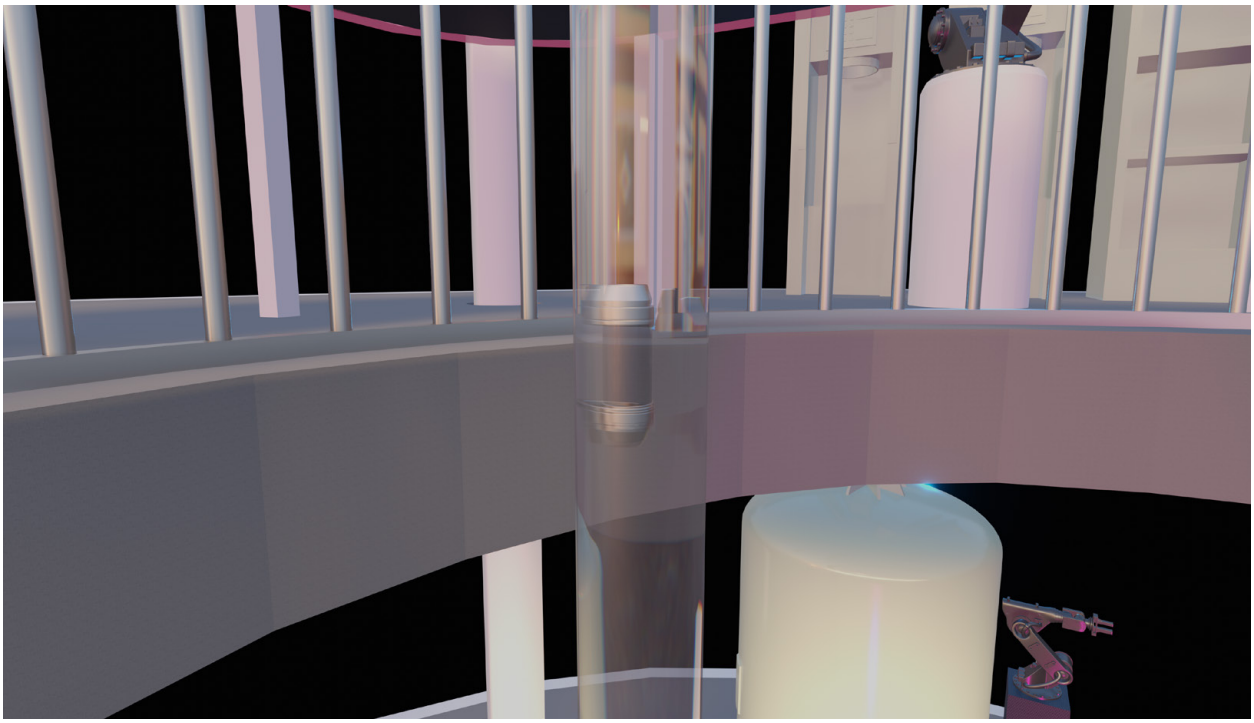


Fig 43. Robot-based Unpacking System(4)

Unpacking System

Cylindrical capsule is transported by air pressure through a pneumatic tube. This facility has a wide selection of containers in different shapes, sizes, and colors.

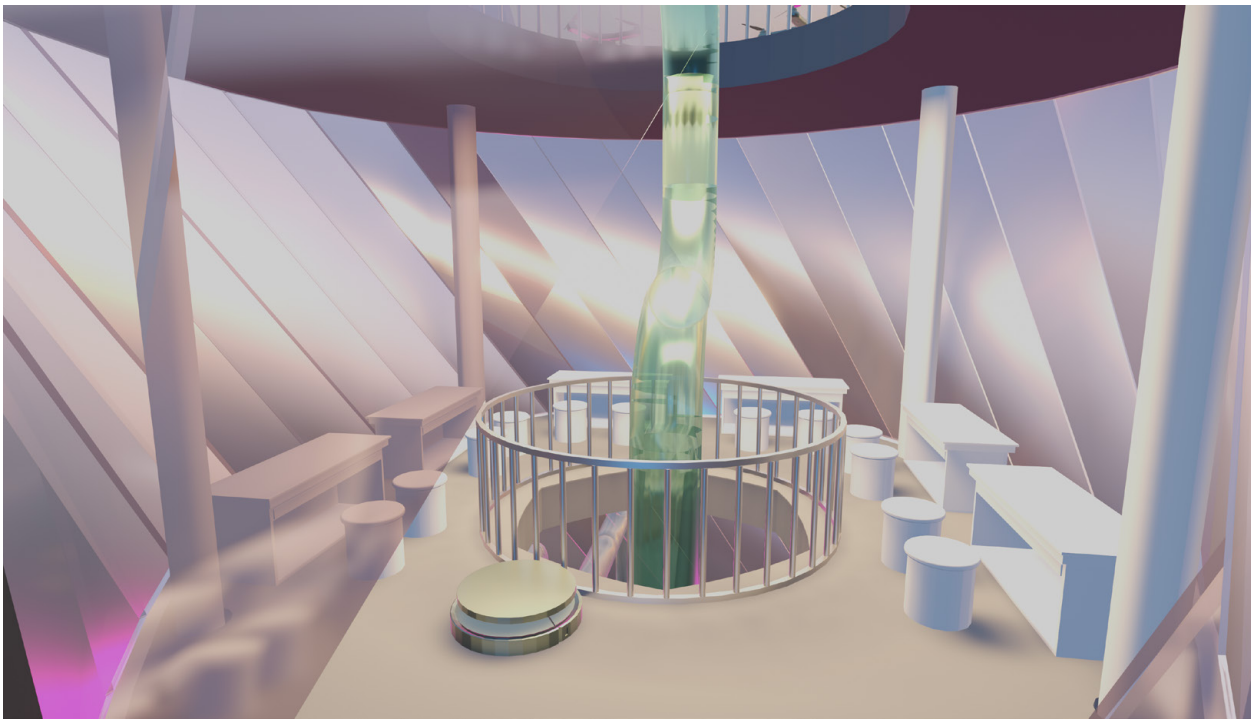


Fig 44. Operation and Data Center(1)

Operation Center and Data Center

The whole process of this facility is monitored and controlled by human directors in the operation center. The facility servers are used for the operation within this building. The app server system is for the app service for outside customers for the deposit or purchasing the second-hand items.

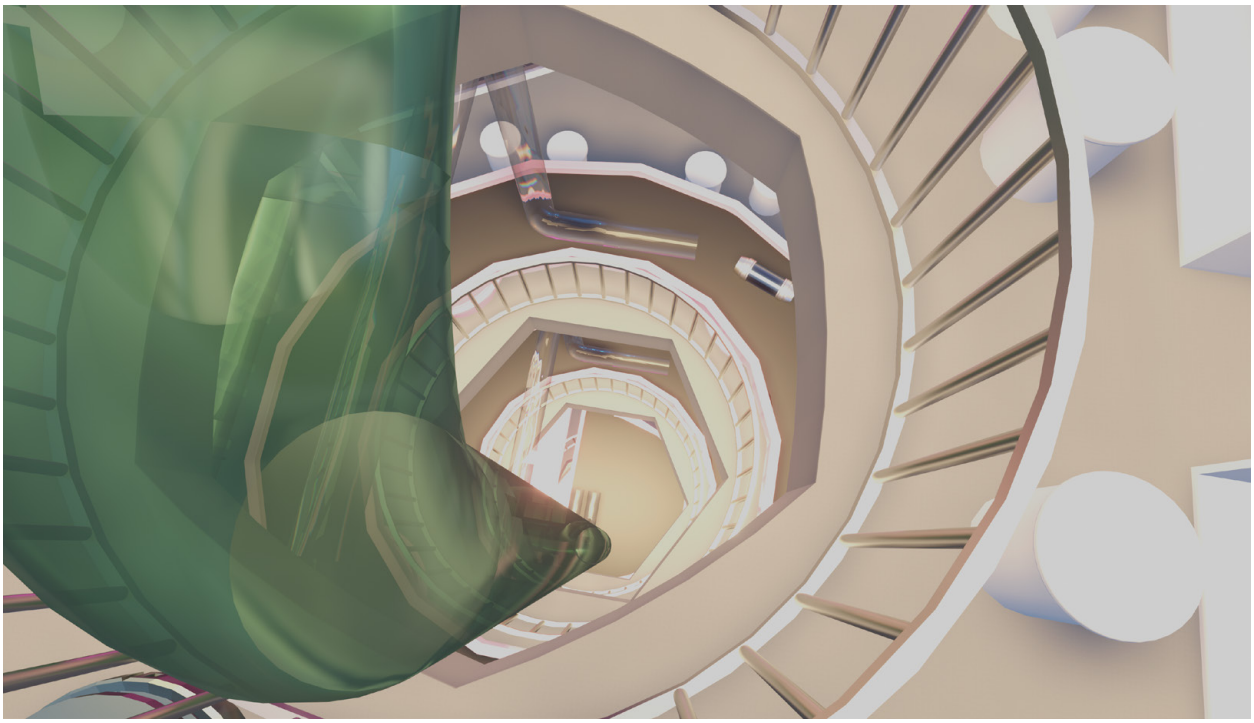


Fig 45. Operation and Data Center(2)

Operation Center and Data Center

The data center manages power supply, data communications, applications, and environmental controls. The data center is monitored by personnel working in an operation center.

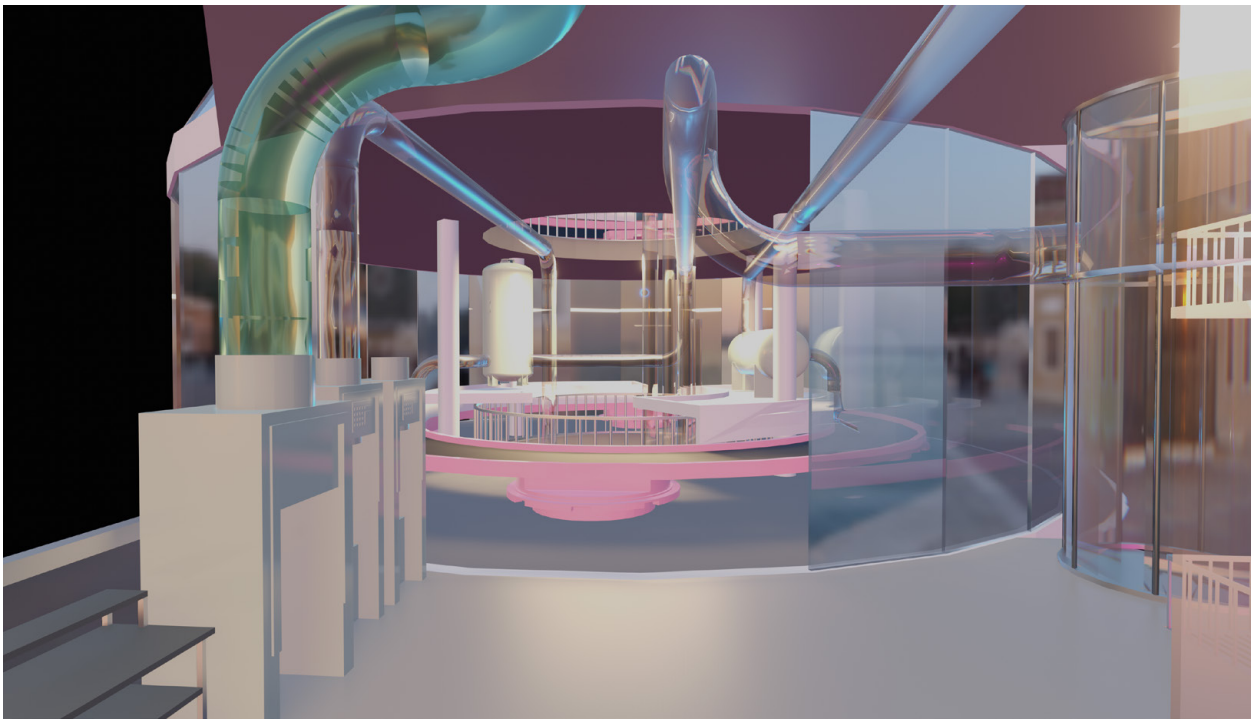


Fig 46. Scanning and Analysis System(1)

Scanning and Analysis System

Unpacked items go through the scanning unit. 3d scanning produces a large amount of visual information about the item. This visual information is used to analyze the item thoroughly. Item type, name, level of tear and wear, cleanness, counterfeit checking, weight, volume, and other useful data are directly estimated by AI engines.

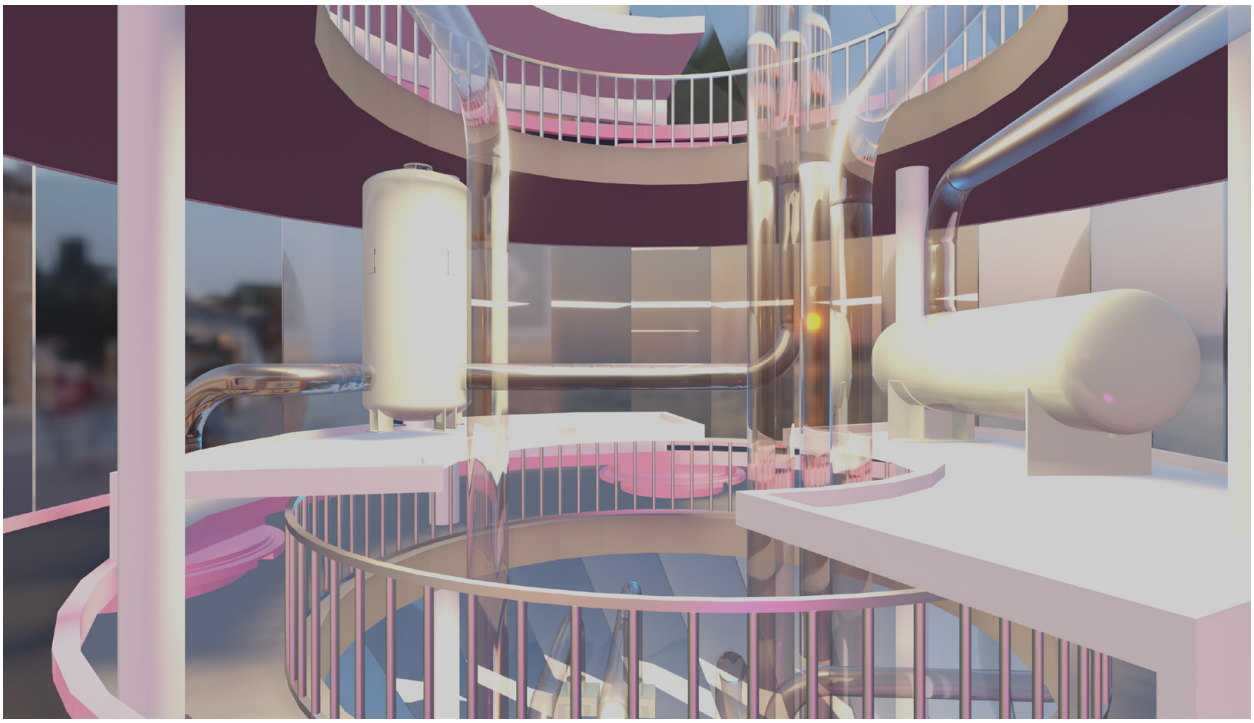


Fig 47. Scanning and Analysis System(2)

Scanning and Analysis System

Price and market analysis of the item is also suggested for efficient sales. AI engines are monitored and operated by high-capacity servers located in the operation center.

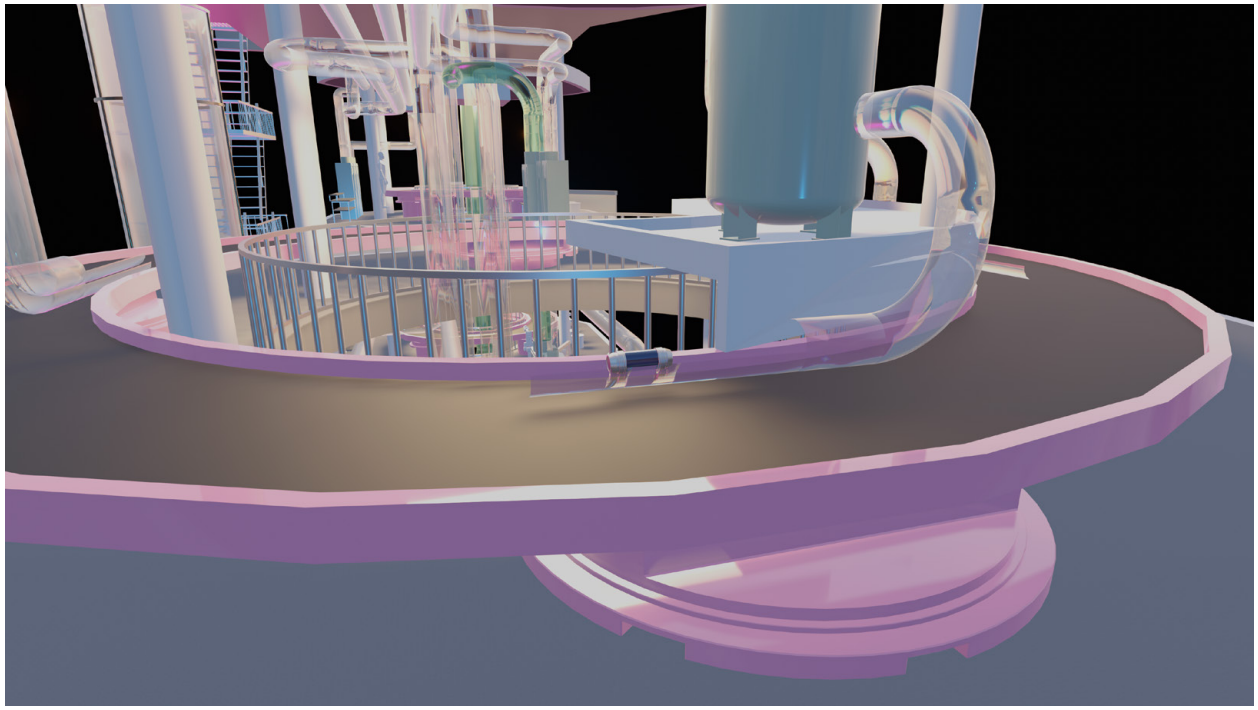


Fig 48. Scanning and Analysis System(3)

Scanning and Analysis System

A Carrier is sent to the scanning area from the unpacking area.

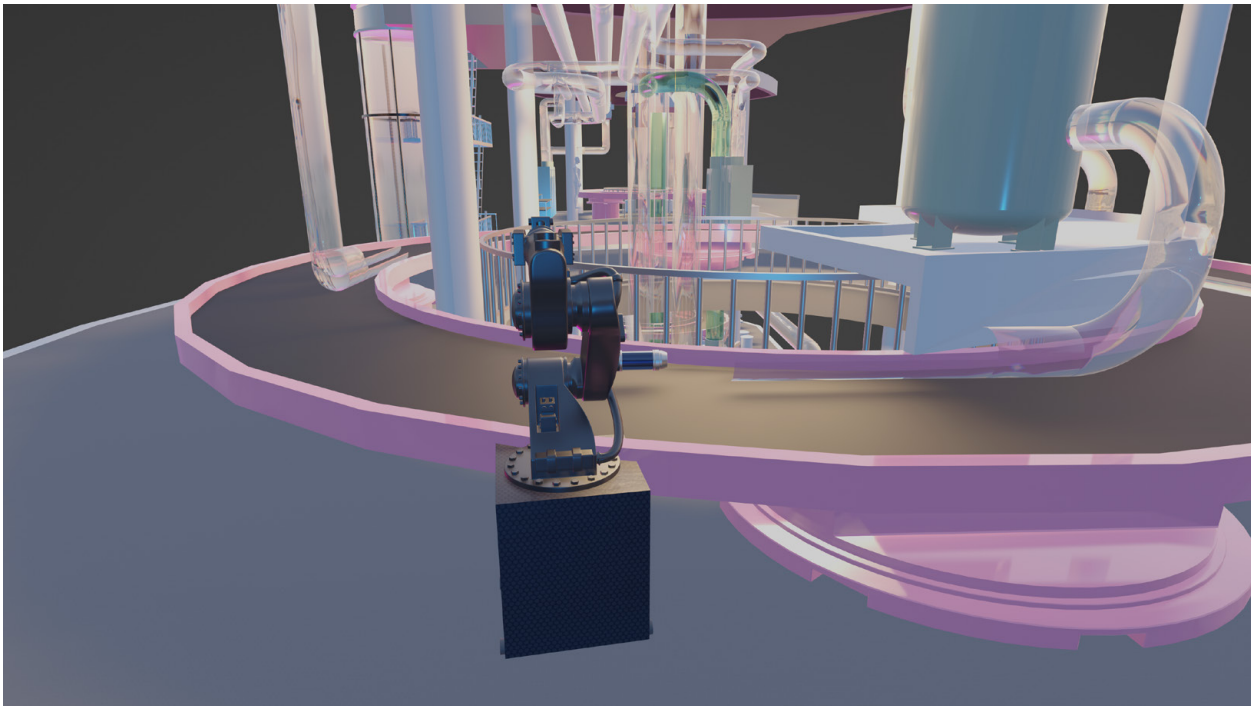


Fig 49. Scanning and Analysis System(4)

Scanning and Analysis System

The robot picks up the carrier.

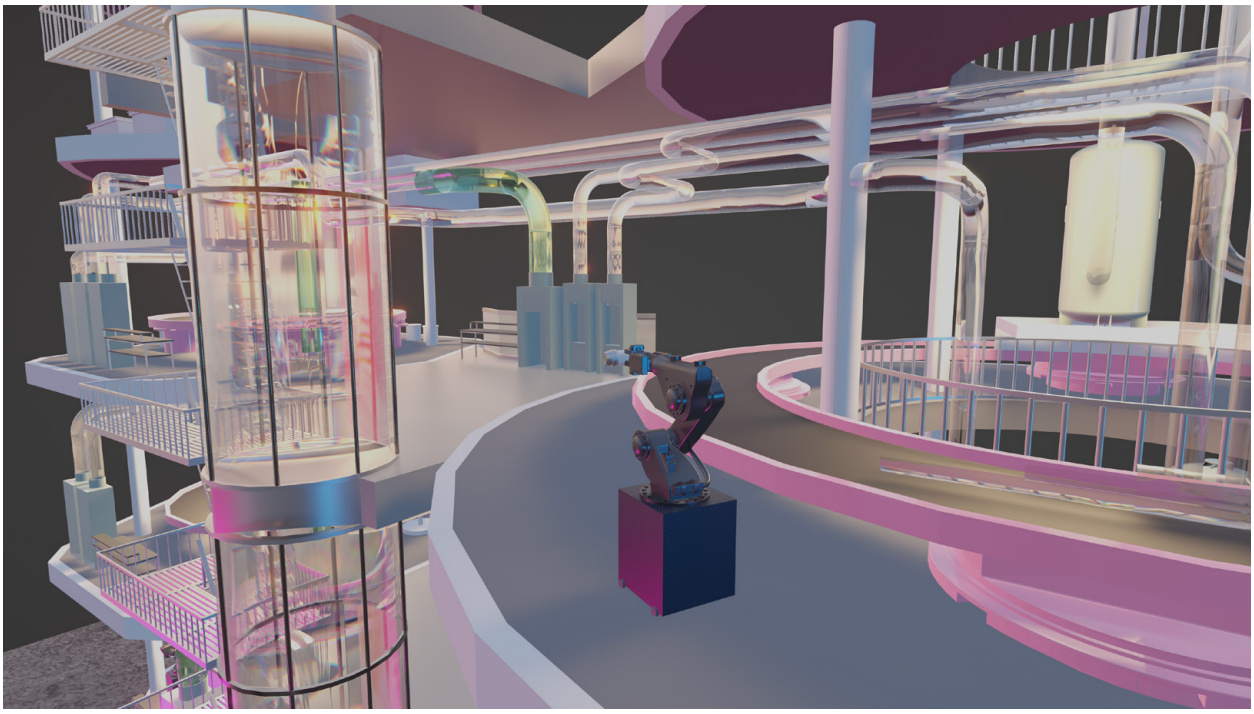


Fig 50. Scanning Area(1)

Scanning Area

The Carriers are sent to the fixing room for polishing by the robot arm.

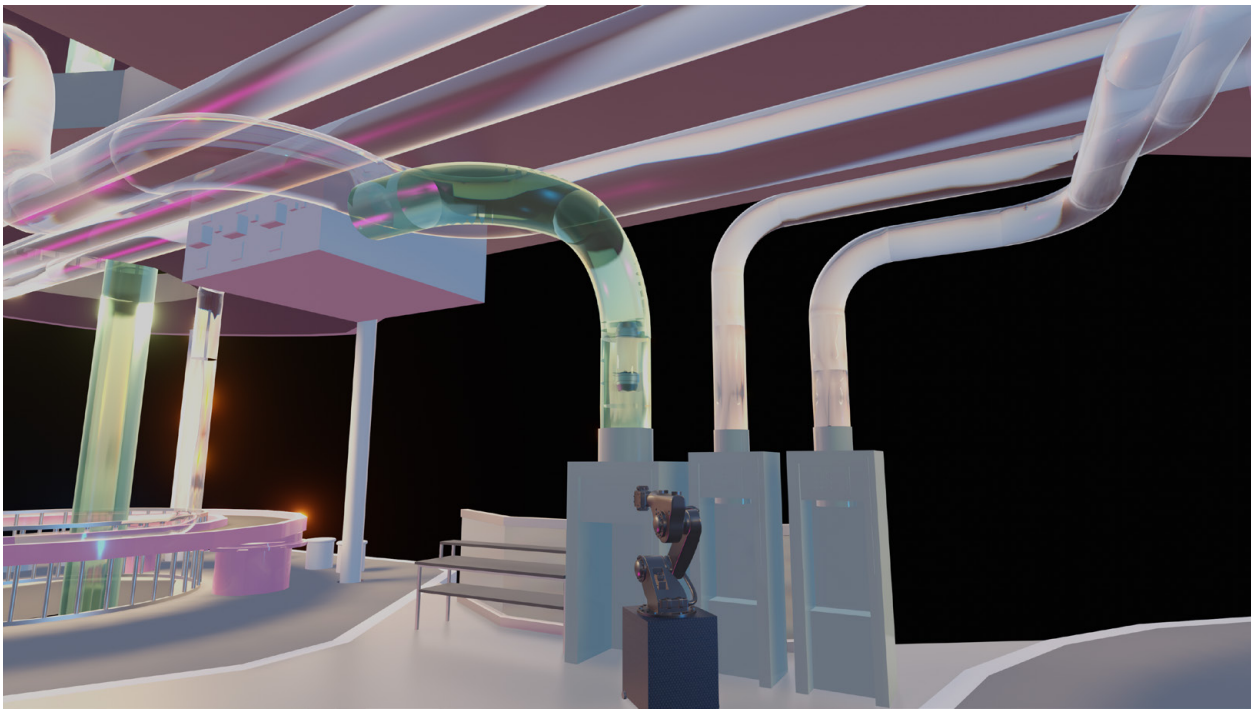


Fig 51. Scanning Area(2)

Scanning Area

Pneumatic tube stations receive and unload the content of a carrier.

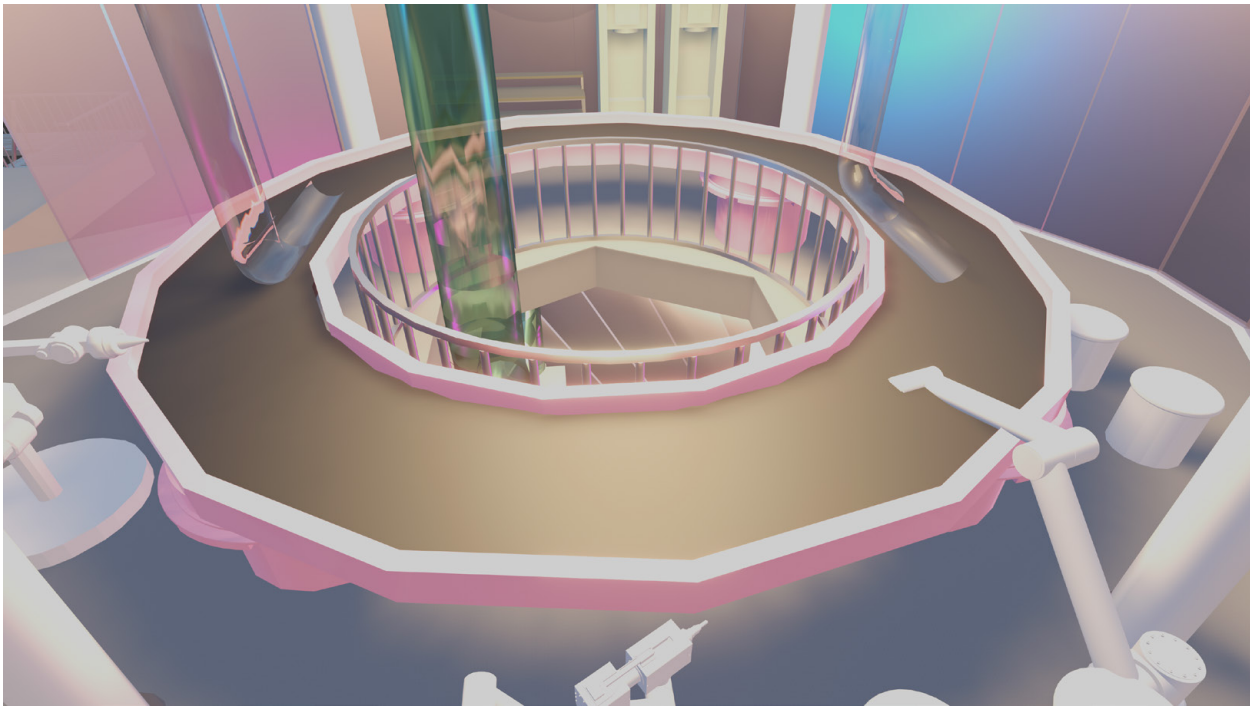


Fig 52. Restoration System

Restoration System

If AI engines decide that the deposit item needs polishing and repair, it moves to the restoration room. With the help of human technicians and engineers, the item can increase its value significantly.

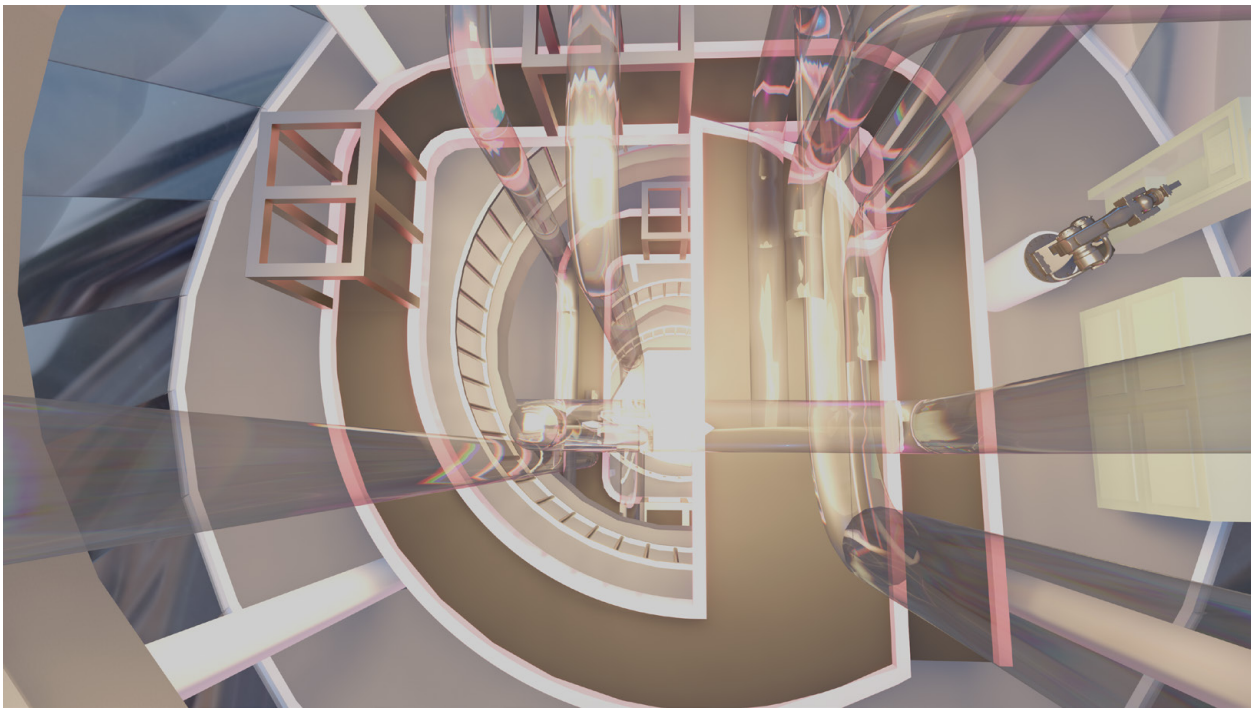


Fig 53. Categorization Unit(1)

Categorizing Unit

Carrier arrives categorizing area from restoration area.

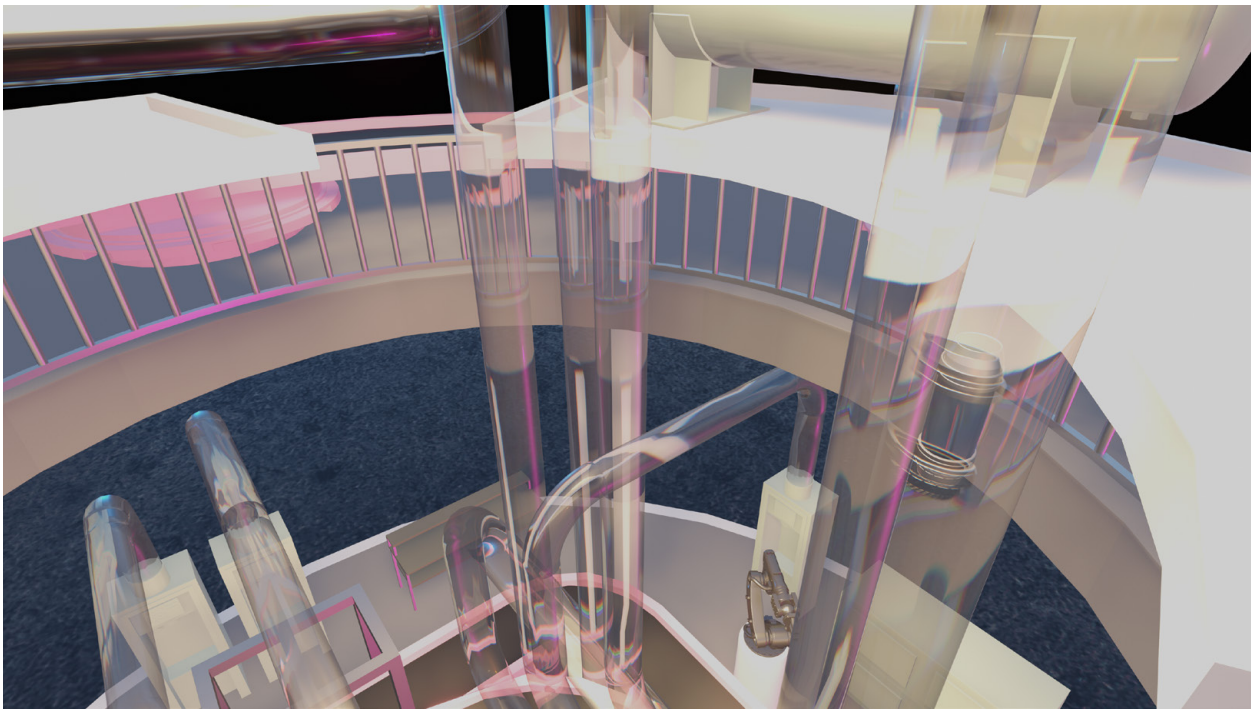


Fig 54. Categorization Unit(2)

Categorizing Unit

Scanned items are then categorized into subgroups for organized storage. Type and sizes are the main factors.

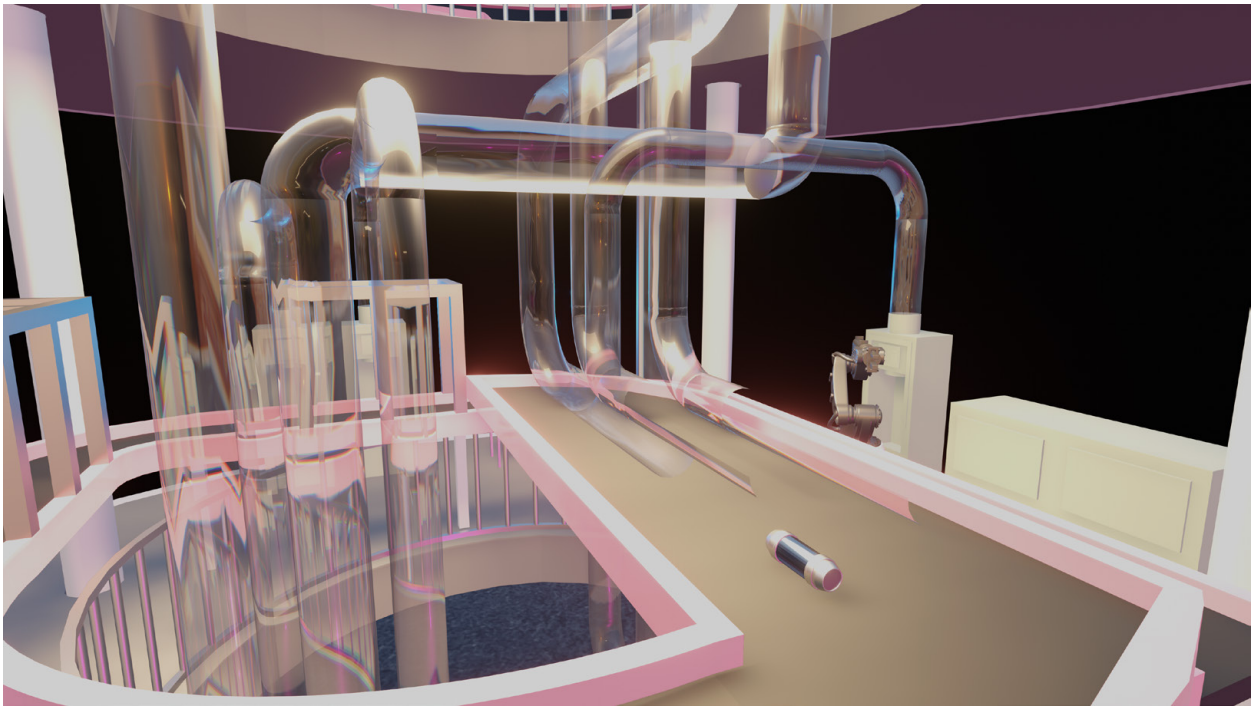


Fig 55. Categorization Unit(3)

Categorizing Unit

Scanned items are then categorized into subgroups for organized storage. Type and sizes are main factors.

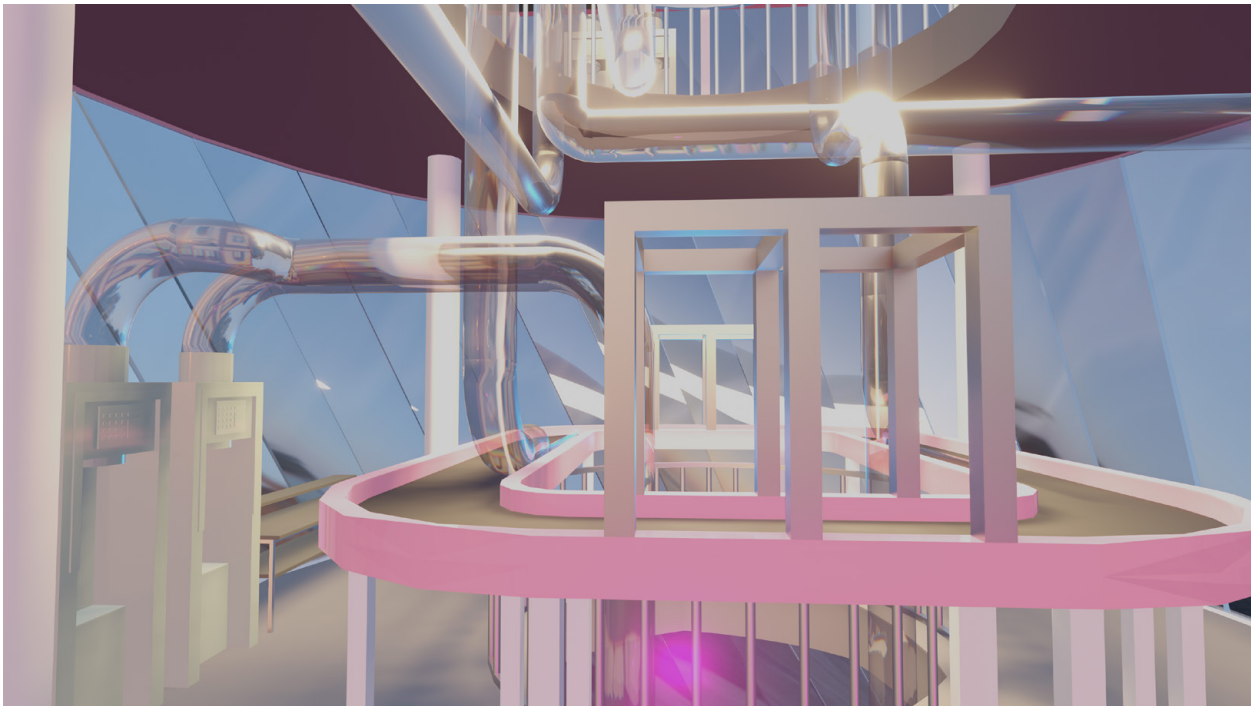


Fig 56. Categorization Unit(4)

Categorizing Unit

The carrier is sent to the storage after sorting is completed.

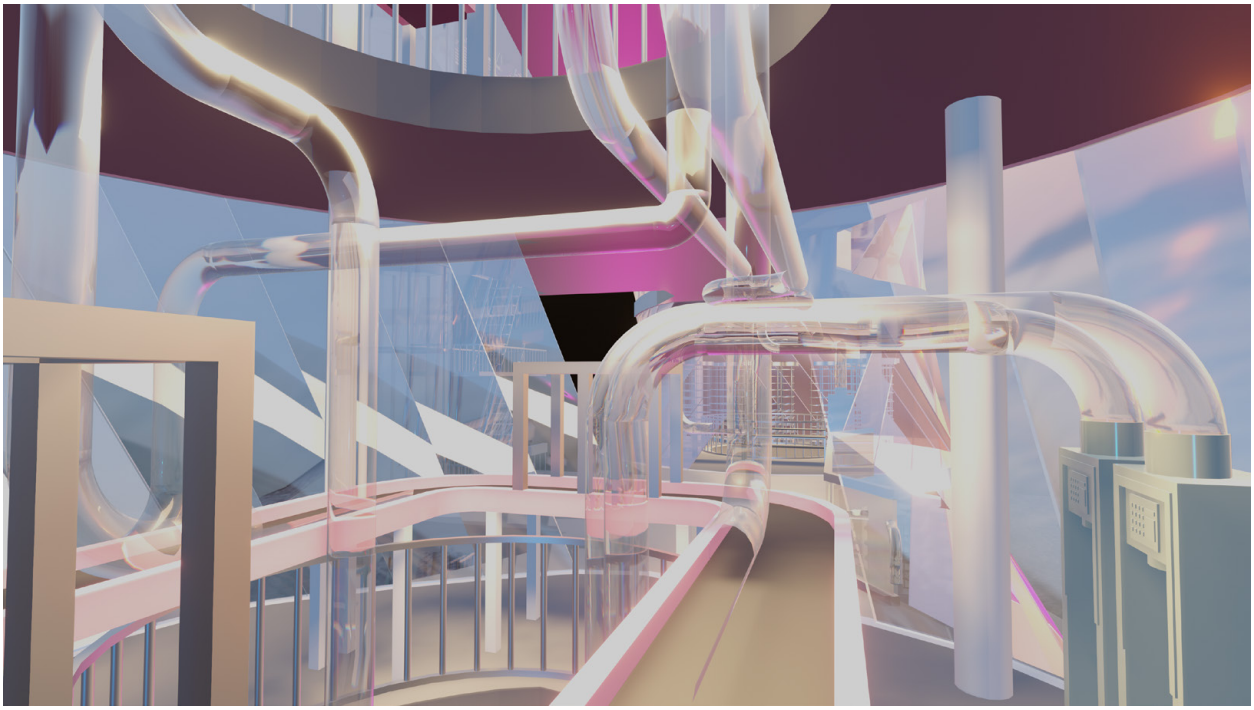


Fig 57. Categorization Unit(5)

Categorizing Unit

After reviewing the storage capacity, items are classified into inventories.

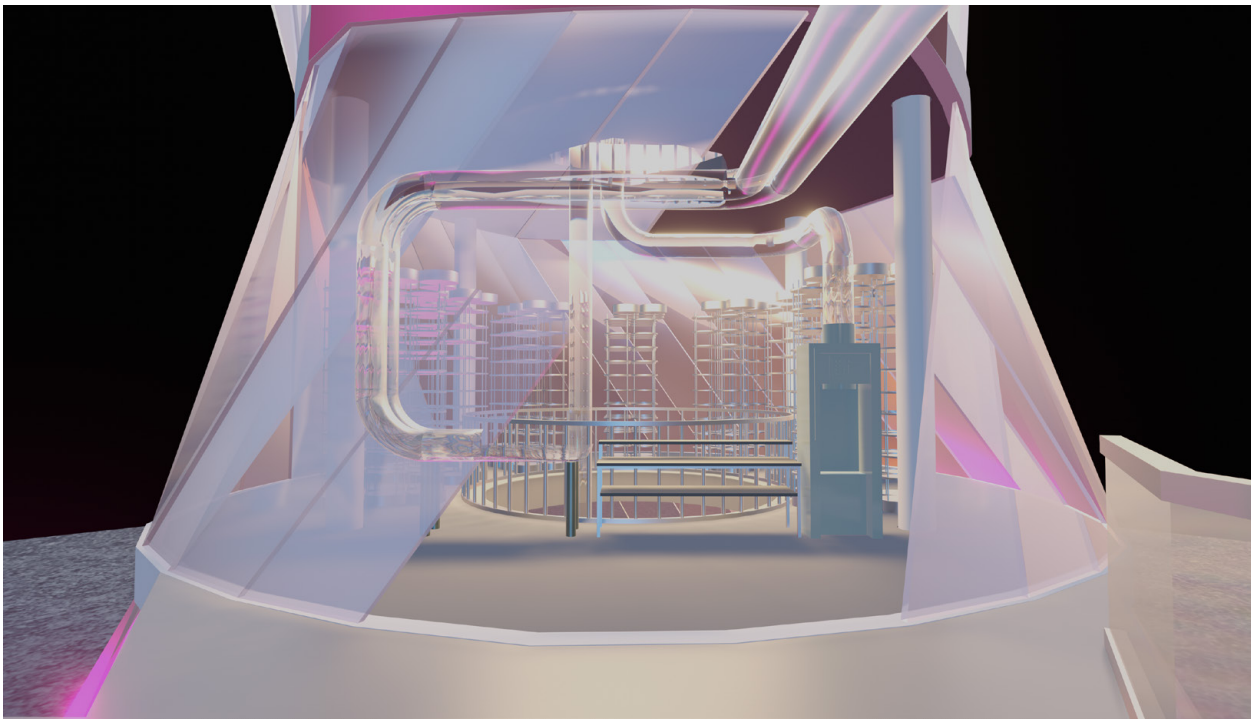


Fig 58. Storage(1)

Storage

Vertical inventory units density storage and save space. Storage area is designed with different sizes of decks and storage units. Deposit and retrieving is automated by using robots.

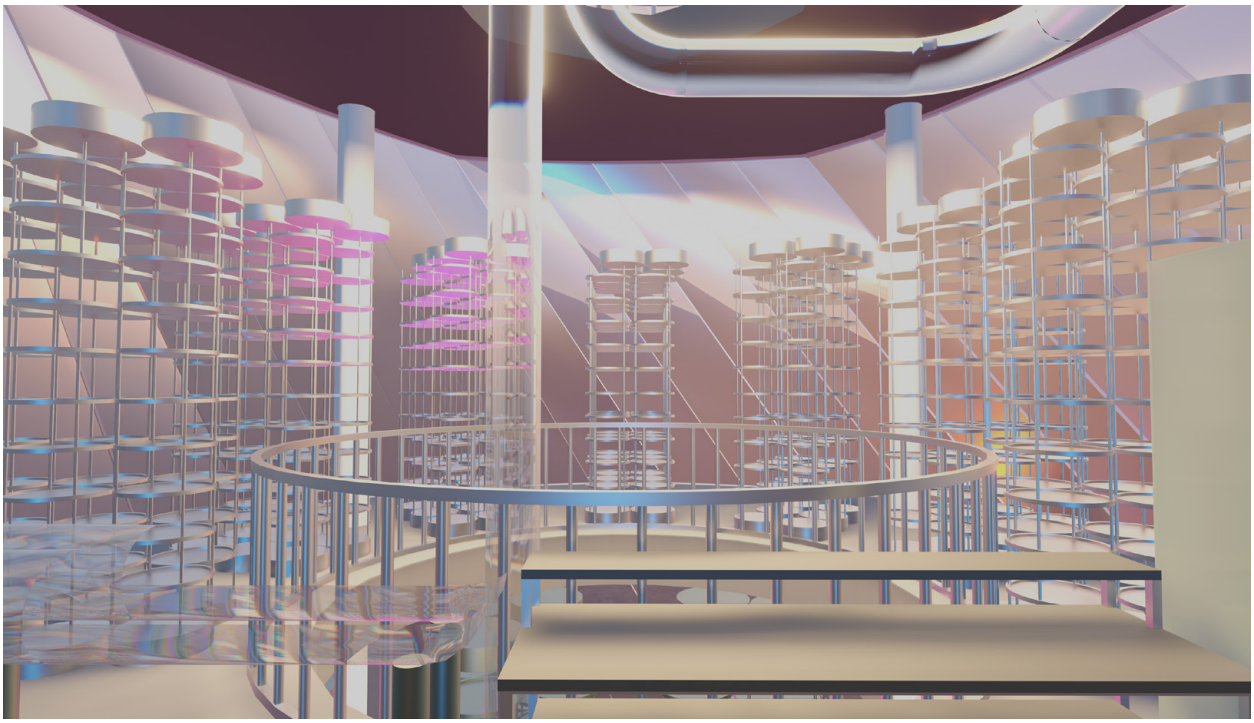


Fig 59. Storage(2)

Storage

This facility has types of inventory in different size.

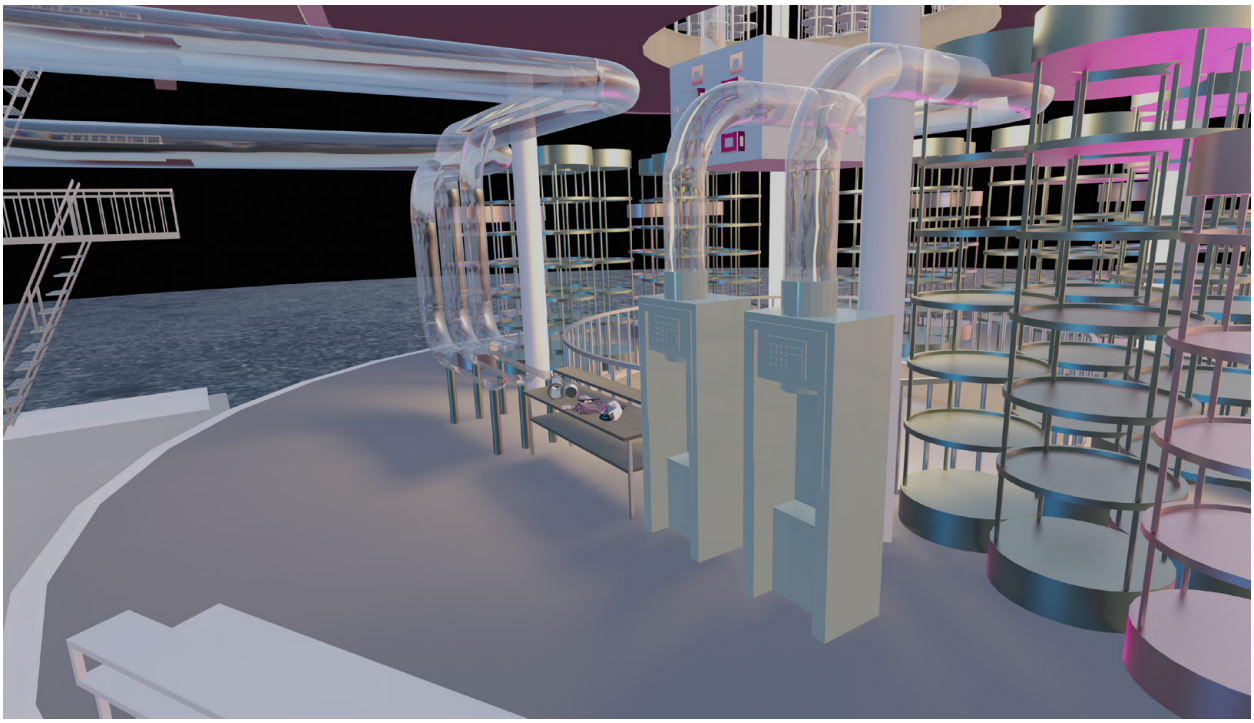


Fig 60. Storage(3)

Storage

Carrier arrives storage from categorizing area.

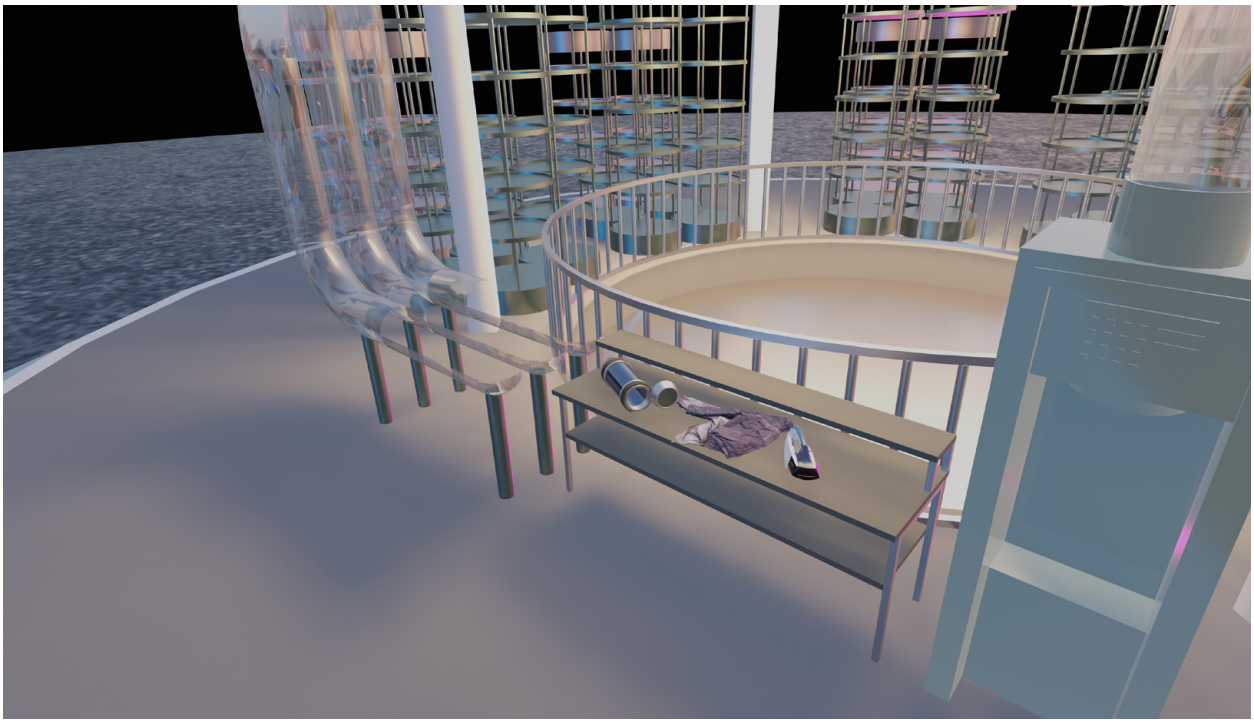


Fig 61. Storage(4)

Storage

Autonomous pickers navigate this facility and send items to the packing area. The process of stocking, picking, and palletizing is automatized by the robot arm.

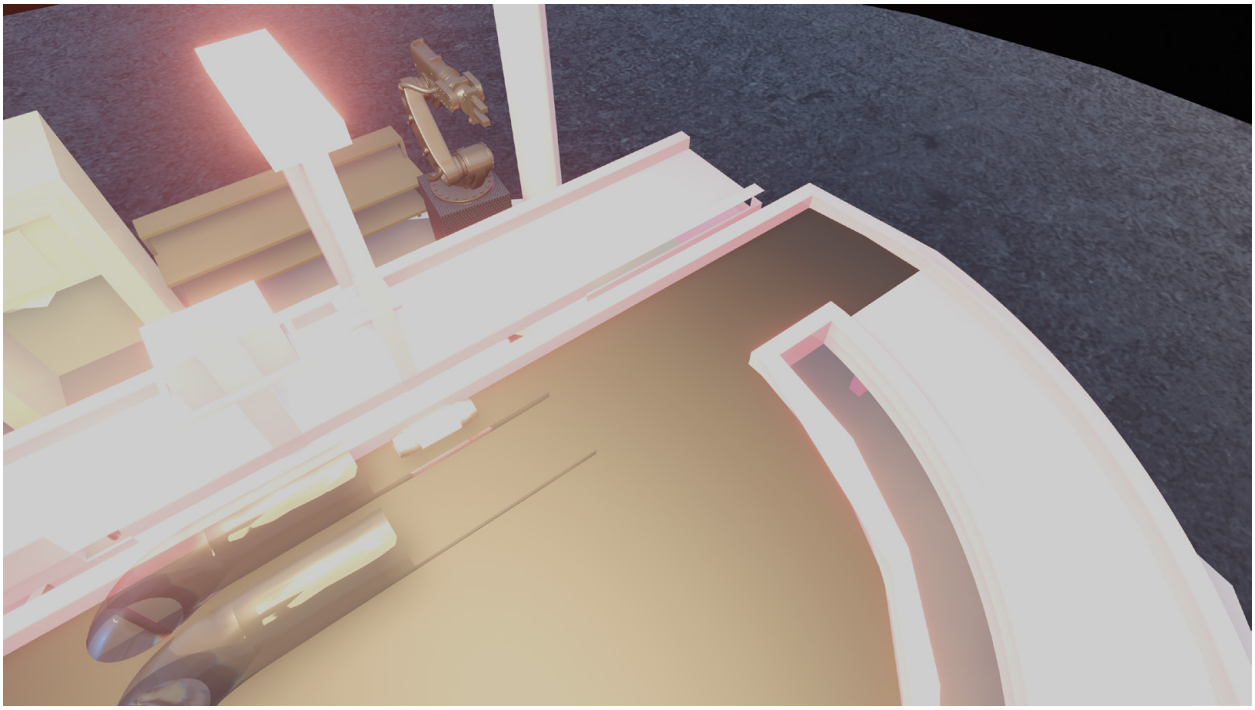


Fig 62. Packing Area(1)

Packing Area

The carrier arrives packing area from storage.

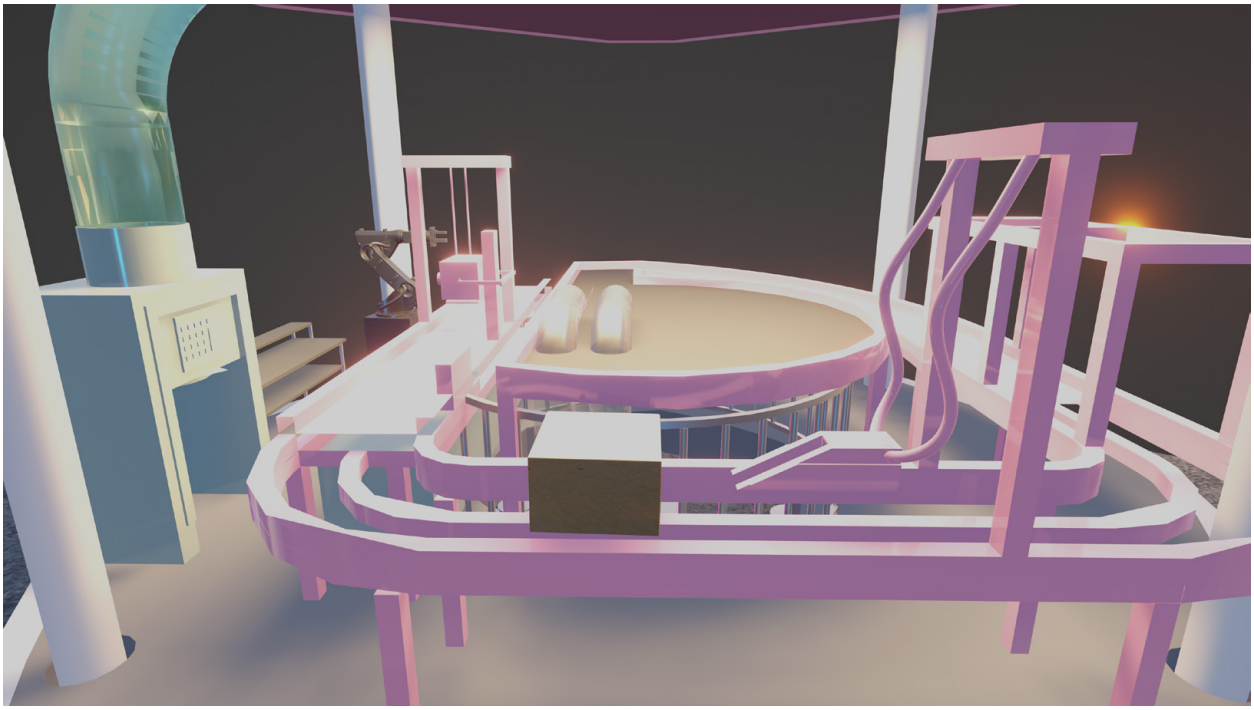


Fig 63. Packing Area(2)

Packing Area

Automatic horizontal cartoning packing machine packs out to the box with precision.

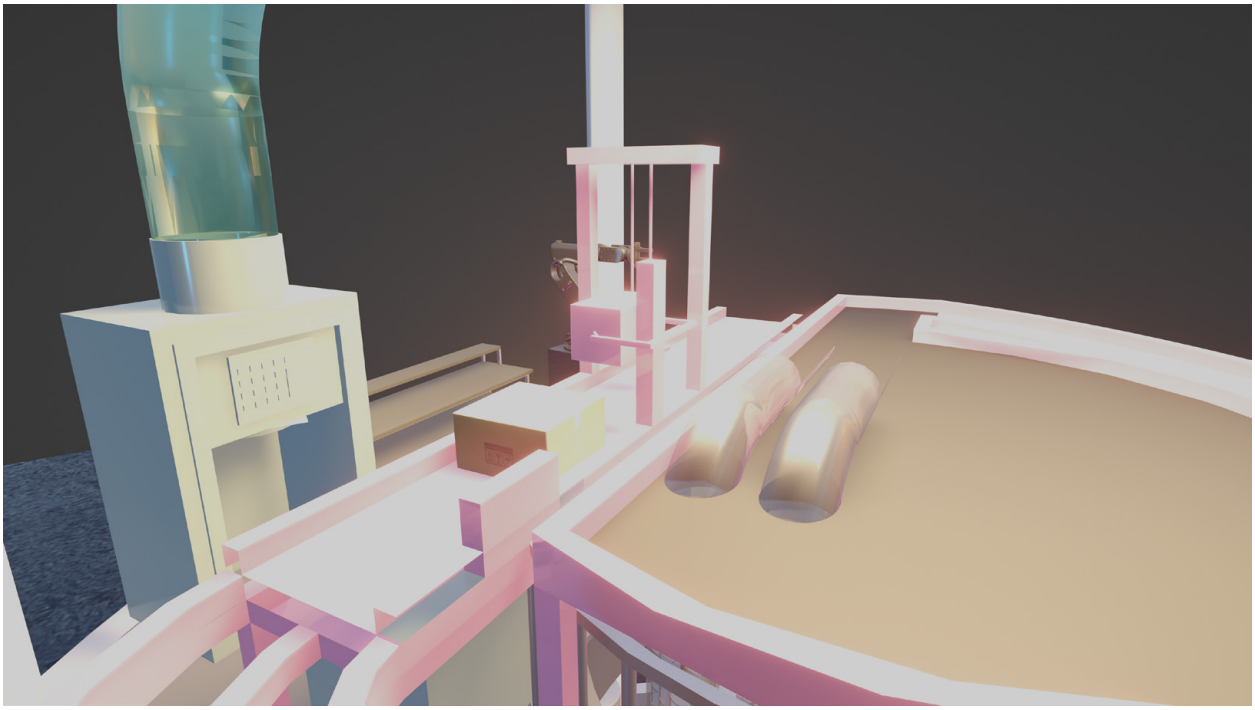


Fig 64. Packing Area(3)

Packing Area

The packed box has a certificate stamp and mailing address on the outside of the box

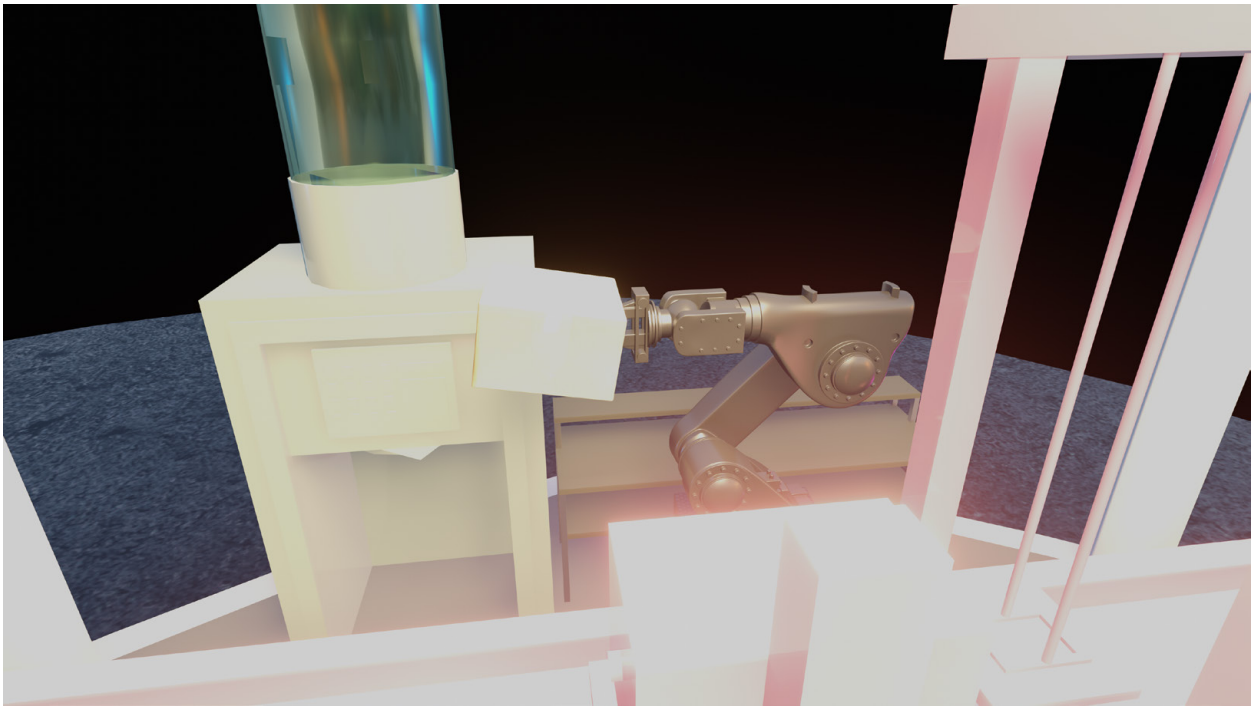


Fig 65. Packing Area(4)

Packing Area

Automated machine picks up the packed box and send it to the drone station.

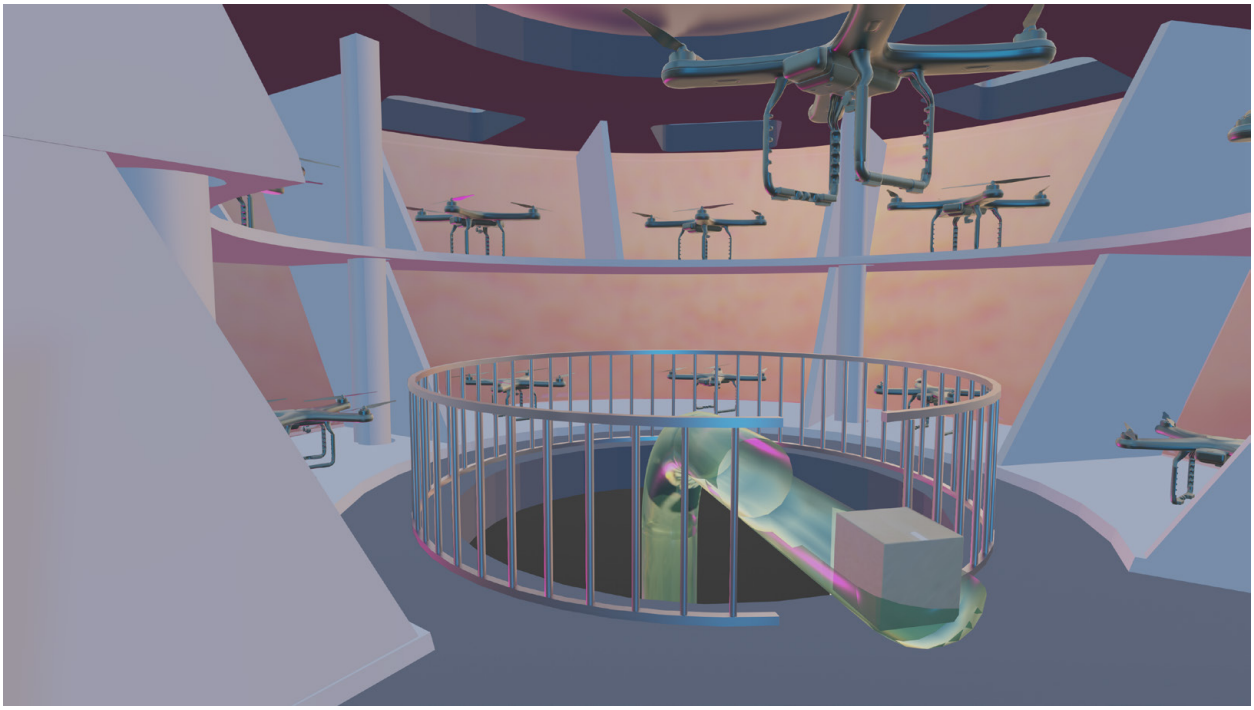


Fig 66. Drone Station(1)

Drone Station

The parcel is sent to the drone port on the very top floor.

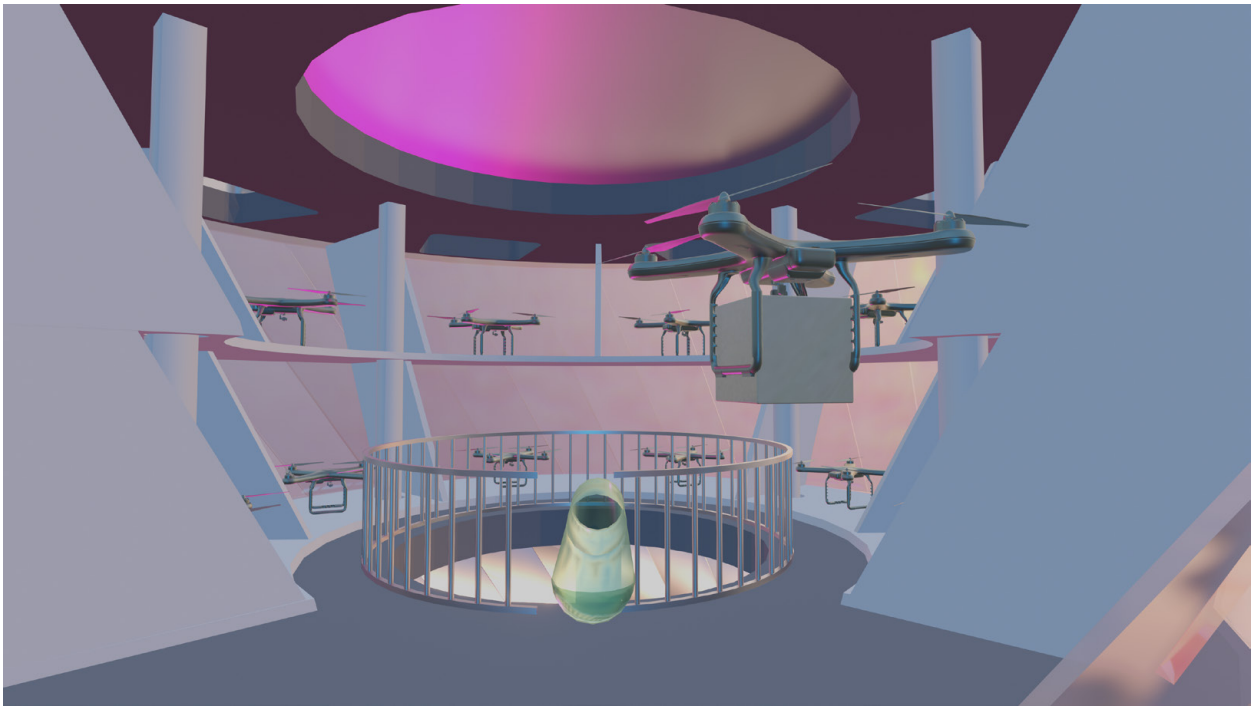


Fig 67. Drone Station(2)

Drone Station

The sold items are loaded into the drones here. The Roof of the building is punctured with holes so that drones can move in and out.

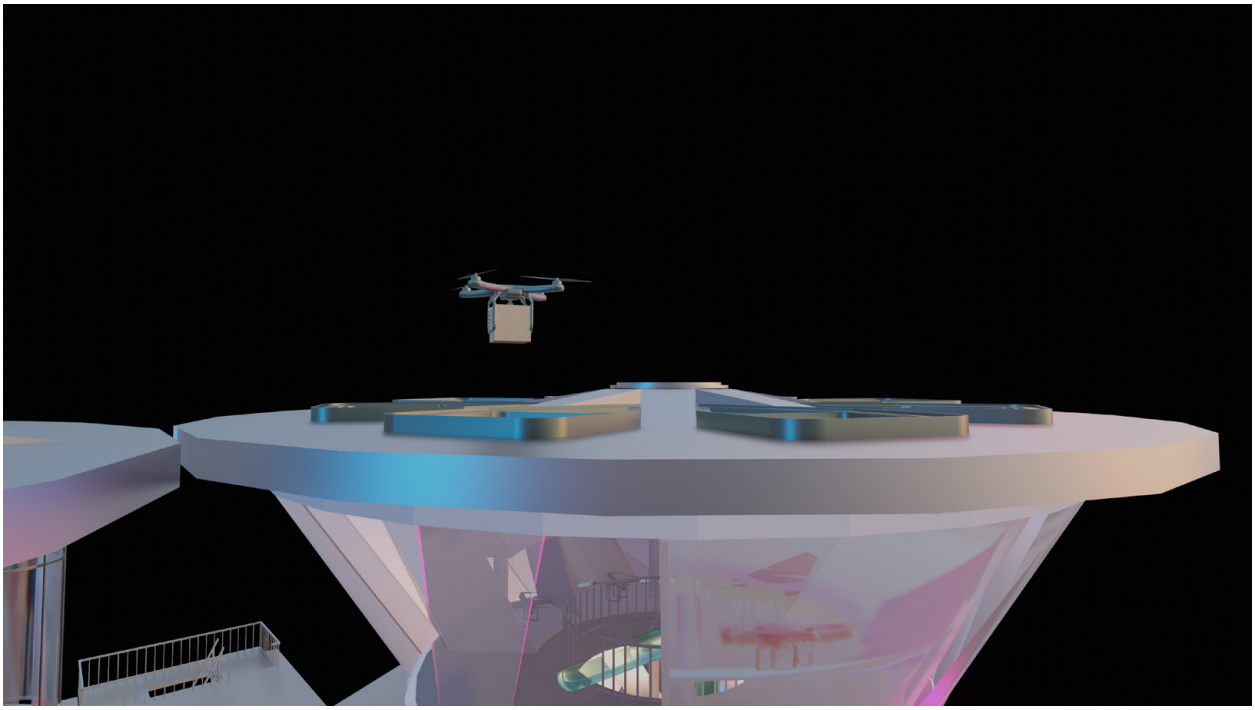


Fig 68. Drone Parcel Dispath(1)

Drone Parcel Dispatch

Parcel leaves this facility to the destination.

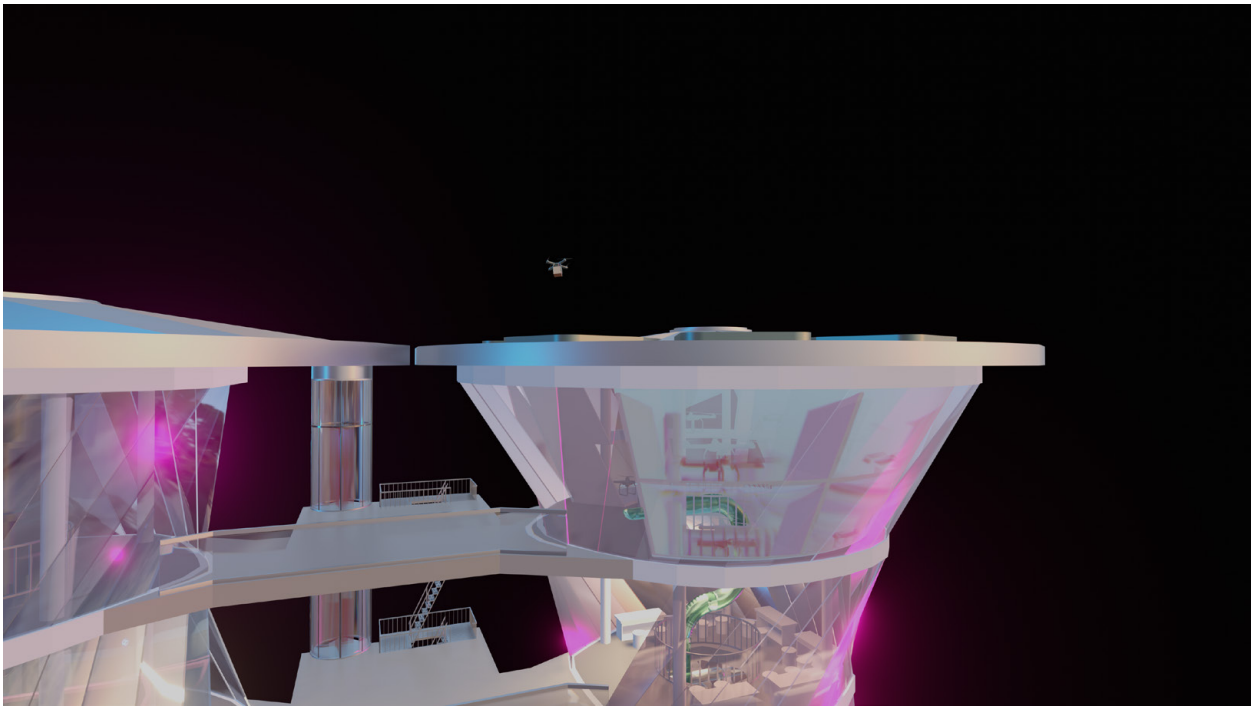


Fig 69. Drone Parcel Dispatch(2)

Drone Parcel Dispatch

Pickup and delivery status on jobs can be tracked and monitored through the App.

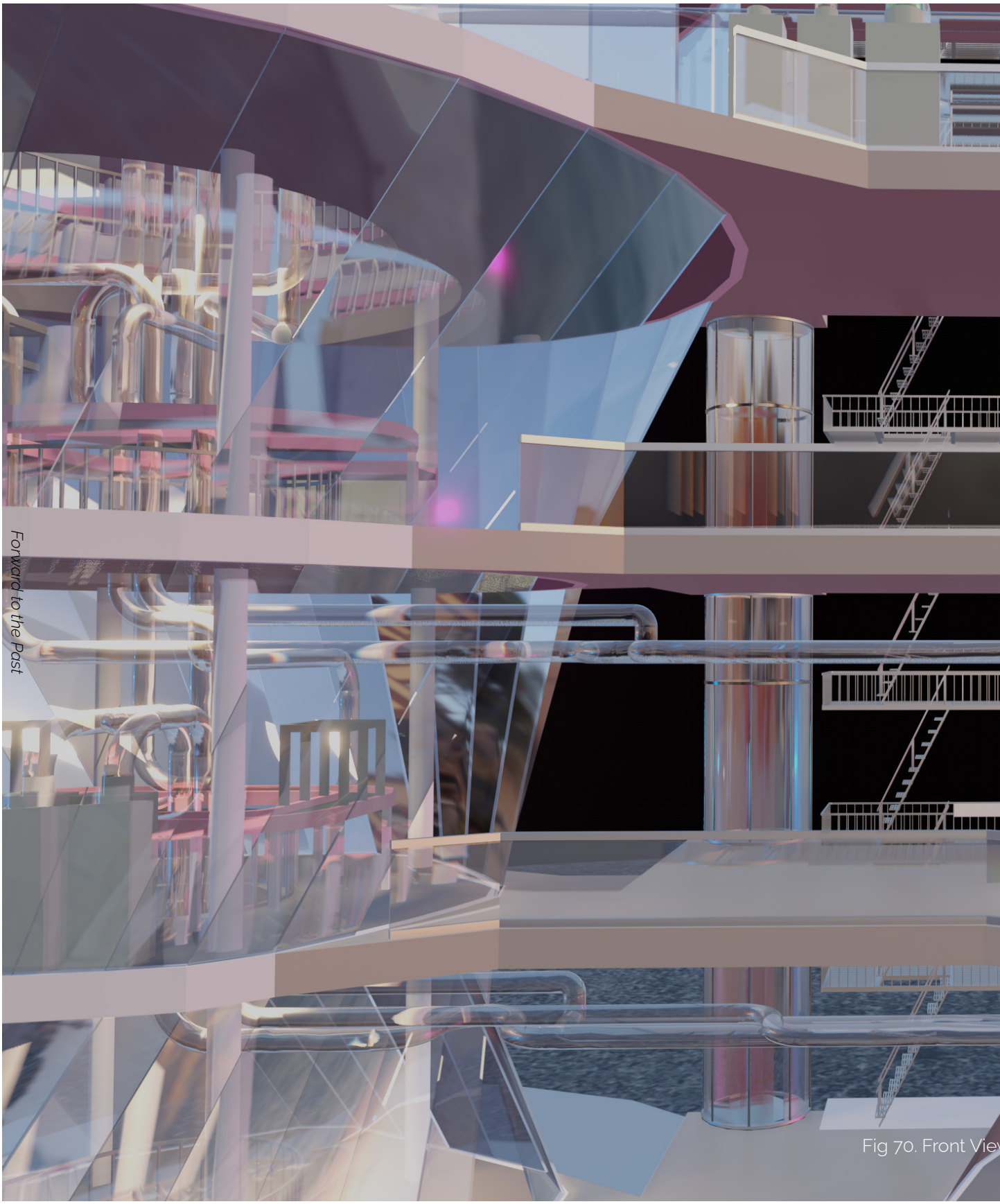
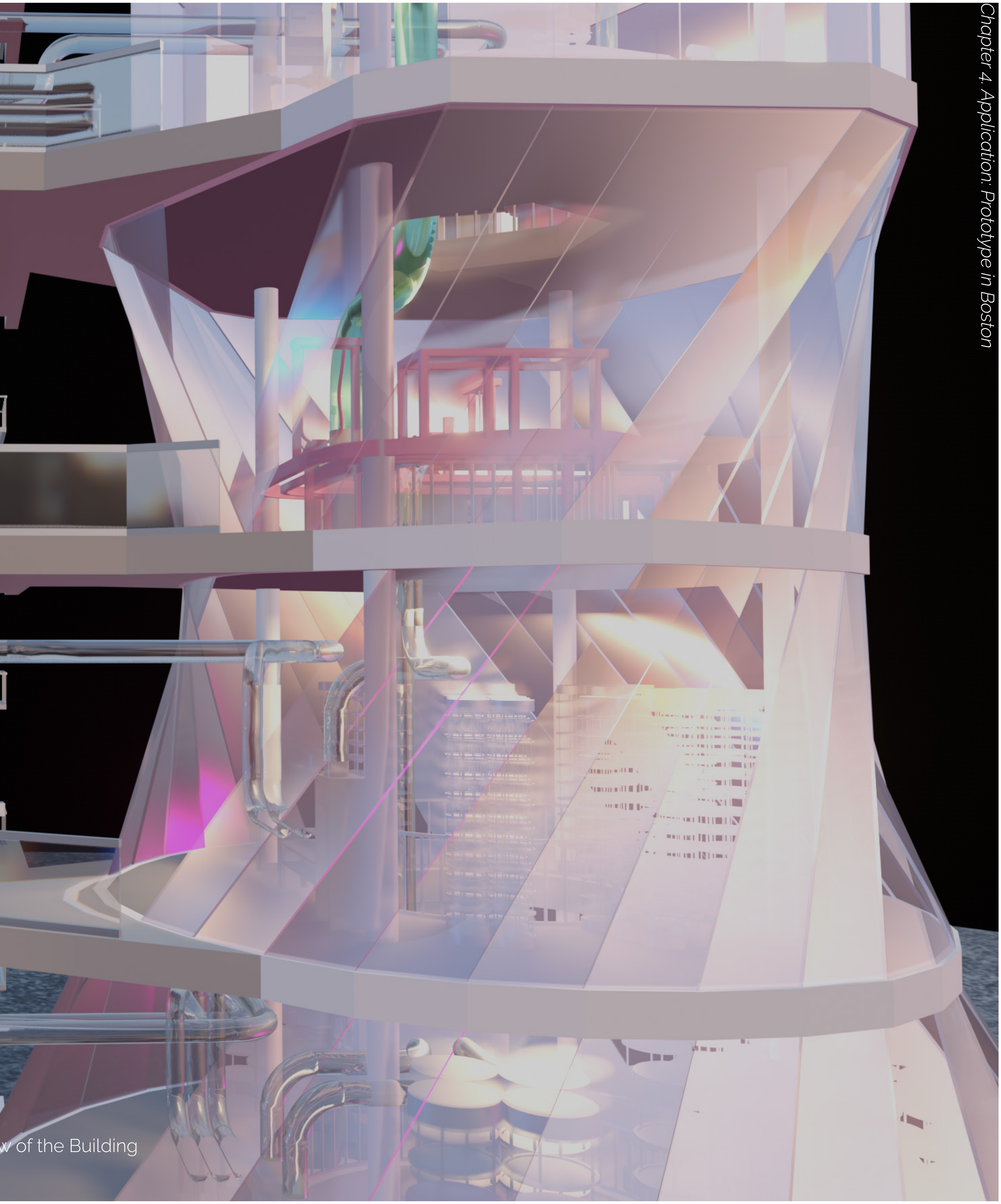


Fig 70. Front View



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List of Figures