

# Recyclage -

In search for nomadic application of aluminum from urban mining in the design of a recycle learning center

Graduation Reflection  
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## 1. Introduction

“Everyone is equipped by nature to receive and to assimilate sensory experiences,” (Lehmann, 2017). The fairness that every being can be inspired by materials and the affective emotions that materials afford embolden me to dedicate the graduation project to designing Recyclage, an innovative recycle learning center which offers a pedagogical environment that enables hands-on discovery with versatility of materials, fueling of curiosity towards materiality, contemplation towards values attached to the life cycle of materials, and the rethink of urban mining practice. The urban proposal, narrative, building programmes, and materiality are highly informed by close examination of the site and the research conducted from P1 to P2. The following paragraphs aim to elaborate on the major insights and decisions acquired from research to architectural design. Then the relevance of the project with the methodical approach of the chair of urban architecture, the wider social context, architecture profession will be discussed. Last but not least, the ethical issues and dilemma throughout the process will be reviewed.

## 2. The relationship between research and design

The research objectives are built on the intuitions and observations from site analysis and field study. I preliminarily analyzed the given site in Anderlecht, Belgium as a fragmented urban fabric in terms of morphological evolution in the post-industrial period, functional mix of the urban plot, connection with the immediate urban grains and the ephemeral state of ownership of spaces around the site (fig.1). Then I started to examine several adaptive reuse buildings around the site through the lens of buildings as shearing layers of change. The adaptability of buildings can be comprehended in terms of structure, skin, services, space plan and stuff (Brand, 2012). It was found that inhabitants are highly dependent on the refurbishing of the ‘stuff’ layer which means alternating the furniture layout and material in the interior as concluded in (fig.2). The mode of inhabiting as ‘nomads’ who always plan to relocate prompts the site actors to practise informal ‘urban mining’. Urban mining enables material flow that compresses the physical distance of the urban fragments and allows affordance of space at affordable cost. In light of this site impression, I decided to formulate my research to explore the possibility of urban mining being integrated into an unstable and fragmented post-industrial plot. The research is branched into the following questions:

- a) What is the relevance of urban mining in the context of the ever-changing post-industrial city?
- b) What is the feasibility of urban mining in local and regional scale? What are the potential materials to be mined from the extant specifically? What is the logistics requirement for the application of mining these materials?
- c) What are the semantic capital carried by the materials around the site?
- d) How can urban mining and new composite materials fortify social capital and identity?
- e) How can the site be reinvented ground-up with urban mining and beneficial to the nomadic users?

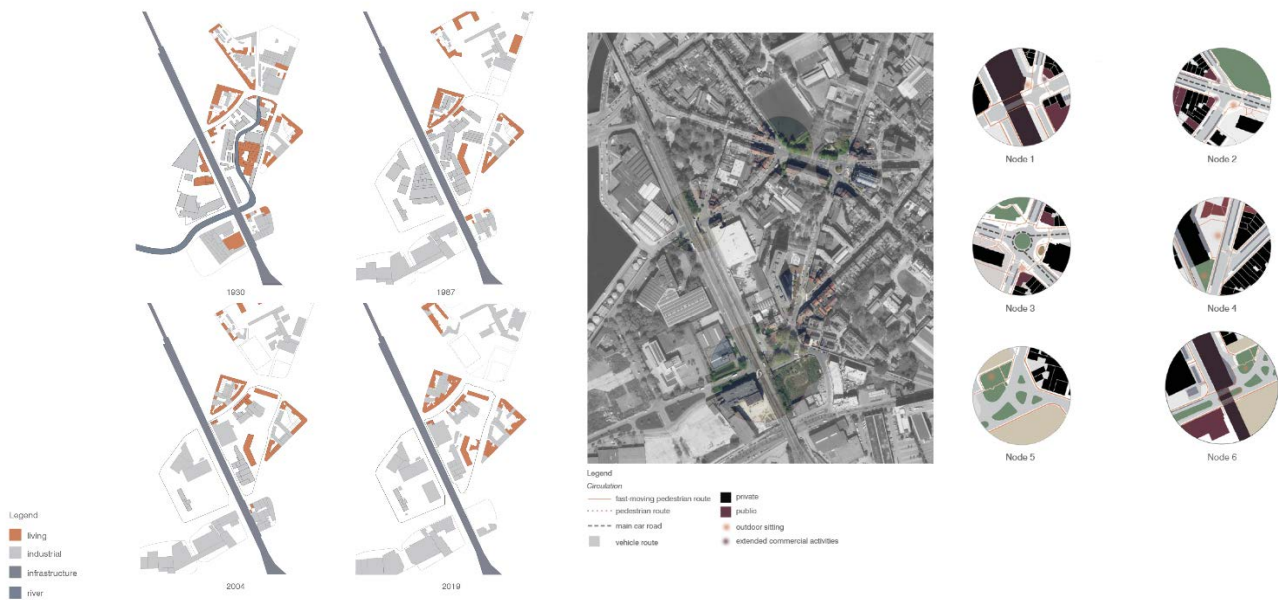


Fig.1 Diagram showing the fragmentation of the plot in terms of morphology, functions and connection with immediate urban grains.



Fig.2 Concluding diagram showing adaptive reuse buildings around the site have been accommodating to the changing programmes mostly in the skin, space plan and stuff layers.

When going in search of the aforementioned questions, I arrived at the position of my urban proposal and architectural assignment. There is a massive hibernating anthropogenic stock of metals underground and on-surface, static and flowing, with the largest share in construction and demolition waste. However, the recycling and collection facilities are mostly situated along the Brussels Canal and connected to ring roads surrounding the city of Brussels as well as other smaller towns south of Brussels, making the urban mining process invisible to the public audience. The designated site in Anderlecht is one of the potential spots for developing into a hub for urban mining. The urban planning proposal endeavors to orchestrate the process of urban mining from collection, disassembly, extraction, recovery, consumption and reinvention within the site plot, challenging the status quo of recycling industry as infrastructure. Besides industrial programmes, educational, cultural and commercial spaces can be derived from the elaborated process of urban mining. The master plan endowed contrasting characters to recycling spaces which can integrate production and consumption, infrastructure with education, and practicality with vividness. It is significant to weave different kinds of working and living relationship within the plot to sustain the vibrancy and security of the neighbourhood. To achieve this, redrawing the boundary between private and public, providing a spectrum of spatial hierarchy for the communal space among these groups help generate the symbiosis of consumption and production activities of the neighbourhood. The site is re-zoned into a production strip, mixed commercial and production public interior strip, and a cultural strip, forming a sprawling alley-yard internally that connects the major urban nodes of the plot at its periphery. The organization stitches the urban fragments thematically and functionally with narrating the process of urban mining (fig. 3).



Fig.3 Urban plan showing the zoning and material flow narrated by the notion of urban mining.

I have chosen aluminium as the material to deepen my investigation because it is highly available, omnipresent in ever-changing commercial and residential buildings, and associated with domestic life and the remembrance of Anderlecht being a post-industrial city. Moreover, the study of the life cycle of aluminium (fig. 4) and the anecdotes of people in Brussels carried by aluminium suggest there is indifference of material culture embodied by building materials due to the sake of efficiency and mechanicalization. This poses a potential improvement in closing the loop of production and consumption of aluminium with consideration of the semantic value forged upon interaction between humans and materials. Thereby, *Recyclage* is a hybrid that encompasses a material library, makerspace for material experiment, exposition space for new prototypes, auditorium, meeting rooms, office space for researchers and archive, providing a converge point for inhabitants, entrepreneurs, researchers and everyday makers. The programmes are devised in zones that foster a pedagogical environment (fig. 5) based on the observation of how a person understands and approaches material when I conducted the sensory experience mapping for the research (fig. 6). It will be further expounded in session 4. The center interpreted materials as interlocutor between people from all walks of life, unleashing the inherent material literacy of individuals, reinventing architectural opportunities between traces of events, time as well as memories. The building is depicted as a living life account of aluminium that it is finished with mainly reused aluminium which undergoes a myriad of transformation strategies: reuse, repurpose, reconfigure and transform to take up different expressions (fig. 7).

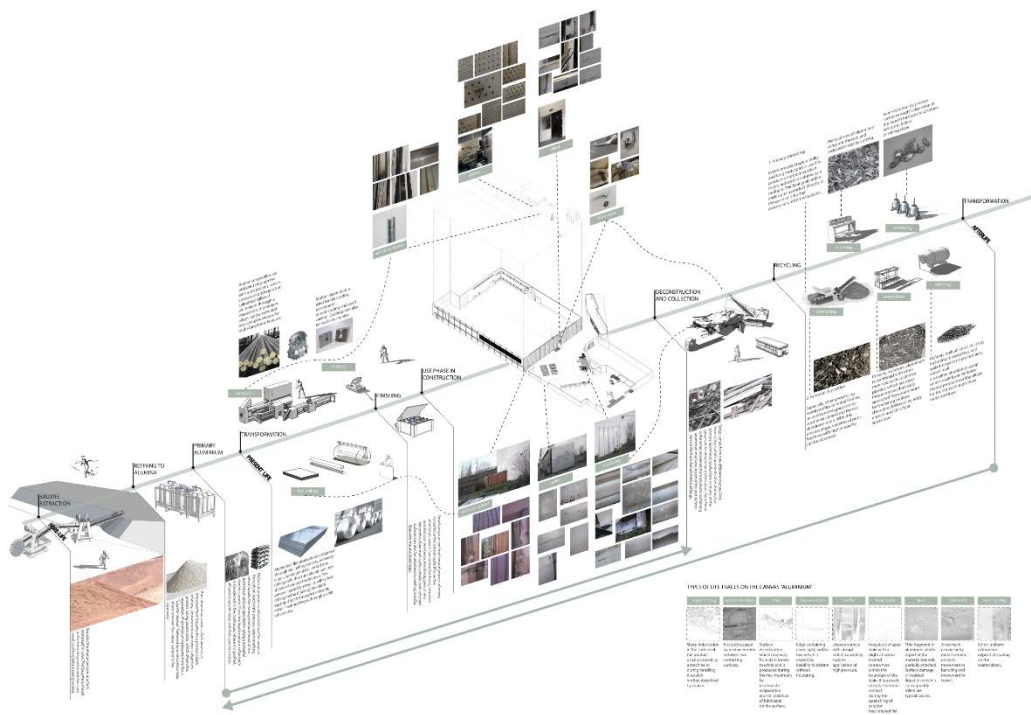


Fig.4 The study of life cycle of aluminum traced from Rotor, an existing upcycling business in the site.

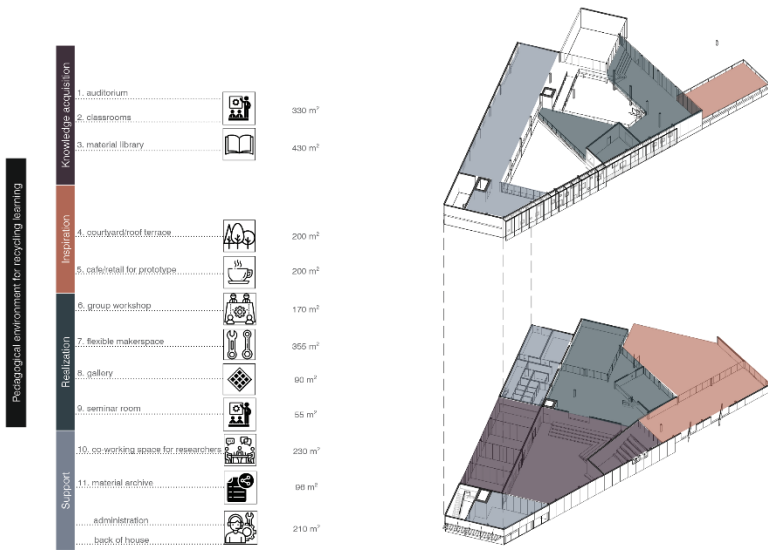


Fig.5 Diagram showing the programmatic schemes of a pedagogical environment of Recyclage inspired by the results of sensory experience mapping.

**What are the following items of aluminium do you prefer in a new interior or exterior world?**

curled and wavy  
knurled  
colour coated  
corrugated

**How would you describe the material?**

hard, smooth, rough, dull, matte, non-reflective, brittle, opaque, rough, strong, light, dull, clean

**What is the meaning of the material to you?**

non-professional, hand/rough, conventional, ordinary/modern, elegant/rigid, nostalgic/retro, nostalgic/futuristic

**Do you like traces on the material? Why or why not?**

scratch, abrasion

**What kind of impacts that do you want to keep?**

sharp, clean, beautiful, modern, sophisticated, elegant, nostalgic, traditional, decorative

Fig.6 Template of sensory experience mapping which investigates interviewees' intuition and reflection at performative, affective level and interpretive level towards aluminium.



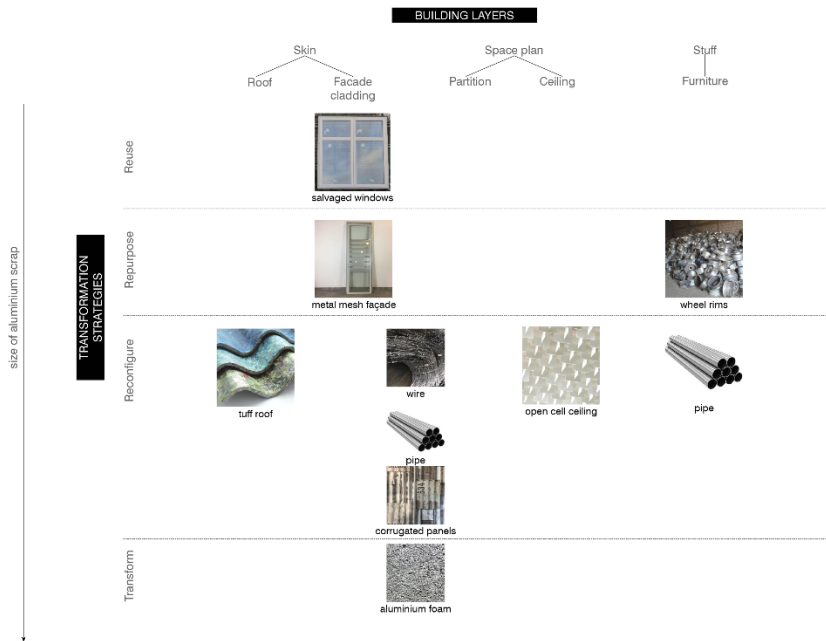


Fig.7 Diagram showing the application of transformation strategies: reuse, repurpose, reconfigure and transform in chosen building layers.

### 3. The relationship between the project topic, the studio topic, the master track (A) and the master program (MSc AUBS)

The master programme and studio topic, Spolia, underscores the importance of contextual design that deals with technical, social and spatial challenges in the extant. My project topic was inspired by examining the site as an unstable city fragment from social, economic, cultural, morphological and typological aspects. Immaterial and material spolia which carry the values and memories are recognized. They become the fragments because the pattern of language between the bits and pieces are yet to be discovered. Regarding materials and materiality as a common ground that connect time and people in spite of their backgrounds, the design proposal condensates the existing human-object relationship exhibited in informal practice of urban mining as spolia and expands it with introducing a new function on site: a recycle learning center where people can contemplate the past and envisage the future living scenarios in a sustainable way. The design is interweaved with urban mining initiative and the care of material culture, bringing in the engineering and humanistic dimension to the architecture. On the other hand, the chair of architecture advocates the rippling impact of architectural design on urban context which means the design vision of the smaller scale (i.e. materials) which then impacts on the larger scale (i.e. architectural form and tectonics). Therefore, the design project is chosen to be situated between

the existing fragments and minimizes the demolition, rather it crafts the public space from the interior and the interior space from the materiality and construction details.

#### **4. Research method and approach in relation to the graduation studio methodical line of inquiry**

The chair of urban architecture accentuates the lucid justification of urban positioning of new architectural intervention through comprehending the actual social happenings and evolution of site context. Phenomenological inquiry is one of the strands of qualitative research which is harnessed. It aims at depicting the nature and underlying meaning of the particular phenomenon (Creswell, 2013). Qualitative research strategy involves interviews and observation that assist me in gaining hands-on understanding of how the site users make sense of their living environment. For example, the phenomenon of informal urban mining, the reuse of anthropogenic materials from urban areas, was understood through conducting semi-structured interviews with groups of individuals who possess first-hand knowledge about the material flow in adaptive reuse projects. The group of individuals include plot owners, plot tenants and plot users. Making interview notes and documenting observation with photography gave insights about the contextual influence and untainted experience of the phenomenon (fig. 8). Afterwards, I applied a mixed methodology of phenomenology and material flow analysis to investigate topics of material culture and urban mining of aluminium. While phenomenology constitutes the qualitative data, material flow analysis makes up the quantitative part. Interactive semi-structured interviews were conducted with a matrix of activities and vocabulary to elicit the emotional expression of research participants instead of relying on their self-elaboration. The interviews were mapped out the interviewees' intuition and reflection at performative, affective level and interpretive level (Camera& Karana, 2018). This was to facilitate a common ground and equal opportunity for each individual to recognize their inherent material literacy. Phenomenological methodology was further applied on the study of material culture encrypted in aluminium from the existing buildings: a dialectic study between subject and object. Through writing autobiographies of different existing aluminum pieces, the everyday interaction with humans that mold their identities could be documented (fig. 9). The human affective and emotional perception towards the material were captured by photography and sensory characterization mapping. By understanding the subject-object relationship, experimental application of aluminum could take place in the new design.



from Antwerp  
Shelves  
↓  
columns, factory material

Rotor  
X reuse the chocolate factory material

Architect - furniture recycled  
problem with electricity

3rd floor architect  
28M, partner with some ppl

10 Brussels 3, 6, 9 year contract  
9-year contract

question	category	City/Context	Client/Program	Project Name	Notes
2.3.2 do you want the route to be like its current state? why?	accessibility	City/Context	Client/Program	Project Name	skate park. - just open for 5 live in this neighbourhood
2.3.3 any further alterations you want for the route of access? why?	accessibility	City/Context	Client/Program	Project Name	- design without money - materials from the cellar - steel bar for track lights - windows from Rotor. - need to open for 15 years - need to open for 8 months - indoor skate park. - strip of light - windows - logistic problem - cooperate with - from the factory - 1 week - effective furniture - look for writing paper - declaration. - took away three walls - not 15 - closing room. - outside - bar. - gallery + atelier - more 2 weeks - visual articles - music room - clean stairs
2.3.4 How is the interior refurbished to accommodate the new programme? (i.e. interior atmosphere / intervention?)	adaptive strategies	City/Context	Client/Program	Project Name	- not a lot of steps.
2.3.6 What are the challenges to redesign the circulation and lighting for the new programme?	adaptive strategies	City/Context	Client/Program	Project Name	- need a lot of steps.
2.3.7 What are the considerations for the material applied? Are they recyclable / usable?	adaptive strategies	City/Context	Client/Program	Project Name	- needed bar from city center - factory design - plywood - green color - code, basic materials - first tenant of the industrial - a lot of old and out - wood joints designed by the other tenants - recycled - flexibility. - 2003 - new - cultural for center - supply is not enough - big party - electricity - biggest investment on this
2.3.8 How are the programmed and unprogrammed spaces joined? How do the functions meet?	adaptive strategies	City/Context	Client/Program	Project Name	- obstacles - concrete - 2003 - new - cultural for center - supply is not enough - big party - electricity - biggest investment on this
2.3.9 How do you foresee the building in the future years? Is it designed for changes?	adaptive strategies	City/Context	Client/Program	Project Name	- 2003 - new - cultural for center - supply is not enough - big party - electricity - biggest investment on this
What do you think the new program should be on these temporary plots?	adaptive strategies	City/Context	Client/Program	Project Name	- 2003 - new - cultural for center - supply is not enough - big party - electricity - biggest investment on this
How did you evaluate back the when you missed an adaptive strategy? Was it already like this or did you have to modify it?	adaptive strategies	City/Context	Client/Program	Project Name	- 2003 - new - cultural for center - supply is not enough - big party - electricity - biggest investment on this

Neighborhood  
- insulation  
- X heaters  
- chocolate factory  
- box in the  
- X invest in the light

2 kind of circulation  
- kitchen (technical)  
- kitchen room & the bar.

Fig.8 Notes taken during interviews with plot owners, tenants and users.



Fig.9 Autobiography of an aluminium door.

## 5. The relationship between the graduation project and the wider social, professional and scientific framework

Recyclage endeavours to demonstrate the humanized facet of urban mining that the notion should not merely be a search of idealism. Nonetheless, recycling and upcycling present an argument for sustainable and reuse of resources while enhancing the quality of urban common. Therefore, the project is positioned to fit the global paradigm shift from traditional business model to circular economy. Moreover, the project also responds to the reduction of carbon footprint for construction by compressing different stages of recycling process in a constrained plot and interweave the recycling infrastructure with cultural programmes to educate the public about the reuse mentality. Investigating

the life cycle and biographies of materials brings more thorough understanding of the intelligent use, recyclability and circular construction methods of materials that are secondarily produced. Being able to explore inventive ways of recycling and maintain a humble attitude towards every material is essential to enhance the practicality, environmental awareness and economic efficiency in my future design proposals. The notion of urban mining also aligns with the technologies developed in the field such as BIM system and material passports. These tools provide an information base for better application of urban mining in cities towards which the thesis is proactively oriented: digging into the possibilities arose from the creation and recreation, use and reuse.

## 6. Ethical issues and dilemmas in doing the research, elaborating the design and potential applications of the results in practice

The urban proposal involves deconstruction and relocation of existing business and social activities. The extent removal of poorly conditioned squatters and residential units for the sake of a more efficient site transportation and re-zoning can be arguable. Therefore, thorough value assessment of the site extant was conducted in advance of making any demolition. However, the assessment can be inaccurate since the time I spent on observing the site is limited and it is depicted from an outsider perspective. On the other hand, ethical dilemma between circularity and aesthetics is also manifested in the selection of materials. Although the intention of a recycle learning center is likely to call for substantial alteration of human behavior and increase in the awareness of smarter use of materials, the amount of materials used for the construction has to be validated. The proportion of utilization of reused materials have to be controlled given the extra cost needed for salvaging and transportation. The building has to be designed with consideration of added value for circular economy, flexibility for the presumed tenants in the near future and the ease of disassembly. Therefore, I attempt to incorporate the notion of 'patchwork' which involves the creative combination of salvaged aluminium scraps to mitigate the paradox between aesthetics and the reuse of materials (fig. 10). The exposition of aluminium is also limited to three building layers, namely skin, space plan and stuff. By incorporating the energy efficient concept such as micro climate mitigation with double facade, the overall design is justified with the subsequent revenue.

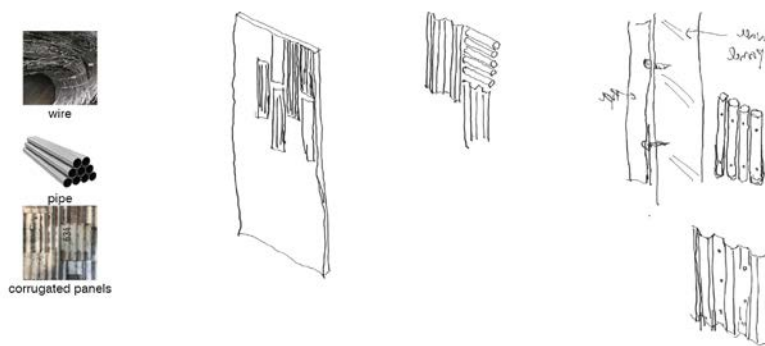


Fig.10 Sketches of patchwork panels made of salvaged aluminium scrap.

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