PATCH22, highrise in wood
1. Wood a Dutch context

When the Netherlands were still a rural country wood was the most important building material and the villages north of Amsterdam still welcome loads of tourists every day. As in many other countries wood became unpopular in the more urbanised areas, due to the risk of city fires. Brick replaced wood as the main material for facades and later in time concrete and steel became the popular structural materials. Amsterdam and many other historic cities are characterised by brick row houses. In the beginning of the 20th century Dutch cities expanded and the first Dutch housing law and hygiene legislation regulated the building industry. At this time the brick industry was well industrialised and brick became our national building material, just like red painted wood is typical of the Nordic countries. Although the avant-garde modernist style is regarded representative of Dutch architecture in this period, the dominant style in building volume was the “Thirties-style”, a more traditional style based on an expressive use of brick in combination with wooden ornaments. Even today a “thirties-style” house is the popular and safe choice of the vast amount of house buyers in the Netherlands.

Due to large-scale urbanisation over the last century the Netherlands have hardly any forests left and the wood industry was marginalised. Wood in Dutch construction is mainly used for creating balloon frame prefab facades, spanning between load bearing walls and clad with brick. Wood in facades is often used for cheap sidings.
2. Forgotten vegetables

There are of course a number of projects that use wood in a more structural way, where wood is used to create a special architectural atmosphere. But these are examples of high-end architecture; villas and public buildings. In that sense the position of wood can be compared to “forgotten vegetables”, recently become more popular in the “local food” trend. Wood is reappraised as a more natural building material that can be produced in harmony with nature. But the use of wood for structural purposes will only become widespread in the Netherlands if it can compete with concrete in building comfort and price, which is not likely to be the case. Therefore wood, like forgotten vegetables, will stay one of these special ingredients, regarded with high esteem but not for use in everyday cooking.
3. Buiksloterham Sustainability tender / the architect as developer

When we started the design of PATCH22 to enter the Amsterdam Buiksloterham Sustainability tender in 2009 we had the restaurant customers that fancy forgotten vegetables in mind. At that time the Buiksloterham was an industrial area with some vacant lots and not attractive at all. In 2009 the housing market in Amsterdam had collapsed due to the financial crisis and we thought it would be impossible to develop a project for ordinary people in an ordinary way. Until the financial crisis this had been the modus operandi of real estate developers, projects would sell anyway.

Together with two partners, building manager Claus Oussoren and a marketing company, my architectural practice FRANTZEN et al founded Lemniskade project development BV to do it “our way”. We decided to develop a special project for special people; XXL work & dwelling lofts build in wood with very flexible floor plans and off course, as sustainable as possible. Everything my normal clients were always hesitant to go for. The project scored a GPR score of 8,9/10, GPR is a Dutch sustainability measuring system. Technical systems like Solar panels, re-use of rainwater, a Pellet Heating system, as well flexibility in use and material choices are important factors in achieving this high score.
4. Flexibility

Figure 5: detail section PATCH22 with removable top floor giving access to hollow space with pipes and cables

Figure 6: NJ Habraken, De Dragers en de mensen, heteinde van de massawoning-bouw, 1961, Scheltema & Holkema publishers

A very energy-efficient building with a good choice of materials is not sustainable by definition. In our view ultimate sustainability is achieved when people are able to use the building a 100 years from now and to convert the function of structure from housing to working to whatever...

Therefore we superimposed the functional demands of an office building on a housing block and we went as far as to negotiate a new kind of land-lease contract with the city of Amsterdam to make sure that our super flexible structure would not become obsolete due to functional regulations. Each level is 4m high and has a load bearing capacity of 4KN/m² instead of the usual 2KN/m². The core is designed to accommodate a maximum of eight apartments per floor, although actually only 2 to 5 apartments per floor are realised. Larger apartments simply combine two, three or even more smaller apartment units. These units are built Casco, without division walls. To enable our future inhabitants to design their own individual homes inside these Casco’s we proposed hollow floors in which pipes and cables could be custom fit to the floor plan above. Whenever somebody would want to change the layout of an apartment in the future, the top floor can be easily removed and the underlying infrastructure of cables and pipes can be adjusted. In the end our approach resembles very much the frame & content concept of Prof. John Habraken in which he separates the frame of a building, the outer walls and structure, from the content, the internal division walls and house related installations.
5. Architecture

![Figure 7: visualisation PATCH22, view from south west](image)

![Figure 8: formal concept PATCH22](image)

Although the architectural quality was not a criterion in the tendering procedure we proposed a daring formal concept of a solid concrete base with 6 wooden boxes placed loosely on top of each other, as if the wind has blown every box in another direction. Each box has a large wooden truss on the south façade, giving the building a very bold and structural image in contradiction to the instability of the shifted volumes. This play of stability versus instability will make PATCH22 the landmark of the redeveloping Buiksloot district.

6. Wood as a marketing advantage

![Figure 9: visualisation PATCH22, interior appartment](image)

Our choice for wood as a dominant building material was based upon the cradle-to-cradle sustainability philosophy, wood being the only building material that renews itself, but marketing advantages were also part of the deal. Wood, when visible in an interior, has very a comfortable look and feel and is seldom used in Dutch housing. Therefore it was a perfect building material to attract Amsterdam inhabitants that were looking for something special. The large and flexible floor plans even strengthened this effect and the sales of the apartments proved to be a success in 2014.
7. The wood structure

The 30m high building is build directly at a harbor dock with the main façade facing southwest. Therefore wind forces on the freestanding structures are enormous, since it directly faces the dominant wind direction in The Netherlands. Because wood is a relatively light building material we needed to build the ground level in concrete to have some mass to attach the wood structure to. On top of this 6m high concrete podium we designed a structure with 6 levels of 4m high wooden load bearing sidewalls and wooden beams and trusses in between. The core is built in semi-prefab concrete and the floors are built in a prefabricated steel-concrete system, the so-called “Slimline” floor. Of course our initial idea was to build also the floors mainly in wood, with a Holzbeton-deck, a combination of wood and concrete. Due to the fire protection actions this wood/concrete floor unfortunately would become too expensive and we had to decide for the Slimline system.

8. Fire protection

Figure 10: wood on the outside protects wood on the inside from fire

In the Netherlands fire protection is based upon the time a load bearing structure will not loose its structural integrity. In the case of Patch22 we had to achieve the 120 minutes standard. How to achieve this is not specifically regulated in Dutch building requirements. Since wood is often used as a fire protective layer around steel structures we simply proposed to use wood on the outside of the structure to protect the wood on the inside of the structure from fire. In case of fire 0,8mm of wood is burned away and charred. To achieve the 120 min. fire protection we added 96 mm of wood to all exposed surfaces of the wood structure. This way it was possible to have the aesthetic quality of wood visible inside the apartments. From a sustainability point of view it complies with the cradle-to-cradle philosophy that if the source is renewable it is OK to use a surplus of material. Steel joints are used to connect all the wood elements and the structural wood itself is used to protect these joints in case of fire.

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- Design: FRANTZEN et al, Tom Frantzen, Karel van Eijken, Laura
- Building management & MEP Consultancy: H2O building management, Claus Oussoren, Marco Hijink
- Structural engineer: Pieters Bouwtechniek Amsterdam, Hubert Kuipers, Thijs van Schenk Brill
- Building Physics & Fire consultant: LBP sight, Frans Houtkamp, Bram Kersten, Janneke van der Weerd
- Contractor: Hillen en Roosen, Pieter Wassenaar, Remco van Achthoven, Joris Deley
- Subcontractor wood structure: Korlam Nederland, Sint-Oedenrode
- Subcontractor Installations: Bosman installatietechniek, Amersfoort
- Subcontractor eco-installations: ecomass.nl