

**Built between 1926 and 1931, Van Nelle's tobacco, coffee and tea factory in Rotterdam is a place of exemplary modernity and functionalism. Transformed into offices by Dutch firm Wessel de Jonge Architecten in 2004, the Van Nelle factory has been listed as a UNESCO World Heritage Site since 2014. About a productivist architecture. Excerpt from *Vertical Urban Factory* (2015) by Nina Rappaport, of which a new edition is now available by Actar Publishers.**

#### NINA RAPPAPORT

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A seminal project of the Nieuwe Bouwen group of Dutch Modern architects, the Van Nelle company — a tobacco, tea, and coffee production facility with glass facades, dramatic bridge overpasses for conveyors, and smooth surfaces — exemplified the Modern aesthetic in a prime European port of Rotterdam. At the time, the city was already home to many multistoried, new factory waterfront developments up the Nieuwe Maas River at the town of Delfshaven. From there, the Dutch West Indian Company conducted their importing and exporting of goods and the Pilgrims set sail in 1620 for North America. The engineering of waterways epitomized the Dutch manipulation of land. First, a dam and lock were built in the River Rotte, which spurred the development of the town. Deep harbors were dug in the sixteenth century, but access to the North Sea was limited as ships had to travel meandering routes. Engineer Pieter Caland proposed a canal, the Nieuw Waterweg, for shipping traffic in 1873. This new river opening joined the Rhine and the Meuse rivers to the North Sea, developing into the largest transit harbor to Germany and then Belgium with two thousand ships making passage in 1850 and five times as many in 1910. The city's population increased in parallel from 86,000 to 425,000. Rotterdam's economic urban center beckoned industrialists such as the Van der Leeuw family, which was importing, tea, coffee, and tobacco. Another similar company, but one that was organized as a cooperative, was the coffee, tea, and grain collective HandelsKammer, or HaKa, a wholesaler established in 1914 for the working class. Haka's new building, designed

by Herman Friedrich Mertens (1885–1960), was erected in 1931–1932. The narrow site both fronted the water and rail networks, and inspired cantilevering of the six floors of the concrete frame building, which had circular and ribbon windows resembling a ship at the port's docks.

Van Nelle's owners, Kees van der Leeuw and his brother Dick (1894–1936) were inspired by Theosophy, a mystical religious movement that gained popularity in the late nineteenth century. In 1923, Kees helped to build the Amsterdam-based headquarters of the Order of the Star in the East, an offshoot of the Theosophical Society's India branch. He was also extremely active as the Order's secretary, and determined that the Van Nelle factory's design, construction methods, and spatial planning should coalesce with Theosophist beliefs. Their orientation towards philanthropy, humanism, and light as a symbol of life, became the driving guidelines for the development of their new production space. Kees Van der Leeuw had also researched successful American factories prior to constructing Van Nelle. At first he was keen to test Taylorized efficiency models by consolidating the company's numerous factories, scattered around the city, into a focused organization under one roof. He looked to Ford's Highland Park for its vertical integration of processing from top to bottom, use of overhead conveyors, and gravity flow, but was concerned by the plant's lack of natural light, writing that: "Many halls are so wide that people in the middle have to work with artificial light all the time. And most of the time a sort of Moorlight (mercury tubular lamps) is used which produces a bluish tone. In some halls there are too many labourers, which deteriorates the quality of the air, something the Labor inspectorate in our country would not accept."

Van der Leeuw also cared about the quality of the workspace. In a 1930 lecture titled "Beauty in Industry" delivered at a joint meeting of the Theosophists and the workplace efficiency organization, he said: "In each human being lingers a need for beauty. . . . Beauty in the factory is therefore not only an ideal pursuit but also in our own interest. . . . If the work is monotonous and hardly interesting, we ought to consider whether the environment could play a role in easing that monotony." He also combined

Modernist and industrial design approaches to provide cost advantages for items such as the curtain wall, and described in his lectures guidelines such as:

1. The outward appearance of a factory should be derived from the requirements of its contents.
2. In the design, the human element deserves at least as much attention as the mechanical.
3. Extra expense for finishing details that does not demonstrate an immediately identifiable advantage can still be justified.

Van der Leeuw hired the architects Michiel Brinkman (1873–1925) and Leendert C. van der Vlugt (1894–1936), who had designed a steam-driven flour mill in 1913 with Mart Stam. The commission was to build the Van Nelle factory on new landfill plots — polders — along a canal next to the Overschie River in Rotterdam, a short distance from the city's bustling harbor. Land was purchased in 1910, but due to the outbreak of World War I, the project was not started until 1926. After Brinkman died suddenly, the project went to his son Johannes (1902–1949), who continued in partnership with Van der Vlugt.

They designed retail stores, worker housing, and Modern houses for the company owners. They later joined with Jaap Bakema (1914–1981) designing other factories and warehouses along Rotterdam's waterways through the 1950s. The Van Nelle complex included a series of separate but connected buildings of varying heights for the processing and packaging of coffee (six stories), tea (three stories), and tobacco (eight stories). Additionally, there were warehouses, offices, and worker amenities such as a soccer field and a library. Plans for expansion included a parallel addition with crossbar volumes connecting to the main factory spaces, but they were never implemented. Fire safety analysis determined that it was necessary to place the boiler house away from the main factory along the Schie River, not only for access to water in case of explosion, but for proximity to the delivery of coal. This decision made more open space available in the factory, which was used for additional workshops. The Van Nelle factory's emphasis on transparency created a new model for manufacturing spaces by exemplifying a hygienic, light-filled, airy environment, one open to both internal and external views while at the same time being a result of Theosophist ideas reflected in architectural details such as the admittance of light and fresh air and the use of ergonomically sensitive furniture. The building glistened at night and reflected and refracted sunlight during the day. To improve working conditions, Van der Leeuw supplemented the factory lighting with Modernist Siemens & Haske spherical and conical hanging lamps and installed the best available heating systems. General Electric's Lamp Works in Nela Park in Cleveland in 1926 served as a lighting model for the factory, while the Bauhaus school (founded 1919) and the Fagus factory in Germany inspired the transparent facade. Van der Leeuw incorporated portable screens to block drafts and installed American-made aluminum

blinds that workers could control individually.

Van der Leeuw's notion of a happy workforce may have been naïve, but his paternalistic approach, which was more oriented to the worker, led to better conditions and an optimized work environment with light and air and common spaces. From the curved, glass and steel facade of the four-story administrative building that joined the factory via a glass-clad pedestrian bridge to the ample and airy office layouts, the project exemplified the Modern aesthetic. The managing director's office was followed by a sequence of meeting rooms, drafting offices, sample rooms, the general administrative offices with a mezzanine, and then cafeteria. Other design strategies created a sense of floating volumes such as the use of pilotis to support the curved volume, and a semicircular glazed rooftop tearoom and viewing platform that cantilevered from the southeast stairwell of the factory. Four prominent glazed exterior stair towers — two for women and two for men — provided separate access to each work area and separate washrooms and locker rooms.

As a vertically organized factory, production flowed from the upper to the lower floors, with the raw goods delivered to the topmost floor as organized by the production engineers. Transport shafts and conveyors were aligned adjacent to the staircase volumes. The final products were transferred into the glazed dispatch buildings via overhead U-shaped platform conveyors circulating from the interior of the factory to glass bridges traversing the site's internal street.

Van Nelle hired the graphic designer Jac Jongert (1883–1942) to design the company's packaging and rooftop signage. His choice of a Modern sans serif typeface set an avant-garde tone for the company's identity and advertising and reflected new directions in Dutch design. Innovative structural engineering allowed for new manufacturing configurations.

The eight floors of the tobacco factory were designed to be flexible for machinery to be moved as needed, by means of a structural system that engineer Jan G. Wiebenga (1886–1974) developed. It constituted a minimal framework employing octagonal, reinforced concrete columns to support beamless poured-in-place concrete floor slabs. During a 1924 trip to the U.S., Wiebenga had conducted a great deal of research into the most efficient construction systems. Based on his findings, he reworked the Turner mushroom column to meet his own needs. The first concrete pour was in October of 1926 for the tobacco factory floors; they cantilevered beyond the last row of columns in a 5.75- by-5.75-meter module containing two rows of five central columns. A narrow corridor along the interior of the wall was set aside for the running of conduits and heating. The tobacco factory's glass and steel facade was a groundbreaking curtain wall system. Erected from the interior, the full-height unit, combining glass, steel, and

metal spandrels, was mounted to the building's concrete frame. The vertical steel mullion system was supplied by a Dutch subcontractor of the ever popular Crittall Windows of England with both fixed and operable glass panels sized 50 by 120 centimeters, forming a flush facade. The steel spandrels represented an early sandwich panel of thin insulating Torfoleum made of compressed peat moss, a new thermal insulation material, rather than traditional brick spandrels. But the panels did not respond well to the climate and have since been replaced.

In the production process for cigarettes, the tobacco leaves were unloaded on the first floor, separated, and then moved to the seventh floor for fermentation. They traveled back down to the first floor to dry on conveyor belts and then were cut, after which workers wrapped and packaged the cigarettes on the third and fourth floors. Tobacco was separately processed on the fifth and sixth floors. Vertical systems for goods distribution were integrated into the building with elevators and chain conveyors, conveyor belts, rollways, and overhead conveyors. This kept the artificial stone floor free of carts until palettes and forklifts were used in the 1970s.

The building for tea processing was only three stories high so that workers could transfer tea leaves quickly through the bridges to the dispatch buildings, thereby maintaining the leaves' consistency. In a fluid movement system, the tea was placed on an elevator to the second floor and the empty boxes were fed down and out of the building through exterior slides. On the second floor the leaves were separated, cleaned, and blended, then poured down through the enclosed openings in the floor to the first floor for tasting. The ground floor, as in the other buildings, contained the packaging and labeling.

The verticality of the six-story coffee factory was used to the fullest, including a two-story volume to house the roasting machines and stainless steel storage silos. This section was built between 1928 and 1930, with the ceiling heights from 3.5 meters to seven meters high to allow for the machinery, and factory 18.9 meters deep. The module was a bit reduced from the rest of the factory, at 5-by-5.70 meters. North-facing roof monitor skylights illuminated the space where the coffee beans were sorted by color. Coffee was ground on the second floor and then transferred to the main floor for packaging.

Van Nelle had a sophisticated mechanical system. Like the Usine Claude & Duval, instead of running ducts along the ceiling, the concrete floor incorporated the building's electrical conduits and water pipes. The vertical piping was painted in bright colors to indicate their purpose in a color-coded system. Natural ventilation was used for cooling. To clean the windows, a metal rail was installed at the parapet from which to suspend a cleaner's scaffolding, integrating the mechanism as part of the Modernist, ship-like building's aesthetic. This feature was inspired by

similar systems that Van der Leeuw had seen in factories in Cleveland, Ohio. Many praised the complex, including Le Corbusier, who noted Van der Vlugt's "perfect form for the architect's mission, which is to bring happiness to people and he has chosen the factory to do so." Photographers and cinematographers were intrigued by the conveyor bridges, overall transparency, reflective qualities, and light. However, others derided the working conditions and claimed that the design really didn't change the workers' treatment. With the advent of new machinery, the workers as operatives were doing mundane tasks combining machinic and handwork skills. Van Nelle was kind to workers, providing benefits and a pension fund even in the early twentieth century, but there was oppressive worker supervision. As a coffee worker commented decades later, "When the supervisor gave a sign, all the sorters went to the toilets at the same time (so as to keep the peace in the department. . .always everything at the same time). If there were any machinery defects the machinists could then set to work at that time."

The factory paradox prevailed with the improved space and harsh work unreconciled. As Dutch artist R.N. Roland Holst (1868–1938) observed, "A factory such as this is perfect, but it sickens me nonetheless to see the work done there; work is reduced to the most deathly monotony and the highest intensity, a perfected system of exploitation, but one that is more or less mechanized and that has a strongly aesthetic character." Van der Leeuw failed in his construction of a model society, as "when the building was finished the labourers did not become healthier, or more dedicated to their work. On the contrary, in the thirties, serious social problems among the personnel even got out of hand" But Van der Leeuw continued to be committed to the Modernist experiment and befriended Austrian architect Richard Neutra (1892–1970), funding his efforts with a \$3,000 contribution to build a glass house in California that he named the VDL Research House. ■