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Architecture, Spatial Logistics & Production.

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The F.I.A.T. Lingotto & MOI Market
as exemplary case studies
for early logistics issues
in the 20th century
industri-food city.

ARCHITECTONIC DIPTYCHS
is a publication dedicated to reading one building against another.

This publication looks at the FIAT Lingotto & the MOI market and explores aspects of logistics & production.

ARCHITECTONIC DIPTYCHS
is written and structured in the form of a linear narrative.

The documents illustrating the texts and confronting the buildings are presented in a diptych form.

I'd like to thank my brother who three years ago encouraged me to go to Turin for my Erasmus where I could discover a passion for the Lingotto but more particularly for this city and its warm-hearted people. Pierpaolo Righero from the F.I.A.T. historical archives, whose efficient cooperation was much appreciated. I would also like to thank him for showing me around the building and carefully displaying all the materials. Thanks to the HITAM team, whose comments were always very sharp, well-directed and precious. Without them, this publication would certainly not have reached this stage.

Thanks to my old friend Fabio Petrino for working with me on the film. Your comments and contributions are always very valuable. It's always a pleasure to work with you on these types of formats.

Thanks to my faithful friend and fellow student Laurent Jacoby for your feedbacks on this project but especially for the years we spent together at EPFL. They were the result of a wonderful growing friendship.

Finally, thanks to my grandfather, Trinito, for sharing his curiosity with his grandchildren. I wish you could have seen this work.

ARCHITECTONIC DIPTYCHS

Architecture, Spatial Logistics & Production.

The F.I.A.T. Lingotto & MOI Market as exemplary case studies for early logistics issues in the 20th century industri-food city.

ARCHITECTONIC DIPTYCHS is published as part of the 2023-2024 master's 'énoncé théorique' at EPFL.

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2024, Dorian Fabbro
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Foreword on a research & on Turin's industrial city status

In 1861, Turin was chosen as Italy's first capital following the country's reunification. Formerly known as capital of the States of Savoy, the Kingdom of Sicily and then Sardinia, it made sense to establish the first capital in the city that had itself launched the process of Italian unification thanks to Victor-Emmanuel and Camillo Cavour, who himself gave the name *Risorgimento* to this process. The Oxford dictionary defines the *Risorgimento* as "a general European trend towards national affirmation, aimed at achieving political freedom, independence and unity for Italy". This independence and freedom were very much evident in Turin, where industrialisation helped to establish them throughout the 19th and 20th centuries: a melting pot of different cultures from all over the country has flourished in Turin since the start of the industrial and economic growth that followed the First World War.

Long before the *Risorgimento*, the Susa Valley in west of Turin was the indsutry's birthplace. Numerous factories were located along the Dora river, taking advantage of the water's mechanical energy potential. It led them to develop all the way to the north of Turin, where they were located along the Stura and Dora rivers. With the advent of the electric power supply, factories were gradually able to move away from a river-based strategies towards a railway-based one. Flows were changing and it was no surprise that Giovanni Agnelli chose Turin in 1900 to set up FIAT's first major factory in Corso Dante.[1] The factory operated for around ten years, during which rapid growth led to the saturation of the workshops, forcing the company in 1914 to draw the first plans for the plant that would centralise all production: The FIAT Lingotto **(fig. 1)**. It was the largest factory in Europe at the time, largely inspired by the Ford factory in River Rouge, Detroit **(fig. 2)**. A few years after launching the so-called ocean liner[2], the city's entire food distribution system began to be reconsidered. The increasing growth in the urban landscape as a result of industrial immigration led to the saturation of food markets which forced the city's mayor to launch a competition for a new and first wholesale market. In 1933, the MOI general markets[3] **(fig. 3)** were built on the other side of the railways under the watchful eye of the FIAT roof test track. Its logistical mechanisms were inspired by the Los Angeles Terminal Market **(fig.4)**. Like the Lingotto, the wholesale markets were designed to centralise some kind of production: food. But it was not producing it. While one building was designed for production and distribution, the other handled distribution only. Another difference lies in the interests that have been

1 FIAT stand for *Fabbrica Italiana Automobili Torino*. It was founded on July 11, 1899 by the «Società Anonima Fabbrica Italiana Automobili Torino» at Palazzo Bricherasio in Turin.

2 In a 1937 painting by the Futurist painter Carlo Carrà and in a FIAT advertisement from 1935, the Lingotto emerges from the fog, framed in a way that, with its chimneys, is reminiscent of an ocean liner.

3 MOI stands for *Mercato Ortofrutticolo all'Ingrosso*, meaning Wholesale Fruit and Vegetable Market.

shown for both buildings: historiography and theory has given very little space to the MOI, while it has given a great deal to the Lingotto. Despite the great architectural quality that emanates from the Italian rationalist building, its purely functional quality took centre stage and quickly sent it to the back burner. To the point that today the only literature that exists deals with the building's redevelopment for the 2006 Olympic Games.[4]
The Lingotto, on the other hand, has caused a great stir in the architectural debate. Its inauguration by King Vittorio Emmanuele III underlines the building's importance. Visits from Le Corbusier, Filippo Tommaso Marinetti, Mussolini and other important figures all helped to catapult the factory to the forefront of the architectural stage. Films made by the *CineFiat* production also played a major role in promoting the building and attaching it to the Fiat branding image: a symbol of grandeur and power. These interests have given rise to a vast literature discussing a wide range of subjects. Carlo Olmo is undoubtedly the historian who has collected most of the FIAT Miracle years materials.[5]
Marco Pozzetto has studied the building's structural systems and spaces. Duccio Bigazzi analysed the Lingotto's and Mirafiori's factories programmatic and hierarchical functions. The plant had also been much glorified in photographic essays: Maria Grazia Daprà Conti, for example, took a series of photographs in the factory after it closed in 1982. These great centres of interests have in turn helped to identify Turin as an "industrial city". Pierre Gabert, Anthony L. Cardoza, Geoffrey W. Symcox, Stefano Musso, Giuseppe Berta, Carlo Olmo and Nicola Tranfaglia, to name but a few, have all contributed to narratives that see Torino's development as exclusively due to industry. But if it was so important to Turin's development, how is it possible that, following the industrial decline of the 1980s, the city is still experiencing a stable economic heartbeat? Following the departure of FIAT and many other industries, how can the city continue to live at a thriving pace?

The study will attempt to put Turin back into its proper context: a city that was not only an industrial centre, but also a food centre. The street markets and food distribution in general, which were themselves fuelling industries, did not experience a similar decline at the end of the twentieth century, and appear to have been the mainstay during a strategic transition phase when the city had to find a way to reinvent itself. The study will therefore attempt to uncover an aspect of Turin that has been sidelined too much by literature and historiography, while trying to understand why the culinary aspect is still so present today.

To do so, a comparative study will first be carried out between the FIAT Lingotto – protagonist of industries – and the MOI – protagonist of street food markets. Similarities and differences between these two projects will be identified, bearing in mind that they both share a common characteristic: they marked a turning point in architectural historiography, where spatial logistical issues are placed at the very heart of the design. The topics will cover

4 The book in question is *Torino MOI. Da mercati generali a villaggio olimpico* published by Officina Città Torino in 2005.
It gives a very brief presentation of the MOI project, including a few fragments of drawings. However, a large number of testimonials were collected, providing an insight into a day at the market.

5 The years of the FIAT Miracle corresponded to the mid-50s and late 60s, when the city experienced strong waves of immigration from the southern part of Italy.
See the chapter «*Le miracle F.I.A.T. L'essor démographique de l'agglomération turinoise soutenu par les vagues de gens à la recherche d'un travail industriel*» in *Turin, Ville Industrielle* by Pierre Gabert, 1964.

a range of aspects, from the projects origins to formal and architectural aspects, to questions of flows and production, to their political and social relationships with the city and its inhabitants, and so on. The aim is to go beyond a simple architectural analysis and place these two objects in their proper context: interwar Italy, in the midst of cultural, political and social transition.

A subsequent part of the research will look at how the industrial and food sectors influence each other through a common protagonist: housing. The industrial era marked two turning points in housing 'manufacture': a pre- and a post-Lingotto period, each of which witnessed radical changes in the urban fabric. These changing habits subsequently affected the food supply, which was forced to rethink its production and distribution logistics.
The MOI appears to have presented itself as a solution to the new developments taking place in the city. Once again, it would appear that these two rail-side buildings **(front cover figure)** played an essential role in defining a dynamic where industry, housing and subsistence are closely connected.

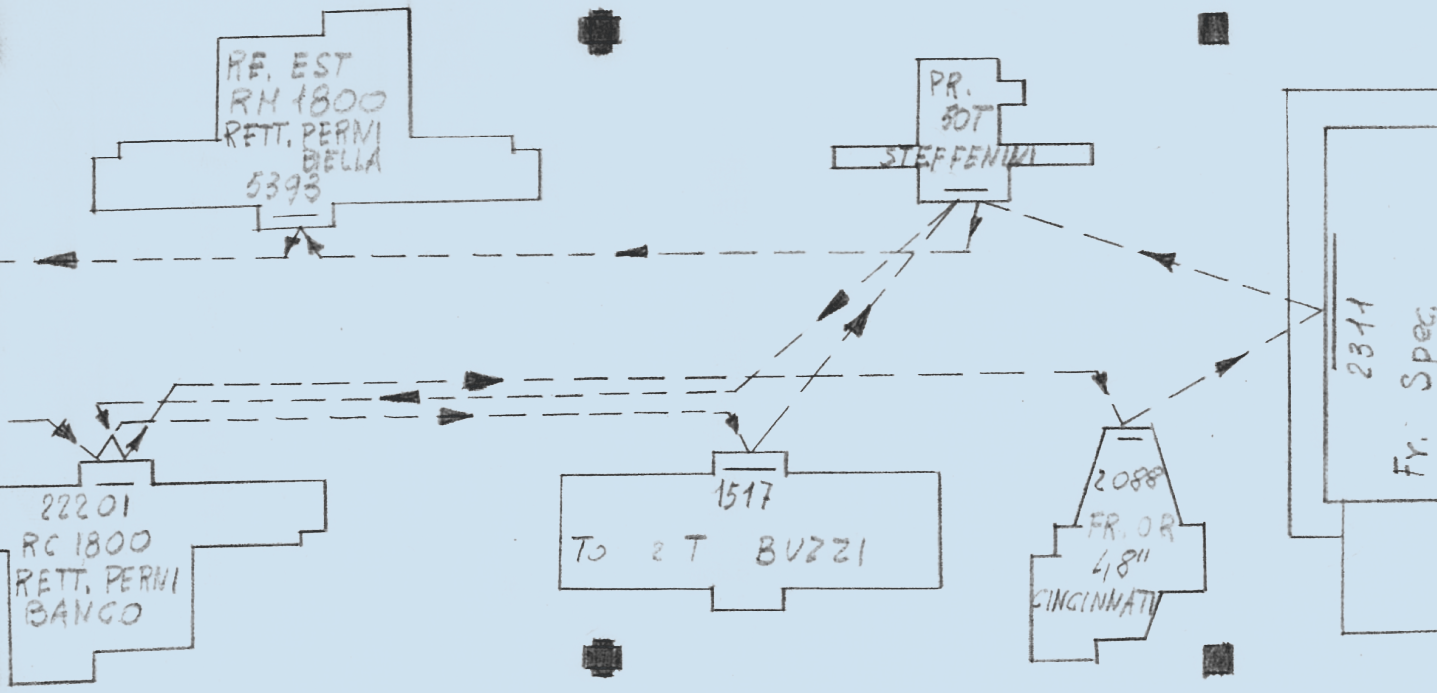
Fig. 1
FIAT Lingotto Plant during
a work shift, 1931.

Fig. 2
Ford Highland Park Plant
rolling chassis storage, 1913.

Fig. 3
Merchants queuing up before the opening of Turin General Market in Via Giordano Bruno, 1938 circa.

Fig. 4
Terminal Market at South Central Avenue and 7th Street, Los Angeles, CA, 1926.

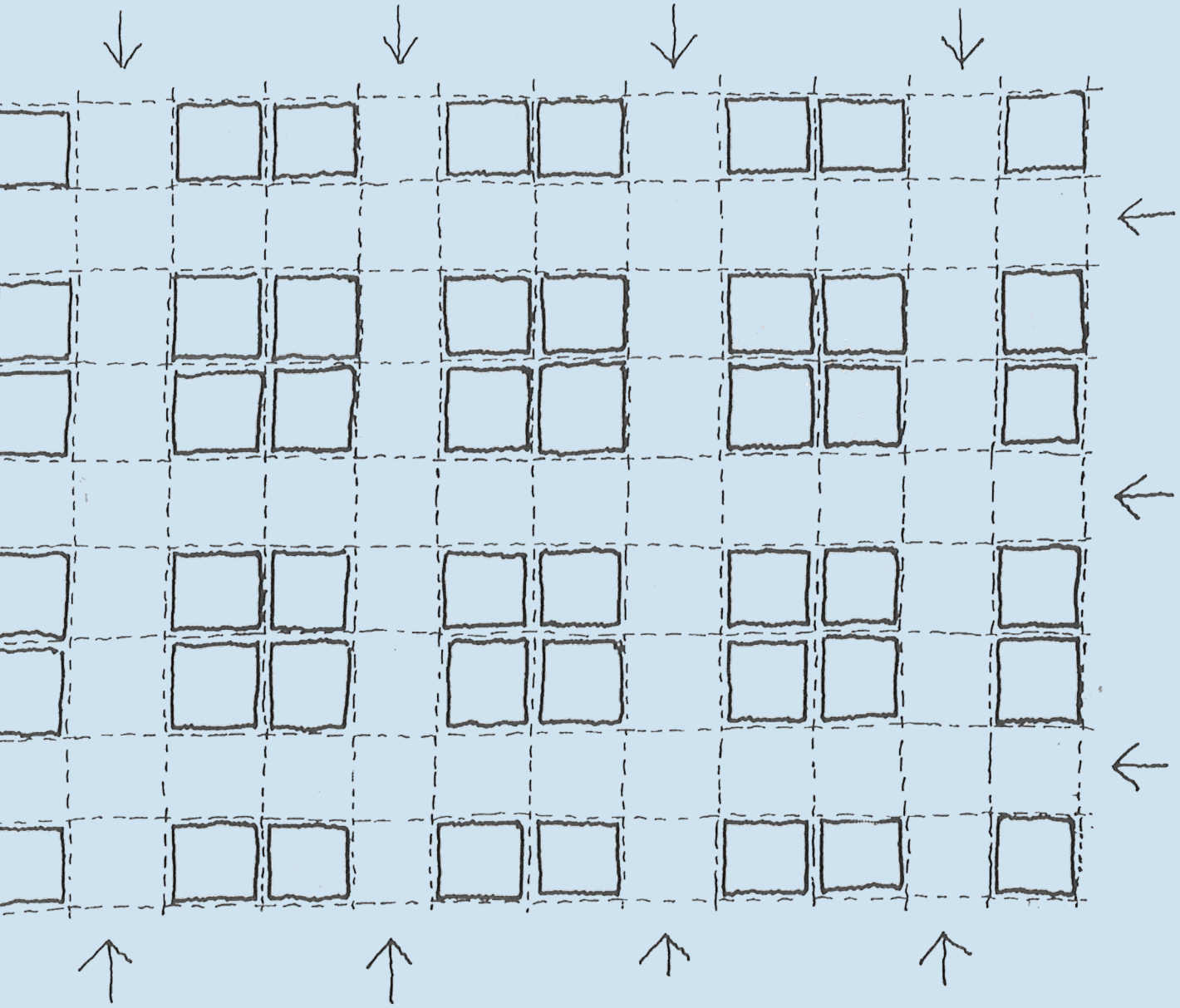
1. THE FIAT LINGOTTO FACING THE MOI



- Disposizione attuale del macchinario

On the previous page, a tracing paper drawing dating from 1950 circa, showing a proposed machinery installation at the FIAT Lingotto for the *planing line* workshop.
From FIAT Historical Archives.

Below, a schematic layout of a typical daily market highlighting the relationship between lanes dedicated to customers and permanent stalls dedicated to traders. The MOI adopts this same pattern in its enclosure.
From Di Macco Sergio, *I luoghi dei mercati quotidiani - l'edilizia annonaria e le sue nuove regole*: 73.



FIAT Lingotto's & MOI wholesale's Stories

The wheels of productive growth were set in motion at FIAT even before the Lingotto was built. In its 12'000m^2 factory on Corso Dante, 150 workers were deployed to produce 24 cars by hand during the first year (1900). This workforce, multiplied by ten over six years, enabled car production to increase by a factor forty-eight, while maintaining the same manufacturing processes. In 1906, 10'000 workers were packed into the plant producing a total of 1'150 cars. The Lingotto project therefore stemmed from a desire to expand the company's spaces, but above all to rationalise production methods within a new architectural model.

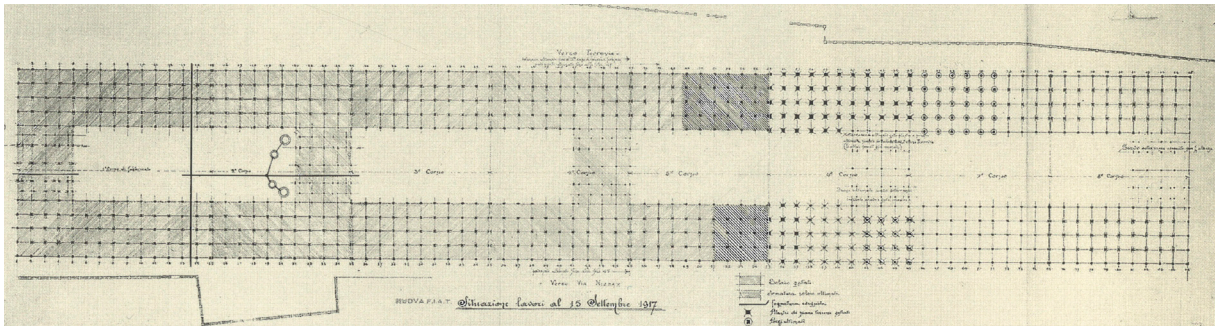
Giovanni Agnelli commissioned the French-Italian engineer Giacomo Mattè-Trucco in 1914 to draw up the plans the first and largest complete-cycle factory in Europe. The engineer had already undergone several industrial buildings under the company *Ateliers Mécaniques Michele Ansaldi* (later bought by FIAT and renamed *Fiat Ansaldo*). Among these was the Officina Grandi Motori in Corso Vercelli built between 1905 and 1906.[1] The building already bears some similarities to the Lingotto: the internal load-bearing structures are visible on the facade which is itself composed of large glazed areas. It was therefore natural that the FIAT patron turned to this industrial engineer to design the "new industrial production".

The construction on Nizza street began in 1917 and was undertaken by the engineering firm Porcheddu (**fig. 1 & 2)**. It is 506.8 metres long, 80 metres wide and 27 metres high and it consists of two linear buildings running parallel to each other, joined perpendicularly by five transverses. Each body is 24 metres wide and divided into five shopfloors. Service elements – staircases, lifts and goods lifts – are placed in these transverse sections, enabling the two main bodies to be spatially continuous. The junctions between the traverses and the two main bodies define four courtyard isles, providing continuous and equal light on either side of the shop floors. The factory is divided in a pair of eight modular blocks that will follow a site construction logic running from south to north **(fig. 3 & 4)**. This "building by block" system is dictated by the reinforced concrete and the building's dimensions, which required large thermal expansion joints.[2] The latter made it necessary to build module by module, connecting them as they went along. It is within this logic that the workshops will later be distributed within the building.

1 Unfortunately, Giacomo Mattè-Trucco's activities were poorly archived and therefore quickly lost.
Volume 1 of the 1984 book *Beni culturali ambientali nel Comune di Torino*, produced by the Politecnico di Torino. Dipartimento Casa Città mentions his project for FIAT Grandi Motori on p. 427 but without describing it.
Marco Pozzetto in *La Fiat-Lingotto Un'architettura torinese d'avanguardia* describes the project on pages 17–18. Images and drawings are included.

2 Marco Pozzetto writes on page 27 in *La Fiat-Lingotto. Un'architettura torinese d'avanguardia:* "Each building body is divided from adjacent ones by expansion joints of about 5cm free width, for the entire height of the ground floor up to above the track".

Fig. 1 & 2
Left: Lingotto construction photographs
Right: post-inauguration construction photographs: FIAT had decided to extend the building with a number of accessory structures and two five-storey buildings.



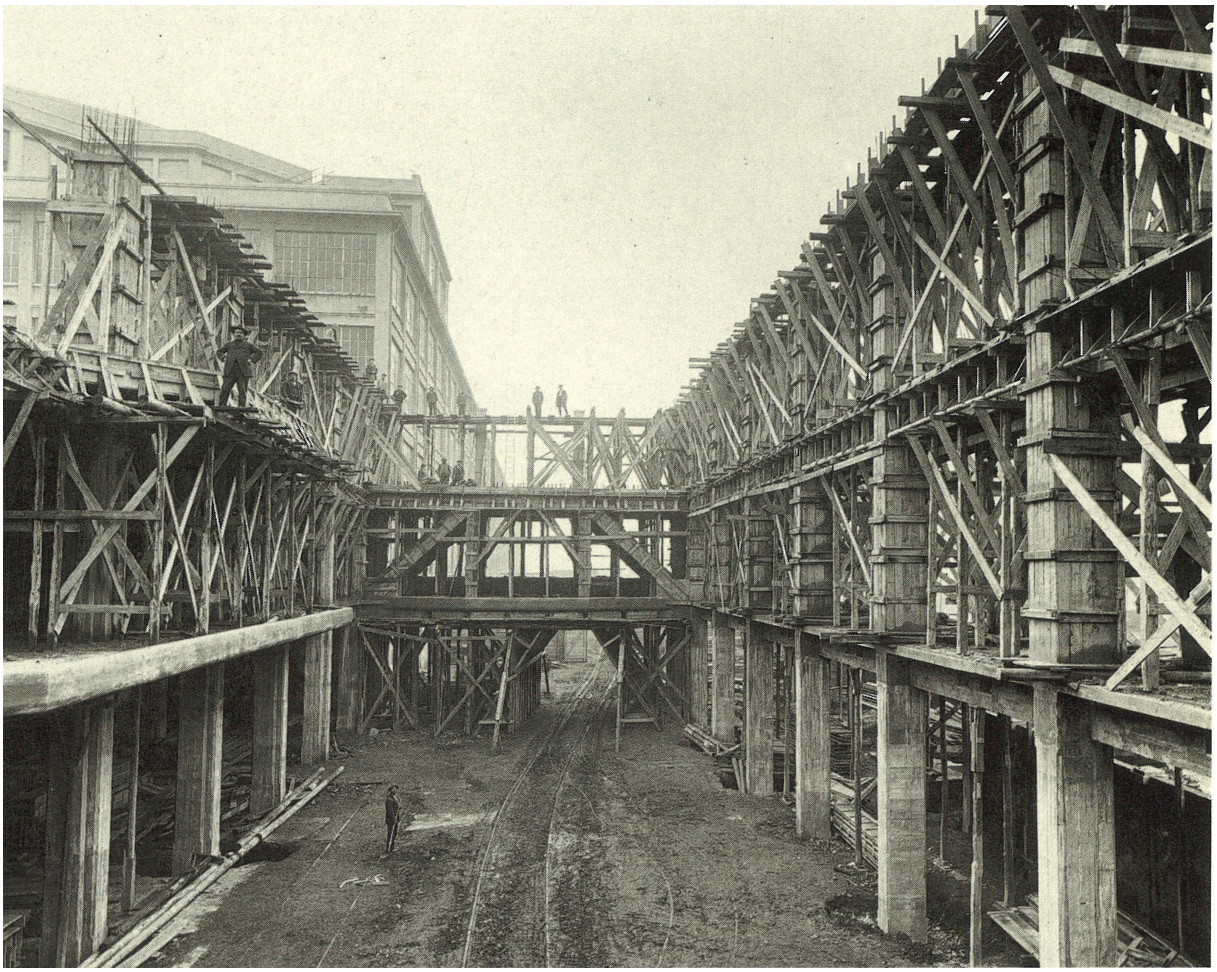
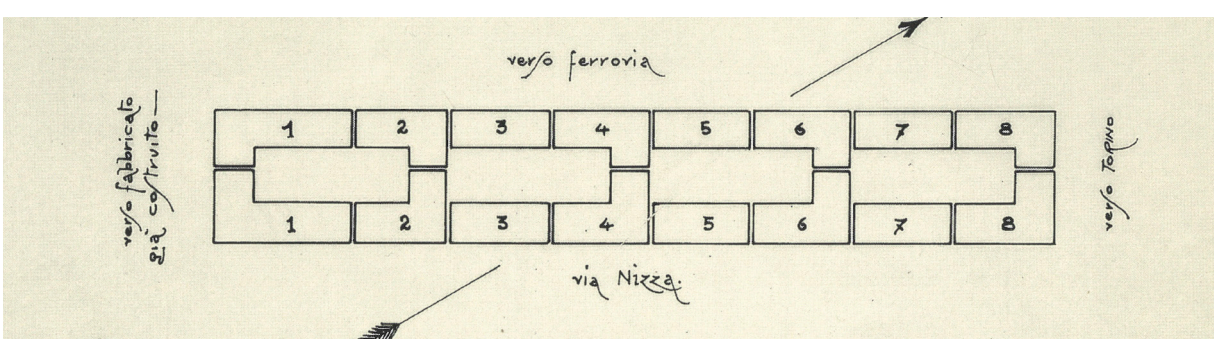


Fig. 3 & 4
Left: plans showing the construction work progresses from left (south) to right (northern). They show, among other things, an acceleration that began in August 1917.
Right: principle of regularity, modularity and repeatability of the modules for the central body.



The entire structure is based on a 6x6m grid with 60cm chamfered columns. The "chamfered style" column, which came directly from an American standard developed by Albert Kahn for Henry Ford's plants, clearly shows the River Rouge factory's influence in Detroit **(fig. 5 & 6)**.[3] This construction system met a twofold imperative: the structure had to allow flexibility and free use of the floor plan so each workshop's layout and distribution could be redesigned in line with the technological advances of the time. As a result, 181'000m^2 were built on the Nizza street, with a total of 126'000m^2 covered area devoted to industrial production. Parts of the building were already in use on the ground floor even before its construction was completed in 1923, underlining its "efficient future" character: the construction site wasn't even finished that it was already productive.[4] In their initial phases, both factory's ends were occupied by two freight lifts whose inefficiency forced the engineer to rethink their utility **(fig. 7)**.[5] In 1926, they were replaced by the northern and southern ramps leading to the roof test track, itself consisting of two straight 400 meter sections linked by two inclined parabolic curves on sides.

3 Moreover, Giacomo Mattè-Trucco decided to follow the same logic as Albert Kahn by placing the services outside the main floor plan dedicated to the factory workshops. Albert Kahn placed them outside the plan as annex blocks, while Mattè-Trucco placed them in the traverses. There are a number of similarities between the two factories, which do not just restrict to the facades.

4 In 1921 the foundries, forges, chassis preparation department, automatic furnaces and in 1922 the bodywork, final assembly and mechanical workshops were in operation.

5 The freight lifts were incompatible with the "uninterrupted full-cycle production" system conceived by Giovanni Agnelli and Giacomo Mattè-Trucco. They represented an area of discontinuity, forcing cars to stop while awaiting for the lift's arrival, which could only accommodate a very small number of vehicles, thus congesting shop floor and disrupting production.

Fig. 5 & 6
Left: photograph by Maria Grazia Daprà Conti taken in the factory when it closed.
Right: Albert Kahn's chamfered column published in the book *Kahn system of reinforced concrete*.

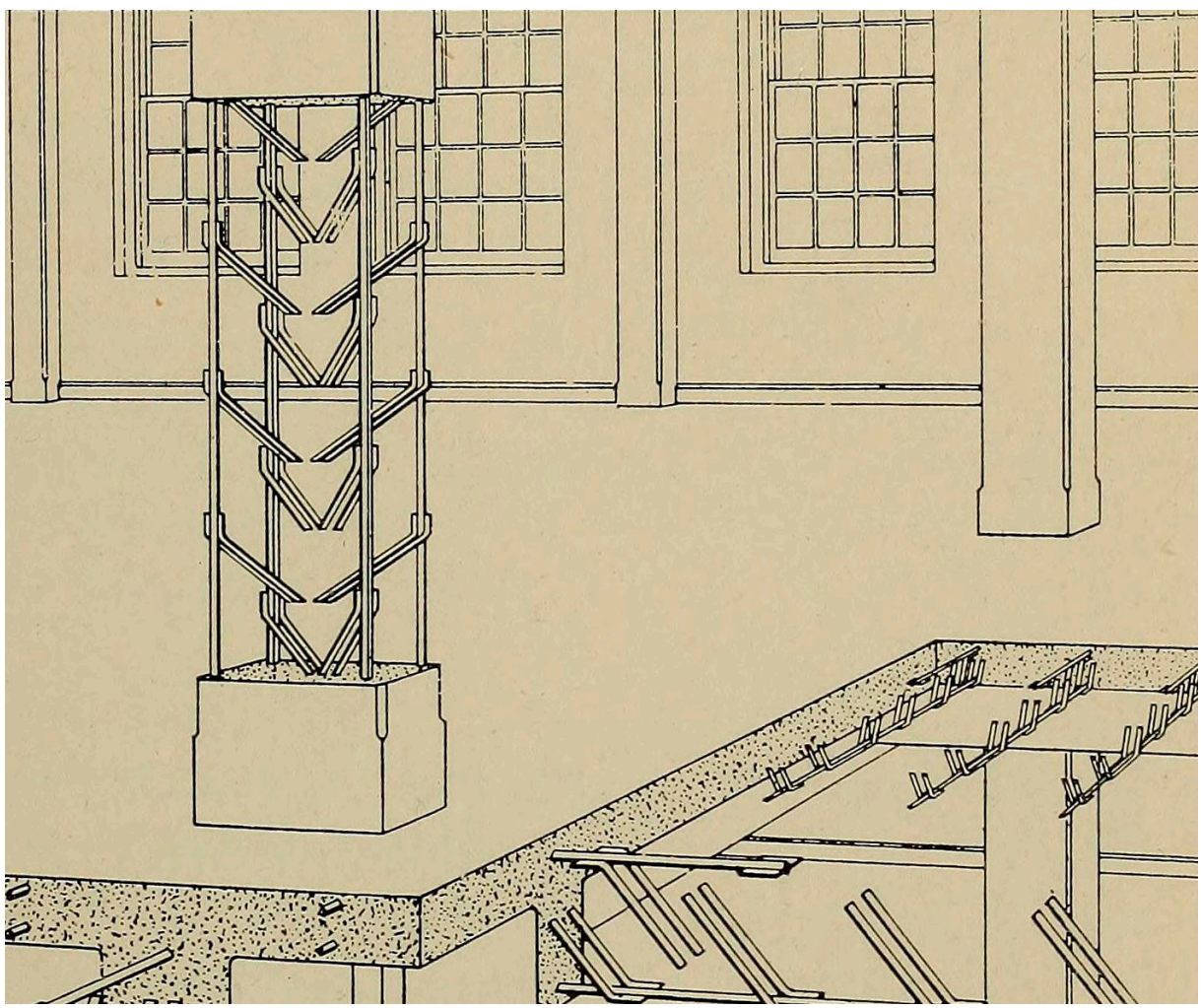
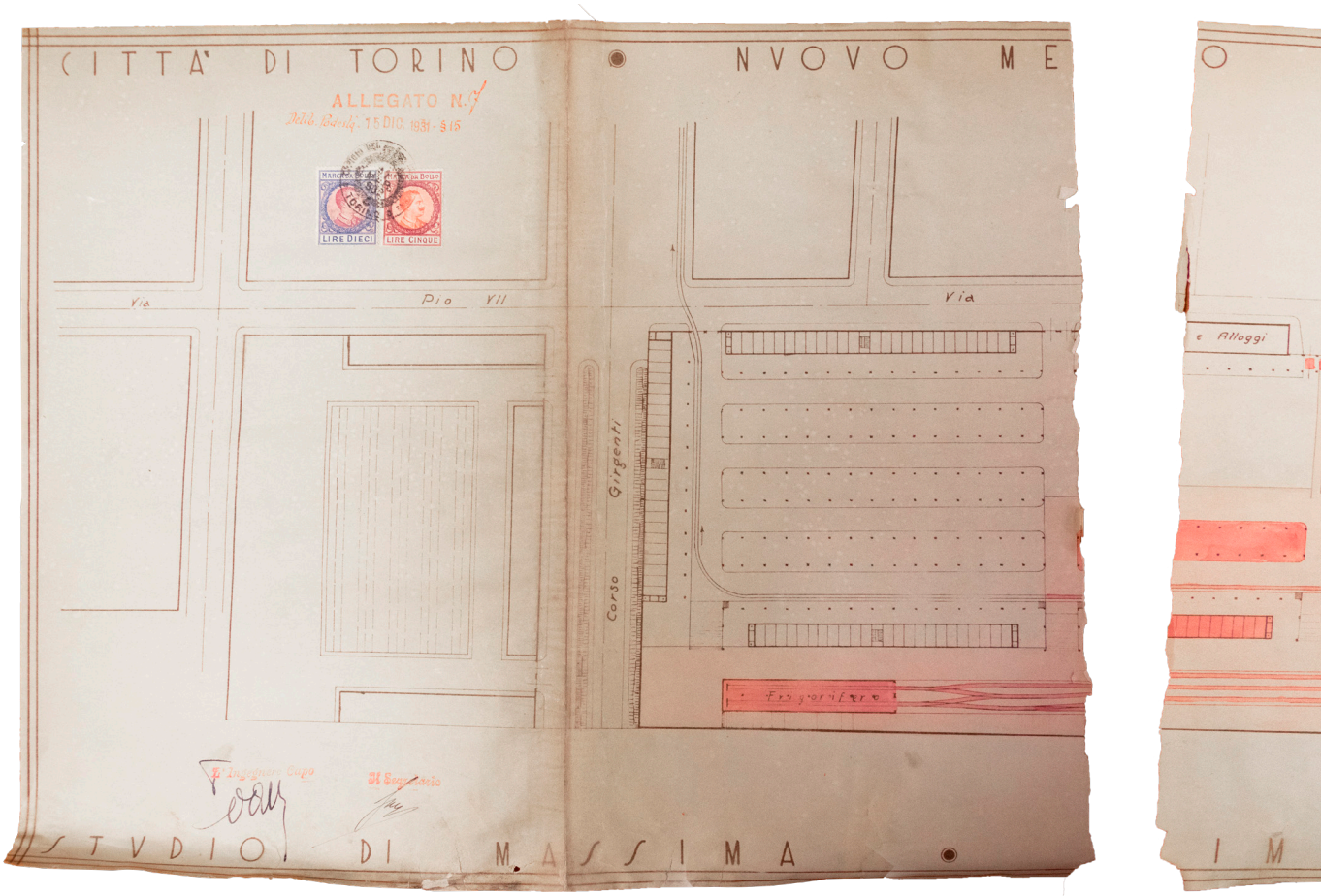


Fig. 7
Photograph taken in October 1925
showing the goods lifts used to move
manufactured pieces from the first to the fifth floor.
There were eight goods lifts throughout the building.

D 3
PORTATA Kg. 6000

Six years after the reorganisation of industrial production, a need arose in 1928 to reorganise the city's food distribution logistics. An initial fund was set up that year to build a new wholesale fruit and vegetable market, which would rationalise distribution methods within a new architectural model. A series of studies were then carried out by the Municipal Technical Department, with proposals put forward by the authorities and private individuals interested in solving an important problem: centralising the various wholesale markets scattered around the city into a single place.[6] Studies lasted almost two years until the 15th December 1931, when the mayor decided to build the market between Giordano Bruno street, Montevideo street, Corso Agrigento and the rail tracks. In other words, on the other side of the railways facing the Lingotto. The strategic reason for this location was threefold: the wholesale market could be close to customs, along the rail line, allowing goods to be loaded and unloaded more quickly, and in the south, close to the new agricultural land supplying the city **(fig. 8)**.

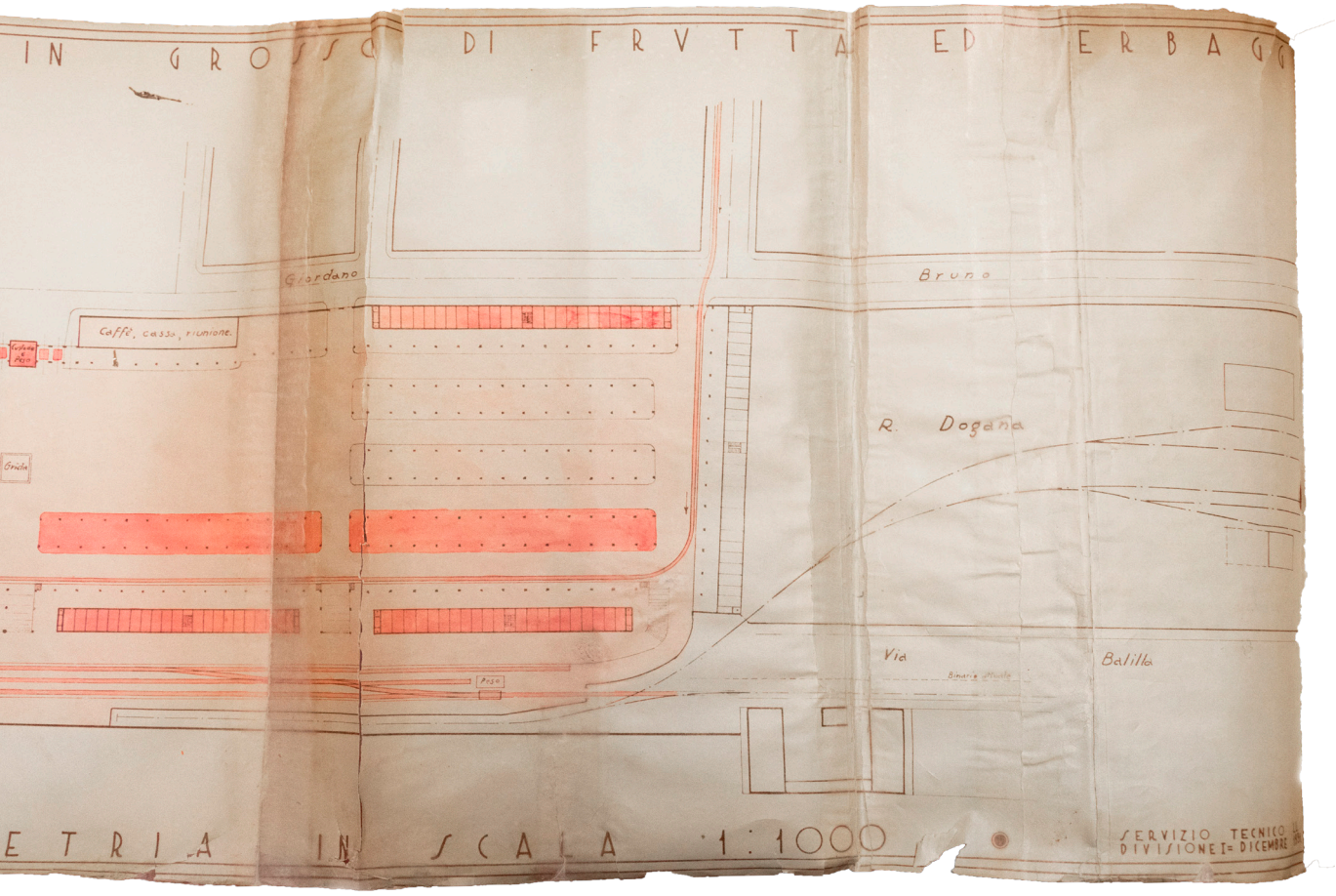
6 See the chapter "When Food industry Logistics reshape Street market Logistics" of this same publication that explains which city markets exactly the MOI welcomed within its walls.



The project outline was drawn up by the Technical Department, while its development was the result of a competition immediately launched between several national companies. The architect Mario Dezzutti, together with the firm ing. G. De Filippi proposed an architecture with arches on the facades reminiscent of Mediterranean architecture without any major structural and spatial contribution **(fig. 9 & 10)**. The project by architect Natale Reviglio with engineer Antonio Giberti used an interesting solution: a Zeiss-Dywidag system to create a thin shell stiffened by perimetral ribs, covering a large space for foods **(fig. 11 & 12)**. Ing. Del Ducca & Miccone, with the rationalist architect Umberto Cuzzi, presented a structural solution consisting of parabolic arches that appealed to the jury. They won the competition and began construction in August 1932 **(fig. 13 to 16)**. It was due to last 16 months, with completion scheduled for December of the following year. However, they were eventually brought forward and the new general markets were inaugurated on the 28th October 1933.[7] The MOI was built on a 44'500m² area that could be enlarged if required in the future to 90'000m² on the northern and southern sides.

7 The project's genesis is transcribed here thanks to the mayor's deliberations and the correspondence between him and Ing. Del Ducca & Miccone, which can be consulted at Turin's city historical archives.

Fig. 8
Plan showing the mayor's deliberation of December 15, 1931 but also the premises of a project which was already almost designed: the load-bearing points are already in place, we can see in red the tram and train tracks, the refrigerated section and the proximity to customs.



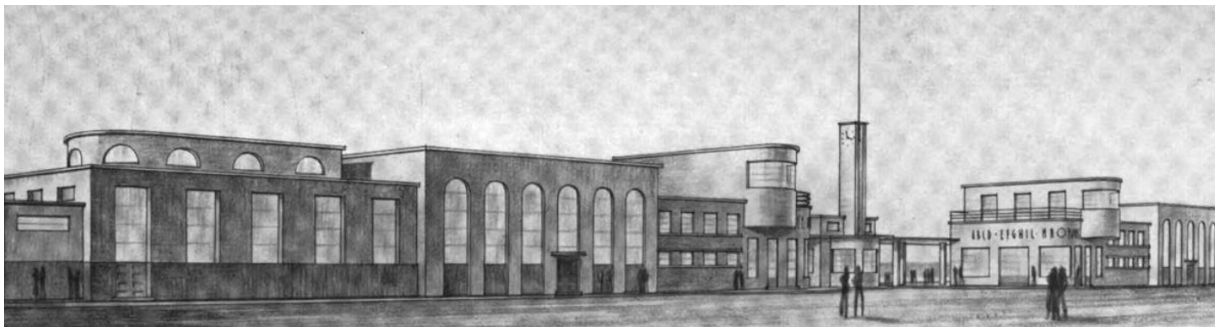
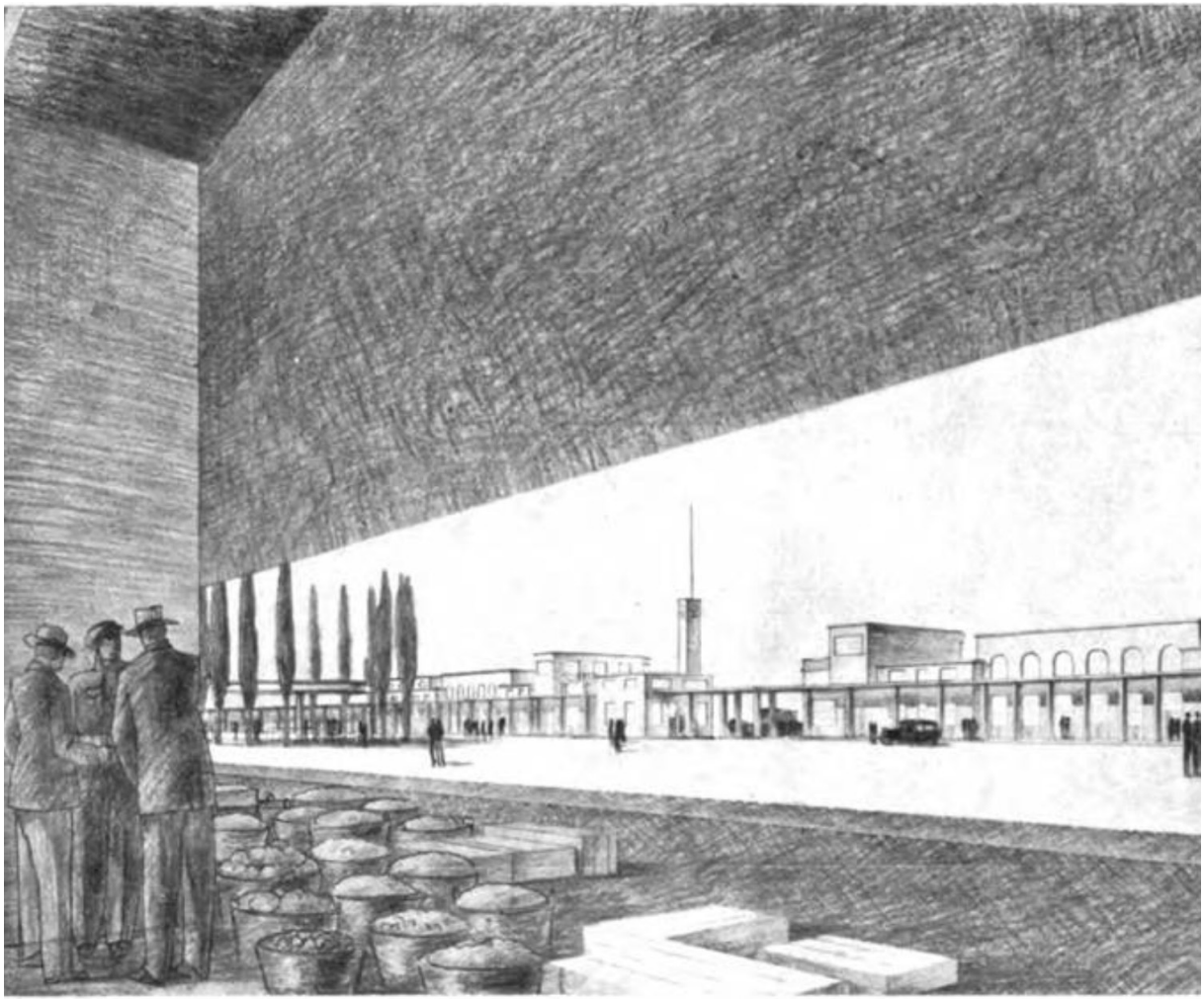


Fig. 9 & 10
Mario Dezzutti's and ing.
G. De Filippi's project for the 1931 MOI competition.
The project features very romantic drawings compared to the competitors.



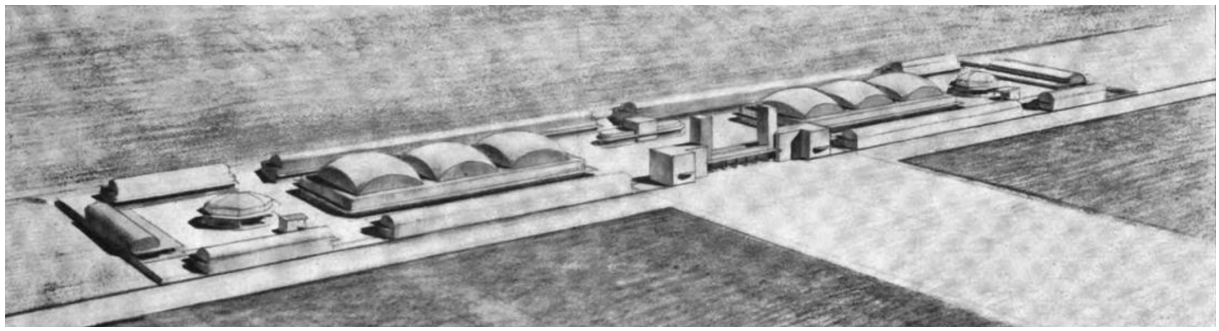


Fig. 11 & 12
Natale Reviglio's and ing.
Antonio Giberti's project for the 1931 MOI competition.
We can see the Zeiss-Dywidag system used for the food showrooms.

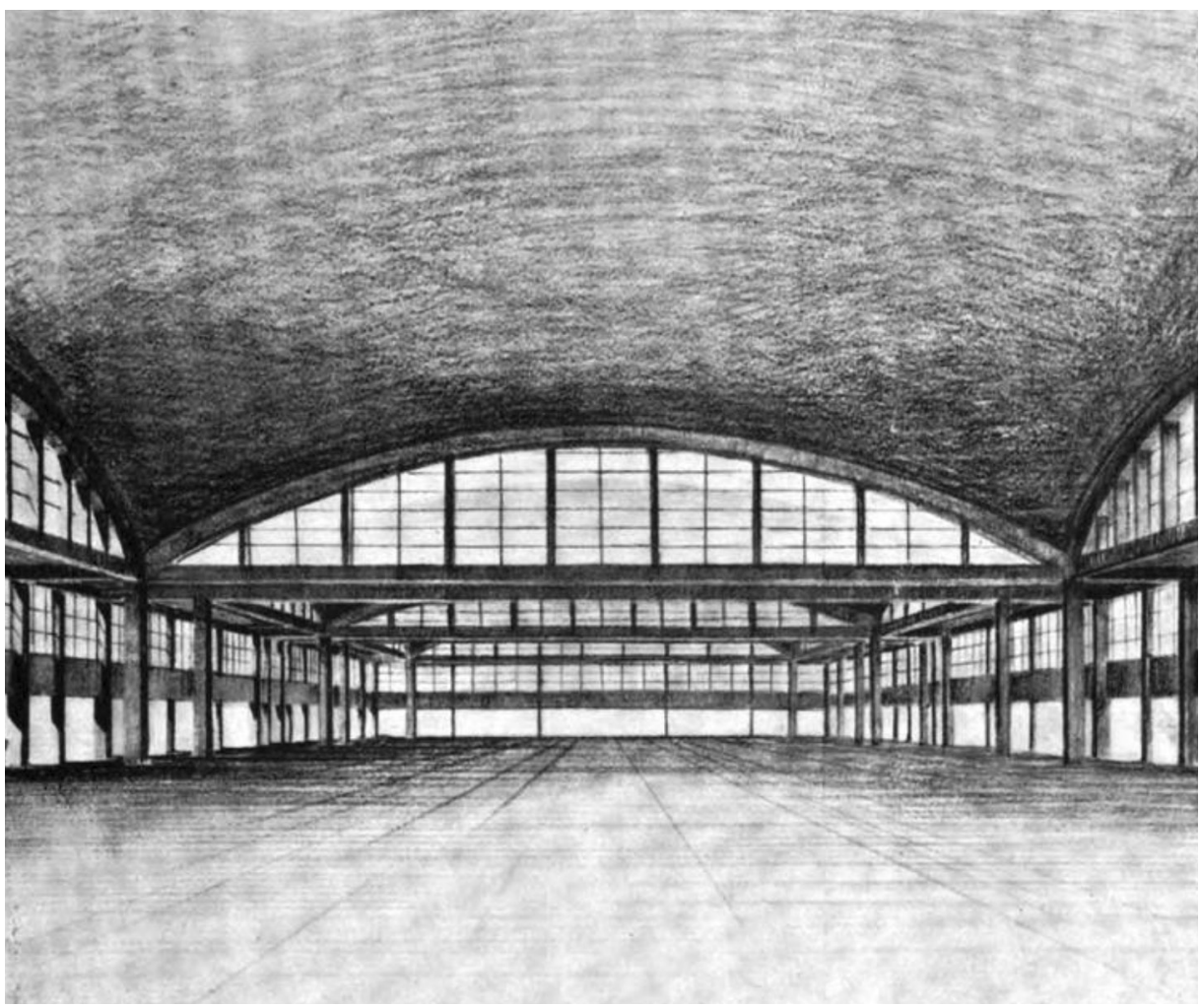


Fig. 13 & 14
Photograph of the formwork installed on site during construction in 1932.

The photos are taken from the photo album
Nuovo Mercato di Frutta e Verdura Torino,
Omaggio della Ditta Ing. Del Duca and Miccone.

We can see the FIAT Lingotto on the right horizon.

Fig. 15
Photograph taken between the end of the construction and the inauguration, showing the 5'800 m² central square.

Fig. 16
Photograph of the loading dock where the food was planned to arrive. Unfortunately, this part of the building has been demolished in 2006.

The project consists of two parallel building bodies on either side of a 5'800m^2 piazza.[8] They are made up of covered strips of alternating streets and exhibition spaces, with two warehouses rows on the Giordano Bruno Street (west) and the rail tracks (east) sides. Each body fits into a 100x100 meter surface. To this we add the piazza's length: the total measures 100x267.5 meters. In front of the piazza stands a 22 meter-high tower containing a water tank, cash desks and a guard room **(fig. 17)**. It divides the entrance and exit, each 9 meters wide, on the right and left sides. Each warehouse has a 56m^2 internal surface area with 7-metre-high ceilings and an external area equal to its internal dedicated to loading goods. There are 66 warehouses, each with a surface area of around 120m^2.
There are two 11-metre wide streets and two 9-metre wide streets. The first two are in front of the warehouses and serve as passageways for the sorting of goods and for customers who are coming to see the produces. There are a total of 3 exhibition areas in each building, each of which is again divided in two by a central carriage aisle. A pedestrian walkway faces the exhibition stalls. In the plans published in magazines (Casabella, January 1933 as well as the 1933 City of Turin magazine), the exhibition areas are referred as "posteggi" and the loading one as "esposizione", meaning "exhibition". A dual definition of the word "posteggi", defined by the Treccani dictionary as an *"occupation of a public section land by street vendors or parked vehicles"*, can lead to misunderstandings. Period pictures are useful to understand that the vehicles were parked between the piazza and the main bodies. In this case, the "posteggi" were used as spaces for the vendors to exhibit their produces on stalls. These photos show something that looks much more like Umberto Cuzzi's 1931 plans than the magazine illustrations.
The railway side has a 15-metre-deep loading platform. Between the warehouses and the tower are located a café and restaurant, a hairdresser, a basement hotel, the guard's bedroom, a post office, a public waiting room, a bank and a meeting room for merchants.

One of the project's qualities lies in its ability to solve a problem of usage through the intelligent use of a rational structure. The streets' and exhibition areas' roofs are supported by parabolic arches, between 9 and 11 metres high, connected by spans of 2.4-metre-wide porticos. This system, largely inspired by the Lawrence Hall in Greycoat Street in London, strongly characterise the spaces and ensure that they are airy and fluid. In fact, this project required to minimize as much as possible the amount of floor space obstacles by using load-bearing columns **(fig. 18 & 19)**.

8 From the early months of 1937, this piazza was occupied by a covered building known as the "aeroplano" because of its airplane-wing shape: a space reserved for direct farmers who could not have produce every day of the year.

Fig. 17
Section of the tower, central to the exit and entrance. Notice the structure shaping the water tank.

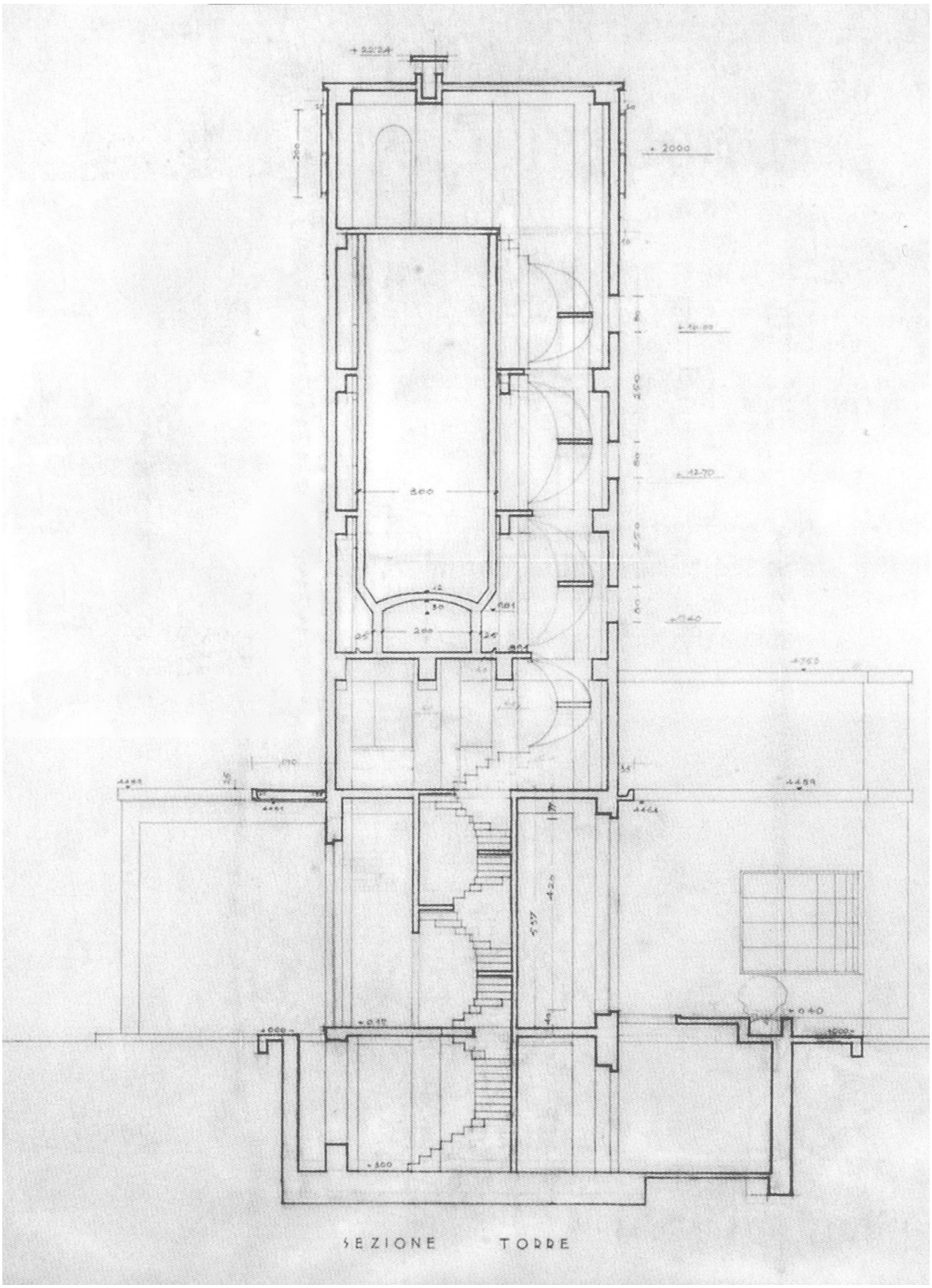

SEZIONE TORRE

Fig. 18
Royal Horticultural Halls,
Westminster, London.
The project was made in 1928 by the architects
Stanley Hall Easton & Robertson
Photo of the New Hall (later renamed the Lawrence Hall)
taken in 1929.

Fig. 19
Interior of the goods exhibition canopy in
Cuzzi's and Ing. Del Ducca & Miccone's 1933 MOI project.
The structural and spatial similarities with its neighbour, the Lawrence Hall in London, are striking. Both buildings are devoted to displaying plant-based merchandise, and pay equal attention to solving space, hygiene and lighting issues.

A design characteristic here is similar to the Lingotto. Whether industrial or wholesale, both projects present the same problem of having to limit the load-bearing points in order to leave as much space as possible for flexibility of use. Both industrial machinery and traditional stalls are independent from the structure and can be positioned freely within the enclosure. The Lingotto is based on a 6x6m grid, regulated by the uniformity of the supporting column. The MOI uses the same 6-metre grid in one direction – corresponding to the definition of the warehouse width, which must all be uniform – but frees itself from uniformity in the other direction thanks to the use of arches: each road is 9 metres wide, except at the front of the warehouses, where 2 metres are added for a greater unloading fluidity. Therefore, the MOI grid varies between 6x9m and 6x11m **(fig. 20 to 23)**.

This limitation of load-bearing points leads to the floorplan disappearance when it is not spatially occupied. The different scales of usages and flows give rise to the floor plan and provide its meaning. Whether it's the transport of people, materials, vehicles or profits. The Lingotto comes to life as soon as all the machines are installed and are starting up. The MOI comes to life when all the stalls are set up and start trading and selling. These profits and sales materialise in the movement of commodities (raw and modified materials, fruit and vegetables).

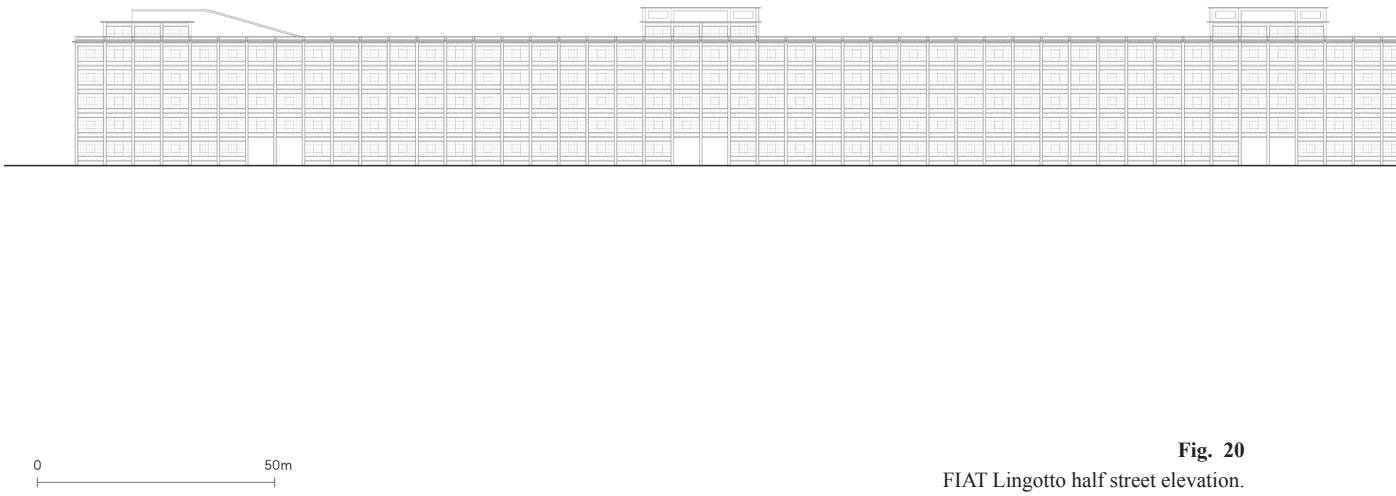


Fig. 20
FIAT Lingotto half street elevation.

At FIAT, different models of car were built, from the smallest to the largest, requiring a certain flexibility of space. During the Second World War, the factory even produced self-propelled tanks, such as the SPA CL 39, which weighed one ton.[9] In a later project at the MOI, rails were installed under the arches in order to let city trams enter.[10] In this way, the city entered directly into the wholesale market and was directly connected to it. These market-serving trams could therefore be loaded directly in the MOI. The perennial structure therefore allows these buildings' uses to be constantly modified according to the activities that take place in it. These different scales of use – which can be summarised as flows, activities and movements – define a second floor plan layer, visible through the programme's manifestations. This analysis of the floor plan made manifest by the events taking place in it, makes the MOI comparable to the factory: in this grid, stalls are identical to machines, raw materials to food products, plant workers to market workers... They all converge towards one same goal: making a profit that materialises in the built premises. The only difference is that the profit made by the plant worker is aimed at FIAT, while the profit made by the market worker is aimed at a MOI independent wholesaler.

9 Refer to pages 45 to 49 of Marco Pozzetto's book where great debates took place between Mattè-Trucco and Vittorio Bonadé Bottino to find out the maximum load-bearing capacity of the track slabs and ramps went it came out to test some fuel oil trucks Fiat 634 and 635.

10 It is difficult to estimate exactly when these rails were installed.

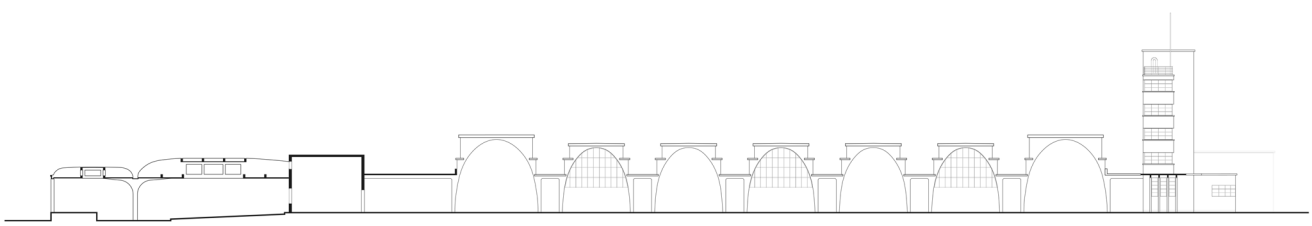


Fig. 21
MOI entire courtyard elevation.

0 50m

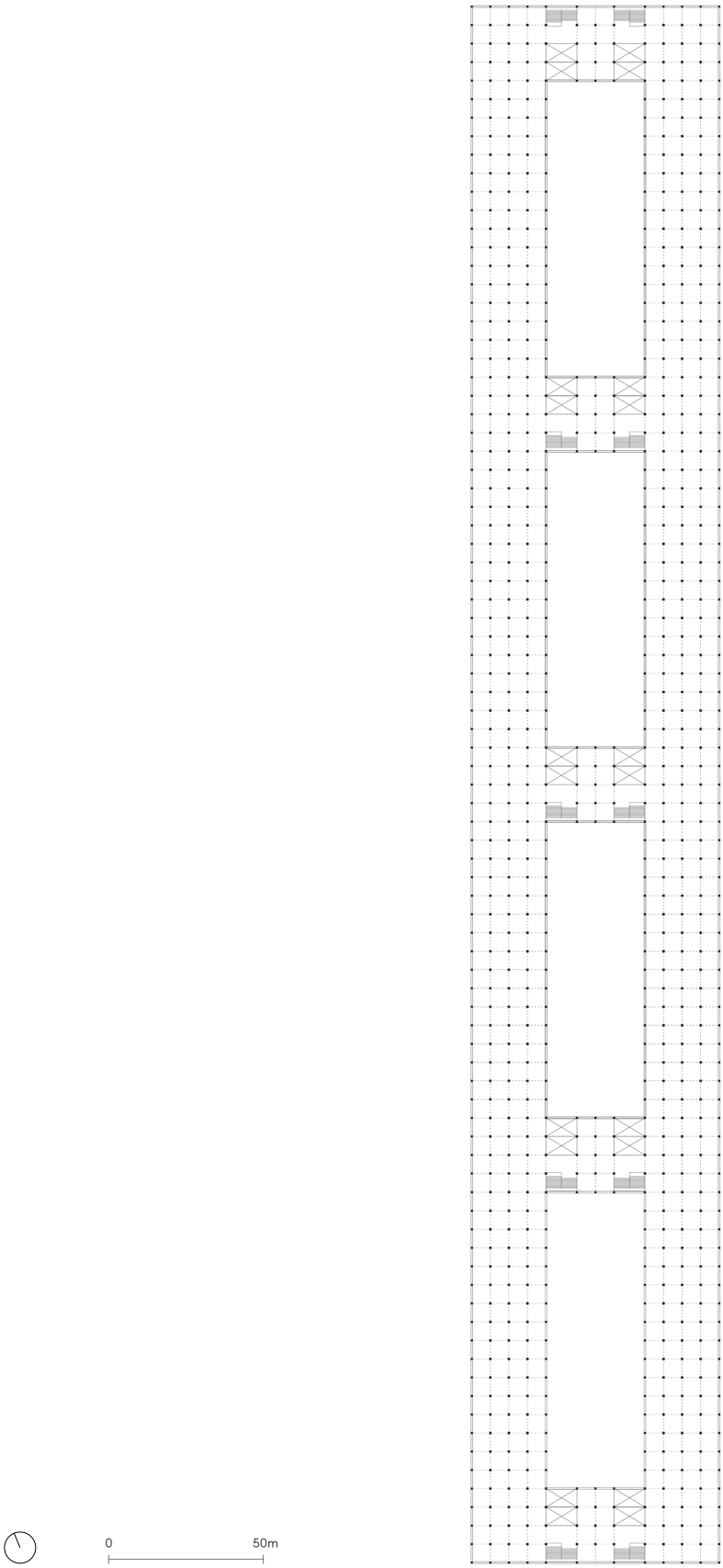


Fig. 22
FIAT Lingotto floor plan.

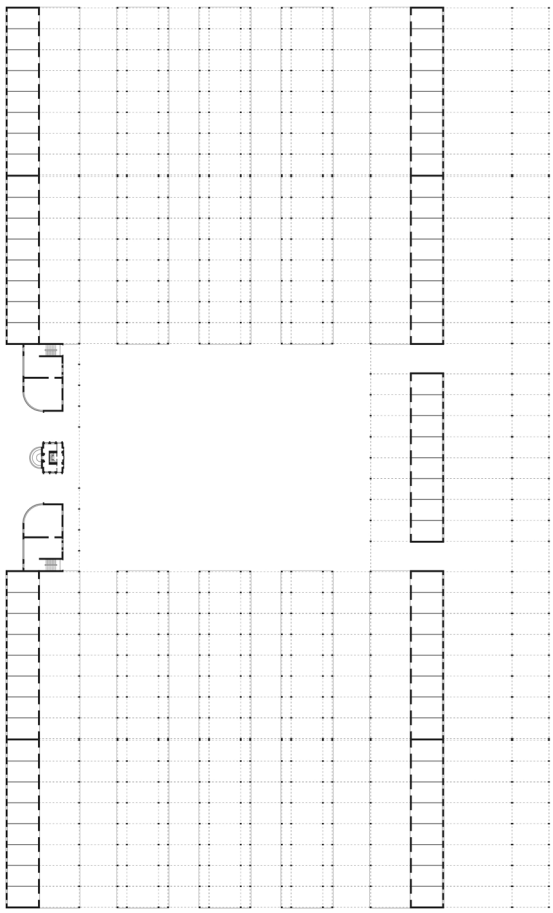


Fig. 23
MOI floor plan.

0 50m

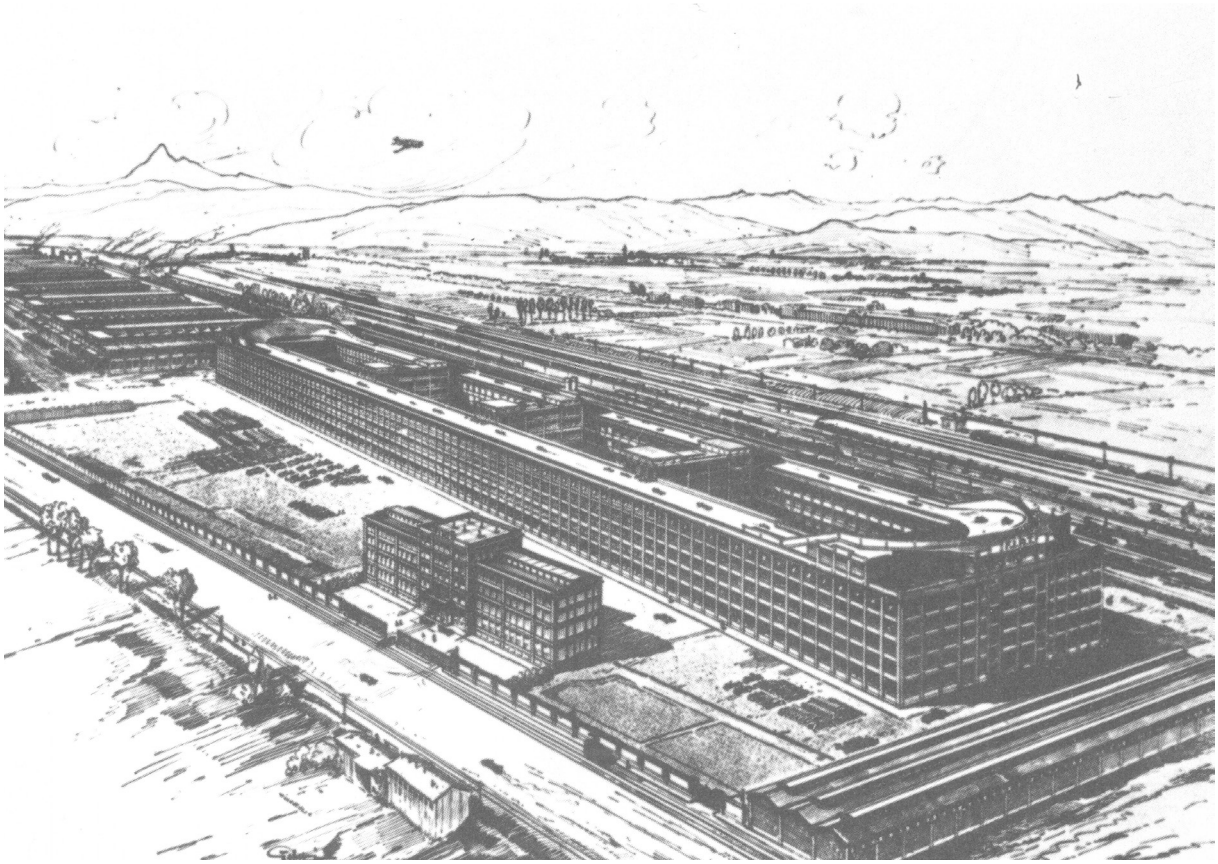


Fig. 24
A 1918 Lingotto perspective drawing made in an advertising frame.

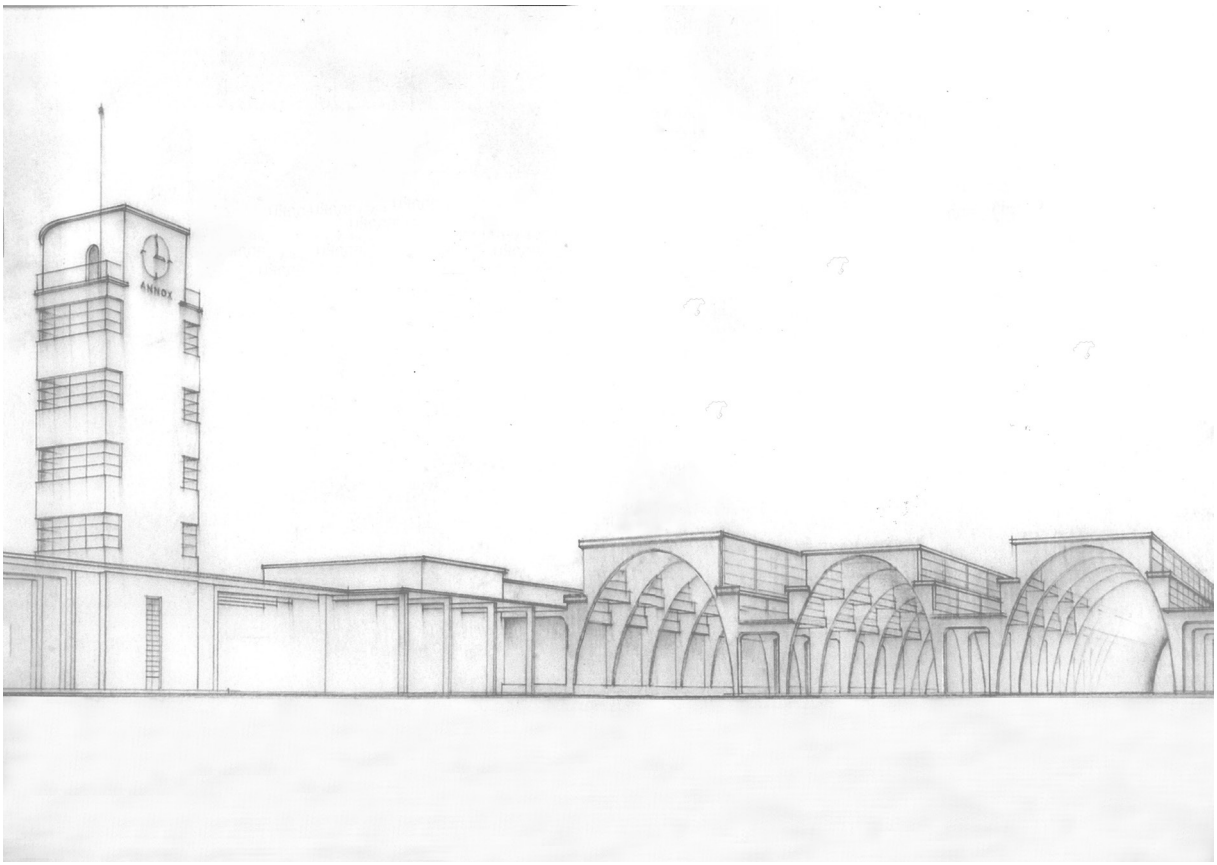


Fig. 25
A 1931 MOI perspective drawing made for the competition.

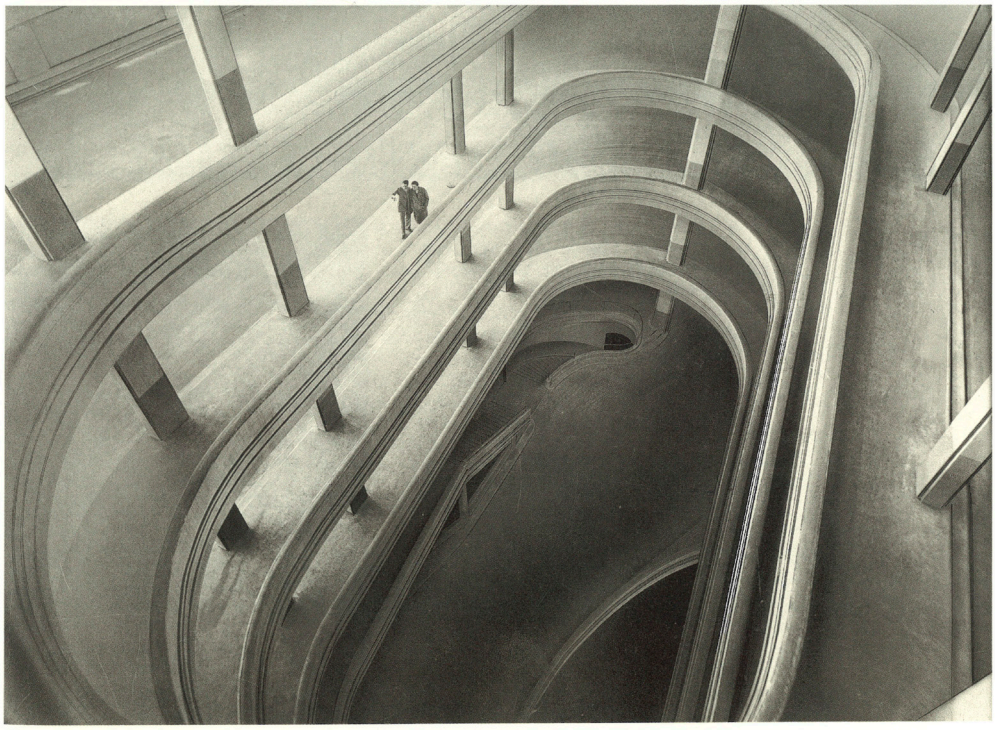


Fig. 26 & 27
The two structures which were not introduced at the hearth of the two projects original conceptions. They both highlight a design weakness from the start.

Left: the Lingotto's south ramp introduced in 1926
to allow more continuous flows.
Right: the MOI's 'aeroplano' introduced in 1937
to accommodate a larger number of producers than originally planned.

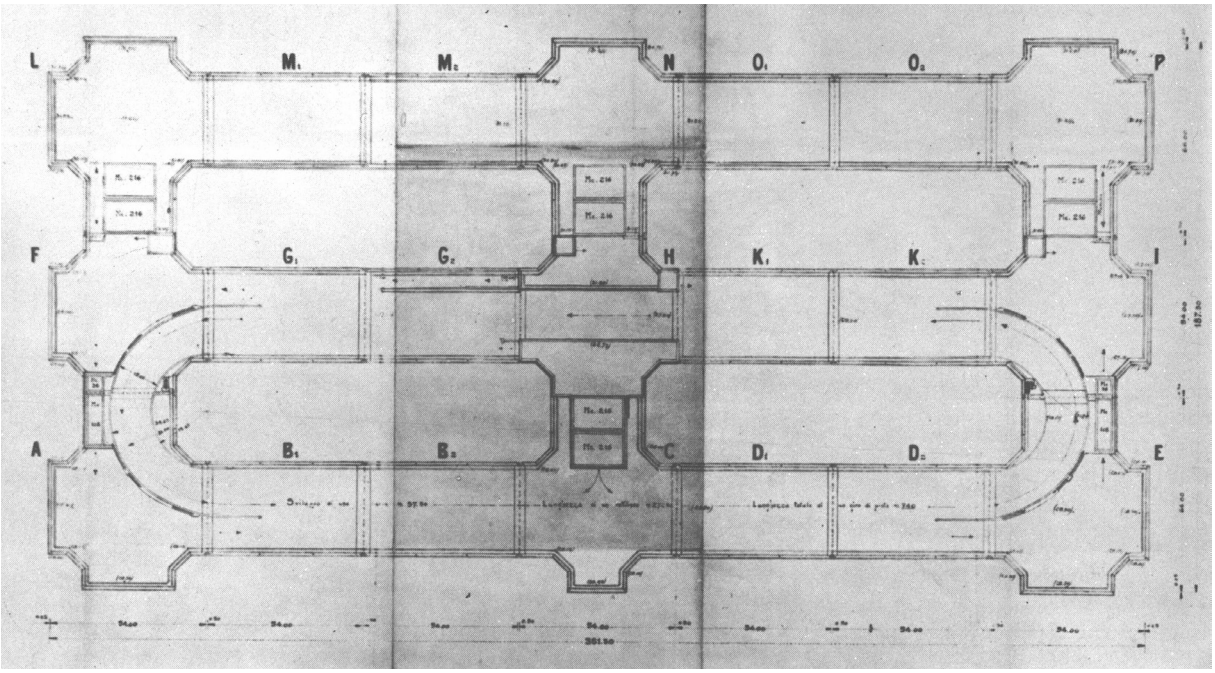
The requirements that led to the establishment of both the MOI and Lingotto programmes had also a common origin : congestions appeared in areas over-saturated by the industrial and food sectors and they needed to be released. Thus, the Lingotto hosts the two factories on Corso Dante, as well as the Officina on Marocchetti street. The MOI does the same with the three wholesale markets from Piazza Madama Cristina, Borgo Dora and Emanuele Filiberto. They were both intended to solve congestion problems by centralising a sector in a single large building with implacable logic. This centralisation will have a similar effect on the two sectors: the pre-Lingotto factories will remain open after its construction, as will the three covered markets mentioned above. However, they will assume a secondary role: it will no longer be cars that come out of these factories, but the parts used to make them; it will no longer be primeurs who sell at the markets, but subsidiary merchants.

In terms of the buildings' architecture, several similarities can be seen beyond the grid. The 1914 drawings show a never built early version of the Lingotto. It consisted of three parallel buildings covering a total surface of 44'000m^2 **(fig. 28)**. These drawings show the utopian component that is similar to the MOI **(fig. 29)**: the project does not consist in its respectable size, but in the relatively small size of its basic elements, which, through successive additions, could have made the factory grow *ad infinitum*. These basic elements are twofold and constitute the facade. In both the Lingotto and the MOI, the elevations are designed using a system of repetitive spans distributed according to an A-B-A rhythm. "B" are the central bodies, made to be *ad infinitum* repeatable. "A" are the side bodies.
They define a proper end to the building by adding an item: at the Lingotto, the paraboloid ramp on the roof test track; at the MOI, the tower and the loading

11 The resulting plan shape of the initial 1914 project was never realised, but the two types of elevation drawn are exactly the same as those of the actual built project.

12 At the Lingotto, this rhythm and extension concept are immediately evident on the street façade. At the MOI, the rythm is evident on both sides although it is more pronounced on the piazza side. However, the extension concept was conceived in the other direction, on the street side, as it was at the Lingotto.

Fig. 28
Roof plan of the never executed original Lingotto project (1914-1915). It was the first proposal for a plant that could be enlarge indefinetly.



platform roof **(fig. 30 to 33)**. The tripartite version of the Lingotto was therefore not built in its original form, but its plan and elevation concept provided the basis for the half kilometre building project.[11] This same concept was applied to the MOI, where a single 50m-long block could be accumulated very easily as long as the available floor area allowed it. The MOI floor area is much more similar to the not built Lingotto project. Anyway, we can well imagine a future to the market, expended along the railway lines by the addition of these 50 meter-long block linked by expansion joints to cover the total surface area of 90'000m^2. This addition would be made in a similar way to the Lingotto since it is due to the reinforced concrete construction site logic.[12]

The MOI shares a final characteristic with Turin's daylight factory: maximum amount of natural light needs to be provided in the inner spaces. As mentioned above, at Lingotto light was provided by the large glazed surfaces so characteristic of the new factories that appeared in the United States and all over Europe at the dawn of the twentieth century.[13] The internal courtyards provide uniform illumination from the east and west throughout the factory. At the MOI, double stepped sheds, each 1.5 meters high and positioned 4.7 meters and 6.7 meters above the ground respectively, provided natural sunlight to the interior. As in the FIAT factory, they were positioned on the west and east sides, providing effective light at any time of the day. This direct sunlight was important because it improved working conditions in the factories, resulting in greater employee productivity.[14] At the MOI, illumination was more directly linked to a good hygiene and a better produce exposure. The better they were highlighted by light, the more they were likely to attract customers.

13 The Turbinenhalle, designed by Peter Behrens for AEG and built in 1909, is worth mentioning, as is the Pulp Mill, designed by Alvar Aalto between 1938 and Sunila, and all the other factories designed by Albert Kahn that helped to define Detroit as an industrial city: the Packard Plant, the Assembly Bulding, the New Shop, the B Building, the Chrysler Tank Arsenal, and so on.

14 By this time, the positive effects of improved working conditions on productivity had been well acknowledged.

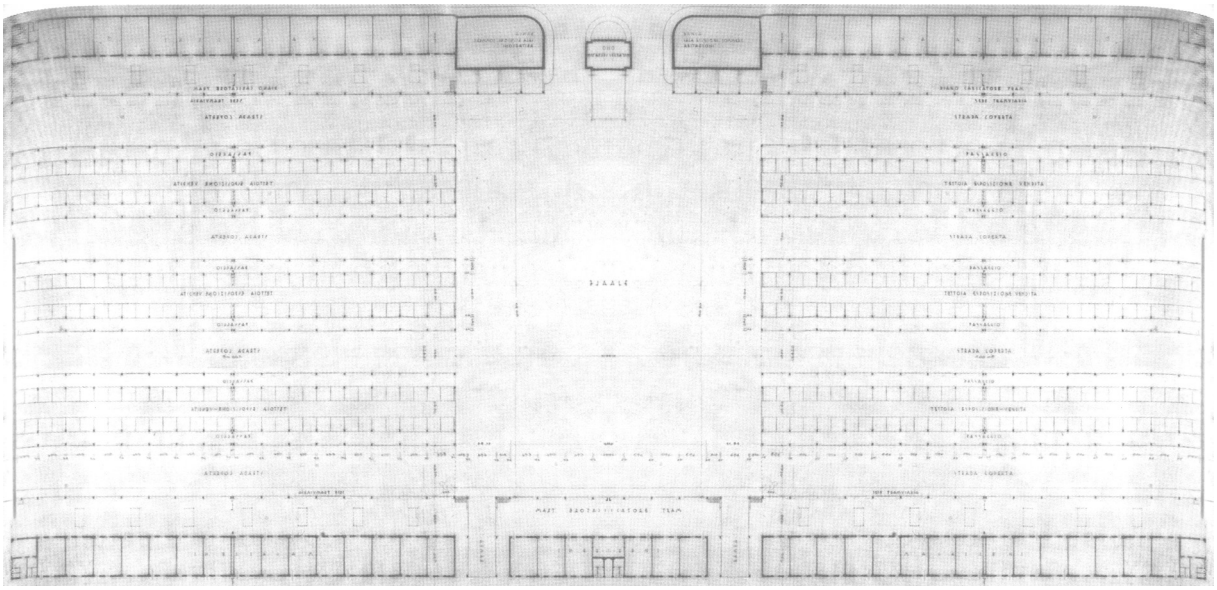


Fig. 29
Plan of the MOI .
The building's footprint is exactly the same as the never executed Lingotto project.

These were the formal aspects that the MOI shared with the FIAT Lingotto. Beyond these two aspects, we will see how they were two types of architecture in which questions of logistics played a major role. If the load-bearing structure grid was chosen to avoid taking up too much space on the floorplan, it was precisely to allow a degree of flexibility in terms of logistical adjustments.

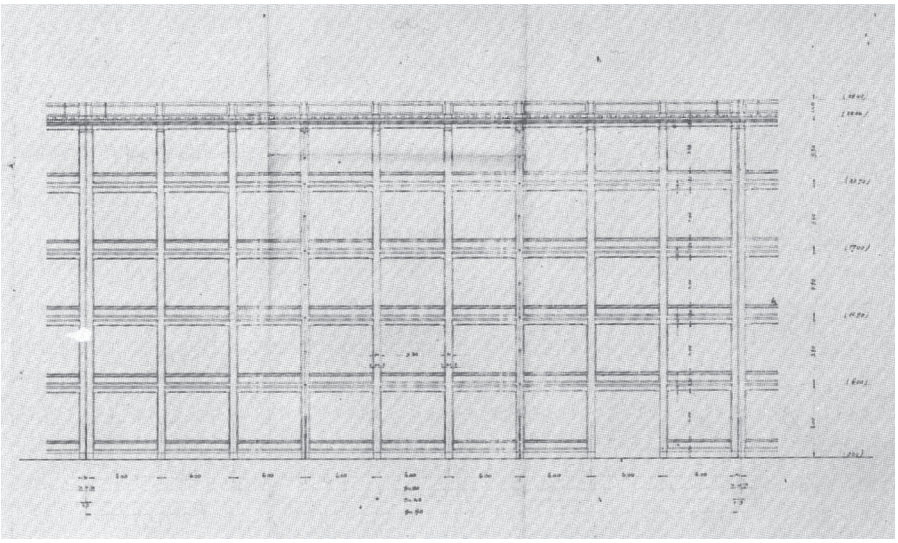


Fig. 30
Drawing of a rectangular element. Side elevation corresponding to section A.

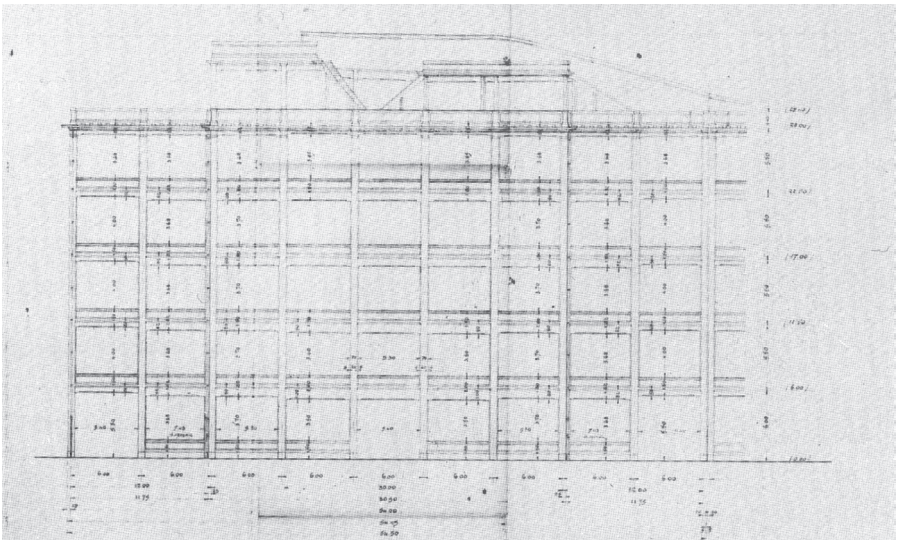


Fig. 31
Drawing of a rectangular element. Central elevation corresponding to section B.

15 Francesco Marullo, *The Typical Plan as Index of Generic*, in *The City as a Project*, edited by Pier Vittorio Aureli: 220.

As Francesco Marullo puts it so well, "*the daylight factory was transformed into a 'layout' that reduced man and raw materials to parameters of an overall logistical dispositive and eliminated any possibility of waste, congestion, or worker insubordination*".[15] We will see from a 1950's case study that this was clear at Lingotto, but was it just as clear at the MOI?

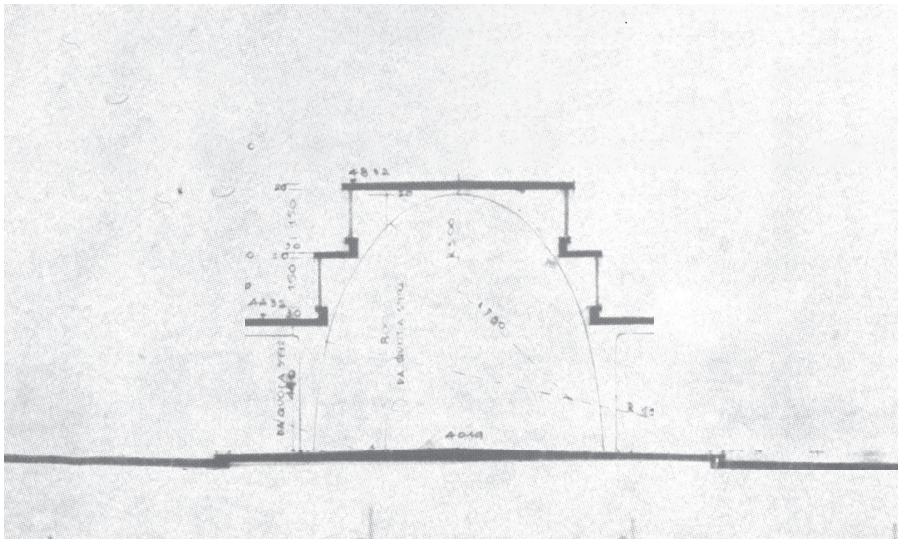


Fig. 32
Drawing of the side elevation corresponding to section A.

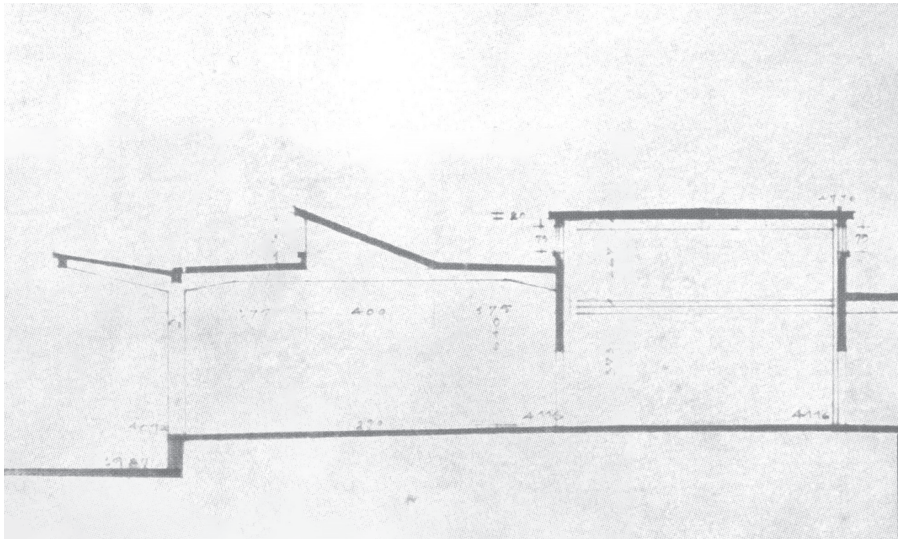


Fig. 33
Drawing of the central elevation corresponding to section B. Unrealised version of the train platform's roof .

A Parenthesis on the Quest for New production & Control

The issues of a new production model, space logistics and managerial control at FIAT Lingotto began to emerge under the influence of two events that took place simultaneously in Italy and the United States: the *Biennio Rosso* riots and the development of Taylorist theories.

The construction of the factory in the aftermath of the First World War took place in an Italy that was facing major crises that led to political and social tensions. Public debt – as a result of armaments loans – and the Lira's value collapse were at the root of a net national income that between 1917 and 1923 had fallen well below pre-war levels. This drastic decline, which was coupled with a deterioration of living standards for the working classes, was at the origin of the *Biennio Rosso* waves of strikes that began in the spring of 1919.[1]
In the industrial sector, the workers' riots directly attacked the power of control exercised by the industrial patrons over the workforce. In Turin, the protests at FIAT began in a particular political context linked to a government decision. On the 13th March 1920, the government decided to introduce summer hours in Italy. The decision was obviously not welcomed by the workers, who were forced to work at night. The departmental commissioners of FIAT's mechanical industries requested that working hours should continue according to solar time, and on the 22nd March they moved the hands of the factory clock.
FIAT objected and dismissed three workers belonging to the internal committee. This was the final blow and the episode ended up in a series of conflicts between the FIAT directors and the factory's internal committees. The workers had realised that what was at stake was not so much a question of working hours, but rather of management control in the factory. The 'Needles strike' was declared on that same day, and quickly spread to other factories in the city and the region. On the 14th April, there were more than 500'000 workers in Piedmont who – under the revolutionary impulse of Antonio Gramsci and Piero Gobetti and with the FIOM's[2] support – occupied the factories with an autonomous organisation that was more effective than elsewhere in Italy. In Turin, where workers had been directly influenced by Gramsci's writings advocating the replacement of internal committees by factory councils run by the workers themselves. This "factory council" organisation was put to the test directly during the occupations.[3] The city's 150'000 workers led to the creation of factory and military committees to coordinate production, trade and supplies at city level. At the FIAT Centro workshop, production had reached considerable levels, reaching 70% of pre-conflict levels. The workers, through local Chambers

1 Giorgio Candeloro, *Storia dell'Italia moderna*, vol. VIII – *La prima guerra mondiale, il dopoguerra, l'avvento del fascismo*, 6ª ed., Milano, Feltrinelli, 1996: 229–236.
Real wage index equal to 100 in 1913, down to 64.6 in 1918.

2 Italian Federation of Metalworkers

3 In *Common Sense* no. 11, Sergio Bologna, a figure of the Italian extra-parliamentary left and university lecturer on the history of the labour movement in Italy, outlines the implications of Antonio Gramsci for the *Biennio Rosso* workers' rebellions. On 1st May 1919, he set up the periodical *Ordine Nuovo* (New Order). Its aim was to provide workers with a political and cultural education that would enable them to build their own culture. The magazine advocated a new political line based on the role of the "factory councils". In an article entitled "*Workers' Democracy*" published in June 1919, Gramsci developed the idea that the 'Internal Commission' structure, operating in large Italian companies and elected only by union members, should be transformed into 'Factory Councils', elected by all workers, including non-union members, capable of taking charge of production beyond the classic union defence of workers' interests.

of Labour, tried to secure the necessary means of subsistence by selling off goods from their occupied factories. In this way, the workers took full control and management of the factories. In some workshops, grenades, helmets and weapons parts were produced. In others, workers equipped themselves with machine guns. Reflectors were installed on factory roofs, and many workshop entries were mined and controlled by signalling and alarm systems. The Lingotto factory was defended by an electric fence. The factories were generally defended by the Red Guards **(fig. 1)**. The industrials asked the government for military intervention to empty the factories, but it was rejected: Prime Minister Giolitti wanted to avoid an armed conflict which, he feared, could lead to civil war. The police limited themselves to peacefully guarding the factories from the outside, without intervening with weapons.[4] On the 20th September 1920, Giolitti finally signed an agreement that sanctioned the end of the occupation by providing economic and wage improvements for the workers and promising to appoint a study commission responsible for drawing up a draft law on workers' control. However, the agreement rejected the factory councils so dear to factory workers. The occupation of the factories lasted another ten days after the agreement. It was during this ten-day period that the greatest number of armed clashes between workers and police took place, with many victims on both sides. It seemed to be an angry reaction from the avant-gardes: the idea of having to abandon the factories they had occupied at the cost of so many sacrifices – and without having achieved any real political progress – seemed to be an unbearable mockery.

The remarkable appeal of this fight laid in the workers' management: they had set up a gigantic experiment in workers' management of factories in a sector at the forefront of the capitalist economy, confronted to active industrialist and state sabotage. The industrialists had never imagined that the workers were capable of facing up the technical difficulties of production and were therefore bound to rethink the management of their factories. The organisation into internal committees enabled the workers to understand the factory management mechanisms and thus take on a productive occupation. This episode convinced the big industrial leaders that the factory had to be organised in such a way as to strengthen their control over the workforce.

In parallel to the *Biennio Rosso* workers' riots, a few years earlier in the United States the American engineer F. W. Taylor was developing a new method of "scientific" work organisation. The studies focused on the rationalisation of workers' gestures and movements through the precise timing of their actions, and on the division of work into two cooperating sectors: the factory management planning department on the one hand, and the labour force on the other. Taylor's studies were born from a series of investigations that had a common source in art, particularly in the world of photography with the '*Motion-Studies*'.

4 For more details about the events sequences linked to the *Biennio Rosso* protests, see pages 91 to 177 of the book *Il Biennio rosso. Autonomia e spontaneità operaia nel 1919-1920* by Giuseppe Maione, published by Il Mulino, Bologna 1975.

Fig. 1
Photo of the Red Guards during the factory occupations in 1920.

Fig. 2
The daily *L'Ordine Nuovo* where the name of Antonio Gramsci appears as Editorial Secretary.

L'ORDINE NUOVO

Rassegna settimanale di cultura socialista

Istruitevi, perchè avremo bisogno di tutta la nostra intelligenza
Agitatevi, perchè avremo bisogno di tutto il nostro entusiasmo
Organizzatevi, perchè avremo bisogno di tutta la nostra forza

Segretario di Redazione:
ANTONIO GRAMSCI

21 GIUGNO 1919

Redazione e Amministrazione: Via XX Settembre, 19 - TORINO
Abbonamenti: Annuale L. 10; Semestrale L. 5, trimestrale L. 3; Abbonamento straordinario dal maggio a tutto dicembre 1919 L. 6.
Abbonamento sostenitore L. 20 annuale; L. 10 semestrale.

ANNO I. - N. 7

Un numero: Cent. 20 - Conto corr. con la Posta

SOMMARIO

Cronache dell' « Ordine Nuovo » — **Editoriali:** Democrazia operaia - La settimana politica: Il saccheggio, Voci della terra — Kolciak e Orlando — **John Reed:**

Democrazia operaia

Un problema si impone oggi assillante a ogni comuniste infatti essi continuano a sussistere

The three main protagonists were the French scientist and chronophotographer Étienne-Jules Marey, the London photographer Eadweard Muybridge and the American engineer Frank Bunker Gilbreth, widely recognised as the father of Taylorism.

Muybridge's *The Horse in Motion* (1878) **(fig. 3 & 4)** made it possible to study the horse's galloping posture and thus to falsify the social beliefs so widespread at the time: those that used to show, as in Théodore Géricault's painting *The Race to Epson*, a galloping horse with its legs suspended above the ground, stretched outwards. In his photograph, we thus understood the horse's true motion: legs bent inwards. His studies were carried out in Palo Alto using a row of twenty-four cameras whose triggers were connected to wires operated by the horse itself. The reason for this number of cameras

5 The French philosopher Maurice Merleau-Ponty has written extensively about the representations of our perceptions. Notably in *Phénoménologie de la perception* (1945) and *L'Œil et l'Esprit* (1960). In the latter, Merleau-Ponty distinguishes art from science. In his view, art deals with the experienced world, the body and existence, whereas science takes the world as an object of knowledge dissociated from the existing subject, in order to identify laws beyond phenomenon. He argues that science tends to artificialise our world, because the subject becomes a mechanical body and the mind a technique. In this sense,

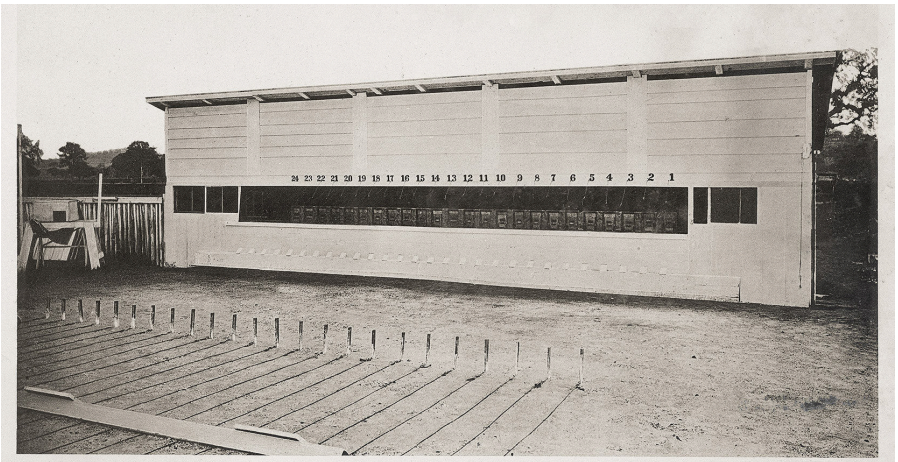
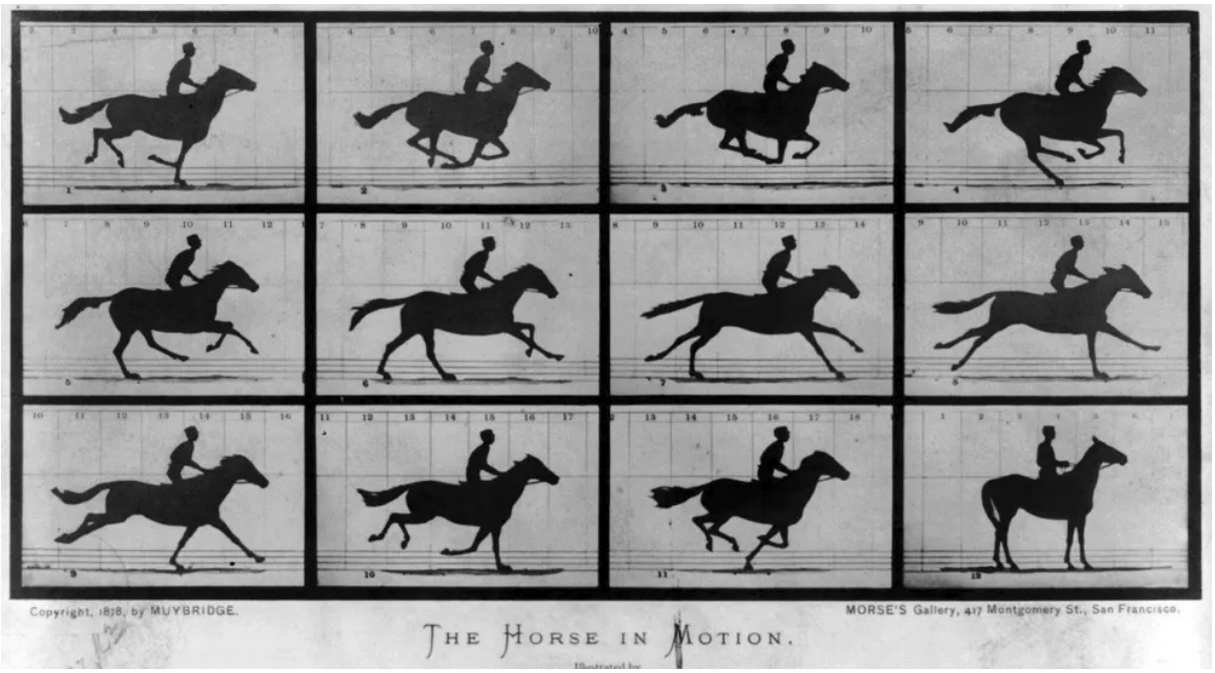


Fig. 3 & 4
Muybridge's installation in Palo Alto which was used to produce the photographs shown below: the horse's movement is broken down into 12 photographs (24 for the film).



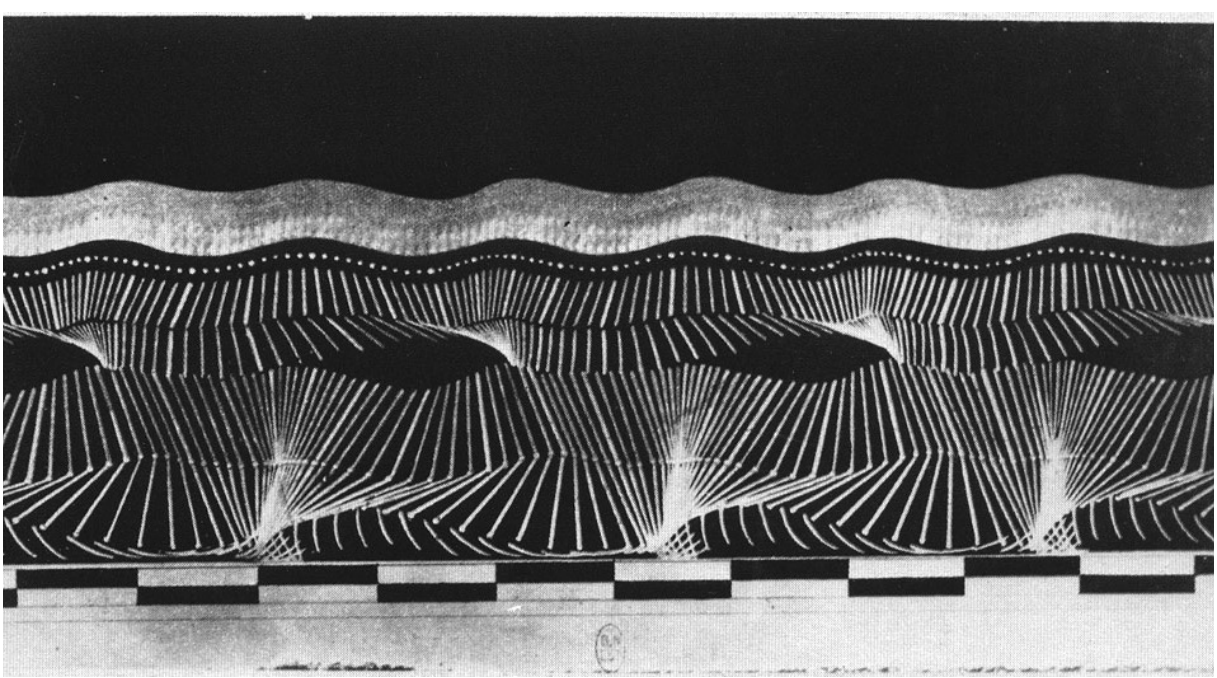
science tends to overwhelm any sensitive notion of the world. Painting is given as an answer to return to the origin of the world: it is a staging of our original relationship to the world that we tend to forget. Cézanne's paintings and Giacometti's drawings are used to support these ideas: Sainte-Victoire and the subjects are represented according to the artist's perceptions. These paintings, produced without any faithful tracing of the scientific reality of the world, seem to represent what is real, because they touch on our perception of it. Through painting, we gain access to the impact that the world leaves on us, to what the eye has been stirred by.

was to be able to break down the movement of the horse contained in one second into twenty-four images: it was thus possible to reproduce a film in a loop by assembling the twenty-four photographic prints. These films generated debates that were confined to the world of art, i.e. whether they should be represented scientifically or sensitively: the true and authentic position of the horse in the photograph seems to freeze it in space, whereas the false position in the paintings gives us the impression that it is moving.[5]

Étienne-Jules Marey suggested a study contemporary to Muybridge's, but quite different: in *Walking Study* (1884) **(fig. 5)**, the scientist developed a chronophotographic method: the image was the result of a single long exposure point of view. The subject, dressed in black in front of a black background, had reflective strips attached to the limbs and joints involved in the movement. Instead of decomposing movement in the manner of Muybridge, Marey composed it like a symphony: he rendered visible and tangible its continuous flow. Here the disappearing subject is no longer important; the movement itself is represented.

These two pseudo artists – or pseudo scientists – inspired Frank Bunker Gilbreth and his wife Lillian Evelyn Moller to analyse the movements of workers at their workplace. Gilbreth's research began in bricklaying, where he observed that each bricklayer approached his work differently, some seeming more efficient than others. By analysing their different movements, he was able to determine which masonry approach was best. These site rationalisations didn't just stop at bricklaying. He also invented a scaffold that was easy to adjust, and a system for stacking bricks on the scaffold in such a way that the worker could easily grasp one in one hand and the mortar in the other.

Fig. 5
Walking Study photograph made by Étienne-Jules Marey in 1884. The photo tends to compose the image in a movement which will be dear to the Italian futurists.



His improvements had a significant impact on the construction site: the movements involved in laying a brick were reduced from 18 to 4 ½, resulting in a spectacular increase in the worker's productivity.[6]

It was with his wife that he formed a duo to develop Chronocyclegraphy: flashing lights were attached to the different parts of a worker's body as he performed his action in front of a grid wall. The distance separating the light dots indicates the speed and moments of hesitation in the movement (time); the position of the light dots against the grid background determines the exact position of the limbs on the work site at a given moment (space). In this way, they were able to record and analyse the precise location of movement trajectories in time-space **(fig. 6 & 7)**.
Their studies were closer to Marey's in the way that the complexity of movement was represented in a single photograph. By analysing these prints, Gilbreth was able to eliminate unnecessary and superfluous movements that led to hesitation and thus improve the efficiency of the worker's actions to increase output while preserving his physical and mental well-being. It was in fact the couple who introduced the application of psychology to industrial management. They understood the benefits of improving employees' satisfaction to increase overall performance and efficiency at work. By studying every movement made by a worker and, in so doing, documenting the best way to perform the task, the systems designed by Frank and Lillian aimed to reduce worker fatigue while increasing productivity. They also took physical comfort into account, and their innovations in office furniture led to the study of ergonomics.[7]

6 At the time, Gilbreth had not yet developed the photographic technique that he would later develop with his wife Lillian Evelyn Moller. His own film, *Time and Motion Study in Bricklaying*, explains the whole process of the new scaffolding. His 1909 book *Bricklaying System*, on the other hand, uses drawings and photographs to explore, in the manner of a construction catalogue, the best methods for laying bricks. It covers the different types of laying (Wire Cut Brick, Hand Made Brick and One Brick Up-side Down), the correct finger posture for laying a brick without disturbing the line, the laying of mortar, the best size for the shield, and so on.

7 Issues relating to physical comfort and innovations in furniture ergonomics can be seen in the book *Fatigue Study: The Elimination of Humanity's Greatest Unnecessary Waste, A First Step in Motion Study* at Chapter V: 'Preliminary fatigue elimination: what can be done now'. This chapter deals with issues of lighting, heating and ventilation, fire protection and emergency exits, the design of tables and chairs, the positioning of tools on these tables and even the design of clothing to improve workers' comfort.

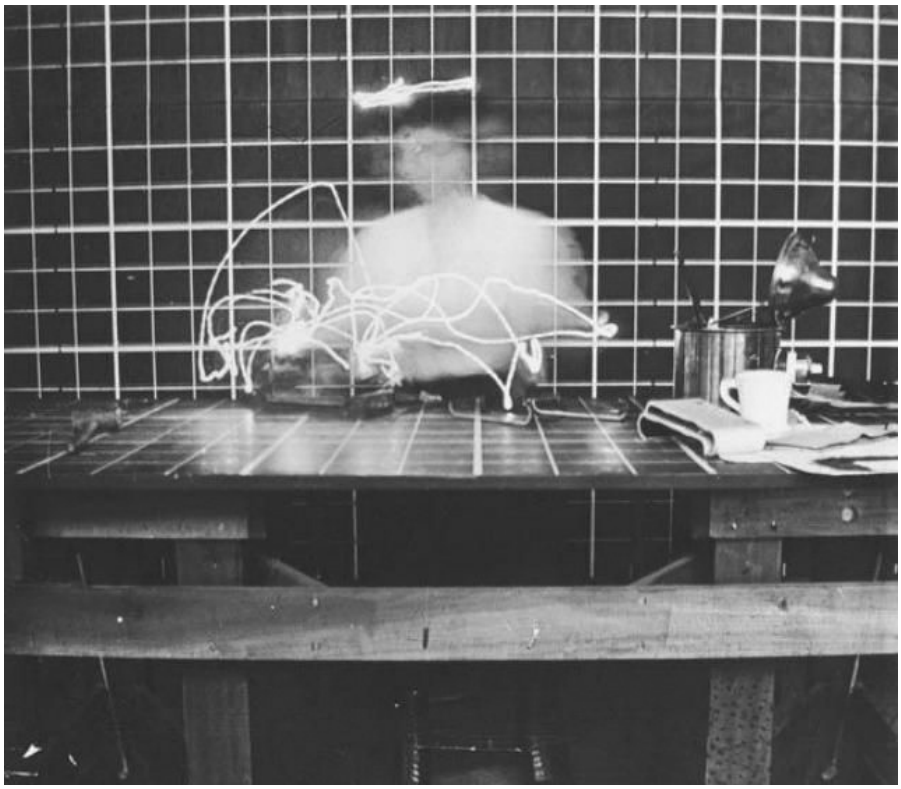


Fig. 6
Frank Gilbreth, *Wire Models of Factory Worker Movements*, Motion Efficiency Study, 1914. National Museum of American History, Behring Center, Division of Work and Industry Collection.

The couple's '*motion-studies*' were carried out as part of manual work requiring a repeated gesture. It was therefore only logical that they found their way into the '*time-studies*' carried out by Frederick Winslow Talyor and later by Henry Ford. Gilbreth met Taylor in 1907 and became a supporter of his time-study system. The couple even played a decisive role in the creation of the Taylor Society, which they left in 1914, explaining that Taylor's 'stopwatch' approach was mainly aimed at reducing processing times, while they

Fig. 7
Frank Gilbreth, *Left hand of drill press operator Positioning after transportation. Machinist with light showing hand movements*, circa 1915. Collection Frank B. Gilbreth Motion Study Photographs (1913-1917).

concentrated on making it more efficient by reducing the movements involved.

In his introduction to *The Principals of Scientific Managment* Taylor clearly defined the aim of the book:

> "*First*. To point out, through a series of simple illustrations, **the great loss** which the whole country is suffering through **inefficiency** in almost all of our daily acts.
> *Second*. To try to convince the reader that the remedy for this inefficiency lies in systematic management, rather than in searching for some unusual or extraordinary man.
> *Third*. To prove that the best management is a true science, resting upon clearly defined laws, rules, and principles, as a foundation. And further to show that the fundamental principles of scientific management are applicable to all kinds of human activities."[8]

This great loss that the country is suffering through inefficiency is precisely the '*lost work*' manifested in work process interruptions. Michael Osman helps us understand what '*lost work*' is by explaining that the research genesis began with the study of mechanical transmissions in 19th century factories such as the Mills and Mill. He explains that around 1880, the engineers who managed power distribution wanted to reduce wasted work by optimising the transmission between each belt so as to obtain a constant coefficient of friction.
In other words, it was this coefficient of friction that represented lost work in the factory: it materialised slowdowns in the production process through lost energy and therefore generated interruptions between a workshop that depended on another, resulting in a loss of productivity.[9] By avoiding this friction in the production chain, productivity could be increased. According to Taylor, it was possible to reduce this wasted work as long as a well-trained employee could supervise the maintenance of machine belts. In order to supervise maintenance and thus avoid future errors, mathematical tools and methods were needed to predict the relationship between cause and effect. Osman explained that, according to Taylor, if the error potential of the factory's belts could be located and controlled, it would also be possible to control more precisely the interaction between each worker and each machine in the factory.[10] A mathematical and scientific method had therefore to be developed to determine in advance the time allocated to each stage of the production process. Each stage could then be defined as a task, and if the estimated time was known, the piecework wage could be replaced by a task wage. By applying a system of initiative and incentives in management, it would be possible to integrate the worker's willingness into the production process and allocate salary rewards: faster work would be rewarded by a higher salary, and slower work by a lower salary.[11] This would avoid 'soldiering' – meaning not working more than what was contractually agreed – since the worker's own will would be directly reflected in

8 Taylor, F. W. *The Principles of Scientific Management*, New York, Harper & Brothers, 1911: 7.

9 Osman, Michael. "Imaging Brainwork." In *Modernism's Visible Hand*. University of Minnesota Press., 2018: 132.

10 Ibid., 134.

11 "The writer repeats, therefore, that in order to have any hope of obtaining the initiative of his workmen the manager must give some special incentive to his men beyond that which is given to the average of the trade. This can be given in several different ways, as, for example, the hope of rapid promotion or advancement, higher wages, either in the form of generous piece work prices or of a premium or bonus of some kind for good and rapid work; shorter hours of labor; better surroundings and working conditions than are ordinarily given, etc." in Taylor, F. W. *The Principles of Scientific Management*, New York, Harper & Brothers, 1911: 33–34.

his own wage. According to Taylor, it is precisely this 'soldiering' that materialises the interruptions and thus restricts production in the work process:

> "doing away with slow working and "soldiering" in all its forms and so arranging the relations between employer and employé that each workman will work to his very best advantage and at his best speed, accompanied by the intimate cooperation with the management and the help (which the workman should receive) from the management, would result on the average in nearly doubling the output of each man and each machine."[12]

12 Ibid., 14.

Taylor foresaw that a large-scale implementation of this system would reveal huge amounts of unused time: work that had been wasted could now be made productive. In Taylor's system, each worker works according to a plan and is paid on the basis of his individual performances. In his view, paying workers according to task, using normative units of time, would make it possible to control the speed of production and thus avoid errors. Following on from having an employee supervising the machine maintenance, he proposed – in order to allow the division of the production process into a number of well-defined tasks to be assigned to a worker – that an administrative body should supervise the employees working on production. The administrative body itself would have scientific tools at its disposal to monitor and supervise workers, thereby erasing all power over the latter. Workers and clerks would therefore be put on an equal footing, forced to work together as equals. In order to define this scientific tool, which could be used by any clerks in the administrative body, Taylor gives a recipe of five steps to be followed:

> "First. Find, say, 10 or 15 different men (preferably in as many separate establishments and different parts of the country) who are especially skilful in doing the particular work to be analysed.
> Second. Study the exact series of elementary operations or motions which each of these men uses in doing the work which is being investigated, as well as the implements each man uses.
> Third. Study with a stop-watch the time required to make each of these elementary movements and then select the quickest way of doing each element of the work.
> Fourth. Eliminate all false movements, slow movements, and useless movements.
> Fifth. After doing away with all unnecessary movements, collect into one series the quickest and best movements

13 Ibid., 117–118.

as well as the best implements."[13]
Presenting these points in the form of a recipe to be followed clearly shows the extent to which this is a system that develops a scientific protocol with the aim of making it easily understandable and reproducible by the clerks from the administrative body. So to clerks are given a management manual, just as to workers are given a manual of tasks. He backs up these five points by devoting many pages to the example of Gilbreth's bricklaying studies. Through the forced standardisation of methods and the forced adoption of better tools and working conditions, Gilbreth succeeded in scientifying bricklaying.[14] He also insisted that management must also recognise that workers would not submit to this more rigid standardisation and would not work harder unless they were paid extra to do so. He realised this when, at the Bethlehem Steel Company, he offered a few motivated workers a wage raise from $1.15 to $1.85 a day, thereby reducing iron handling costs from $0.072 to $0.036 a day.

Gilbreth's *motion-studies* thus joined Taylor's *time-studies* to develop scientific tools for work management. It took shape in the book *Shop Management* where observations made about a 'manual work' at a 'workstation' are divided into a number of stages represented on a table **(fig. 8)**. Each step is timed and compared with the reference time measured on an experienced worker. In this way, each manager could monitor production in real time and, thanks to the comments section, understand any unnecessary movements that needed to be improved for the sake of production. What Taylor was proposing was to use a scientific method rather than the 'rule of thumb' method that was so prevalent in production at the time.[15] A shift from piecework wages to task wages with incentive systems enabled, firstly, to avoid minimum work by investing in the employee's willpower and, secondly, to distribute workloads appropriately between workers and clerks: since production was divided into stages, it was easier to assign team of clerks to each process stage to supervise it. The clerks could then monitor the performance of each worker and quickly correct any errors.

Taylorist and Fordist theories are often intertwined in vague simplifications. As Siegfried Gidieon explains, Henry Ford himself never mentions Taylor's name in his self-centred writings describing the life of a self-made man.[16] It cannot be denied, however, that Henry Ford's theories were very similar to those of Frederick Winslow Talyor, with the difference that he took each of his points to a new dimension. He moved on from task pay to define a daily wage, while elaborating on bonuses. In *My Life and Work* he explains how his company established salary levels according to tasks. The methods were clearly the same as those of his predecessor: with time studies carried out on thousands of operations performed in the workshops, it was theoretically possible to determine a man's output and thus obtain a satisfactory standard output for a day.[17] He therefore adopted eight-hour working days – to get the best service from the men – thus reducing hours

14 Ibid., 83.

15 The Cambridge Dictionary defines the rule of thumb as "a general or approximate principle, procedure, or rule based on experience or practice, as opposed to a specific, scientific calculation or estimate. For example, a good rule of thumb is that a portion of rice is two handfuls".

16 Giedion, Siegfried. *Mechanization Takes Command: A Contribution to Anonymous History*. Third. New York: Oxford University Press, Inc., 1970: 115.

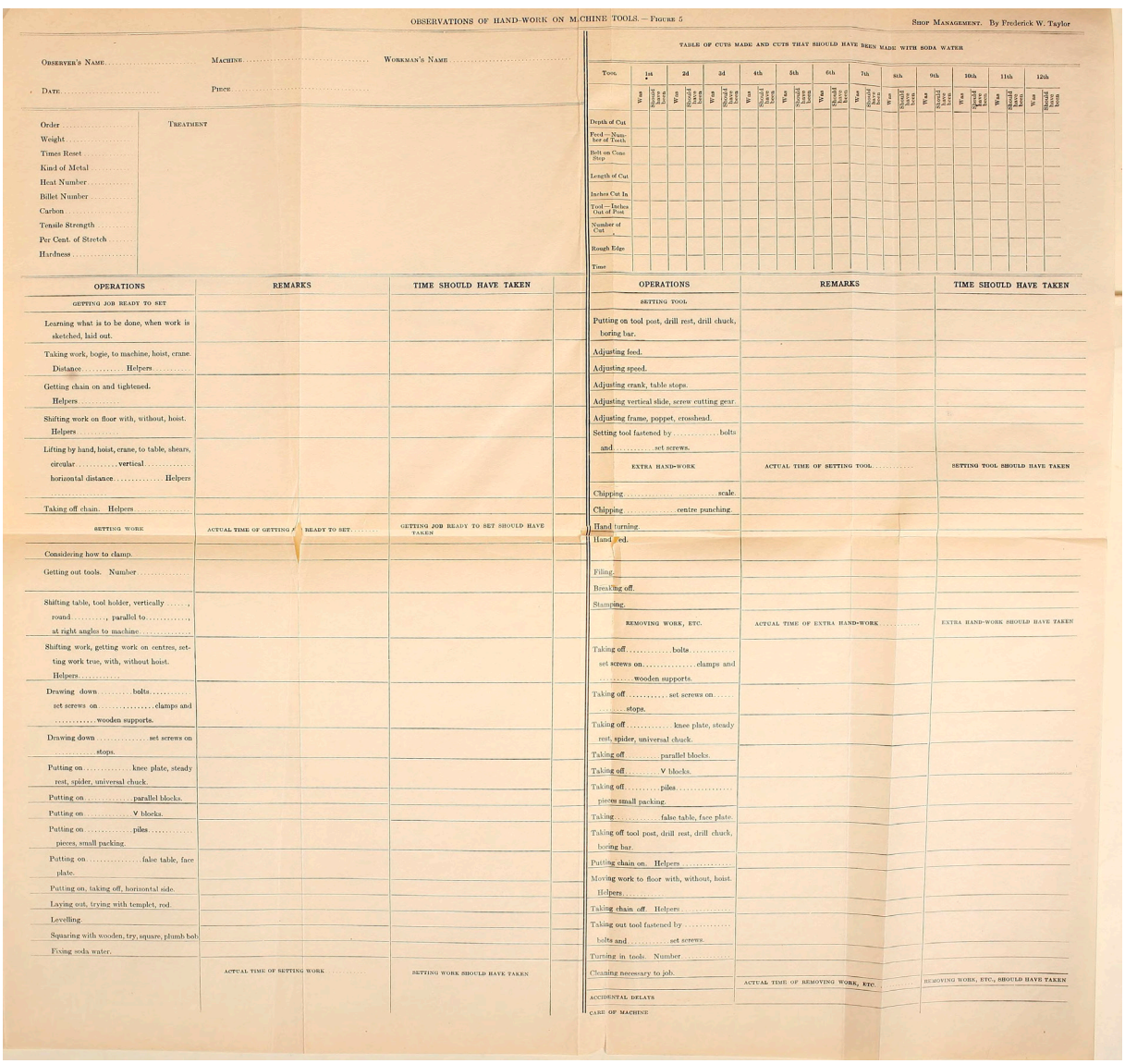
17 Ford, Henry. *My Life and Work*, 1923: 125–126.

Fig. 8
Table developed by Taylor in his book *Shop Managment* as a tool for clerks who manage a factory workshop.

18 Ford, Henry. Today and Tomorrow, 1926: 146.

19 Bologna, Sergio. "The Theory and History of the Mass Worker in Italy." in *Common Sense*, no. 11/12 1987: 17.

but increasing wages. In 1913, at the Highland Park plant, the average monthly turnover rate was about 31.9%. It fell to 1.4% when, in 1915, they introduced the minimum of five dollars a day, which replaced the two and forty dollars of the past.[18] By increasing wages, he was able to tie the workforce to the factory and avoid excessive turnovers. More importantly, he understood that higher wages increased his employees purchasing power, who in turn became his customers. Ford thus saw the worker not only as a producer of goods, but also as a consumer of wages.[19] Unlike Taylor, who wanted to conserve and rationalise the psychophysical energies of workers inside the factory, Ford wanted to conserve them outside too: a worker who generated more purchasing power thanks to his status would inevitably be happier to work and therefore undoubtedly more productive. That's why he later introduced investment certificates with a guaranteed 6% return. Employees who thus had


OBSERVATIONS OF HAND-WORK ON MACHINE TOOLS.—FIGURE 5

SHOP MANAGEMENT. By Frederick W. Taylor

OBSERVER'S NAME ..... MACHINE ..... WORKMAN'S NAME .....

DATE ..... PIECE .....

Order .....
Weight .....
Times Reset .....
Kind of Metal .....
Heat Number .....
Billet Number .....
Carbon .....
Tensile Strength .....
Per Cent. of Stretch .....
Hardness .....

TREATMENT

TABLE OF CUTS MADE AND CUTS THAT SHOULD HAVE BEEN MADE WITH SODA WATER

Tool.	1st		2d		3d		4th		5th		6th		7th		8th		9th		10th		11th		12th	
	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been	Was	Should have been
Depth of Cut																								
Feed — Number of Teeth																								
Bolt on Cone Step																								
Length of Cut																								
Inches Cut In																								
Tool — Inches Out of Post																								
Number of Cut																								
Rough Edge																								
Tone																								

OPERATIONS	REMARKS	TIME SHOULD HAVE TAKEN
GETTING JOB READY TO SET		
Learning what is to be done, when work is sketched, laid out.		
Taking work, bogie, to machine, hoist, crane. Distance ..... Helpers		
Getting chain on and tightened. Helpers		
Shifting work on floor with, without, hoist. Helpers		
Lifting by hand, hoist, crane, to table, shears, circular ..... vertical ..... horizontal distance ..... Helpers		
Taking off chain. Helpers		
SETTING WORK	ACTUAL TIME OF GETTING JOB READY TO SET	GETTING JOB READY TO SET SHOULD HAVE TAKEN
Considering how to clamp.		
Getting out tools. Number		
Shifting table, tool holder, vertically ....., round ....., parallel to ....., at right angles to machine		
Shifting work, getting work on centres, setting work true, with, without hoist. Helpers		
Drawing down ..... bolts ..... set screws on ..... clamps and ..... wooden supports.		
Drawing down ..... set screws on ..... stops.		
Putting on ..... knee plate, steady rest, spider, universal chuck.		
Putting on ..... parallel blocks.		
Putting on ..... V blocks.		
Putting on ..... piles ..... pieces, small packing.		
Putting on ..... false table, face plate.		
Putting on, taking off, horizontal side.		
Laying out, trying with templet, rod.		
Levelling.		
Squaring with wooden, try, square, plumb bob.		
Fixing soda water.		
	ACTUAL TIME OF SETTING WORK	SETTING WORK SHOULD HAVE TAKEN

OPERATIONS	REMARKS	TIME SHOULD HAVE TAKEN
SETTING TOOL		
Putting on tool post, drill rest, drill chuck, boring bar.		
Adjusting feed.		
Adjusting speed.		
Adjusting crank, table stops.		
Adjusting vertical slide, screw cutting gear.		
Adjusting frame, poppet, crosshead.		
Setting tool fastened by ..... bolts and ..... set screws.		
EXTRA HAND-WORK	ACTUAL TIME OF SETTING TOOL	SETTING TOOL SHOULD HAVE TAKEN
Chipping ..... scale.		
Chipping ..... centre punching.		
Hand turning.		
Hand [illegible]ed.		
Filing.		
Breaking off.		
Stamping.		
REMOVING WORK, ETC.	ACTUAL TIME OF EXTRA HAND-WORK	EXTRA HAND-WORK SHOULD HAVE TAKEN
Taking off ..... bolts ..... set screws on ..... clamps and ..... wooden supports.		
Taking off ..... set screws on ..... stops.		
Taking off ..... knee plate, steady rest, spider, universal chuck.		
Taking off ..... parallel blocks.		
Taking off ..... V blocks.		
Taking off ..... piles ..... pieces small packing.		
Taking ..... false table, face plate.		
Taking off tool post, drill rest, drill chuck, boring bar.		
Putting chain on. Helpers		
Moving work to floor with, without, hoist. Helpers		
Taking chain off. Helpers		
Taking out tool fastened by ..... bolts and ..... set screws.		
Turning in tools. Number		
Cleaning necessary to job.	ACTUAL TIME OF REMOVING WORK, ETC.	REMOVING WORK, ETC., SHOULD HAVE TAKEN
ACCIDENTAL DELAYS		
CARE OF MACHINE		

shares in the company were motivated to work harder in order to guarantee higher returns on their investments.
However, the division of labour remained the area in which Taylorist theories were pushed to their limits: not only was the organisation divided into managerial and labour sectors, but in the manufacturing process, the worker was no longer assigned several tasks but only one. Henry Ford thus contributed to the development of the *assembly line* mass production process so well depicted by Charles Chaplin in *Modern Times*.

> "The principles of assembly are these:
> (1) Place the tools and the men in the sequence of the operation so that each component part shall travel the least possible distance while in the process of finishing.
> (2) Use work slides or some other form of carrier so that when a workman completes his operation, he drops the part always in the same place – which place must always be the most convenient place to his hand – and if possible have gravity carry the part to the next workman for his operation.
> (3) Use sliding assembling lines by which the parts to be assembled are delivered at convenient distances.
> The net result of the application of these principles is the reduction of the necessity for thought on the part of the worker and the reduction of his movements to a minimum. He does as nearly as possible **only one thing with only one movement**."[20]

[20] Ford, Henry. *My Life and Work*, 1923: 80.

He took Gilbreth's *motion studies*, so dear to Taylor, to such a high level that he almost killed them: the worker's tasks on an object travelling on a conveyor belt, a platform or overhead rails were reduced to the most minimal manipulations. In this way, the work was brought to the man, not the man to the work.[21]
Production was brought into the worker's hands, so that he only had to perform the minimum number of actions. Their number is reduced to such a minimum that Gilbreth's *motion studies* were no longer useful in Ford's eyes: the worker's gesture no longer even leaves room for hesitation.
Henry Ford carried out the first tests of the *assembly line* in the Highland Park factories on the 1st April 1913 with the assembly of a flywheel magneto: the construction of the engine, which was previously done by a single man, was now divided into forty-eight different operations and took a third of the time compared with previous methods.[22] An initial strategy reduced assembly times to just over thirteen minutes. By raising the level of the conveyor and experimenting with other variable speeds, the time was eventually reduced to just five minutes. Numerous tests were carried out on the conveyor speeds, which had to be neither too slow nor too fast to avoid burying the worker in his own labour, which "must have every second necessary but not a single

[21] Ibid., 80.

[22] Gidion, Siegfried. *Mechanization Takes Command: A Contribution to Anonymous History*, 1970: 116.

[23] Ford, Henry. *My Life and Work*, 1923: 82.

unnecessary second".[23] The success of this experiment encouraged Ford to apply the assembly line principle into all the plant's workshops.
The experiments carried out on chassis assemblies were remarkable in the way they required different spatial configurations. The benchmark time for improvement was twelve hours and twenty-eight minutes. The first experiment consisted of pulling the chassis with a rope and a windlass along a line two hundred and fifty feet long. Six assemblers travelled with the chassis and collected the parts from the piles placed along the line. The time was reduced to five hours and fifty minutes per frame. Then in 1914, the company adopted the policy of working at 'man-height': the assembly lines were raised to suit the height of each team of workers. It was thus divided into one line at twenty-six and three-quarter inches and another at twenty-four and a half inches high. The waist-high layout and a new subdivision of work reduced the time taken to assemble the chassis to just one hour and thirty-three minutes.

Taylor's methods of dividing labour into two departments (workers and managers) meant that factories had to have two very distinct areas (a place to manage and a place to work). But the division of tasks introduced by Ford was architecturally translated into shop floors surfaces divided into manufacturing departments: each component making up the vehicle – chassis, drive shaft, transmission, etc. – had a corresponding department, strategically positioned in the logical continuity of the assembly line production process. Each department was itself divided into workshops, which followed the same logic of the production process and therefore of spatial layout in relation to the production line. In this way, the factory was transformed into a "layout that reduced people and raw materials to the parameters of a global logistics system". The Piquette plant (the first Ford plant, which preceded those at River Rouge) had eighteen departments, compared with one hundred and fifty at Highland Park, which had grown to five hundred by 1914.

It should be remembered that Ford was not the inventor of the assembly line, which seems to have begun in the late 1860s in the Cincinnati agro-industrial plants where pork was packaged. Steve C. Gordon explains how these industries embraced technological changes and marked the beginnings of mass production.[24] Hogs suspended from ceiling rails, each twenty-four inches from the other, could be transported from one worker to the next in a continuous process. Each had his own task to perform: one would split the animal, the next would remove the entrails, the third would remove the heart, liver, etc.[25] and the last would clean it. The packaging process had become so specialised that it took less than a minute to convert an animal carcass into hams, bacon and so on. Henry Ford did not invent assembly line production, but he did have the merit of having recognised the possibilities of democratising a vehicle that had long remained an object of privilege. It was precisely to produce the Ford Model T that he introduced these massive assembly lines, never seen before in the car industry. These methods allowed to speed up the manufacturing processes

24 Steve C. Gordon, "From Slaughterhouse to Soap-Boiler: Cincinnati's Meat Packing Industry, Changing Technologies, and the Rise of Mass Production, 1825-187, in *The Journal of the Society for Industrial Archeology*, Vol. 16, No. 1 (1990): 64-65.
The factory began packing more than 500,000 hogs a year. Constant growth in the industry required new techniques, and by 1840 a step towards mechanisation had already been taken: "slaughterhouses instituted hooks and gambrels as mechanisms for swiftly transporting gutted hogs from the killing floor to the cooling room".

25 Ibid., 64-65.

and thus reduce prices: the average American was finally able to afford one of the Model T Fords, waiting at the plant gate, whose photos featured everywhere in the newspapers **(fig. 9)**.

The FIAT managers' trip to Ford in 1915 gave them an insight into mass production solutions that were being developed over there. It prompted them to develop the construction of the new factory in their administrative offices in Turin: they saw the development of new production methods as a response to the new tensions emerging between the working and ruling classes in post-war Italy. These new production methods had the potential to embody the factory of control.

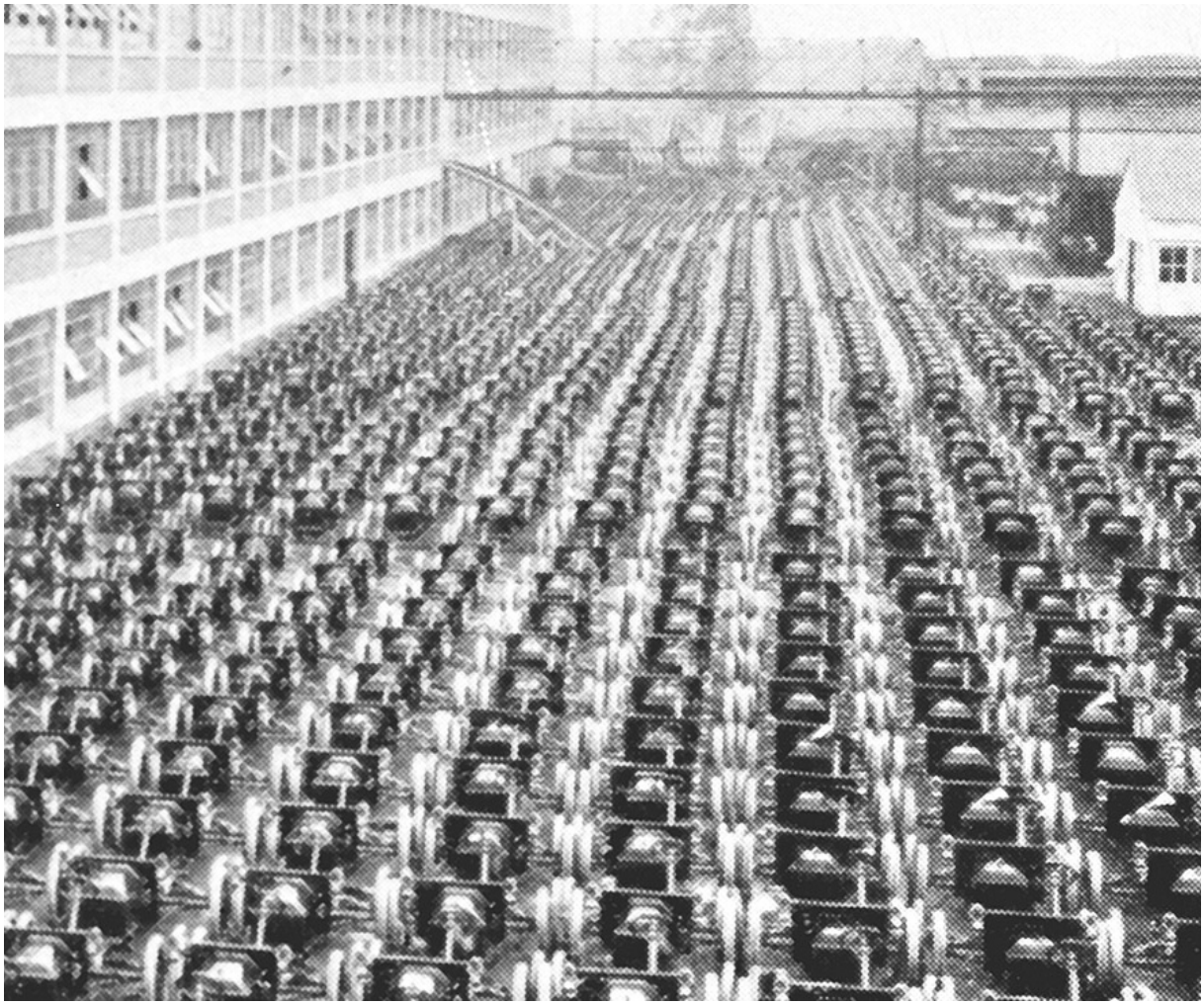


Fig. 9
The Ford Model T chassis
thus installed next to
the factory in preparation
for an advertising photograph.

Architectures of Organisation, Production & Control

In his writings, the Italian journalist and liberal intellectual Piero Gobetti saw in the Lingotto a revolutionary and liberal working class that was regenerating the social and cultural life of the country. His vision was very different from the Church's, which saw the factory as the cathedral of workers' control. If opinions differed at the time, it was because FIAT's administrative offices had confined themselves, in the early stages of the new Italian factory organisation, to translate the Fordist model drowning it in approximations that suited their interests.[1] From the moment it was built, the factory in Nizza street became the new architecture nerve centre of the European landscape. However, it took it a few years to achieve an organisation worthy of the Red River factories.

One of the major differences with Henry Ford was the Bedaux system which FIAT introduced in May 1928 after testing it the previous year in their Riv factory, not far from the Lingotto. After six years of implementation, Giovanni Agnelli decided to abandon the piecework waging in favour of a new system based on the Scientific Labour Organisation. Charles Bedaux had himself developed the "Bedaux method" based on Taylorist theories he had discovered in the United States when he got there in the 1920s. FIAT was the first Italian company to introduce his method. In March 1927 the founder Agnelli even took part in setting up the Società Italiana Bedaux.[2] His method differed from Taylor's because it involved calculating a worker's optimum productivity by means of stopwatches. It was presented as a "method for measuring and controlling human labour", the results of which "are obtained solely by studying the human element involved in production". Unlike Taylor's system, the introduction of which could involve modernising tooling and reorganising the production process, the Bedaux system was an organisational system designed specifically to manage the human factor alone. In other words, Bedaux made it possible to speed up the fragmented work of unskilled or low-skilled workers.[3]
On the basis of a time study, a certain number of points or 'B' units were allocated to each treatment. According to Bedaux, this unit of measurement identified the average amount of labour that could be performed by a worker in one minute, with the corresponding break time. A worker's working hour average was thus 60 B, which corresponded to his basic salary.
A bonus equivalent to 75% of a standard B point was awarded for each point in excess of 60 B. The Bedaux system therefore simplified the analytical control of individual and collective performances. In turn, it encouraged workers to make

1 Bigazzi, Duccio. *Strutture della Produzione : il Lingotto, l'America, l'Europa*, In *Il Lingotto, 1915-1939. L'architettura, l'Immagine, Il Lavoro*, edited by Carlo Olmo: 286.

2 Italian Bedaux Society

3 Geerkens, Eric. *L'application du système Bedaux dans l'industrie belge des années 30*, In *Le travail à l'époque contemporaine. Actes du 127e Congrès national des sociétés historiques et scientifiques, « Le travail et les hommes »*, Nancy, 2002: 112.

the most of every minute they spent in the factory. It was much more limited than Taylor's system because the '*stopwatchers*' – responsible for timing each manufacturing stage and task – and the analysts from the '*Time Analysis*' office – responsible for transcribing these measurements into organisational tables – were only involved in the production area, since their aim was limited to simply increase the workers' productivity. The *time analysis* department offices were allocated to each workshop according to their purpose, as proposed by Taylor. However, unlike his recommendations, they were not subject to the same workers procedures: instead of having a sort of recipe in their hands explaining how to analyse the work on the shop floor, they operated as superiors who analysed and measured every action and gesture. Of course, when the switch to autonomous electric machines allowed the company to move away from the older, slower belt-driven machines, the Bedaux system began to be debated. The measurement unit was based on a pure quantification of production speed, and therefore on the worker's performance alone, which was itself subject to a device's rhythm.
The Bedaux method was thus used to justify the introduction of these new machines, creating controversies in the process.[4] Between 1926 and 1934, the company gradually lowered wages from 3.7 to 2.81 lire average per hour. This represented a saving of 7.12 lire per worker on an 8-hour day.
On an average of 12'000 workers, FIAT saved around 85'500 per day; savings that were reinvested in faster and more sophisticated machines that allowed piecework rates to be increased. Workers were paid less but produced more pieces per hour, enabling them to earn just as much as before and thus limit the damages. As a result of this intensification of labour efforts, workers quickly found themselves exhausted and turnovers rose dramatically, leading to a high level of job instability at FIAT. This is what the Church and many other figures on the anti-fascist and socialist scene were criticising: a system whose sole aim was "the redemption and exploitation of workers to the extreme limit".[5] The Bedaux experiment came to an end at FIAT

4 For example, Duccio Bigazzi explains that "the purchase of a Lockheed hydraulic brake cylinder rectifier would have made it possible to replace the work carried out manually by two workers and to reduce the time needed for one cylinder from 3 to 1.8 B; this would have saved 1,600 B per day, or 42 lire, which would have made it possible to fully amortise the machine in less than two years": 315.

Fig. 1
Three images taken from the film made by the Luce production on Rome's wholesale market in 1932.

in February 1935, when the company signed an agreement to return to piecework wages. This step backwards in the wage system, which lasted until the opening of Mirafiori – the moment when FIAT, under the Fordist model, decided to impose daily wages in all its factories – did not prevent FIAT from keeping its *time analysis* offices, which continued to apply their production analysis method.

The Bedaux system, which was integrated under the Fascist regime as part of a control policy, was not introduced into the wholesale market, which was itself the result of a Fascist programme under the initiative of Mayor Ernesto Nathan in Rome.[6] Mussolini had widely claimed the wholesale market as his own success story and used it in his propaganda as an exemplary building for the sanitary supply of the capital. The regime saw agriculture as a means of improving the country's economic situation and food distribution as a civic matter. That's why Rome's wholesale market, designed by Emilio Saffi, featured prominently in many Luce films (the official state media company).[7] **(fig. 1)** Mussolini's interest in the Turin MOI was demonstrated by the visit he made to the construction site in 1933 **(fig. 2)**.

An elaboration of the market employees' organisation chart will help us to understand why the introduction of a Bedaux system, planning the distribution of wages, was not conceivable in this kind of programme. In its early days, the operation of the MOI had many points in common with the one of Rome, and its management was left to two entities: the Fascist Federation of Agriculture and the Fascist Federation of Commerce. Employment was thus divided into two types of organisation: *producers*, belonging to the first federation, and *merchants*, belonging to the second. The allocation of warehouses and exhibition spaces was given priority to the producers: the latter were allocated to the exhibition spaces while the merchants occupied the warehouses.[8]

5 M. Montagnana, *Inchiesta sul sistema Bedaux*, in "Lo Stato operaio", VII, n.8, agosto 1933: 522.

6 On this subject see chapter 8 by Ruth W. Lo "HYGIENE, URBANISM, and FASCIST POLITICS at ROME'S WHOLESALE MARKET." In *Mobs and Microbes: Global Perspectives on Market Halls, Civic Order and Public Health*, edited by Leila Marie Farah and Samantha L. Martin. Leuven University Press, 2023.

7 See Istituto Luce, *Roma: Scene dei mercati generali* (1932; Rome, Italy: Istituto Luce, 1932), newsreel

Fig. 2
The Duce Benito Mussolini visiting the MOI's construction site in 1933 with the workers at his side.

There were two rational reasons for this. Firstly, the harvests from the independent producers could not be as constant as the goods imported by the traders by wagon. This meant that they only came to the market when they had produce to sell, and therefore had no need for a storage space. Secondly, there were 2.7 times more exhibition areas than warehouses (180 compared to 66) and there were 170 merchants compared to 420 producers. It was therefore logical to place the mass where it had most space available. By the way, these two facts helped to make the MOI the largest Italian market.[9] To back up the figures and give a better idea of goods amount passing through the MOI, between 1923 and 1929 Rome's market handled
an average of 5 wagons of fruit and vegetables a day, compared with 50 for Turin.[10] There was no distinction between *producers*, but *merchants* were divided into "*importers*" and "*medium-sized wholesalers*", also known as "*sensali*", a term that defined their activity in a much more figurative way.[11] The former were direct importers, i.e. they bought directly from the producer to resell to *shop retailers*; the latter were wholesalers, buying products in large quantities from a *supplier* to resell to *shop retailers*. Alongside the merchants were pure *commission agents*, i.e. people who never bought on their own, but who received goods from producers to sell on their behalf in return for a commission. At times, it was even possible to see producers present at the market entrusting commission agents with the sale of the products they brought with them, because they knew better how to place them. Unless the producer was present, the commission agents had no control over their commercial activities, which led to certain bureaucratic complications in a business based on fast service.[12] As direct importers also operated in part as commission agents, pure commission agents were not distinguished from the latter. It was therefore impossible to distinguish between a direct importer who had his own company and a commission agent who sold on behalf of a producer. Finally, there were the porters, known as "*facchini*", hired by the merchants, most of them immigrants from Egypt, who did a job that no Italian wanted to do: carrying and moving each fruit and vegetable cases from the unloading platform to the warehouses and from the warehouses to the purchaser. It is almost impossible to know how many *facchini* were working on site. Their number varied according to each merchant and the season: the market was much busier in summer. The contracting, weighing and selling took place directly at the exhibition sites, and the merchants were free to hire cashiers to relieve themselves of this burden. It was up to them to calculate whether having an extra employee would enable them to be more efficient and therefore more profitable in terms of sales. On the other hand, weighing checks could be conducted at the market exit to prevent robberies. Exhibition areas and warehouses were rented directly by merchants and producers to the city and were subject to facilities maintenance charges managed by the city itself.

The organisational chart **(fig. 3)** shows a highly complex system which is not managed by a single entity as in the factory, but by several

8 *L'Inaugurazione ed il Funzionamento del Nuovo Mercato Orto-Frutticolo* in *Torino*. In *Rivista mensile municipale* anno XIV, n.8, agosto 1934: 2.

9 Lojacono, S, I Guarino, and M. Varetto. *Torino MOI. Da Mercati Generali a Villaggio Olimpico*. Torino: Città di Torino, 2005: 227.

10 Stemperini, Giuseppe. *La Politica Annonaria Del Comune Di Roma Tra Ottocento E Anni Trenta Del Novecento*. CROMA - Università degli studi Roma Tre, 2009: 236.

11 The Treccani dictionary defines sensali as a "*Mediator between seller and buyer in commercial transactions, especially in the negotiation of agricultural products and livestock*". Thus, a purchaser knew that he was not buying from a producer or a direct importer, but from an intermediary.

12 It should be notice that the wholesale market economy, based on food transit flows speeds, itself imposed by the nature of food being rapidly perishable, diverges from the industrial economy which is based on regulating its speed and not necessarily accentuating its pace.

independent companies, some of which are not even recognised. Their is one general organisation chart for market management and food distribution in general, but several specific organisation charts for each company. This explains why it was impossible to impose a general work measurement system in this type of programme: each company defined its own organisation. It is also for this reason that, in addition to its strong typological similarity, the activity of the wholesale market was often compared to a city: its life takes shape from the moment it is occupied by a considerable number of intertwined autonomous activities. This activity-based organisation is similar to the workshop-based organisation of a factory: each workshop represents an activity, with the difference that each one is subject to a same entity and is not autonomous, since each depends on the other to drive forward the complete production cycle. The activities of a factory are therefore much more linear than those of a city or the wholesale market. It would therefore be wrong to draw an overhasty and simplified parallel between the two.

As far as salaries were concerned, those of the producers and merchants were obviously linked to their own profits, equivalent to the margins they made after deducting from revenues various expenses (transport, cleaning, employee pays, etc.). In this sense, they played the same role as a plant owner: they transformed raw materials in order to make a profit out of them. They themselves were responsible for hiring the *fachini*, who were the wholesale workmen. As the Lingotto workers, they did manual work that didn't require any specialisation. However, they worked much longer hours (usually from 3am to 10am) and were paid on a daily basis: the multiple interactions between seller, purchaser, goods loading and unloading, as well as the *fachini*'s mobility, would have made it difficult to isolate a quantity of work that could be done in a minute. Their loading and unloading speeds depended on too many external factors and would not have affected sales speed so much. Neither was their working speed regulated according to a conveyor belt and other equipments that generally regulated the machining pace in the Lingotto. In this sense, the wholesale market was much less controllable than the factory and this was clearly visible in the crowds of people pictured in period images.

This organisational chart is therefore very different from the Lingotto's, which shows a very precise organisation within the building and reflects a factory whose operation "must be like clockwork".[13] **(fig. 4)** It is divided into two parts: one for the organisation of the workshops and the other for the general organisation, which did not take its definitive form until 1927. The factory had already established a very precise production organisation based on the assembly line model when it opened, but was struggling to understand why Henry Ford's plants were producing at four to five times faster. In August 1926, Ugo Gobbato, General Manager of Lingotto, went to Detroit with his senior colleagues in an attempt to uncover the secrets. After two months of research, they realised that the secrets of Fordist mass production were mainly the result of *study*, *order* and *method*.[14]

13 Gobetti, Piero. *Visita alla Fiat*, dicembre 1923, Scritti Politici: 553.

14 Bigazzi, Duccio. *Strutture della Produzione: Il Lingotto, l'America, l'Europa*. In *Il Lingotto, 1915-1939. L'architettura, l'Immagine, Il Lavoro,* edited by Carlo Olmo, 1994: 306.

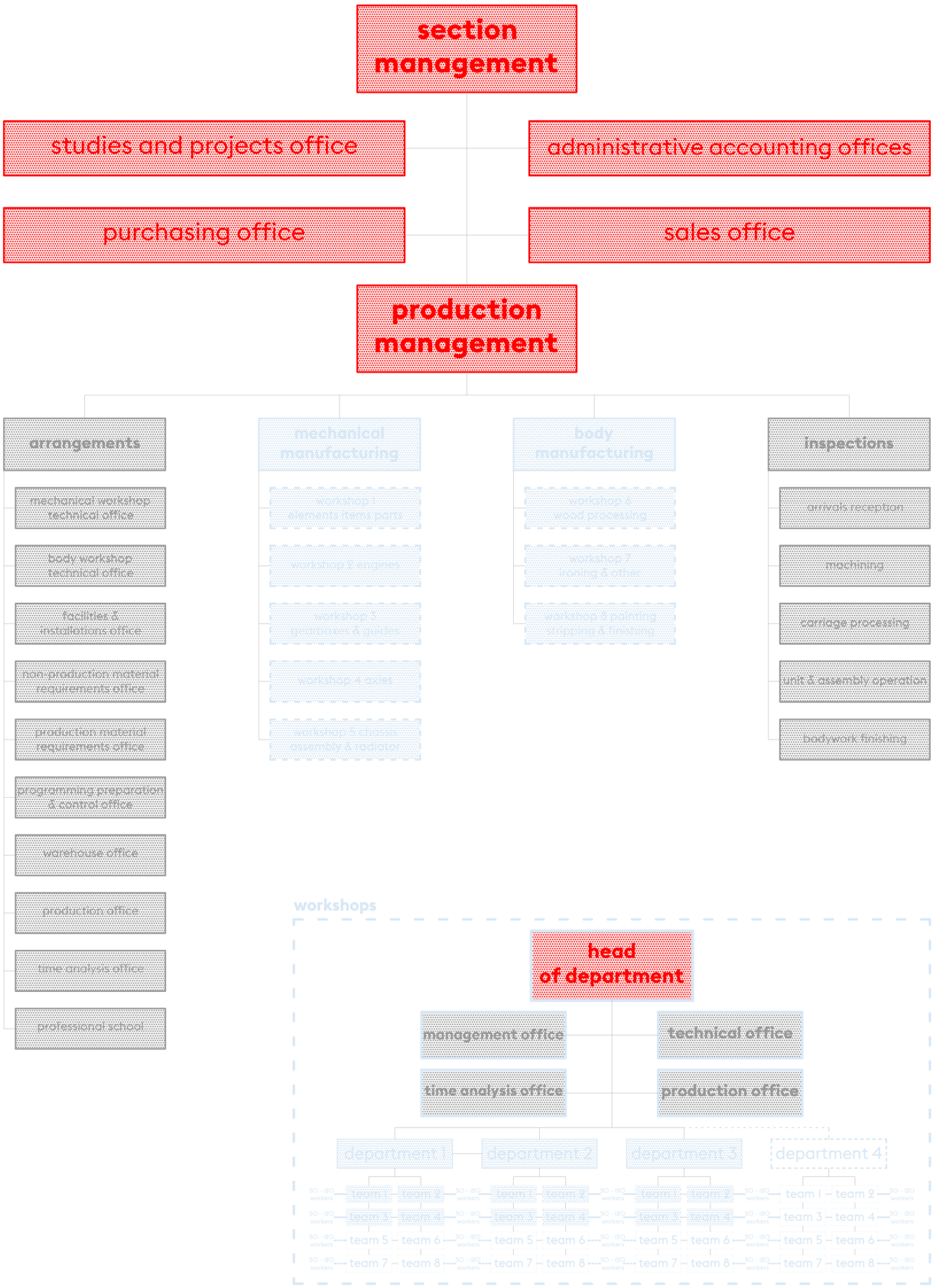
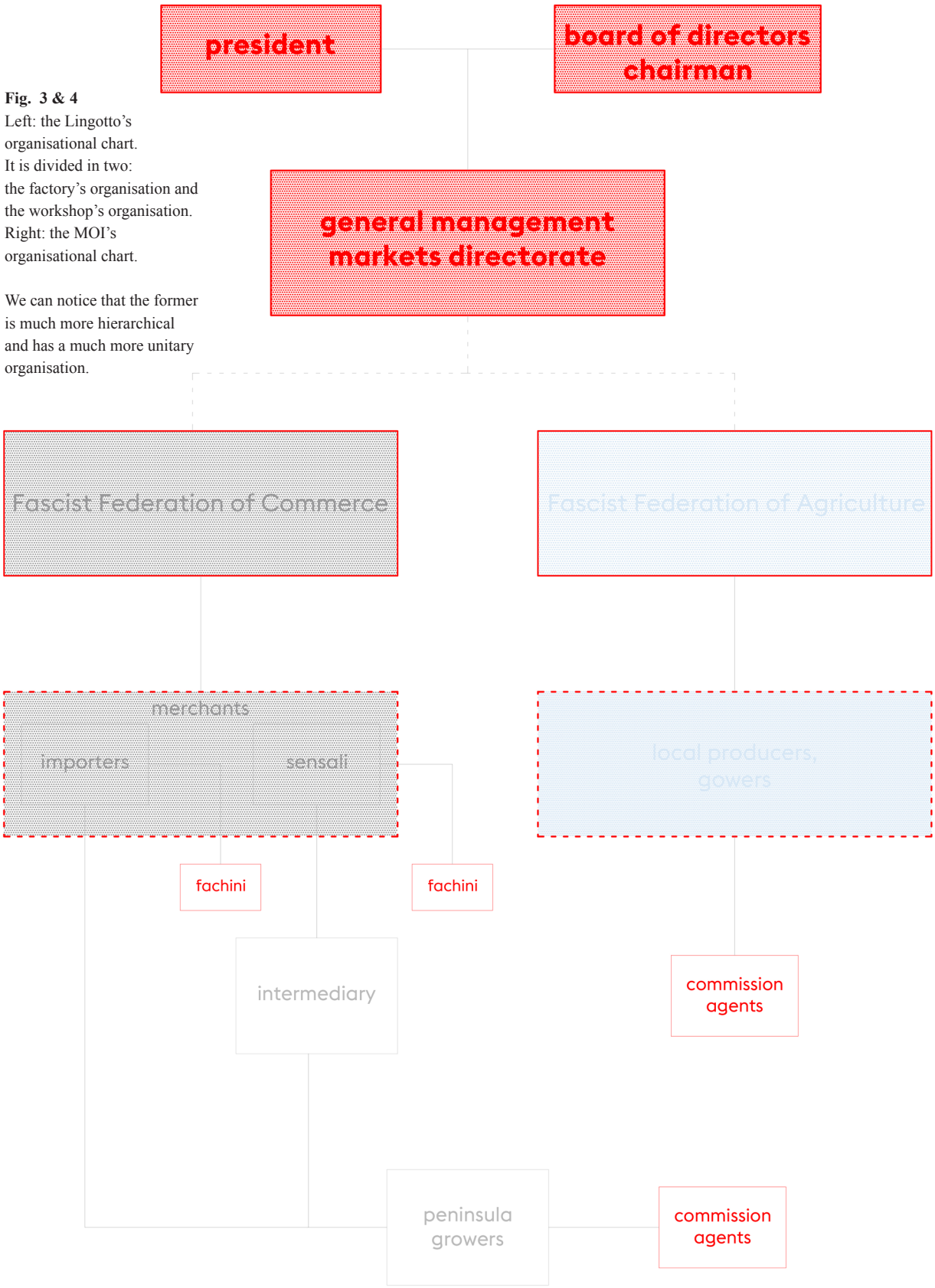

section management
studies and projects office
administrative accounting offices
purchasing office
sales office
production management
arrangements
mechanical workshop technical office
body workshop technical office
facilities & installations office
non-production material requirements office
production material requirements office
programming preparation & control office
warehouse office
production office
time analysis office
professional school
mechanical manufacturing
workshop 1 elements items parts
workshop 2 engines
workshop 3 gearboxes & guides
workshop 4 axles
workshop 5 chassis assembly & radiator
body manufacturing
workshop 6 wood processing
workshop 7 ironing & other
workshop 8 painting stripping & finishing
inspections
arrivals reception
machining
carriage processing
unit & assembly operation
bodywork finishing
workshops
head of department
management office
technical office
time analysis office
production office
department 1
department 2
department 3
department 4
50 - 180 workers
team 1
team 2
team 3
team 4
team 5
team 6
team 7
team 8

Fig. 3 & 4
Left: the Lingotto's organisational chart. It is divided in two: the factory's organisation and the workshop's organisation. Right: the MOI's organisational chart.

We can notice that the former is much more hierarchical and has a much more unitary organisation.



The illusions that the conveyor system could in itself be a sort of automatic production monitor had now come to an end, and this journey showed them that the inadequate coordination of flows was the obstacle to their production. They therefore studied the requirement for functional specialities that Taylor had introduced in 1927. The Lingotto instituted a division between *deliberative bodies* (production management) and *executive bodies* (manufacturing management), which consequently assigned greater importance to central services. These included the *Workshop Technical Department*, which already existed for several years. Its mission was to study current and planned machining operations to ensure "economy and precision of execution". Its tasks therefore included analysing manufacturing cycles, proposing technical modifications to products, designing tooling, standardisation and so on. The head office also set up the *Time and Production Analysis* offices (accompanying the new Bedaux method), which consisted in a series of separate units in each workshop. In addition to their timekeeping duties, time analysts had to be highly skilled technicians in technology and labour economics. Their systematic analysis of the work cycle made it possible to apply remuneration systems based on individual incentives, which guaranteed high wages in exchange for "greater speed" and constant control of all the technical factors required for an efficient production flow. The Production office was responsible for scheduling production cycles, stabilising and checking deadlines and targets, and replenishing materials.

The spatial organisation of the half-kilometre main body was therefore based on the division of the car's manufacturing cycle into its essential parts. Firstly, the chassis and body sections each had their own half of the building: to the north, the body section; to the south, the mechanical section. They were themselves broken down into groups of independent workshops responsible for producing, assembling and testing the assemblies allocated to them. Each workshop was in turn divided into departments, corresponding to the production of the sub-components. Finally, the departments were divided into teams.[15] Production took the opposite direction to Highland Park where it proceeded from top to bottom. At Lingotto, each workshop was responsible for producing and assembling the parts that would be sent to the chassis assembly line on the fifth floor, where the ready-to-run car would be tested on the roof. It would be then sent back to the shipping and packaging area on the ground floor to the north. These comings and goings of materials flows, forced by the roof test track position reinforcing FIAT's brand image, constitute a paradox in a production process that was intended to be strictly linear. This paradox is not only reflected in the test track. Firstly, moving a work-piece from one machine to another was interrupted after each manufacturing phase because there was no automatic means of transport. The materials, loaded and unloaded manually, remained stacked in warehouses of varying sizes. Also, the transfer of a work-piece from one workshop to another, and therefore from one floor to another, did not necessarily follow the supposedly linear course from bottom to top. For example, the second floor, intended for workshop n. 2

15 It should be noted that this organisation is not limited to the five-storey central body. This is a simplification for clarity purposes. In reality, in addition to this central body, the Via Nizza complex consisted of the office building (the Palazzo Uffici, where the head office was located), a number of buildings in the southern area (moulding and forging, woodworking, presses, general warehouse), including the very important single-storey horizontal "presses" building, and the packaging and shipping area to the north near the wagons. Overall, the plant covered an area of 206'000m^2; at the end of 1924, there were 12'859 employees, including 11'892 manual workers and 967 clerical staff.

'engines', did not have its own test room. An engine finished being assembled on the 2nd floor therefore had to transit to the engine test room on the 1st floor before being sent to the fifth floor where it would be assembled with the rest of the car. The painting process on the fifth floor also considerably slowed down the production cycle. Drying times could not match manufacturing times. As a result, the assembly line's overall fluidity was hampered.
The two axonometries produced **(fig. 5 & 6)** show the factory's organisation and the concern about interruptions in the linear production chain. They are compared with the MOI axonometries, which show a much less complex and more organised network **(fig. 7 & 8)**.
There were 8 independent workshops in the factory (components; engines; gearboxes and rails; axles and bridges; chassis assembly; woodworking, sanding and others, and finally painting, sawing and finishing), each divided into 3 to 5 departments, themselves divided into 4 to 8 teams, each made up of 50 to 120 workers. The efficiency of systematically reducing the product to its simplest elements required constant and regular centralisation of information. This was the *time and production analysis* office' task: it had to send to the production management department a daily "updated" production report based on their clocked observations in the workshop. After a review, the production management department would draw a report summarising *1. the current state of affairs* and *2. the possible improvements,* and would then send it to the "*facilities and installations*" office, responsible for the shop floors layouts. Unfortunately, there is little graphic evidence of these drawings made by this office. In fact, no archive, neither the FIAT Historical Centre nor the Porcheddu archive, currently seems to have any plans showing the layout of the machineries on the plant's shop floors.[16] It would seem that the building's image on the architectural stage took precedence over its contents. Nevertheless, there is a file at the FIAT History Centre tracing the work carried out in the plant between 1946 and 1953. During these years, the Lingotto was much less productive than before: it had already abandoned its successful factory status in the hands of Mirafiori, inaugurated on the 5th May 1939. FIAT's management had already considered in 1938 the possibility to house both the Polytechnic, which was looking for space for its new headquarters, and the Military School in the main building.[17] This procedure was brought to a sudden halt by the advent of the Second World War, which forced FIAT to use the Lingotto in support of Mirafiori for armaments production. The tragic episode did however demonstrate the factory's ongoing potential, and for many years it continued to manufacture mainly spare parts (electrical appliances, injection pumps, refrigerators, bodywork, aircraft engines, etc.) until it was revived in the 60s and 70s with the Fiat 1100. This 1946 report therefore retraces the analytical work carried out at a plant whose production had largely declined, but whose spatial and managerial organisation had been greatly strengthened over time, always with a focus on rationalising and improving performances.

16 Unlike the Ford factories in Detroit, which have been extremely well documented by Horace Lucien Arnold and Fay Leone Faurote in the book *Ford Methods and the Ford Shops*, which shows the layout of machines on each workshop floor.

17 Pozzetto, Marco. *La Fiat-Lingotto : Un'architettura Torinese D'avanguardia*, 1975: 49-51.

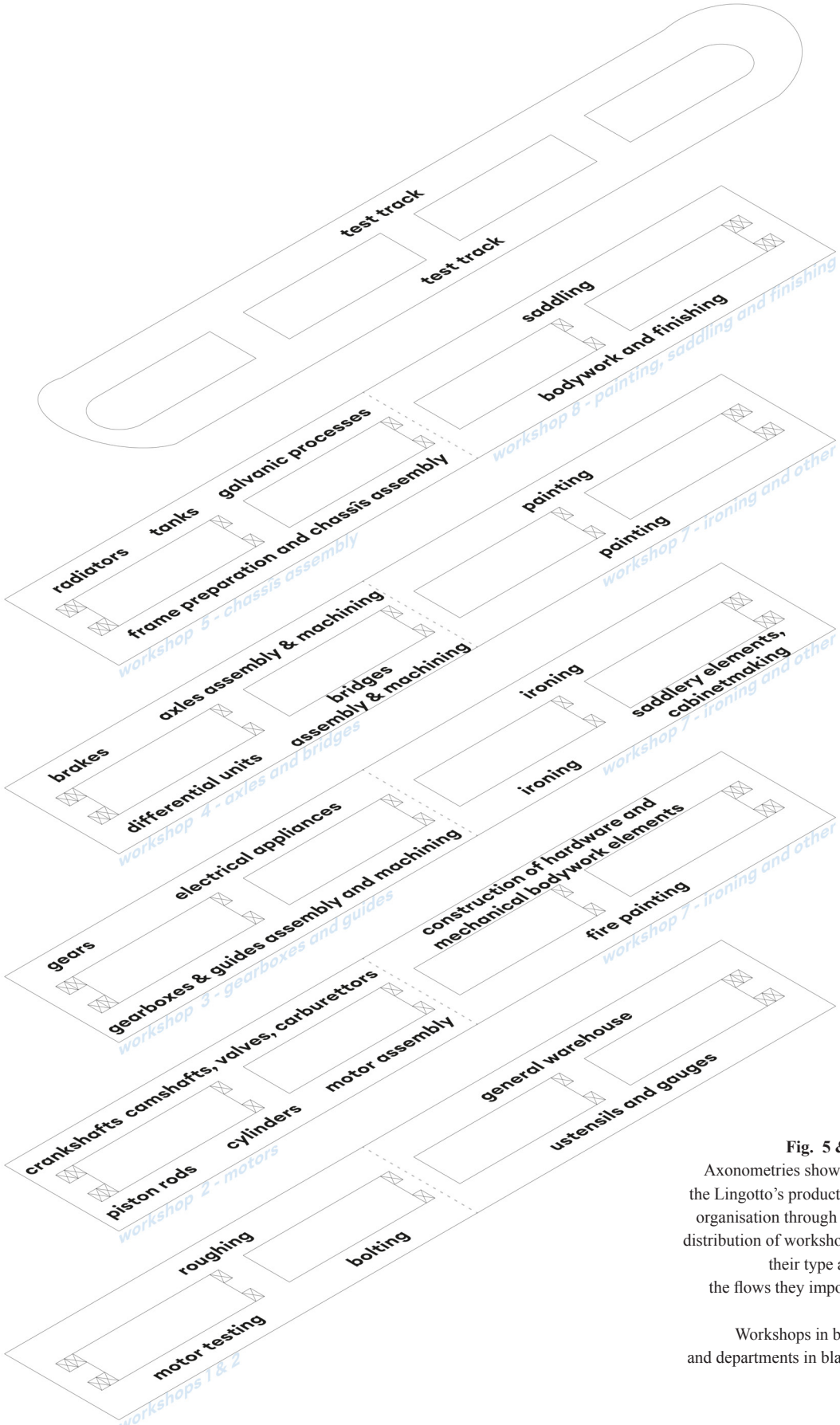
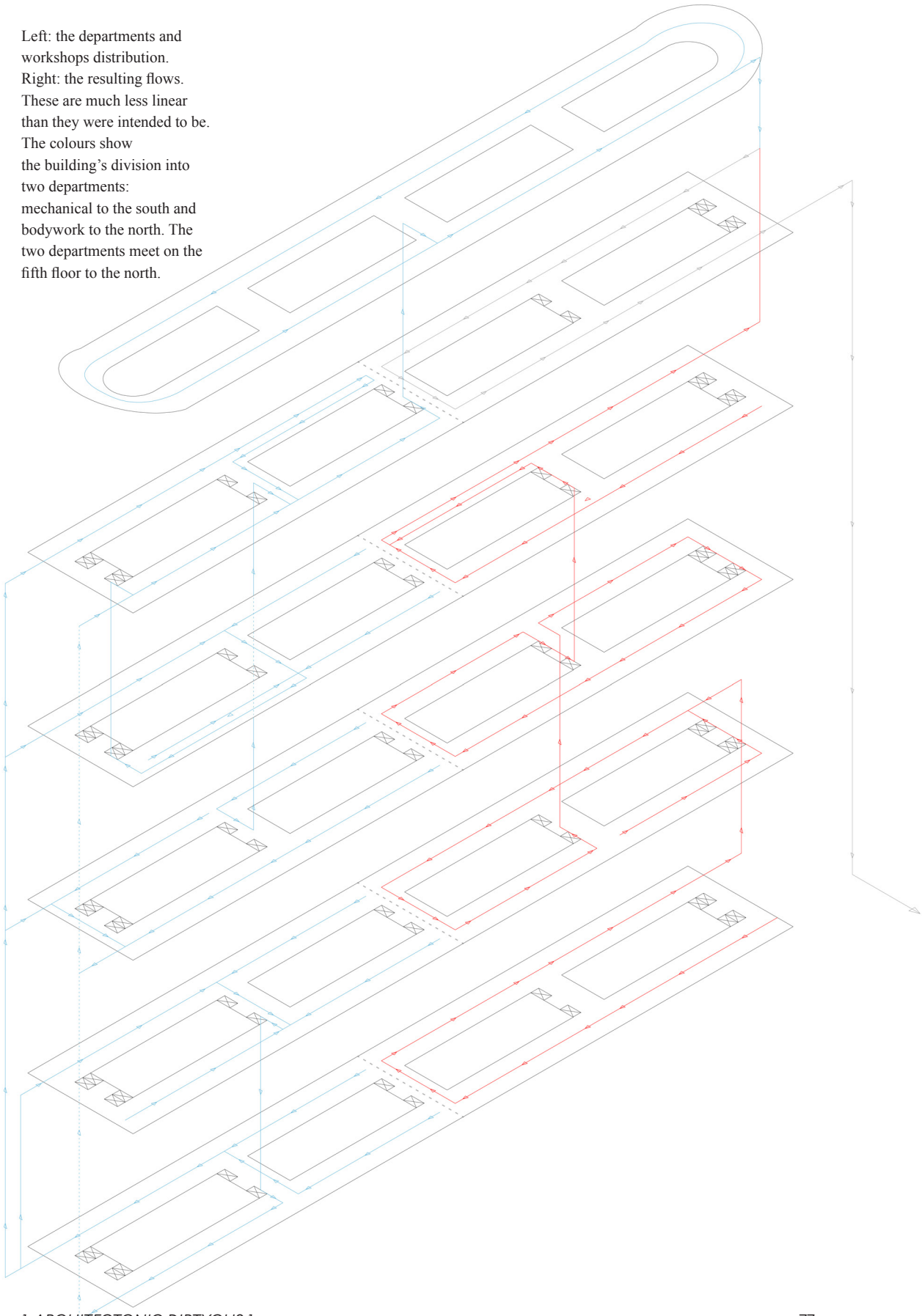


Fig. 5 & 6
Axonometries showing the Lingotto's production organisation through the distribution of workshops, their type and the flows they impose.

Workshops in blue and departments in black.

Left: the departments and workshops distribution. Right: the resulting flows. These are much less linear than they were intended to be. The colours show the building's division into two departments: mechanical to the south and bodywork to the north. The two departments meet on the fifth floor to the north.



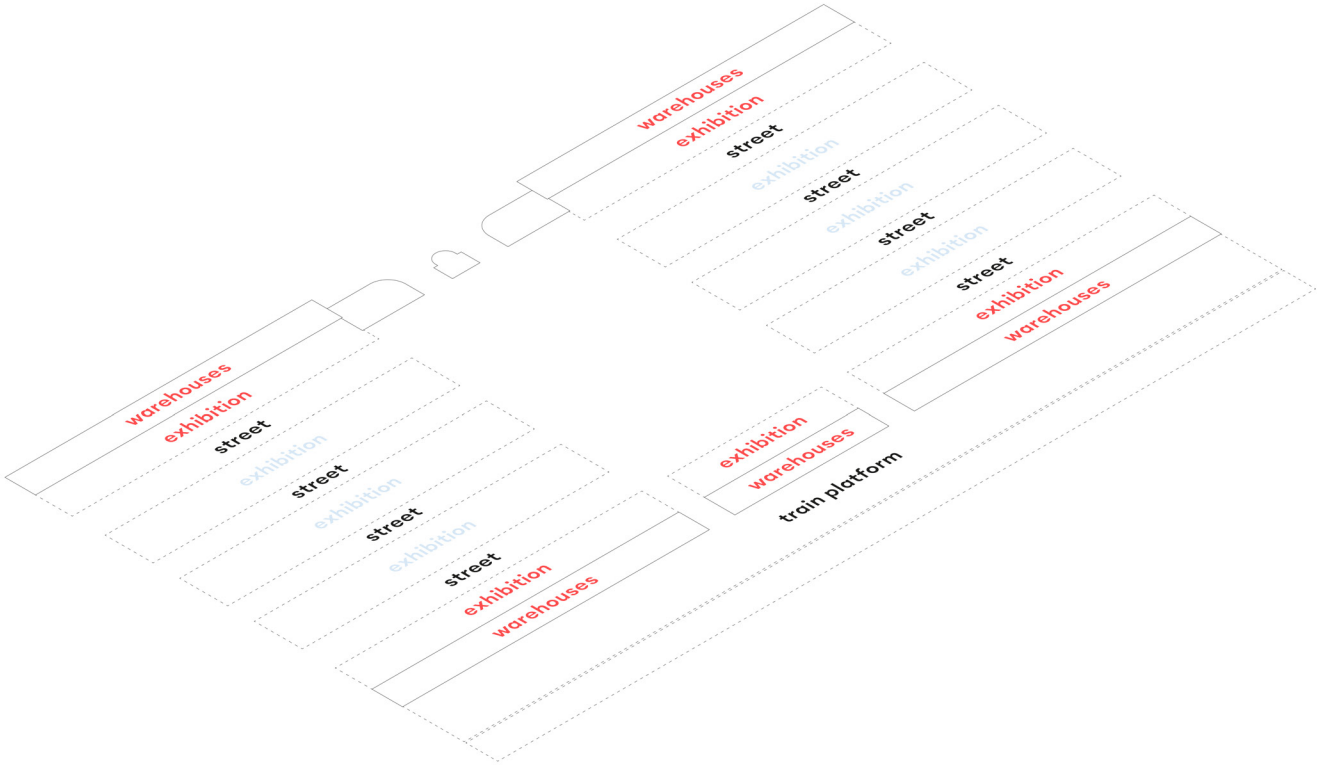
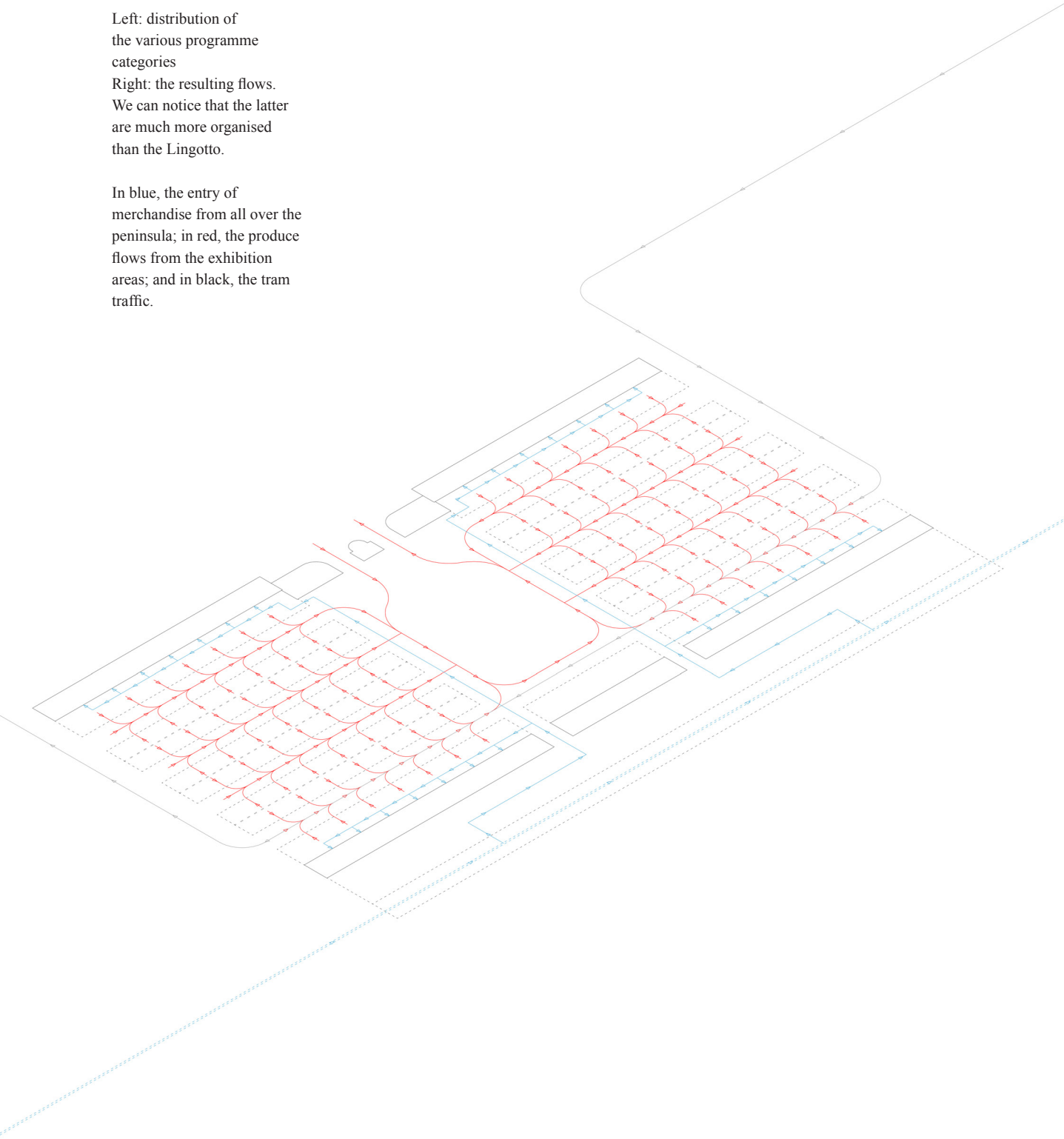


Fig. 7 & 8
Axonometries showing the MOI's distribution organisation through streets, exhibitions and warehouses.

Local producers in blue, merchants in red and public spaces in black.

Left: distribution of the various programme categories
Right: the resulting flows. We can notice that the latter are much more organised than the Lingotto.

In blue, the entry of merchandise from all over the peninsula; in red, the produce flows from the exhibition areas; and in black, the tram traffic.



The report begins by tracing the introduction of new German, Swiss and American machines, acquired largely thanks to the Marshall Plan. In an almost obsessive manner, each machine is documented with plans and technical statistics (concerning the number of revolutions per minute, improvements over previous machines, etc.) **(fig. 8)** and photographs depicting their installation in the factory **(fig. 9)**. The photographs clearly show how the spaces gained in luminous and spatial quality once the transition to the autonomous electric machine had been established **(fig. 10 & 11)**: no more belts running through the whole space and casting shadows on the floor, no more obstacles for the workers who were able to produce even more.

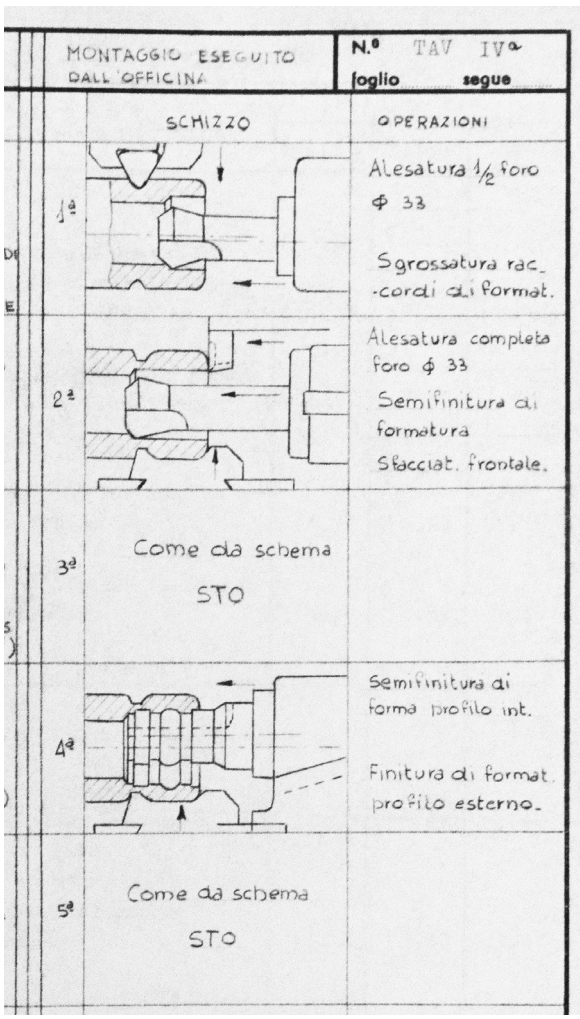
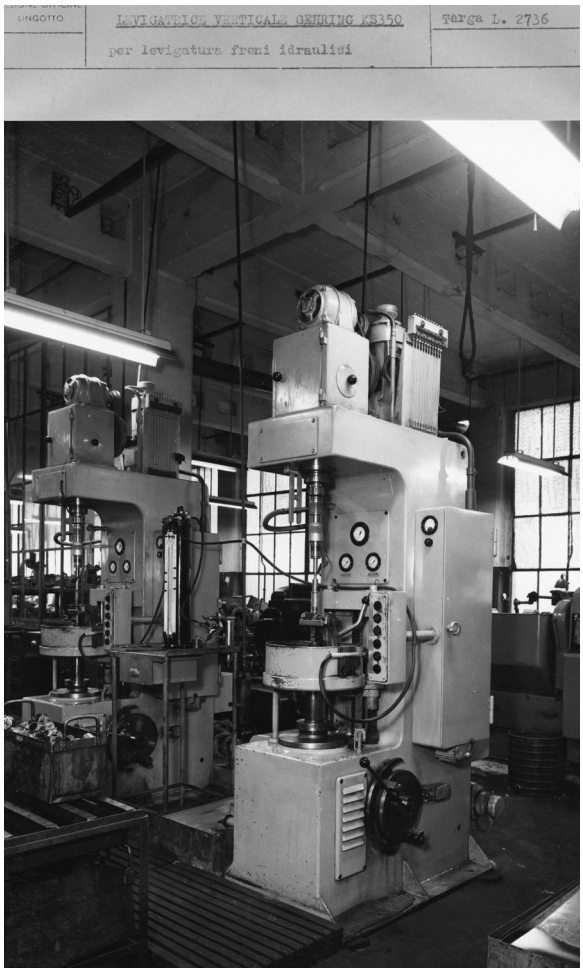


Fig. 8
Fragment of the tables showing the technical details of each new machine being installed in the FIAT Lingotto workshops.

Fig. annex
Women workers at work in the Lingotto, 1950 circa. Note the conveyor in the centre where the pieces are being placed, as well as a clerk from the *Time Analysis* office who examines times taken to manufacture the parts.

Fig. annex
An employee from the *Facilities and installations* office checking that a machine is working properly.



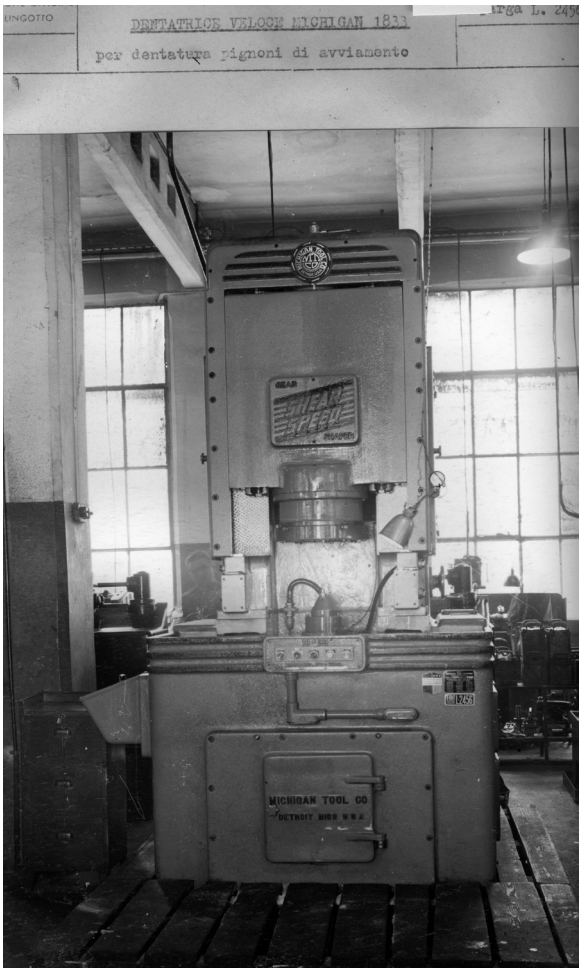
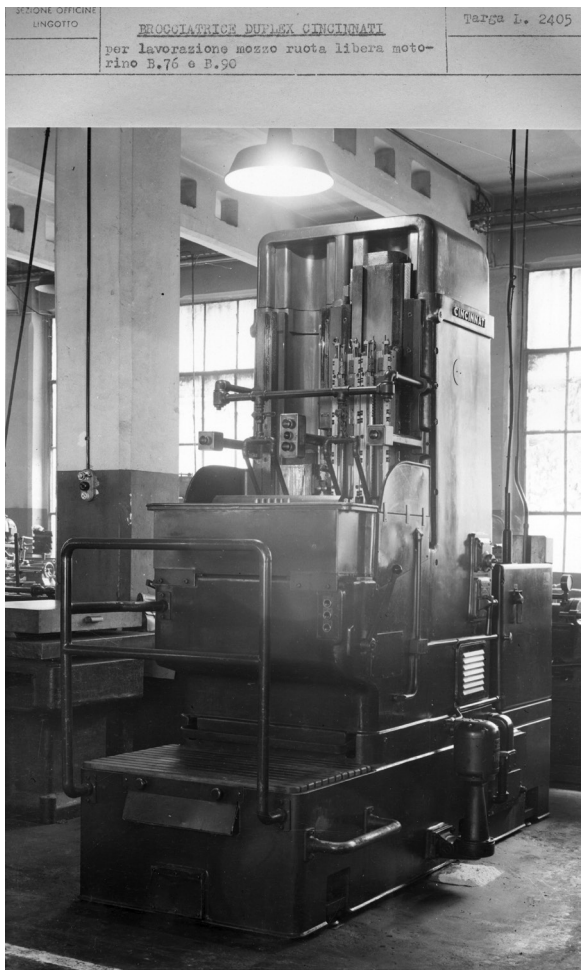


Fig. 9
Four examples
of documentation methods
for machine installations at the
Lingotto during the year 1946.



Each machine is given a number identifying it in case of future works that would need to be carried out.
Each machine is photographed and then placed in an album showing its number, name and intended use.

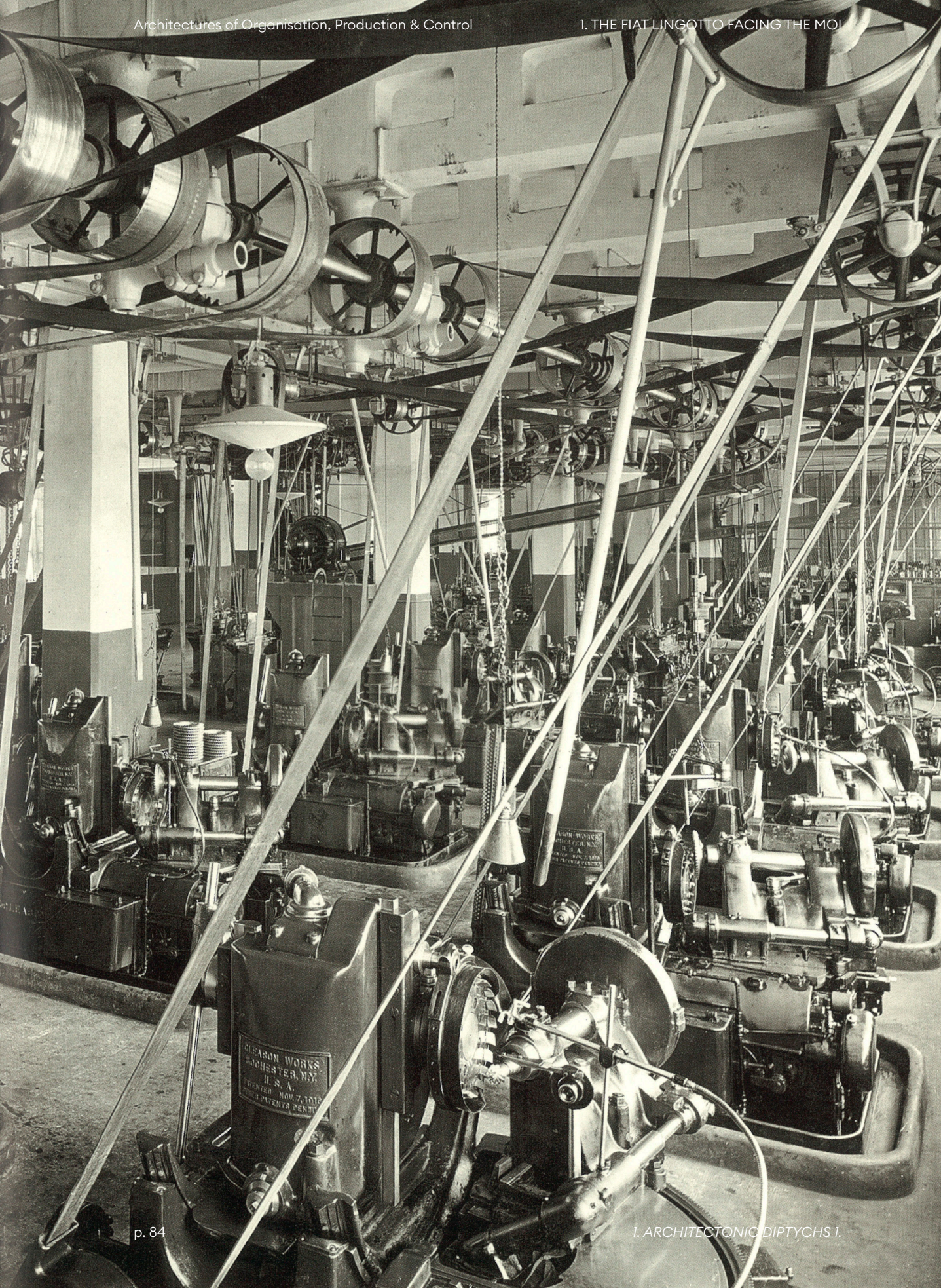

GLEASON WORKS
ROCHESTER, N.Y.
U. S. A.

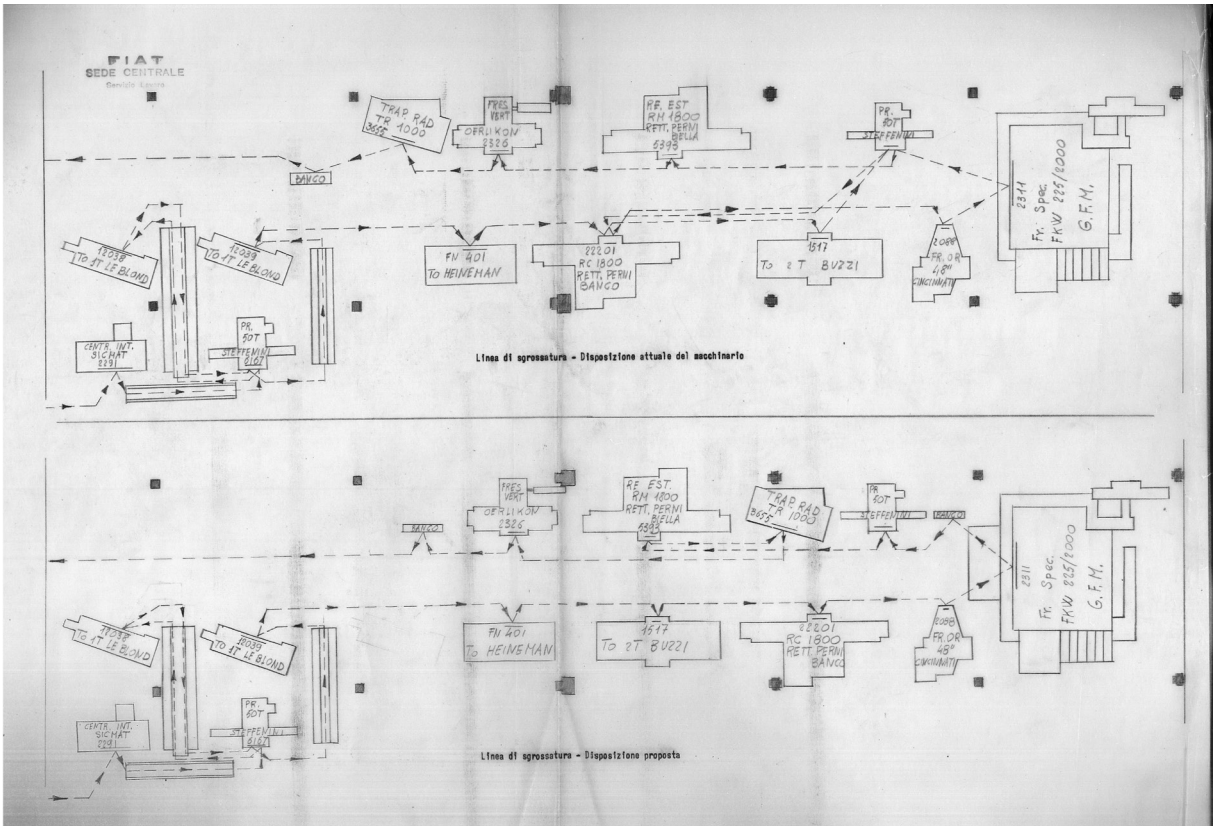
Fig. 10 & 11
Light & Space improvements.
Left: a field of Gleason gear cutting machines (workshop 4). The individual engine and driving force had not yet been implemented. The space is completely obstructed by the belts.
Right: a picture taken in the same workshop n.4 (department 32). We can see some of the machines previously presented.
On the left, each machine is also much less autonomous than on the right. This is reflected in the sort of permanent pedestals built into the floor that don't appear on the right.

Next are two shop-floor plans, each showing two different machines layouts in the *planing line* workshop **(fig. 12)** preceding the *finishing line* **(fig. 13)**.[18] They confront a current layout with a suggested improved one. The arrows on the plans indicate the workpiece's path, not the worker's: one or two workers were assigned to each machine, working in a fixed position, following the old principles of "reducing the worker to a specific workstation, simplifying and avoiding every unproductive movement".[19] With the introduction of stationary machines, the worker's immobility was pushed to the extreme. By studying the most appropriate spatial arrangement for machines in the workshop, these plans set out ways of increasing production simply by rationalising the movement of goods. They were in no way aimed at changing the workforce, nor did they imply any change in the worker's production speed.[20] The study therefore aimed to increase overall productivity by analysing the movement of materials alone: in the relationship between product and factors of production (defining the productivity ratio), the layout and the relationship between machines took the place of the so-called "factors of production".

18 Unfortunately, these are the only two drawings present. Since the plans have not come down to us, we don't know if the other factory workshops were subjected to the same experiments, but this was probably the case.

19 Bigazzi, Duccio. *Strutture della Produzione: Il Lingotto, l'America, l'Europa*. In *Il Lingotto, 1915-1939. L'architettura, l'Immagine, Il Lavoro*, edited by Carlo Olmo, 1994: 291.

Fig. 12
Proposal for new machine distributions in the *planing line* workshop.

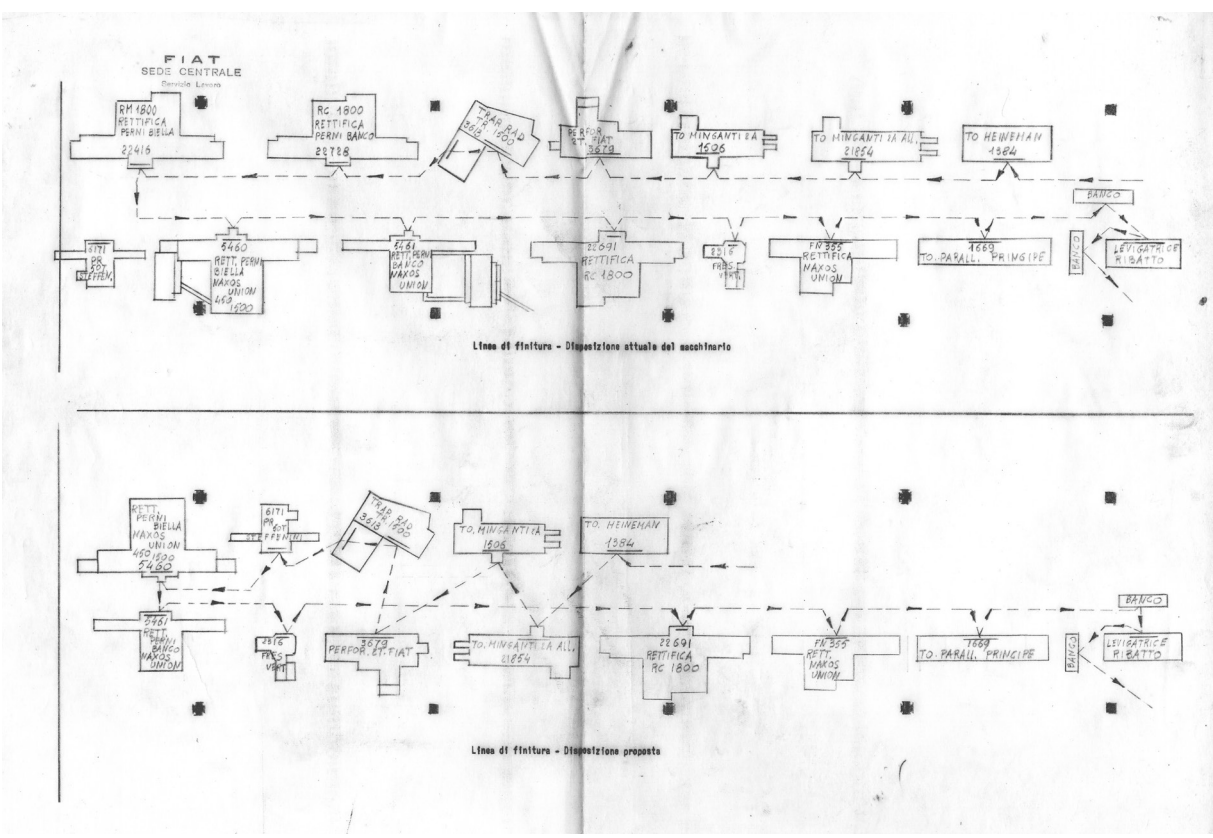


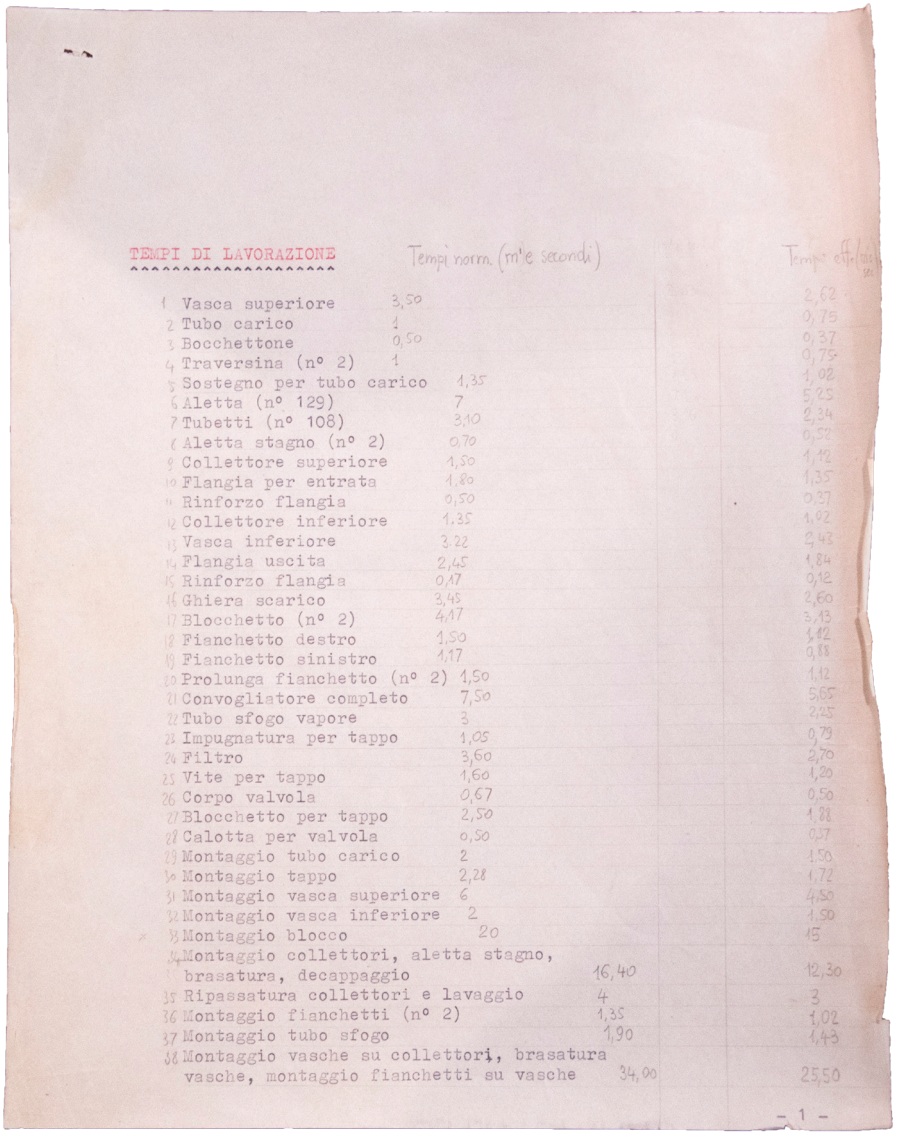
This new layout made possible to significantly reduce production times, which were set out in charts comparing the initial times and the updated ones **(fig. 14)**. The graph drawn by the company **(fig. 15)** comparing production with manpower is a also clear demonstration : over the four years studied, production almost doubled while labour force remained relatively stable.
The Lingotto production directors, probably under the influence of the new methods implemented at Mirafiori, had finally realised that copying Ford's production methods was simply not enough to increase productivity.
On the contrary, it was necessary to replicate the process of experimentation he was carrying out in his factories.[21] Like Ford, FIAT had eliminated Gilbreth's studies, not by minimising the worker's gestures, but by ceasing to study them: the material's path, at the centre of concerns, made it possible to establish the right workshop layout and subsequently to define the necessary workforce.
Of course, we cannot deny that workers and supplies are linked and that both depend on each other, but it is important to emphasise the methodological shift at FIAT, which was no longer placing the worker at the heart of its concerns, but rather the technology.

20 On the contrary, through these studies, the *analysis office* even sought to establish the minimum workforce required for a given phase of production.

21 We recall the experiments carried out by Henry Ford in his Detroit plant (explained in the previous chapter of this publication), for the construction of the engines and the assembly of the chassis forty years earlier, which involved several dimensions: regulation of rhythms, machines' spatial layout modifications, etc. It was only through experimentation that Henry Ford was able to define the best production methods.

Fig. 13
Proposal for new machine distributions in the *finishing line* workshop.





TEMPI DI LAVORAZIONE	Tempi norm. (min'e secondi)		Tempi eff.
1 Vasca superiore	3,50		2,62
2 Tubo carico	1		0,75
3 Bocchettone	0,50		0,37
4 Traversina (nº 2)	1		0,75
5 Sostegno per tubo carico	1,35		1,02
6 Aletta (nº 129)	7		5,25
7 Tubetti (nº 108)	3,10		2,34
8 Aletta stagno (nº 2)	0,70		0,52
9 Collettore superiore	1,50		1,12
10 Flangia per entrata	1,80		1,35
11 Rinforzo flangia	0,50		0,37
12 Collettore inferiore	1,35		1,02
13 Vasca inferiore	3,22		2,43
14 Flangia uscita	2,45		1,84
15 Rinforzo flangia	0,17		0,12
16 Ghiera scarico	3,45		2,60
17 Blocchetto (nº 2)	4,17		3,13
18 Fianchetto destro	1,50		1,12
19 Fianchetto sinistro	1,17		0,88
20 Prolunga fianchetto (nº 2)	1,50		1,12
21 Convogliatore completo	7,50		5,65
22 Tubo sfogo vapore	3		2,25
23 Impugnatura per tappo	1,05		0,79
24 Filtro	3,60		2,70
25 Vite per tappo	1,60		1,20
26 Corpo valvola	0,67		0,50
27 Blocchetto per tappo	2,50		1,88
28 Calotta per valvola	0,50		0,37
29 Montaggio tubo carico	2		1,50
30 Montaggio tappo	2,28		1,72
31 Montaggio vasca superiore	6		4,50
32 Montaggio vasca inferiore	2		1,50
33 Montaggio blocco	20		15
34 Montaggio collettori, aletta stagno, brasatura, decappaggio		16,40	12,30
35 Ripassatura collettori e lavaggio		4	3
36 Montaggio fianchetti (nº 2)		1,35	1,02
37 Montaggio tubo sfogo		1,90	1,43
38 Montaggio vasche su collettori, brasatura vasche, montaggio fianchetti su vasche		34,00	25,50

– 1 –

Fig. 14
Table showing each piece's production time in minutes and seconds. They compare old times with new times established.

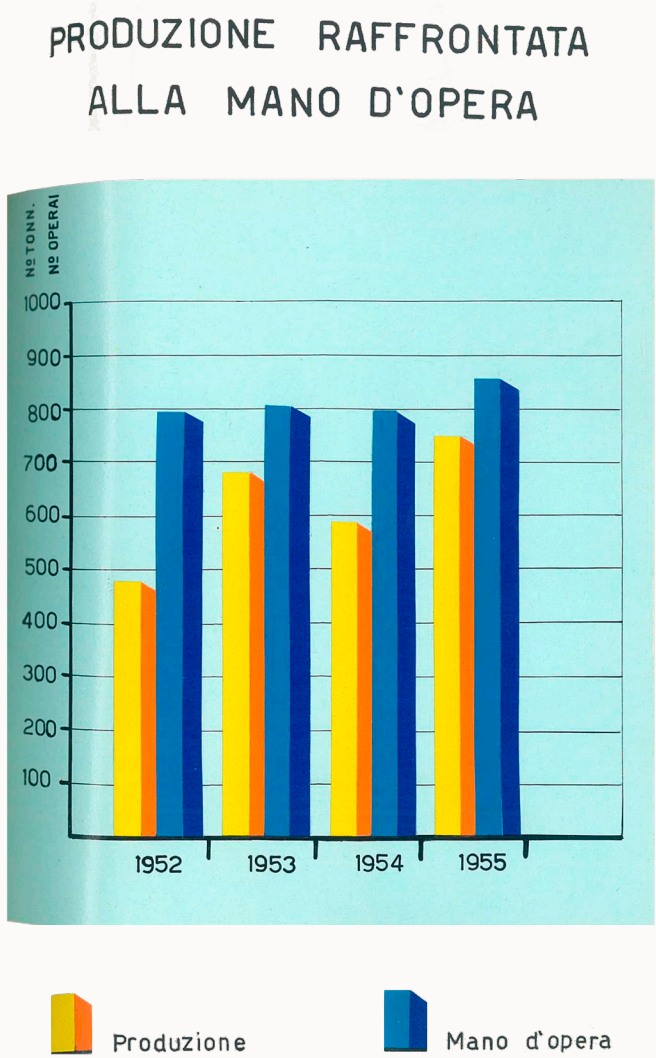


Fig. 15
Graph establishing production in relation to labour during the four years studies. They will allow to double production without drastically changing the workforce. A further drop in production in 1954 was the result of unsuccessful trials.

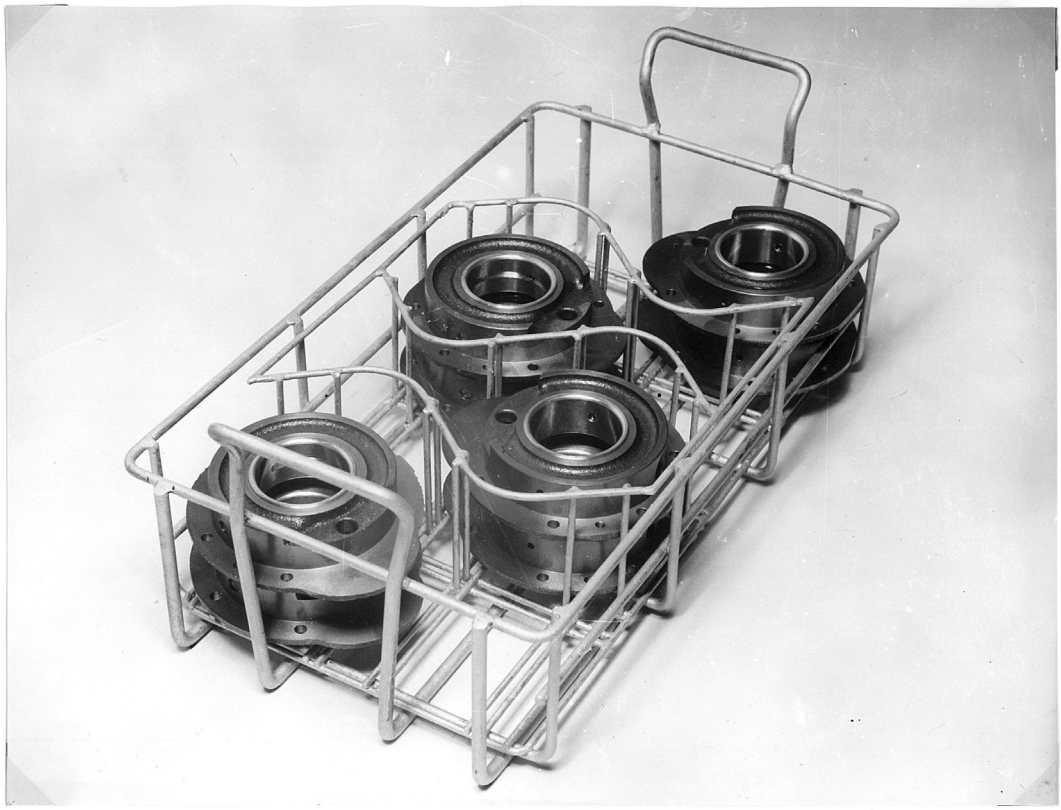
This can be clearly observed in the ergonomic studies they carried out during the same years (present in the same report) concerning tools for moving manufactured objects. Project 17490, which inventoried means of collection and storage to transport various pieces, is a perfect example. Note how the containers for collecting pistons **(fig. 16)** were different from the cylinder heads ones **(fig. 17)**. Here, however, they are in line with the experiments carried out by the Gilbreths, in the sense that they were defining the design of objects that would make it possible to gain confort and therefore time for workers. The studies also led to the design of objects that minimised errors and accidents in the factory. On the other hand, and once again, the worker was no longer at the centre of the process, and it was not his movements that were being studied anymore. The emphasis was placed on technique; and means used to document it were the same: photography, becoming a scientific tool to support real evidence.

Fig. 16
Piston storage method in the "Collection and storage for special transports" study.

FIAT-AUTO - Serv.Impianti & Sistemaz.

VARIE - PROGETTO 17490 - Mezzi di raccolta e deposito per trasporto particolari vari.

Fig. 17
Cylinder head storage method in the "Collection and storage for special transports" study.



FIAT-AUTO - Serv.Impianti & Sistemaz.

VARIE - PROGETTO 17490 - Mezzi di raccolta e deposito per trasporto particolari vari.

These processes and manias for studying and rationalising the various mechanisms were not at all present at the MOI. This is the major difference between industrial production and food distribution. These studies aimed at implementing technological changes have certainly taken place on the wholesale market; but they were never based on a precise study aimed at increasing productivity and they were never carried out as precisely and assiduously as at the Lingotto. Correspondence between the Mayor and the Del Ducca & Miccone engineering firm includes proposals to introduce new technologies such as refrigeration units in each storage room to improve food preservation. Proposals were also made to improve the network of drinking fountains, but these cases were aimed solely at improving hygiene. The only two case studies that could be put forward and that relate to the issue of logistics at Lingotto are the introduction of tramways at the entrance to the arcades[22] and when "fruit and vegetable boxes were palletised" in the 1970s at the MOI, leading to the use of a new machine: the forklift truck.[23] These two innovations saved a considerable amount of time. The trams could be loaded directly on site and then sent to the various neighbourhood markets. They were specially equipped for this type of operation. The forklift trucks made it possible, firstly, to reduce the fatigue of the *fachini*, who no longer had to carry the boxes on their shoulders or on wheeled trolleys which they pulled with their own strength. Food could be transported more quickly, with less effort and therefore less fatigue, making the *fachini* more productive. But the scale of these two interventions is in no way comparable to those carried out by FIAT. Firstly, even if the aim was the same (to increase productivity), they were opposed in terms of method: the MOI sought to improve and free up the movements of the *fachini* to make them more productive, while the Lingotto sought to limit those of the worker. Secondly, no research was carried out by the MOI: they simply introduced a new technology into their buildings. This leads to the logical conclusion that no study has been carried out to seek the various possibilities to arrange or even store these different machines within the wholesale market. Also because most of these were moving machines. It would seem that each modification was made immediately, without confronting a considerable number of solutions. This is partly due to the managerial organisation of the site, which differs from the Lingotto: the director of the MOI, who is himself employed by the local authority, would see no point in spending considerable amounts of money on projects dedicated to improve spatial logistics, as they would only serve the interests of merchants and producers. The initiative should rather come from these two groups proposing projects to the director, but here again, it would appear that this was not their priority.

However, both the MOI and FIAT found a common solution for the two buildings in order to resolve two distinct concerns: the fixity of the worker on the one hand and the mobility of the *fachini* on the other. The principle of formal order that governed the production and distribution process was also expressed in the meticulous construction of a kind of coded toponymy that tried to keep the two buildings under control. At the Lingotto **(fig. 18 & 20)**, the 6'155

22 Casabella, gennaio 1933: 13.

23 This is explained by Livio Serra, director of Turin's general markets from 1933 to 2001 in *Torino MOI. Da Mercati Generali a Villaggio Olimpico*, 2005: 232.

columns were identified by a four-digit number: from left to right, the first digit corresponded to the floor, the next two to the column number and the last to the row. The pillars were numbered from south to north and the rows from east to west. The traverses, courtyards, staircases and lifts were also all coded in the same polar direction: the first with a letter, the second with a Roman numeral, and finally the third and last with the letter of the traverse followed by a number. At the MOI **(fig. 19, 21 & 22)**, each arcade was identified from A to F counter-clockwise from the southern entrance to the northern exit around the square. Each pillar then followed the same numbering system as buildings in a street: odd numbers in the west and even numbers in the east, running from 1 to 32 from the central square to the north and south ends. In this way, it was possible to head towards both D16 and K16, which were mirrored. Both the factory and the food market aspired to present themselves as a 'city' where orientation had to be as quick and concise as possible. At the Lingotto, this orientation was intended only for workers and employees; at the MOI, it was intended for *fachini*, producers, traders and buyers alike.

Finally, at the Lingotto as at the MOI, the dress code was important. From April 1922 onwards, at FIAT, every worker had to wear a clearly visible medal indicating the department to which he belonged, marked with a letter and a number. Anyone moving from one department to another had to wear a "special armband" and the transition of items from one department to another was generally carried out by a person designated for this purpose. The separation between the mechanical and bodywork departments was also indicated by the overalls colours: blue for the mechanical department **(fig. 23)** and grey for the bodywork department **(fig. 24)**. At the MOI, each *fachini* wore a top that enabled him to be assigned to the merchant for whom he was working. These clothes were distinguished by their colour and by the inscription bearing the name of the merchant's company. This made it easier for the employer to spot the actions of his employees. A similarity of conformity therefore appears in both the factory and the market. However, it did not arise for the same reasons. In the MOI, this practice was simply put in place to simplify the work of each merchant. It also allowed them to advertise their own business: the brand name visible on the back could be seen by everyone when the porters were moving through the arcades to stack boxes on a purchaser's truck in the central square. This garment also represented a sense of community: reading the testimonies and seeing the atmosphere in Turin's new terminal market (CAAT), you can immediately sense the proximity between each worker and the family order that is established there. This policy was very different at FIAT, which used clothing as a mean of control. The Biennio Rosso riots had forced the company to study a system to discipline workers by meticulously reducing the possibilities of moving from one department to another, putting an end to a practice of freedom of movement that had particularly characterised the immediate post-war years. These were the practices so criticised by Gramsci and the socialist circle at the time. If we look at the archive pictures, we can see that these practices gradually began to diminish and almost disappeared in the aftermath of the Second World War.

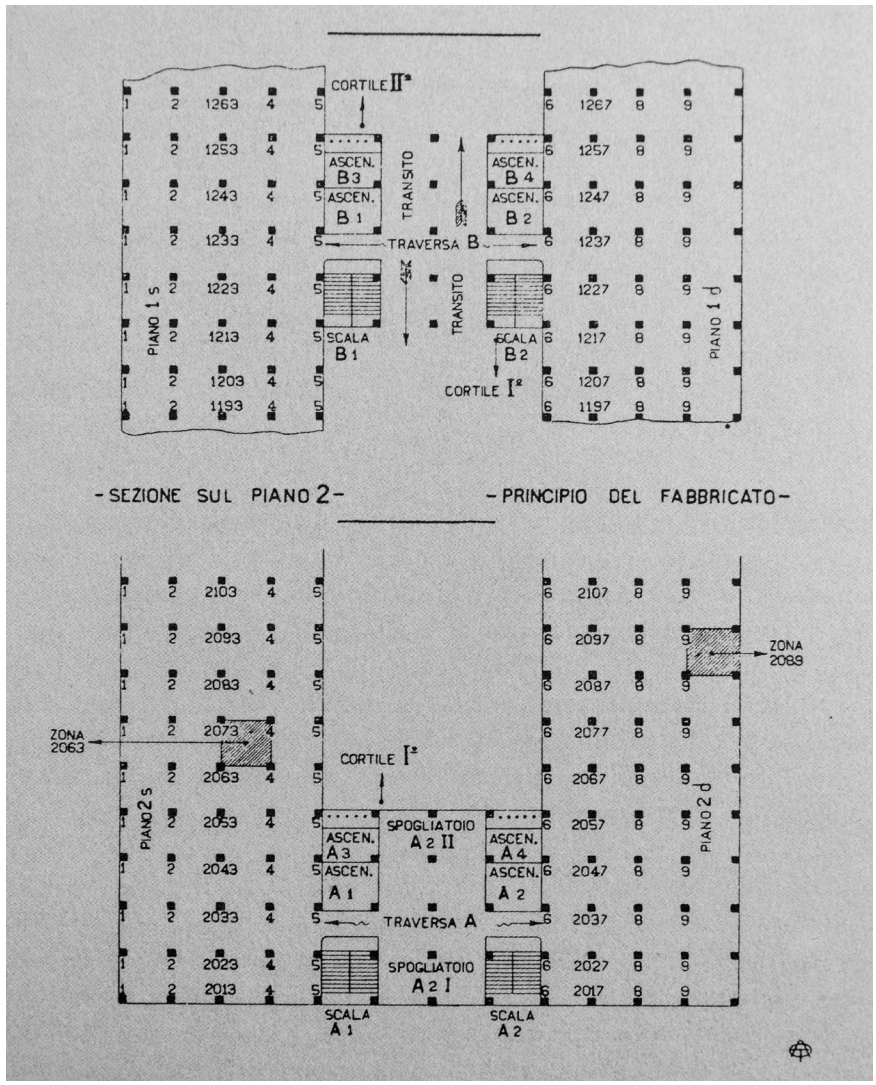


Fig. 18
Plan which sets out the Lingotto's internal toponimistic logic.

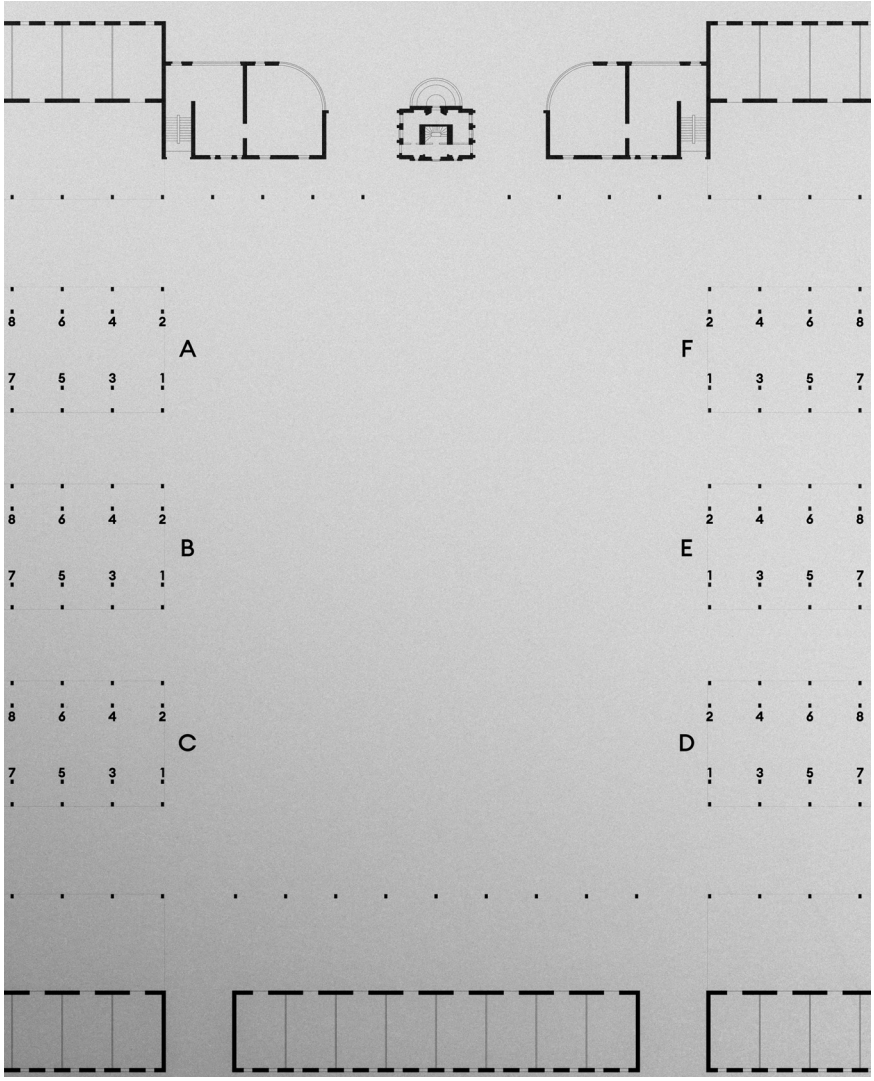
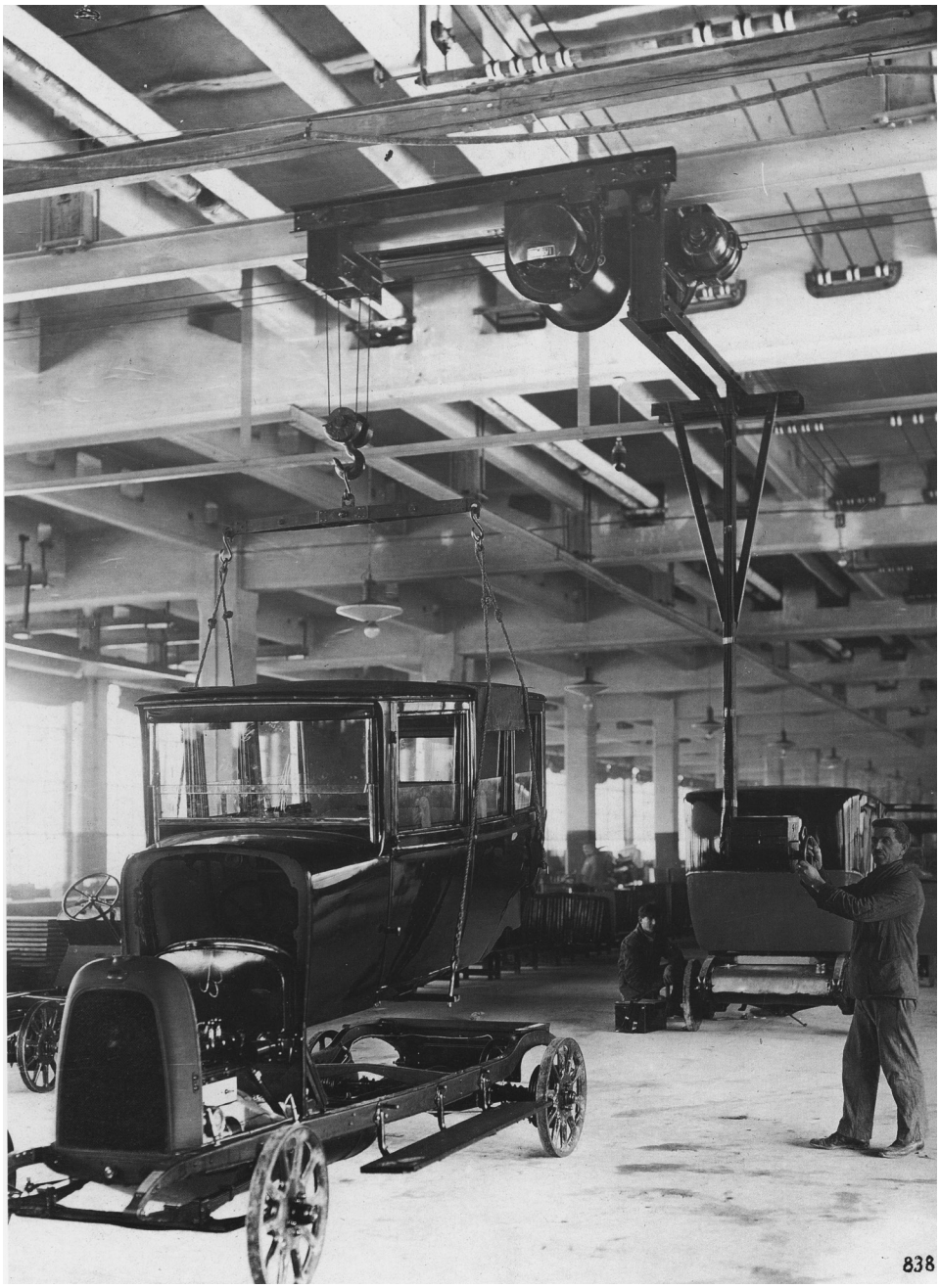


Fig. 19
Plan which sets out the MOI's internal toponimistic logic.

Fig. 20
Photographs of the automatic machines in the Lingotto.
We see the numbered pillars.
The machines were placed on the 1st floor,
between pillars 8 and 20, to the right of row n.8.

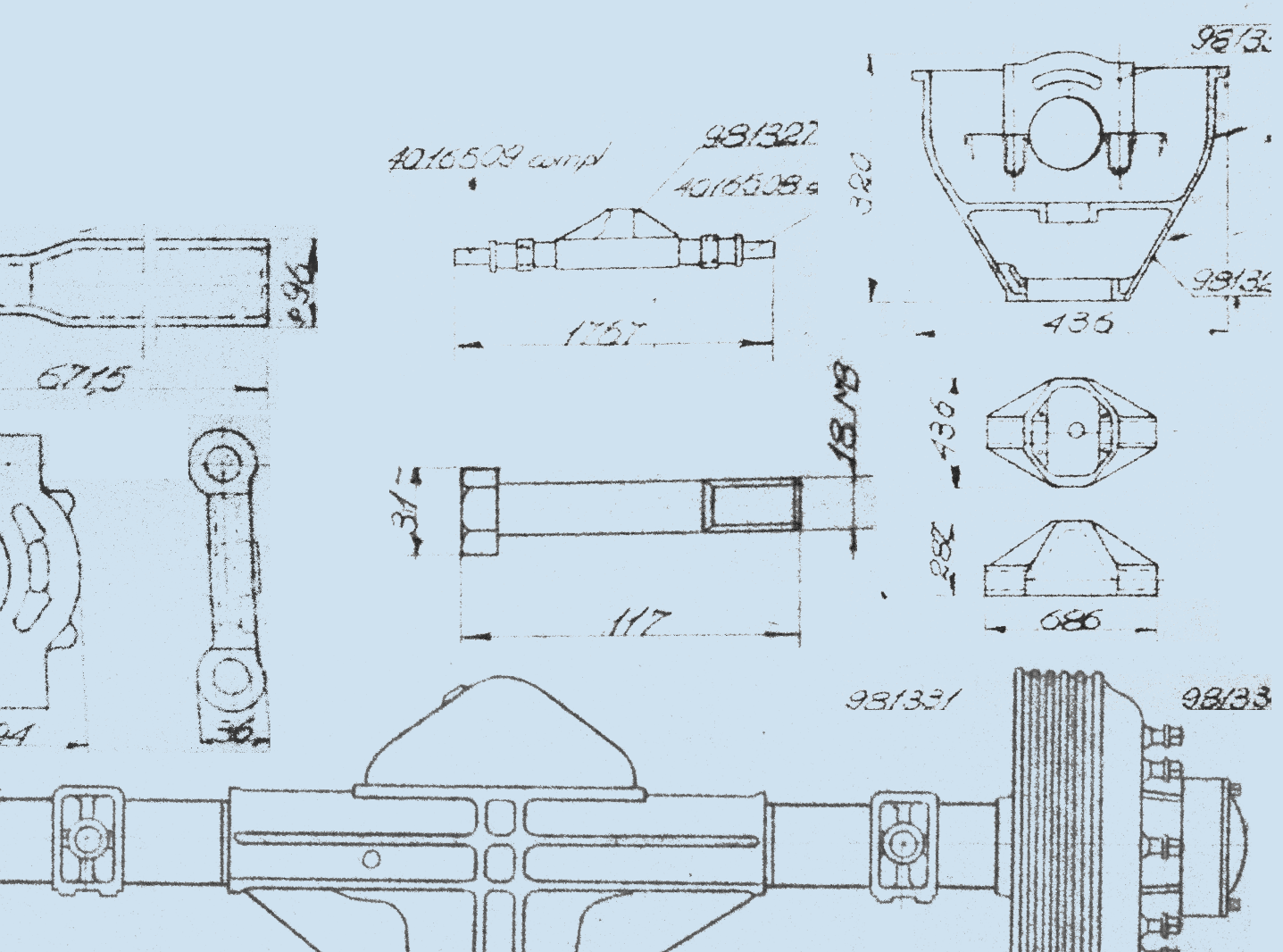
Fig. 21 & 22
Two MOI photographs showing at the top, sectors A to C on the arches and at the bottom, the numbered load bearing points: 3 on the left, 4 on the right.

Fig. 23 & 24
Left: Engine assembly
on the 501 chassis in workshop n.5.
Right: The bodywork application phase
on the 501 chassis on the fifth floor.
April 1925.



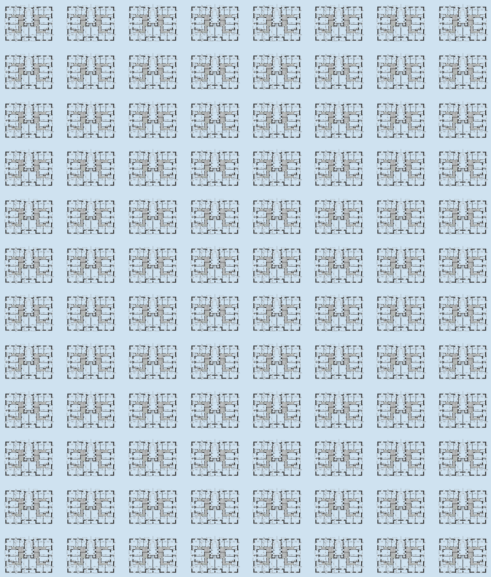
Notice the difference clothing colours between the mechanical (left) and bodywork (right) departments

2. THE FIAT LINGOTTO FACING HOUSING



On the previous page, breakdown of the FIAT *Carro 213* rear bridge into its individual components.
From FIAT Historical Archives.

Below, collage of the typical standardised plan used for the FIAT district in Onorato Vigliani street.



When Car Mass production meets Housing Mass production

Industry in Turin underwent significant growth at the turn of the 19th century when the capital moved out of Turin. A significant reinforcement of the industrial sector appeared at that time, although still dependent on the availability of hydraulic power. Numerous textile, mechanical and agro-industrial (sugar, chocolate, tobacco, etc.) industries were established along the Dora and Stura rivers to the north of the city, taking advantage of the rivers' mechanical power **(fig. 1)**. The Po River at south, on the other hand, did not undergo the same kind of development: the medieval town, which had already begun to extend its organisation along the Po's river banks instantly recognised its environmental value.[1] This contrasting situation already highlighted the influence that industries tended to have on the housing sector in particular. Like a magnet, they attracted the construction of new housing units for factory workers. Numerous suburbs sprang up, following the shape of the rivers, and their eccentricity got even more pronounced when the city walls were built in 1853 (a military-style wall 3 metres high).[2] These two aspects gave rise to the working-class barriers that were so characteristic of the new 19th-century city developments: the 17th and 18th centuries city, which used to house the entire social hierarchy under a single nobility palace on a level-by-level basis, saw the emergence of a new era characterised by the separation of social

[1] Politecnico di Torino. Dipartimento Casa Città, *Beni culturali ambientali nel Comune di Torino*, Vol.1, Società degli ingegneri e degli architetti in Torino, Torino, 1984: 739.

[2] Gambino, Leonardo. *Il Lingotto una volta. Voci e immagini di un sobborgo di Torino nei primi decenni del Novecento*, Città di Torino, Circoscrizione 9, Nizza, Lingotto, Torino, 1998: 17.

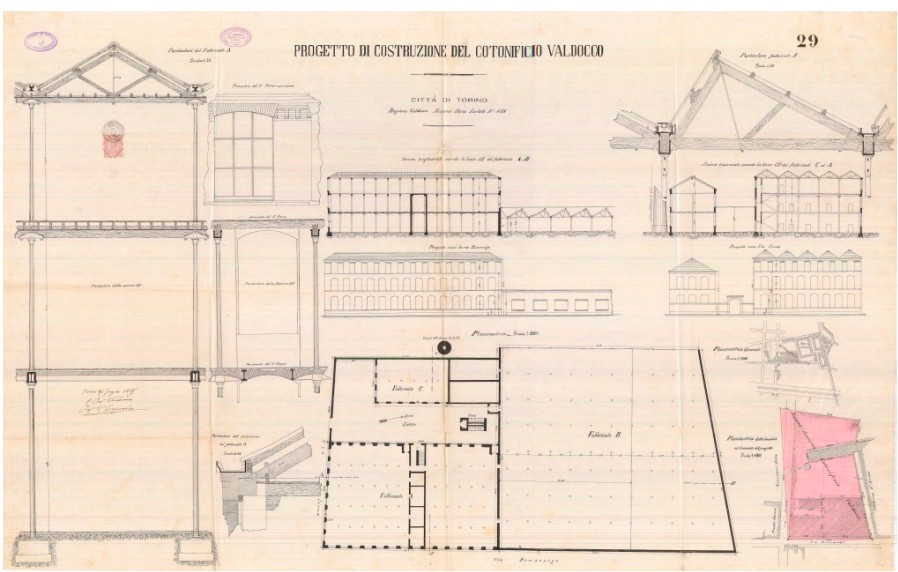


Fig. 1
Example of a factory located on the banks of the Dora River.

classes in the city and the opposition between a bourgeois city centre and the working-class barriers outside.[3] These outlying areas were characterised by rural architecture dominated by the *cascine*, a farm type typical of northern Italy, made of a series of separate buildings (dwellings, stables, barns, cheese and butter production units and various storerooms) grouped around a large courtyard. This architectural type was thus complemented by the new workers' housing units, closer to their workplace and where the living costs were lower. With the advent of electricity, industry was able to free itself from the city's northern suburbs, which were already saturated to a large extent, and could shift its location logic closer to the new railway lines. Consequently to the country's economy **(fig. 2 & 3)**. The industry therefore turned its attention to the south, which at the time consisted of nothing more than small suburban villages living from farming. The settlement logic continued to be the same.
The most exemplary working-class suburb in terms of relationships between

[3] Jalla, Daniel, and Florence Baptiste. "Le quartier comme territoire et comme représentation: les "barrières" ouvrières de Turin au début du XXe siècle." In *Le Mouvement Social*, January 1982: 80.

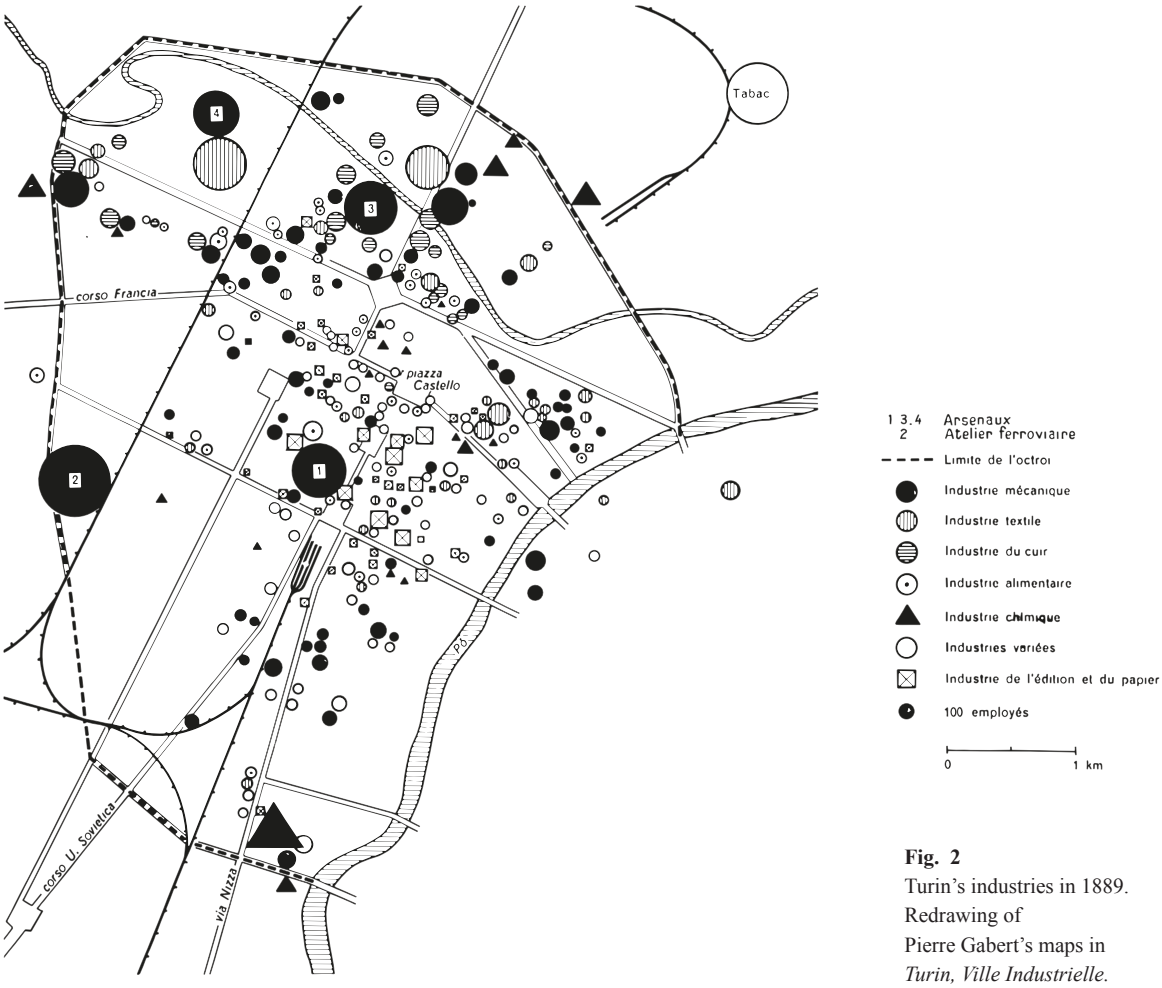


Fig. 2
Turin's industries in 1889.
Redrawing of
Pierre Gabert's maps in
Turin, Ville Industrielle.

industry and housing is undoubtedly the Borgo San Paolo, which arose in the south-west of the city with the establishment of the Officine Ferroviarie (the railway workshops built around 1884 inside the city walls). This Officine was at the origin of the new industrial presence in the brand new Borgo San Paolo (slaughterhouse, livestock market, Westinghouse workshop producing brakes and signals for locomotives, Nebiolo and Ruotificio Italiano and later FIP, SNIA-UTITA and Lancia). This suburb acted as a real autonomous village outside the city: the market square which opened in 1913 on the Piazza Peschiera became a place for festivities and meetings, reinforcing a sense of belonging for the workers excluded from the city walls. Testimonies included in the exhibition catalogue for *Torino tra le due guerre*, held at the Galleria Civica di Arte Moderna and the Scuola Media Statale in Borgo San Paolo in March-June 1978, highlight how the inhabitants of these suburbs positioned themselves in relation to the city centre:

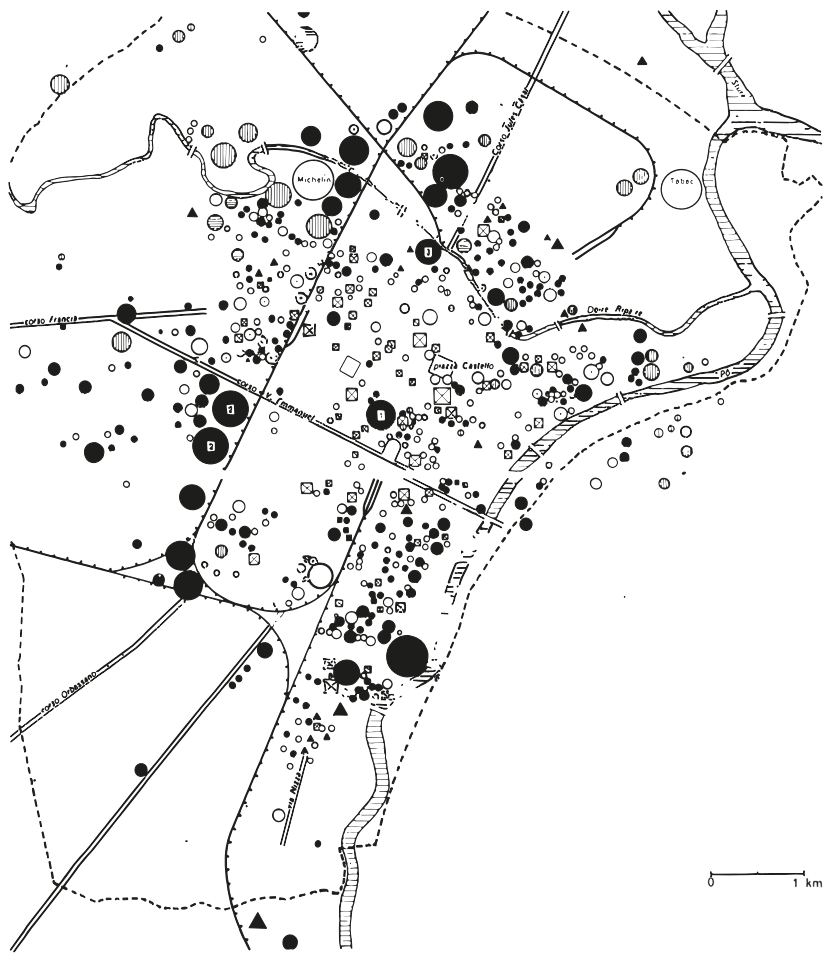


Fig. 3
Turin's industries in 1914. Redrawing of Pierre Gabert's maps in *Turin, Ville Industrielle.* Industries are moving south in large numbers.

"The village was this big... all the fields, all the fields... wheat and wheat... but it was all there...
To say that we were going in town, we'd say "andoma an Turin"...[4]
In Borgo San Paolo, my mother would take a bath to go to the centre, wash all her clothes, change all her clothes."[5]

[4] Which means word for word "let's go to Turin".

[5] "Cultura Operaia E Vita Quotidiana in Borgo San Paolo." In *Torino Tra Le Due Guerre. Cultura Operaia E Vita Quotidiana in Borgo San Paolo*..., edited by Ages Arti, 1978: 18.

In this way, Turin's industry gave rise to new dwellings to the north and south, real catalysts for working-class suburbs. The agricultural landscape patterns were respected by new homes that were grafted onto the old *cascines*. This new urban fabric typology was the birthplace of new workers' barriers, which enabled workers to live close to their workplace.

The Lingotto's construction marked a turning point in the relationship between industry and housing, signalling the end of an era where the local factory essentially used local labour and where the municipality's working population was largely identified with the factory's workforce. This was mainly due to the scale of the factory, which housed between 12'000 and 20'000 workers at its peak productivity, far outstripping the former industries and making it impossible to house the workforce around it. As a result, the workforce had to be found outside the city walls: from the district, we moved on to the city

Fig. 4 & 5
Left: the Lingotto factory in the Nizza plain, 1927.

Right: the Lingotto factory under construction on the 17th September 1916.

and then the region. In addition to this scale concern, there was also a technological one: the avant-garde methods used to build the factory far exceeded the housing construction methods available at the time which could not keep up with the same production frenetic pace. The factory's opening triggered rapid growth in the neighbouring suburbs (instead of its own), creating a mixed community and involving massive daily commuting by workers who came by tram or bicycle. A phenomenon that had never been experienced in Turin at the time.

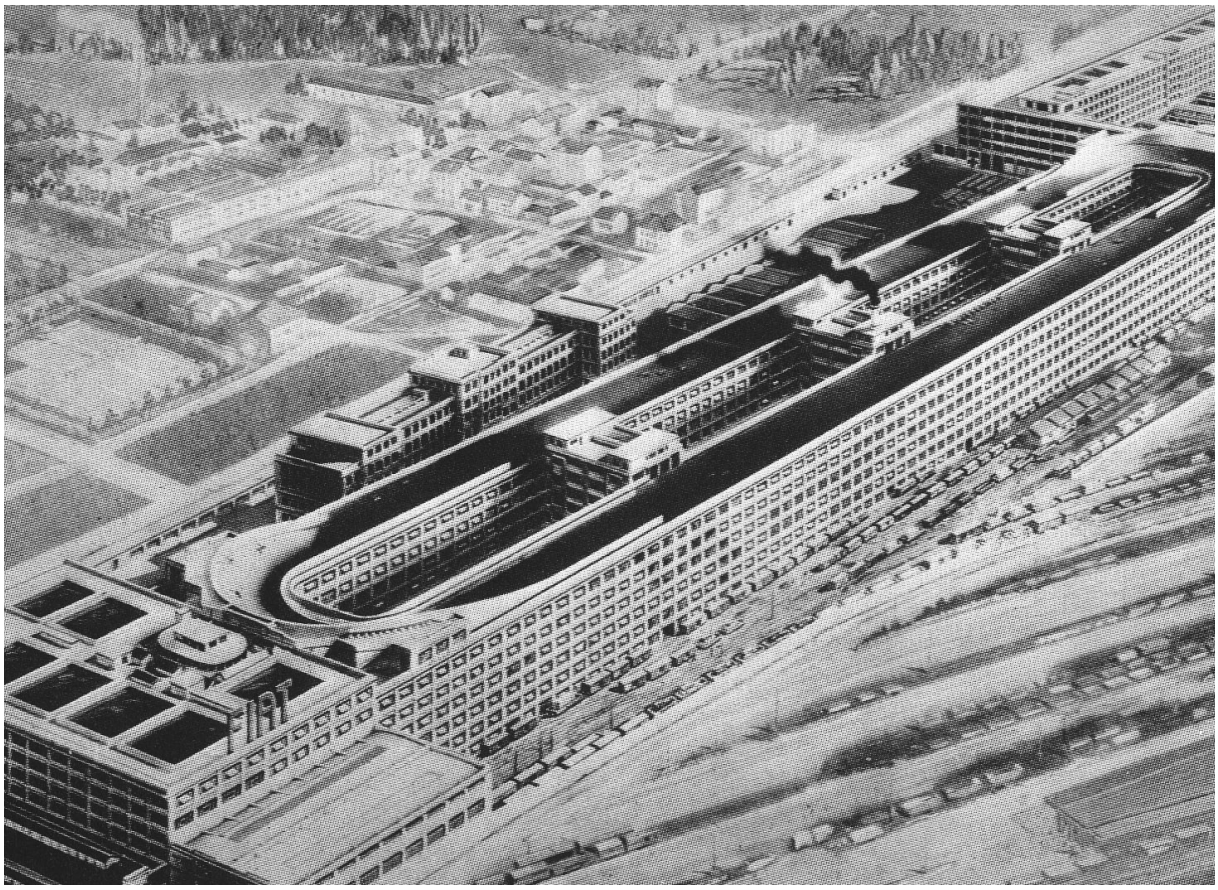
The construction site photograph of the 17th September 1916 **(fig. 4 & 5)** clearly shows the context in which it was built: facing two former wire mesh manufacturers, the Antoniazzi and Fornara factories, which had made a major contribution to the development of Nizza's rural suburbs.[6] Like a tsunami or an atomic bomb wiping out everything in its wake, the Lingotto would be dropped on the landscape like a destructive nuke that would show no mercy. It was built as an exemption to the 1915 regulatory plan, cancelling certain streets and street extensions that had already been planned and definitively eliminating the existing Pesio and Scrivia streets. It was also built on the Millefonti district, completely wiping out thirty years of development **(fig. 6 & 7)**. The Tetti Pilone cascine and the Giairino chapel were also swept away. The only protagonist to show resistance was the Antoniazzi company, which did not bow to the giant FIAT and refused all Agnelli's proposals to grant it the land. Nevertheless, the small company was swallowed up by the bombing raids targeting the FIAT factory during the Second World War, allowing it to come half a winner out of it **(fig. 8 & 9)**[7]. The oral testimony n.32 in the book *Il Lingotto una volta* is a good illustration of this process:

[6] The rural buildings in the photo are owned by Antoniazzi (Fornara is further back and therefore not visible in the photo). Note the proximity of the old plant to the Lingotto.

[7] The image of the factory that has come down to us over the course of history is in fact a pure construction by FIAT. For more than two decades, the Lingotto site was partially occupied by the Antoniazzi factory, which was located within the plant's walls. The company has always regarded this foreign body as a nuisance to its modern factory image, and has systematically removed it from the photos by means of surgical retouching. **Fig. 8 & 9** compare the retouching with reality. A careful search of Turin postcards from the first half of the twentieth century reveals a few traces of this stubborn company that did not bow to the giant.

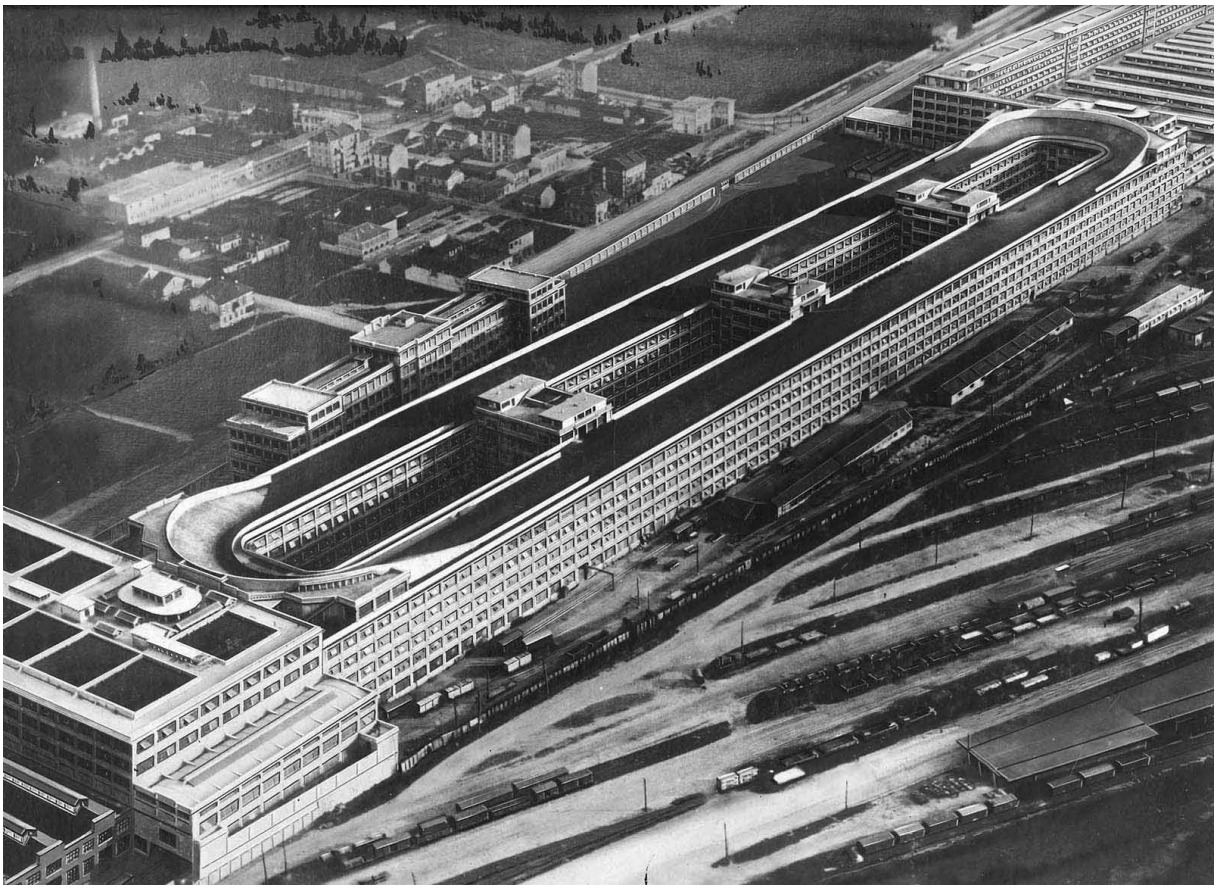
Fig. 6
Redrawn from the original 1915 regulating plan showing the status of the suburbs on the plains of Nizza (east) and Lingotto (west). Along via Nizza you can see (from the north): the residential areas of Tetti Fré (from corso Spezia downwards), Millefonti (especially along the west side of v. Nizza), Osteriatta (more diluted, but with important industries such as Debernardi – south of Via Parigliano –, Fornara, Italo Americana Petroli – near the planned viaduct of corso Maroncelli), Basse (which has invaded the area destined for Father Benghazi). From Leonardo Gambino's book *Il Lingotto una volta*...

Fig. 7
Plan of Turin with indication of the two Regulation and Enlargement Plans respectively for the flat area (in force for Law of 5 April 1908 and decree of 15 January 1920) updated with the modifications subsequently approved up to March 1926.
Urban growth now took off in Osteriatta, still concentrated on the crossroads of Via Nizza and Via P. Buole.
As can be seen, the Fiat Lingotto wiped out the hamlet of Millefonti and was also the tip of the city's compact advance along the Nizza street.
However, the situation at Lingotto, to the west of the railway line, remains unchanged. In blue Antoniazzi's factories.



"There were meadows in front of the Fiat... that's where they built the Fiat, but there were also houses. Then there was a suburb, a hamlet, they called it Pilone. All low-rise, one-storey houses. All facing Fiat. They were old houses, more than old houses, and Fiat was able to demolish them.

Fig. 8
Aerial view of the Lingotto, 1923.
Unretouched photo showing the Antoniazzi factories.



In front of Fiat, there, between Via Millefonti and the centre, there was another factory, again on the Fiat side, that made wire mesh, like Fornara: Antoniazzi. Then Fiat... they demolished it. They built a single parallel wall on Via Nizza.''[8]

Fig. 9
Aerial view of the Lingotto, 1923.
FIAT's retouched photo vanishing Antoniazzi's factories.

8 Gambino, Leonardo. *Il Lingotto una volta. Voci e immagini di un sobborgo di Torino nei primi decenni del Novecento*, Città di Torino, Circoscrizione 9, Nizza, Lingotto, Torino, 1998, oral testimony n.32: 42.

The construction of the Lingotto was therefore a testimony to the destructive nature of local dwellings. Its subsequent extensions demolished much of the housing and industry in the Nizza district. This devastation and the sheer size of the factory were both the source of a new lifestyle model in which workers were forced to come to work from neighbouring districts, putting an end to the famous workers' barriers that characterised the nineteenth-century Turin.

The Lingotto's monopolistic position in the landscape did not prevent the development of new housing from the city centre in the direction of the plant. Turin was already experiencing a housing crisis at the beginning of the 20th century: as a result of strong industrial expansion, a first wave of immigrants arrived, increasing the city's population from 335'000 in 1901 to 367'000 in 1906, leading to massive urbanisation. In response to this, the City of Turin, in collaboration with Cassa di Risparmio and Istituto per le Opere Pie S. Paolo, launched the Istituto per le Case Popolari (Institute for Popular Housing, IACP) programme in 1908, aimed at constructing and managing buildings for the lower classes. The buildings lining on Nizza street began to take up more and more land until finally reaching the new FIAT factory. The IACP itself convinced the Agnelli family of the economic and political potential behind mass produced housing. The company, which had bought all the agricultural land around the Lingotto and converted it into building land, would find a few years later in the IACP model a way to house its workers while at the same time generate capital.

FIAT only began its real estate activities on the 24th February 1949, with the launch of the second government programme dedicated to housing: INA-Casa.[9] The aim was to help the middle and working classes gain access to housing in Italy's main cities, as well as being a "workers' employment development plan" that used the construction sector as a driving force for the more general development of the Italian economy.[10] In Turin, FIAT contributed up to 12.5% of the expenses linked to the INA-Casa plan until 1955, when they decided to launch their own plan: Case-FIAT. The collaboration[11] between INA-Casa and FIAT amounted to 3'700 million lire, of which approximately 1'600 million in construction labour, 860 million in external labour and 1'240 million in manufacturing goods and materials.[12] FIAT's active participation in the INA-Casa plan was not just for political and fiscal reasons. Above all, it allowed FIAT to keep an eye on a sector that had a huge influence on its own: its employees' well-being had a direct impact on their productivity in the factory. If they could find a way to control where they'd live, the quality of their accommodation and their lifestyle, it was a win-win situation. These housing plans also enabled the company to make a double profit: just as Henry Ford saw an explosion in Model T sales as a counterpart to his employees' increased purchasing power, FIAT gave its privileged employees access to an ideal home by offering them the opportunity to buy flats built by the company itself and could profit from them. In total, 72 buildings, 1'621 flats

9 The city of Turin had experienced new waves of immigration, which led to the creation of this programme. The information given by Pierre Gabert on pages 134–138 (on the number of immigrants) and 248 (on the origin of immigrants, mainly from Piedmont) of his book *Turin: Ville Industrielle* provide the city's development overview: by 1918, it had grown to 511'534 inhabitants. Over the next ten years, the city saw an influx of 12'000 to 22'000 people per year. A new wave of arrivals brought the population to 716'261 in 1941. In 40 years, 377'418 people settled in Turin, representing 44% of its 1941 total population.

10 D'attorre, Rita. *Le politiche residenziali di una grande industria: la costruzione di case per i dipendenti FIAT a Torino tra gli anni Cinquanta e Sessanta*, In G. Caramellino, and A. Sotgia. "Tra Pubblico E Privato. Case per Dipendenti Nell'Italia Del Secondo Novecento." *Città & Storia*, Roma: CROMA, 2014: 243.

11 The collaboration itself was named *FIAT-INA-Casa*.

12 Ibid., 247.

and 8’591 rooms were built in collaboration with INA-Casa, compared with 122 buildings, 3’633 flats and 18’126 rooms under the Case-FIAT plan alone, more than twice the amount. In response to this large number of homes being built at high speed[13], the company conducted experiments linked to typological research, consisting in defining the scale of the neighbourhood from the housing unit upwards. Therefore, they developed dwellings standard types (for example, type M and type O), which would be prefabricated and furnished. In most cases, they served two flats per stairwell and together they defined rows of flats ranging from three-and-a-half to five rooms **(fig. 10 & 11)**. Their addition finally shaped the formal aspect of the neighbourhood (**fig. 12 & 13**). The first homes built for Lingotto employees (between 1949 and 1950) took place in Via Finalmarina, Piazza Marconi, Corso Spezia, Via Broni, Via Bizzozzero, Via Baiardi, Via Genova and lastly, the famous Via Nizza housing facing the great ocean liner.

In this way, FIAT took advantage of its car production know-how and applied it to real estate construction, translating an object that could be dismantled and repeated to meet the needs of a highly standardised construction. While the manufacturing process was broken down into the components that made up the car, here the separation into sub-units (the housing unit) made it possible to produce the whole (the neighbourhood). In this sense, translating the car production process into housing became a tool to define the new mass production rules: those of standardised housing. Housing became to the inhabitants what the Fiat 500 was to the common people: a simple, practical, inexpensive object affordable to the greatest number (**fig. 14 & 15**). With this action, FIAT definitively eliminated the old *cascines* typical of the rural Turin – which it had begun to demolish forty years earlier –, replacing them with a new housing model: the product of standardised industry that was to be massively reproduced in the Turin landscape. The “city of FIAT” was finally born.

13 The construction of these 5’300 homes is taking place over a period of just 14 years, leading the company to produce an average rhythm of 378 homes per year, i.e. just over one per day.

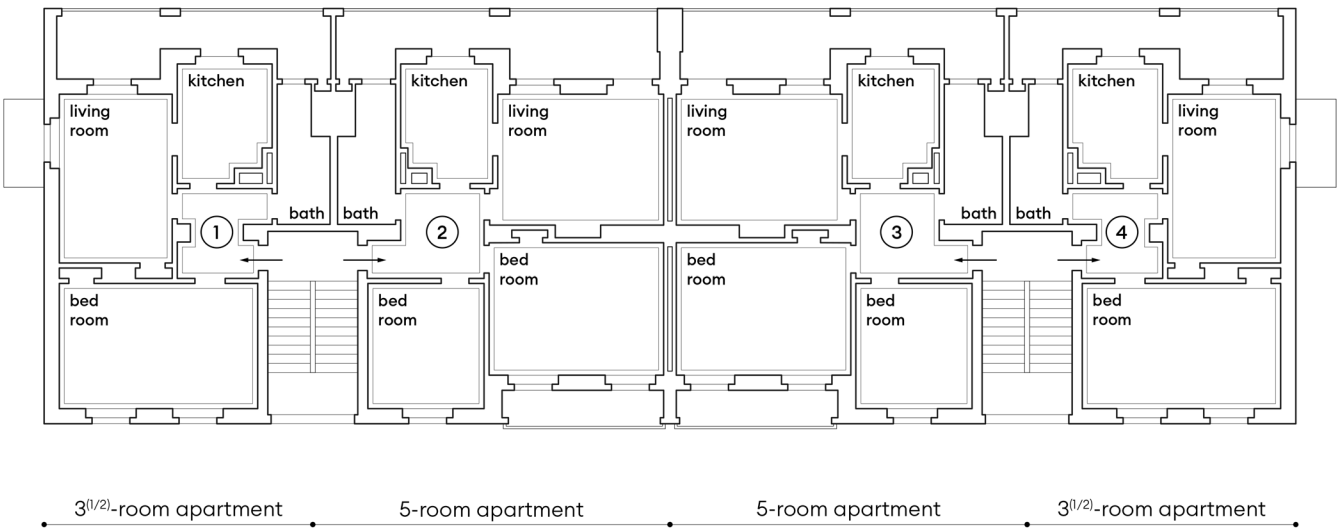


Fig. 10
'Type O' housing made of apartments alternating between three and a half to five rooms.

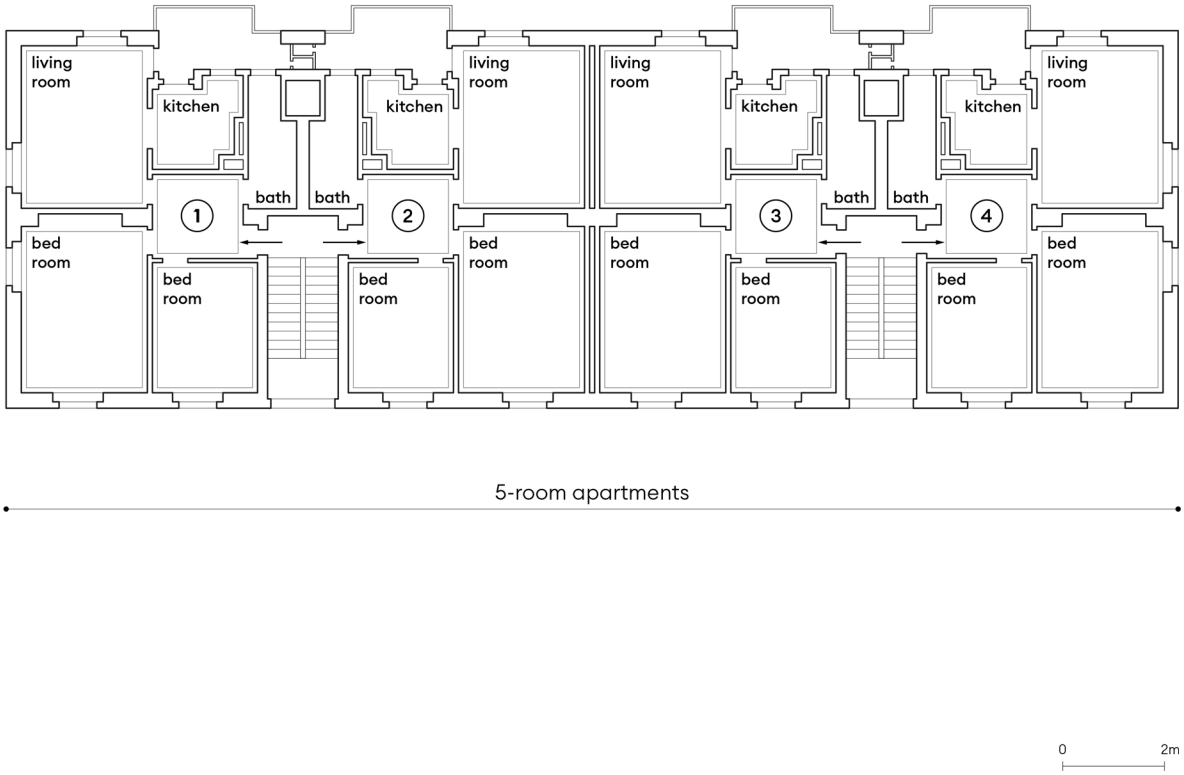
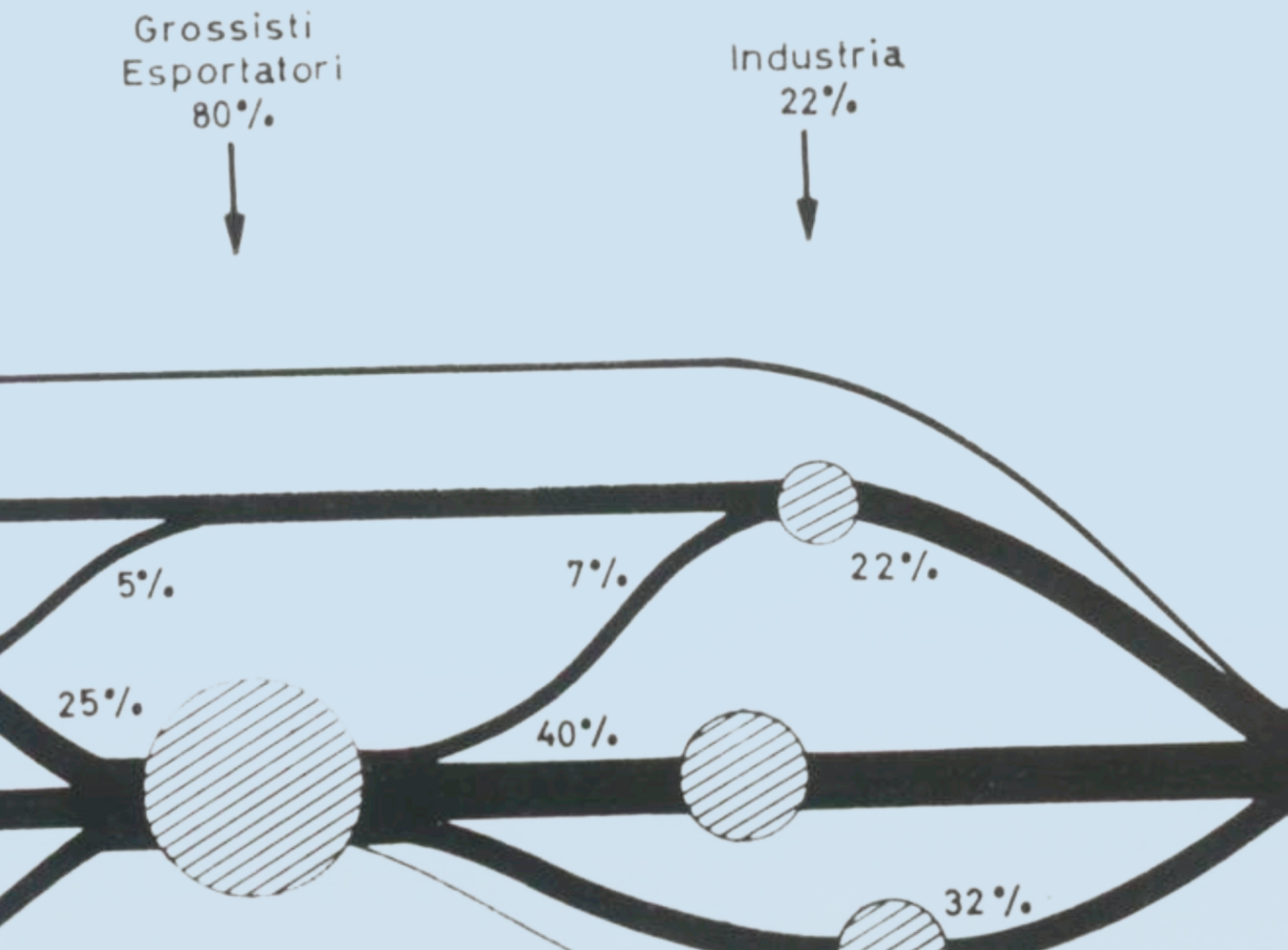


Fig. 11
'Type O' housing made
only of five rooms apartments.
Both types are anchored in the same pattern.

Fig. 12 & 13
Two views of the same FIAT neighbourhood developed at Onorato Vigliani Street in 1956. It's housing 941 families.

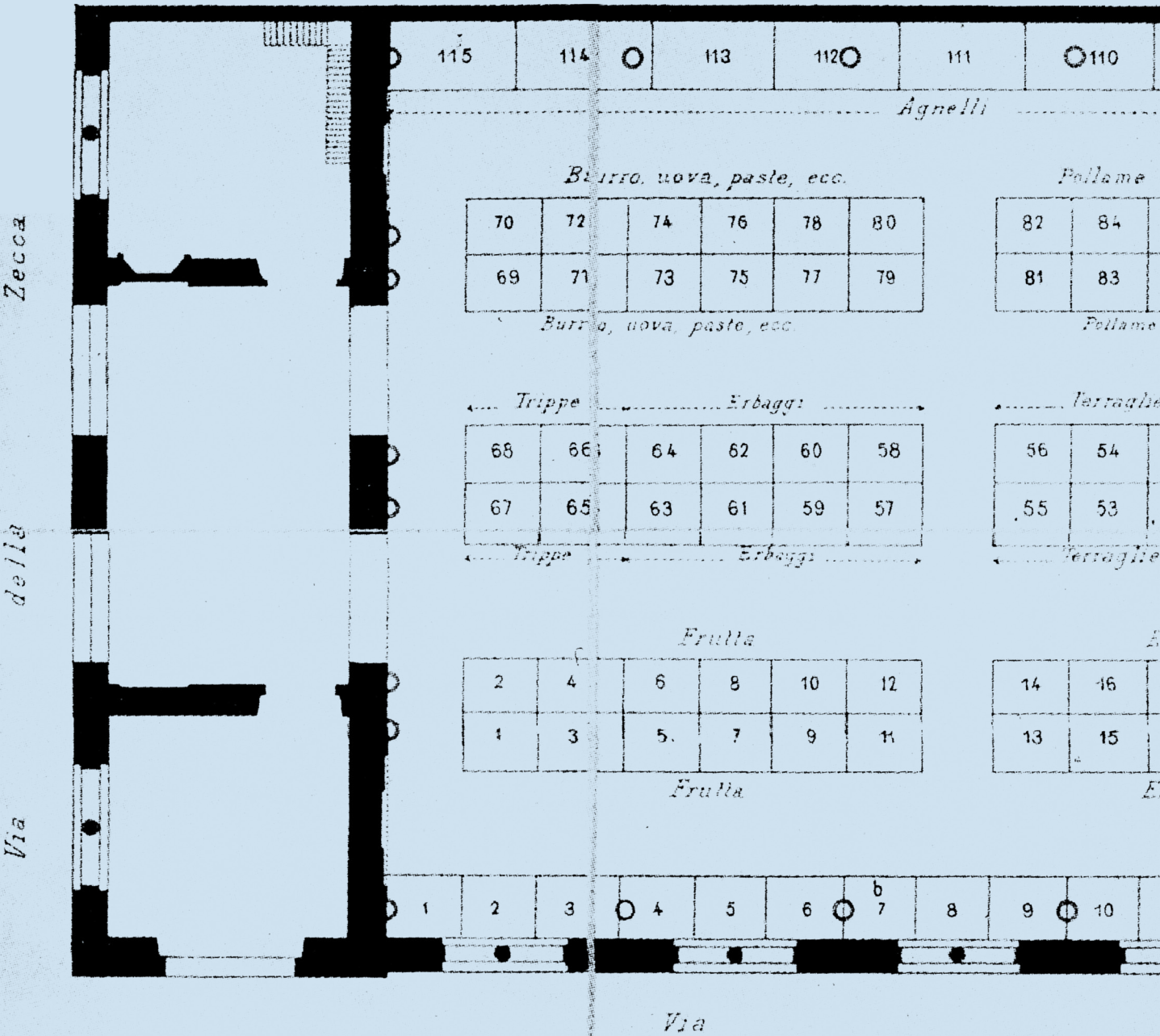
Fig. 14 & 15
Two images confronting a similar reality of housing and cars mass production.
Left: the Onorato Vigliani district.
Right: the FIAT 1400s next to the factory in 1950.

3. THE MOI WHOLESALE FACING MARKETS



On the previous page, a diagram showing all the protagonists involved in the journey of a Picena Coast tomato from harvest to plate.
From Alvisi, F. "Produzione E Mercato Del Pomodoro Da Tavola Nella Fascia Litorale Picena." *Rivista Di Ortoflorofrutticoltura Italiana* 48, no. 2 (March 1964): 135.

Below, a drawing of the Via Montebelllo market.
From Turin's City archives.



When Food industry Logistics reshape Street market Logistics

The evolutionary history of street and wholesale markets in Turin parallels the evolution of industrial development. The market in general originated in the small medieval town, where it was strategically located close to agricultural crops and at the towns' gateways. It therefore played the role of customs offices, regulating taxes on products entering the enclosure.
Its location close to the farmlands ensured that harvests were transported quickly at a time when slow horse-drawn transport was the norm. Food quality and preservation could therefore be guaranteed. Thus, in the medieval town, the first two wholesale markets were set up in Piazza delle Erbe and Piazza S. Tommaso. They were the only fruit and vegetable markets. Other markets were also present, but they sold produce such as wine and wood, which were neither perishable nor dependent on the agricultural production location.
At the beginning of the nineteenth century, the markets followed the course of cultivation, which moved northwards, where the Stura and Dora rivers provided more fertile soil and therefore better agricultural yields. The markets of Piazza Emanuele Filiberto and Via Borgo Dora opened, closer to the harvesting areas and located on the new frontiers. The first was gradually moved to Piazza della Repubblica, known today as Porta Palazzo, which offered a better spatial layout.[1] It is at this precise moment that industry was grafted onto the market's history in Turin. Agricultural production had decided to head for the rivers to the north for fertility reasons; industrial production for the logical reason of using the watercourses that supplied it with hydromechanical energy. At first glance, it would seem that the two could live in perfect symbiosis: the factory is located as close as possible to the watercourse, and agriculture is able to move away from it as much as possible. However, as explained in the previous chapter, it was usual for a local industry to be associated with a local working population. So new housing was built alongside the factories. These suburbs therefore began to overlap with agricultural production, which eventually ran out of space. They had to be relocated to the south, to the Lingotto plains, which were empty at the time, and close to the other neighbouring villages: Moncalieri, Nichelino, Beinasco, Orbassano, and so on.[2]
In this landscape, the *cascine* farms began to take shape, producing food for the city that no longer came from the north, but from the south.
A new market had to be opened in Piazza Madama Cristina, close to the new Porta Nuova train station, which served the entrance to the city.[3]
The food market thus followed

[1] Today, the Porta Palazzo market is considered to be the largest in Europe. Its diamond-shaped layout on a 51'300m² plot of land allowed the market to be optimally divided into three sectors: the first half was devoted to horticulture, the second to meat and other modified edibles (cheese, wine, bread, etc.) and the third to the sale of non-edible products for domestic use. Rachel E. Black's book Porta Palazzo: The Anthropology of an Italian Market describes in great detail how the market operates and its general atmosphere today, touching themes of immigration, social mixing, gender, and so on.

[2] It's worth mentioning that the Lingotto countryside was not the place where FIAT Lingotto was built. FIAT set up its plant a few kilometers north of the Nizza barrier. The name Lingotto refers directly to its shape, which is reminiscent of a gold ingot.

[3] The market in Madama Cristina square was opened in 1866, five years after the opening of Porta Nuova in 1861.

a logic based on rail transport even before the industry thought of it. The city's wholesale fruit and vegetable markets were therefore divided into three areas: Piazza della Reppublica, Borgo Dora and Madama Cristina **(fig. 1)**. These three markets were the only fruit and vegetable suppliers for the city, as the other neighbourhood markets inside the city walls did not sell essential products at the time.[4] Of course, it didn't take long for industry to move away from its waterways and turn to railways. The rail tracks that ran under Porta Nuova provided a direct link between Turin, the port of Genoa and Milan, representing a strategic point for manufacturers who saw it as a mean of expanding their business throughout the country. With the advent of electricity, FIAT was able to set up strategically along the tracks and close to the Po. Despite its initial destructive nature, the factory did not prevent the development of new buildings along Nizza street, breaking down the southern barriers of the city and thus enclosing the market in Piazza Madama Cristina.[5] This led to three wholesale markets scattered and embedded in the urban fabric, no longer able to meet the new requirements in terms of sanitary hygiene.

4 By this time, there were already a number of food markets taking place in the main squares of the new working-class suburbs. The borgo San Paolo is a typical example. It has preserved its authentic family atmosphere. But these were unregistered markets that sold produce harvested from the surrounding fields on a weekly basis. In no way were they comparable to the three markets mentioned above, which sold enough food to feed the town's entire population on a daily basis. Most of the suburbs did not even have their own market.

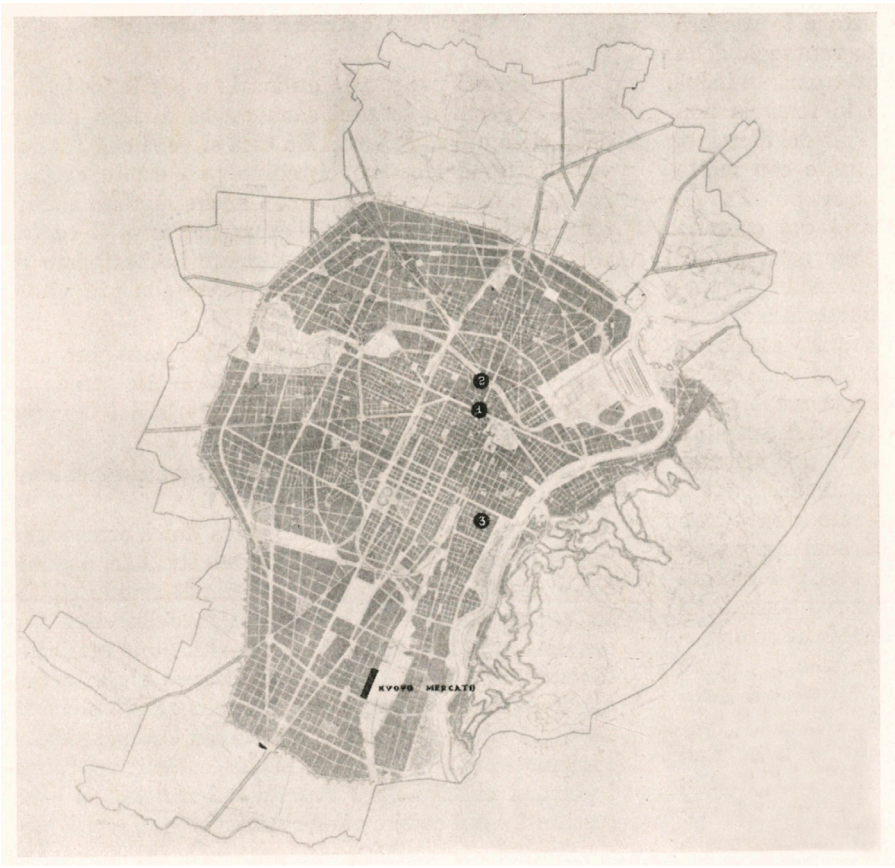


Fig. 1
A Turin 1930 map showing the position of the three old wholesale markets in the city as well as the new MOI.
1. Piazza Emanuele Filiberto
2. Piazza Borgo Dora
3. Piazza Madama Cristina

This was the link between the food market and industry: a constant battle for power. While the food market has played an important role in feeding the industry, the latter has not hesitated to crush it, to invade its space, imposing its power and forcing it to change its strategy. Industries thus emerged victorious, forcing Turin's municipal authorities to come up with a final strategy that saw the development of a new wholesale market along Via Giordano Bruno: it would centralise all the city's food distribution and, at the same time, bear witness to new food production processes on a national scale **(fig. 2)**.

Like the Lingotto, the MOI was built alongside the railway lines and this image is not insignificant: it highlights a period of transition in food production and distribution. The city's three former wholesale markets were located close to agricultural crops because farmers came to sell their harvests directly to the market infrastructure. If the MOI is moving away from this system, it is because it is gradually following the new logistics imposed by the technical industry.

5 The evolution of these wholesale markets can be traced by reading the maps drawn up by Dino Coppo and Anna Osello in their book *Il Disegno Di Luoghi E Mercati a Torino*. In these maps, each market is shown according to the products it sold and its category: district market and wholesale market. The narrative linking the market's development to the industrial development is the result of research into Turin's city magazines and a number of books written about industry in Turin: Gabert, Pierre. *Turin: Ville Industrielle: Etude de Geographie Economique et Humaine* ; Cardoza, Anthony L, and Geoffrey Symcox. *A History of Turin* ; Berta, Giuseppe, ed. *Torino Industria. Persone, Lavoro, Imprese* ; and Tranfaglia, Nicola, ed. *Storia Di Torino, Gli Anni Della Repubblica*.

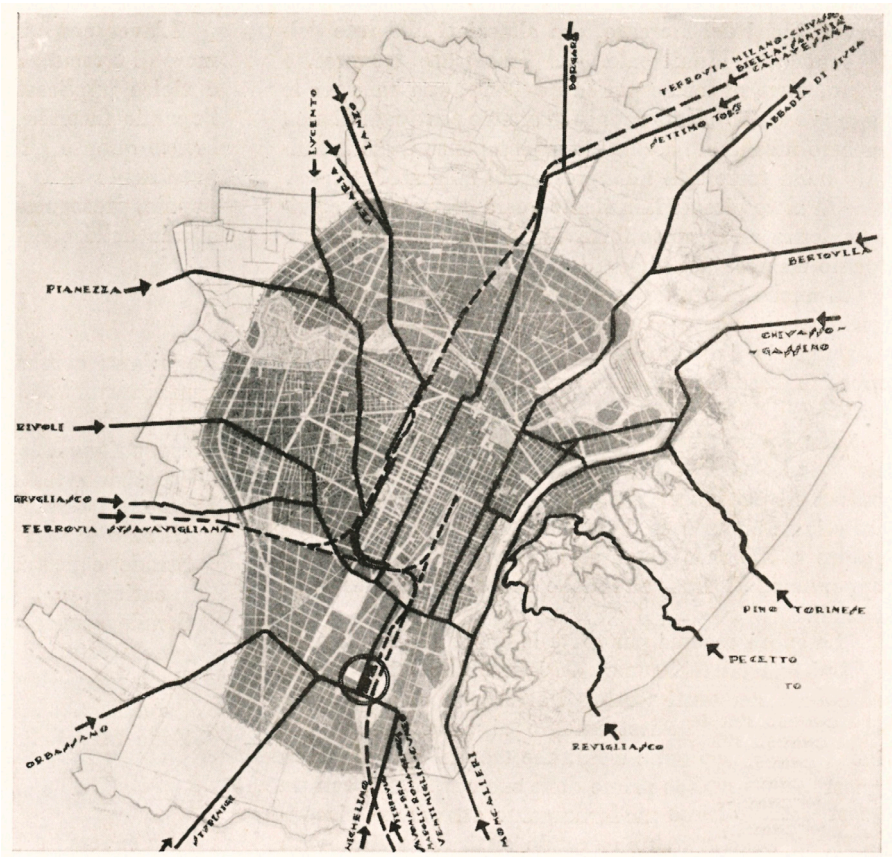


Fig. 2
A Turin 1930 map showing the different routes for importing fresh perishable food (fruits and vegetables).

This logistical transition in the food sector is reflected in the position of the farmer-seller who gradually leaves his 'direct seller' status to the wholesaler. The wholesaler, in other words, embodies this centralisation of production, enabling it to match the distribution rhythms and quantities imposed by the technical industry. In order to implement this logistical transition as effectively as possible, the MOI structure decided to offer spaces for both producers and wholesalers. The evolving occupation of these spaces on site at the new wholesale market provides a concrete and pragmatic outline of the transition: when the MOI opened, there were 170 merchants and 420 producers, each of them occupying the same number of warehouses; when it closed in 2002, around twenty producers had joined together in a cooperative occupying the equivalent of four warehouses with the remaining spaces given over to merchants who had gradually eaten into the local producers' spaces.[6] In this sense, the food industry had ended up absorbing its own production, just as industries had done with street markets a few years earlier. This phenomenon is easy to see if we do a quick calculation based on the studies carried out by F. Alvisi, editor of the *Italian Horticultural Review* (*Rivista di ortoflorofrutticoltura italiana*), who devoted a good number of studies to the production and economics of each fruit and vegetable on the peninsula (blackcurrants 1961; tomatoes, cauliflowers and artichokes 1964; grapes 1965; pears 1980 etc.). Let's take the example of the article dedicated to tomatoes which first lists the fruit's marketing process:

> "*The tomatoes are harvested and sent to processing warehouses, where they are sorted, graded and packaged* [...] *The fruit, which has already undergone rigorous selection in the field by the farmer to eliminate damaged, over-ripe or oversized fruits, passes through special grading machines* [...] *According to the classification, tomatoes destined for export are divided into "extra", "first" and "second" categories.*"[7]

Of these three categories, 78% are intended for the fresh consumption in markets with the remaining 22% absorbed by the processing industries. He goes on to tell us that of this 78%, 45% will be exported to the Italian markets, where Turin and Milan respectively account for 25% of distribution (compared with 5% in Rome and 15% in the Veneto, Marche and the rest of Italy).[8] On an production average established by the author of 219'000 Kg over four months (June, July, August, September), 19'226 Kg reach Turin, i.e. 4 tonnes per month. This study only considers production on the Picena coast. Add to this the tomatoes from Calabria, Sicily, Lazio, etc., it's clear that the quantity passing through the MOI is far greater than local production in Piedmont. The article goes on to show a diagram **(fig. 3)** that highlights how food distribution plays a key role in a global system that benefits retailers and wholesalers, leaving little for producers, who can only profit from 2 to 5% of

6 Figures taken from an interview carried out with Vittorio Rovetta, general director of Borgnino Vittorio srl who worked for thirty years at MOI.

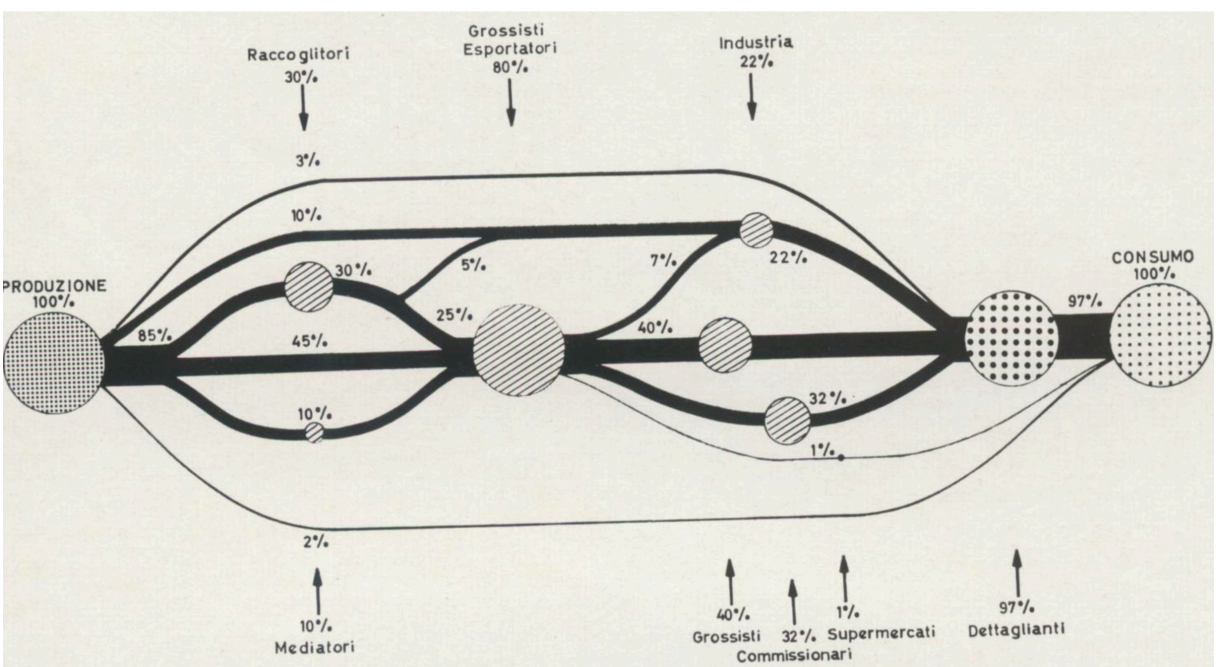
7 Alvisi, F. "Produzione E Mercato Del Pomodoro Da Tavola Nella Fascia Litorale Picena." In *Rivista Di Ortoflorofrutticoltura Italiana* 48, no. 2 (March 1964): 130–131.

8 Ibid., 139.

Fig. 3
Diagram illustrating the "value chain" of a tomato, from harvest to plate.

their harvest. If we draw a parallel between the figures above, showing the quantity of harvest centralised by a wholesaler, and the diagram, showing the margins he is able to make, we understand why the MOI local producer ended up keeping a low profile: their economy based on a local market could not compete with the wholesaler's economy based on a global market.

By adopting industrial production methods, the Turin wholesale market had created a system that had benefited to wholesalers, who have gradually taken the place of local producers. In this respect, the food industry at MOI has acted in the same way as the car industry at FIAT: its new global logistics system has enabled it to overwhelm local competition. These new food production and distribution logistics, defined by the centralisation of a large number of commodities, subsequently played a major role in anchoring the various street markets that had begun to establish themselves autonomously at the beginning of the nineteenth century in the various new working-class neighbourhoods. If the three old wholesale markets did not play a part in this process, it was because their distribution system was subject to a small and unstable local harvest. The small produce quantity resulting from low harvests made it impossible to move goods to the various new established neighbouring markets. In contrast, the MOI's distribution system centralised a country-wide harvest, making it more stable and therefore significant in terms of quantity. With the arrival of new transport technologies (trains and tramways), it was easier to redistribute produces to the new neighbourhood markets.



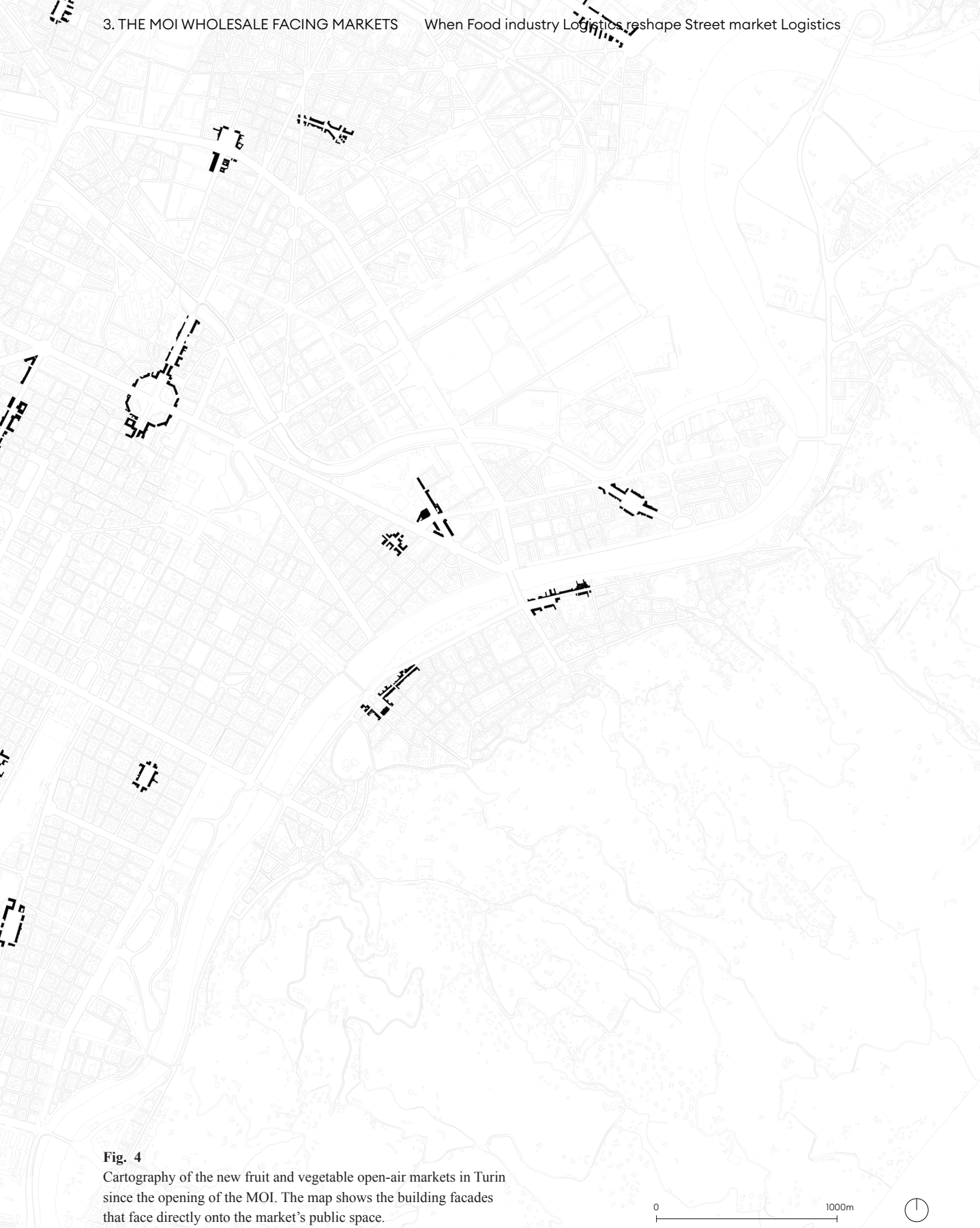


Fig. 4
Cartography of the new fruit and vegetable open-air markets in Turin since the opening of the MOI. The map shows the building facades that face directly onto the market's public space.

In a process similar to Turin's industries, which had fragmented the city through the construction of new neighbourhoods, the MOI helped to relocate the city's various local markets within each neighbourhood. Both its centralising role, its scale of production and 'wholesale' distribution method helped to support the establishment of the new markets that had already started to spring up all over the city. These markets no longer needed to be located on strategic axes, close to the city's borders or to agricultural land.
They could be located close to the consumer, in the heart of the neighbourhood **(fig. 4)**. Henry Ford said that "*the first step towards assembly was taken when* [they] *began to bring work to men rather than men to work*".[9] FIAT understood this and so did the MOI: instead of bringing the consumer to the market, they brought the market to the consumer **(fig. 5)**.

[9] Ford, Henry. *My Life and Work*: 80.

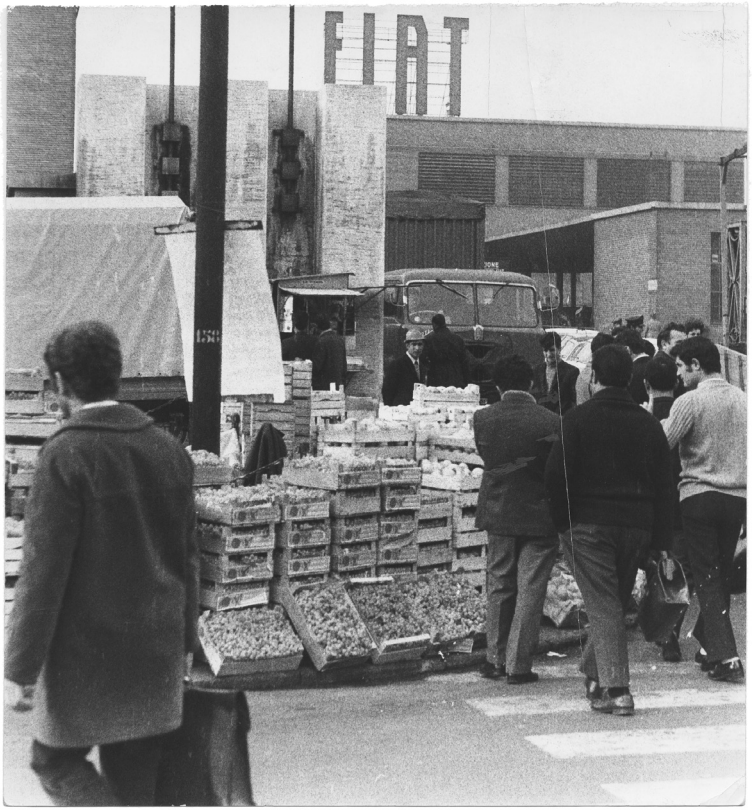
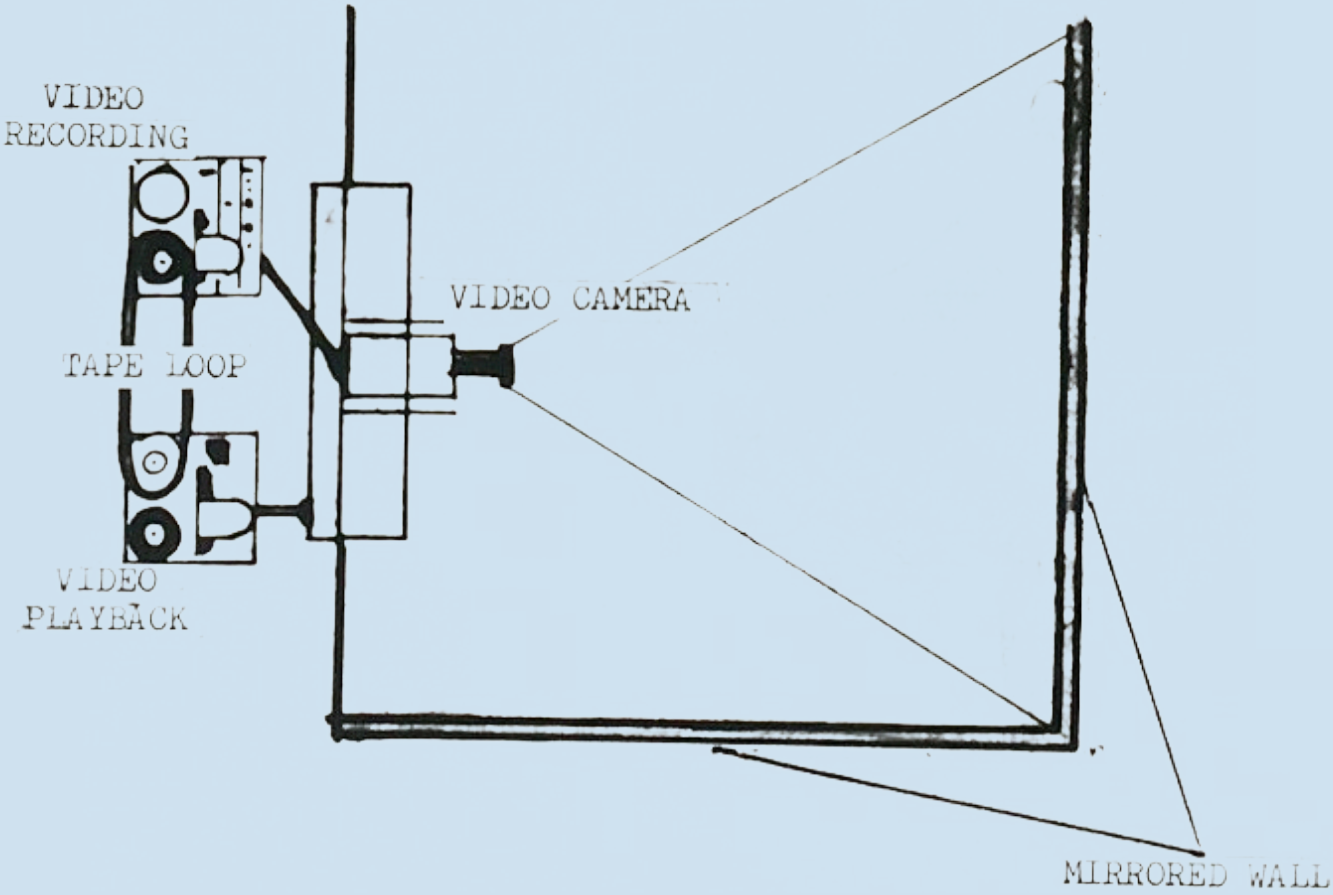


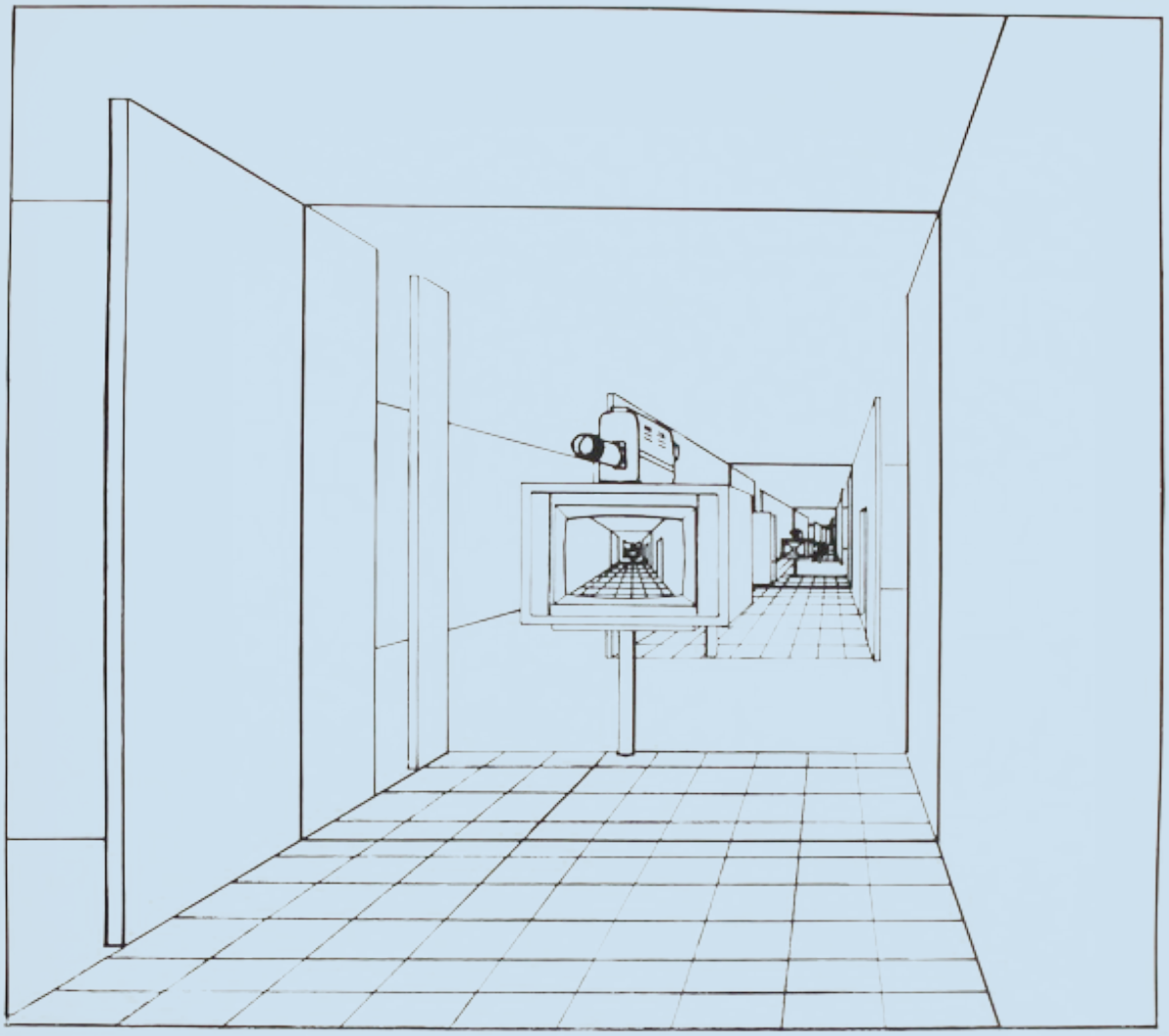
Fig. 5
A neighbourhood market at FIAT Mirafiori. 1960's-70's circa.

4. ABOUT A FILM DIPTYCH



On the previous page, a schematic drawing of Dan Graham's *Present Continous Past* installation on a flyer at the exhibition.

Below, a drawing on the 1975 poster advertising the *Present Continous Past* (April 26-May 9) and *Yesterday* (May 10-May 17) performances at the John Gibson Gallery, 392 West Broadway, New York.



F.I.A.T., an Epilogue to Turin's status as a nurturing city

The film *F.I.A.T.* revisits the original acronym of the Turin-based car company "*Fabbrica Italiana Automobili Torino*" as "*Fabbrica Industriale Alimentare Torino*". To complement the discourse developed all along this research, it attempts to unfold the beauty of a place that was not only the industrial city of the twentieth century, but also a true food city, still clinging to its traditions today. The diptych format aims to establish the links between the industrial and food production mechanisms.

The first part of the film explores parallels that can be drawn between the logistical and production mechanisms of both the FIAT Lingotto (the industrial sector) and the former MOI markets (the food sector); two archaeologies that have borne witness to seventy years of existence, each in their own way. It seeks to recreate an imaginary archive research and draws inspiration from two works by the American artist Dan Graham.

The first, *Two Correlated Rotations* (1970) **(fig. 1 & 2)**: two super-eight films shown simultaneously (at the Multiples Inc. Gallery in New York) revealed the complexity of mechanisms involved in the perception of two people filming each other non-stop in a rotating movement. In *F.I.A.T.*, produced in the Archizoom space at the EPFL, I film myself as an actor of my own staging: showing archive images and plans through an overhead projector. The diptych uses the same process of perception, while the 35mm tapes are replaced by transparent printed sheets.

The second, *Present Continuous Past(s)* (1974) **(fig. 3 & 4)**: visitors entered a room equipped with two mirrors, a camera and a screen. Their own image was projected onto the screen with an eight-second echo. As well as being actors and directors, visitors also became viewers of their own actions. The mirror at the back of the room in *F.I.A.T.* makes me a viewer of my own projection as it takes place.

The imaginary world of archival research thus comes to life when I become both an actor and a viewer of the process carried by myself: I'm an actor of my own digging and a viewer of my own discoveries. The architectural dimension is therefore the focus of this first part. The FIAT Lingotto and MOI architecture are briefly compared, along with a few mechanisms that summarise the line of this research (production, spatial and mental logistics, and their implication on architecture itself).

The next two parts of the film explicitly move away from the FIAT Lingotto to focus on food distribution issues. The wholesale mechanics are depicted in today's CAAT terminal market (Centro Agro Alimentare Torino), which opened in 2002 in Grugliasco, a town on the outskirts of Turin. A voice-over narration describes how things used to be in the former MOI markets. The aim of these sequences is to show the mechanisms which continue to feed an entire city to this day. These rapid, highly standardised processes are hidden in the street market set-up before it opens in the morning, where focus is placed on slowness and care. Here, the wholesale market's industrial processes are disguised by the artisanal care taken in setting up each product one by one. The diptych allows to draw a parallel between the produce installation and the street markets development since the beginning of the MOI era. On the left, the neighbouring markets are piling up like fruits on a stall. **(fig. 5 to 9)**

This film therefore seeks to conclude the study that has been carried out so far. It moves away from Taylorism, Fordism and the many social revolts in post-war Italy. It also leaves behind mass production, in both industrial and housing spheres, to focus on what remains of the industrial city today: an urban fabric shaped by more than forty street food markets operating in the daily lives of its inhabitants. They seem to have accumulated to a level that industry had never reached before. A sovereign level that made them free and independent, impassive to the fall of industrial power in the 1980s. They learned its methods to the point where they absorbed them, eventually swallowed them up. Turin's markets were also unaffected by the latest developments of our century, which saw the arrival of numerous supermarkets in our cities. In Turin, they are struggling to gain a monopoly. If the food sector has such a strong presence in Turin today, it's because it has always played the role of a nurturing pillar for the activities that developed there; and it continues to do so today. The street market is defined as much by its economic as its social potential. Today, Turinese people are as attached to this tradition as they were back in the days. It's precisely because the economy generated helped to bring the city to life in a much more humane way than other contemporary cities. This highly social activity met the needs of a mixed population attracted by the industrial sector. The market gave to Piedmontese workers, living in the suburbs, a place to belong and to southern Italian workers, excluded because of their colour, accents and habits strange to the Piedmontese, a place where they could feel welcome. Finally, today, the market continues to play this same role, offering to immigrants from North Africa a place where they can integrate. In the end, the market perhaps more than the factory has never ceased to represent a liberal working class that regenerates the social and cultural life of the country.

Fig. annex
Top: immigrants freshly arrived
from Sicily at Porta Nuova station.
1950's-60's circa.

Bottom: photo taken in the MOI
showing a crowd's agitation.
1960's circa.

A
B
clockwise spiral
counter-clockwise spiral

Fig. 1 & 2
Dan Graham,
T*wo Correlated Rotations*,
1970.

Fig. 3 & 4
Dan Graham,
Present Continous Past,
1974.

F.I.A.T.

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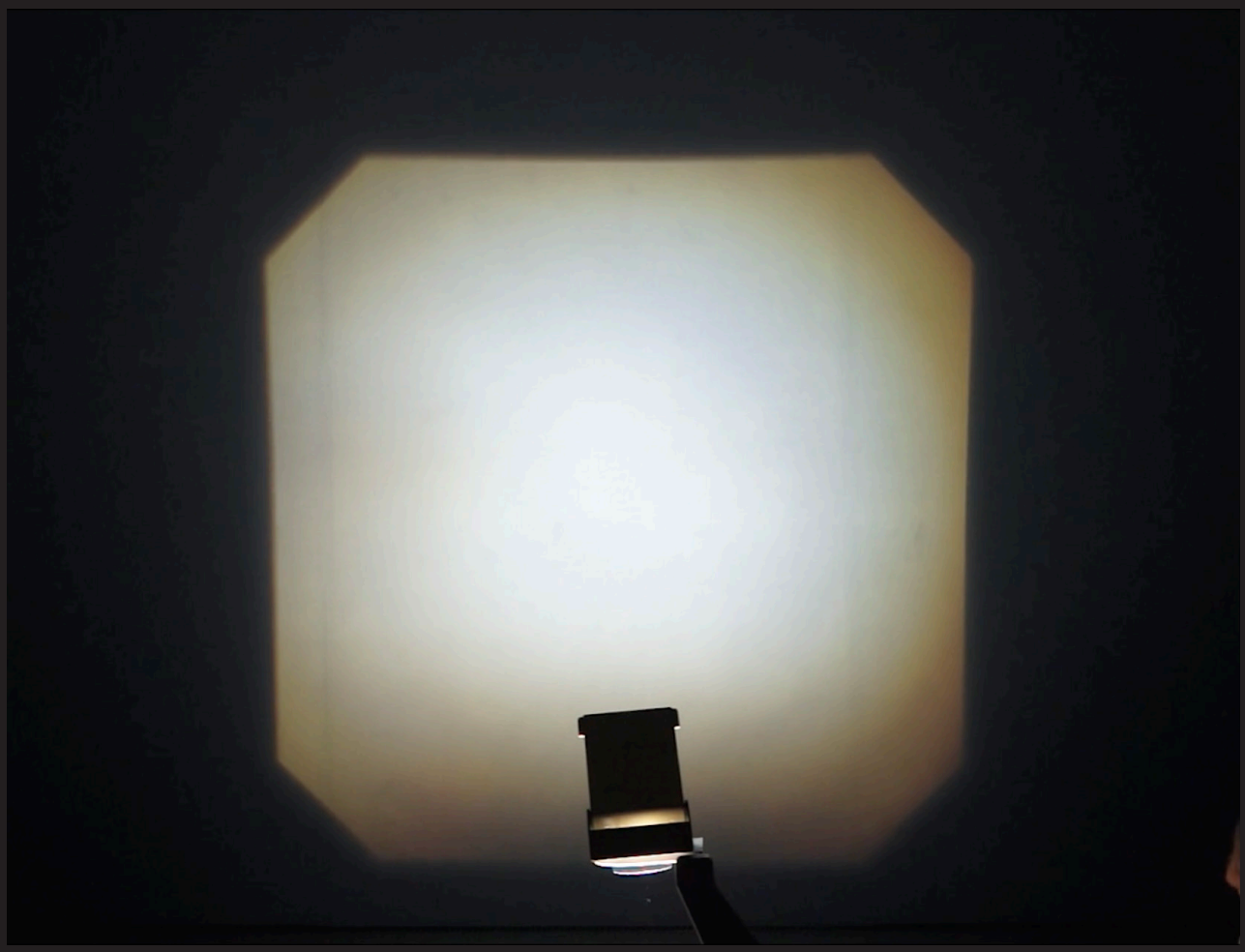

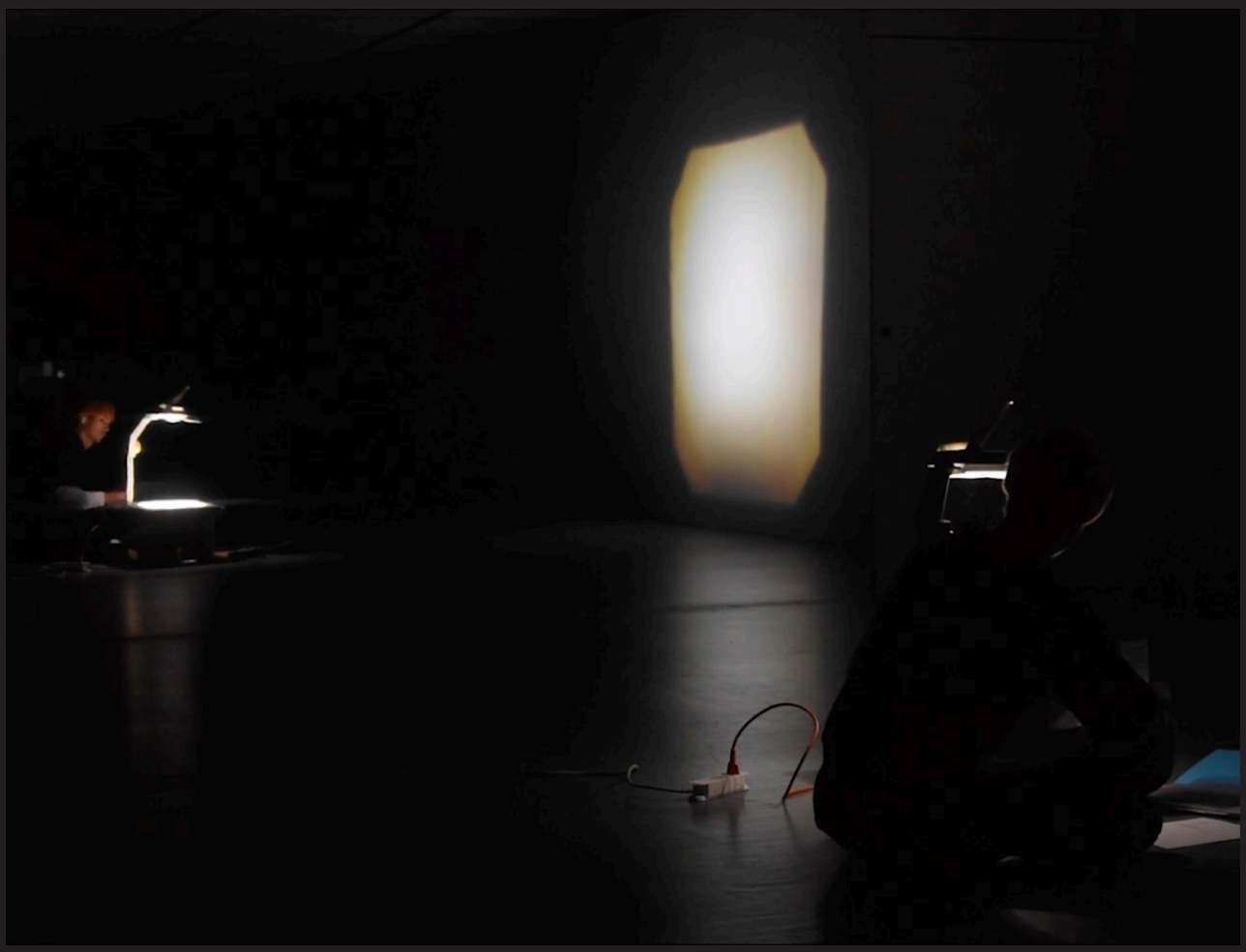

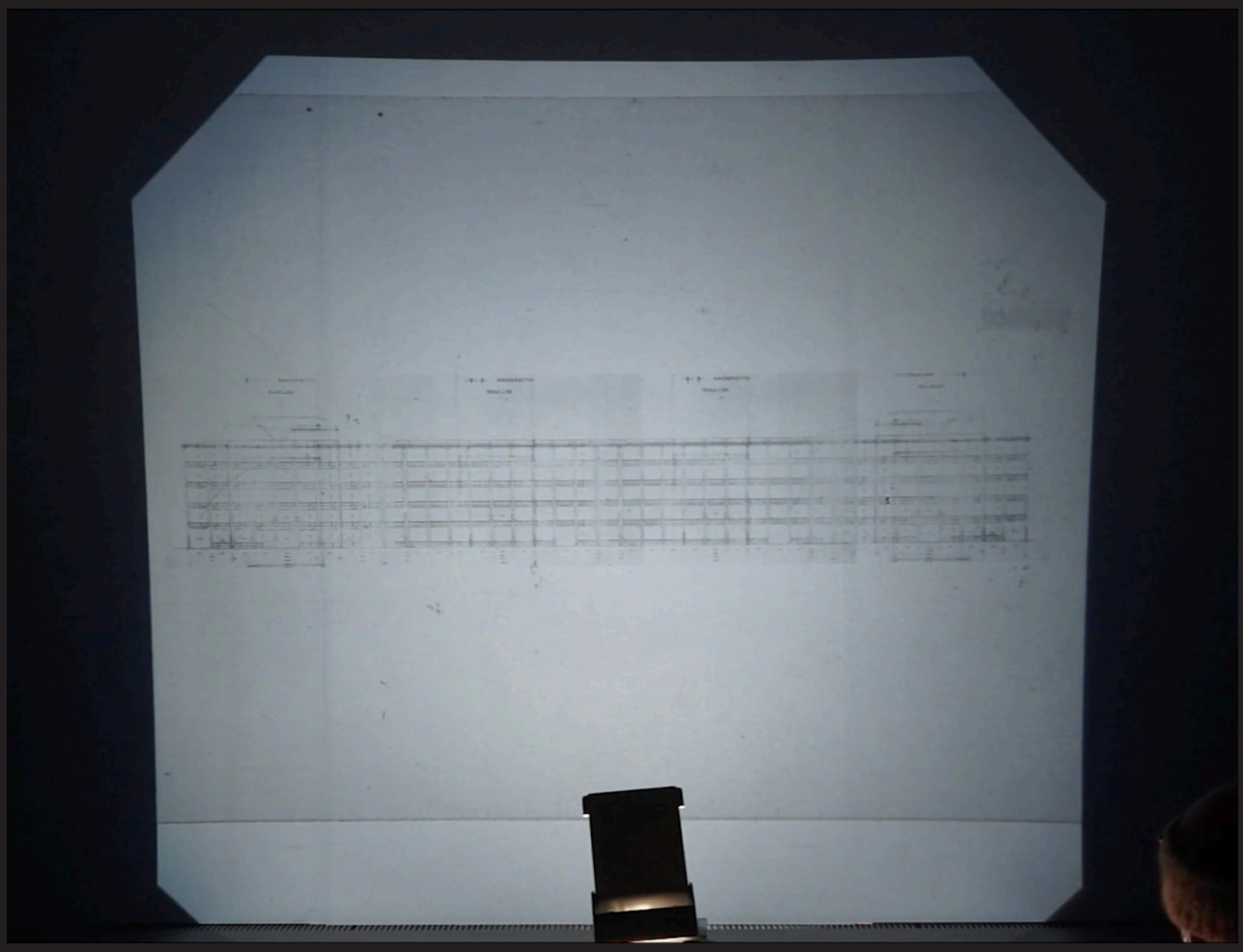

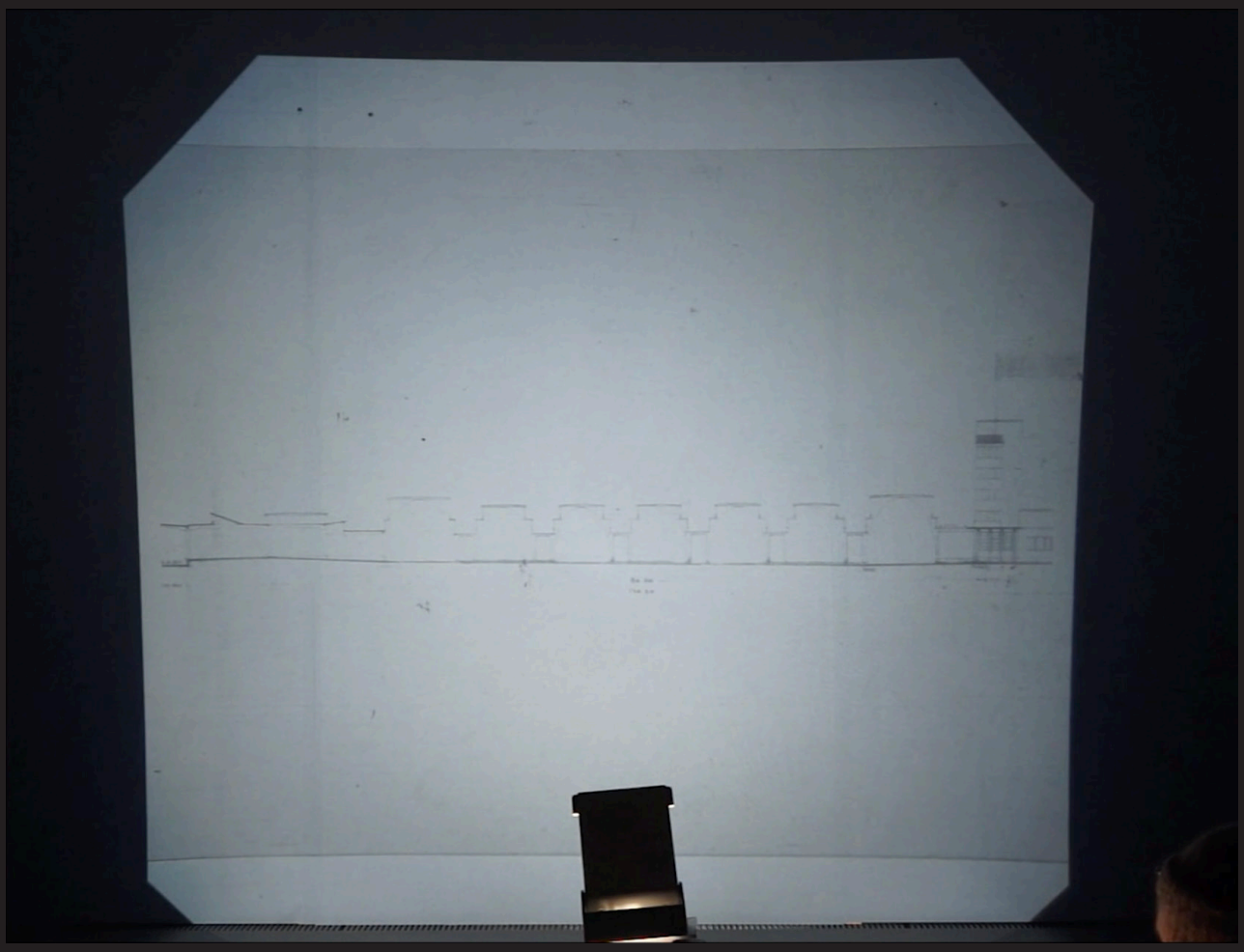

SPATARO
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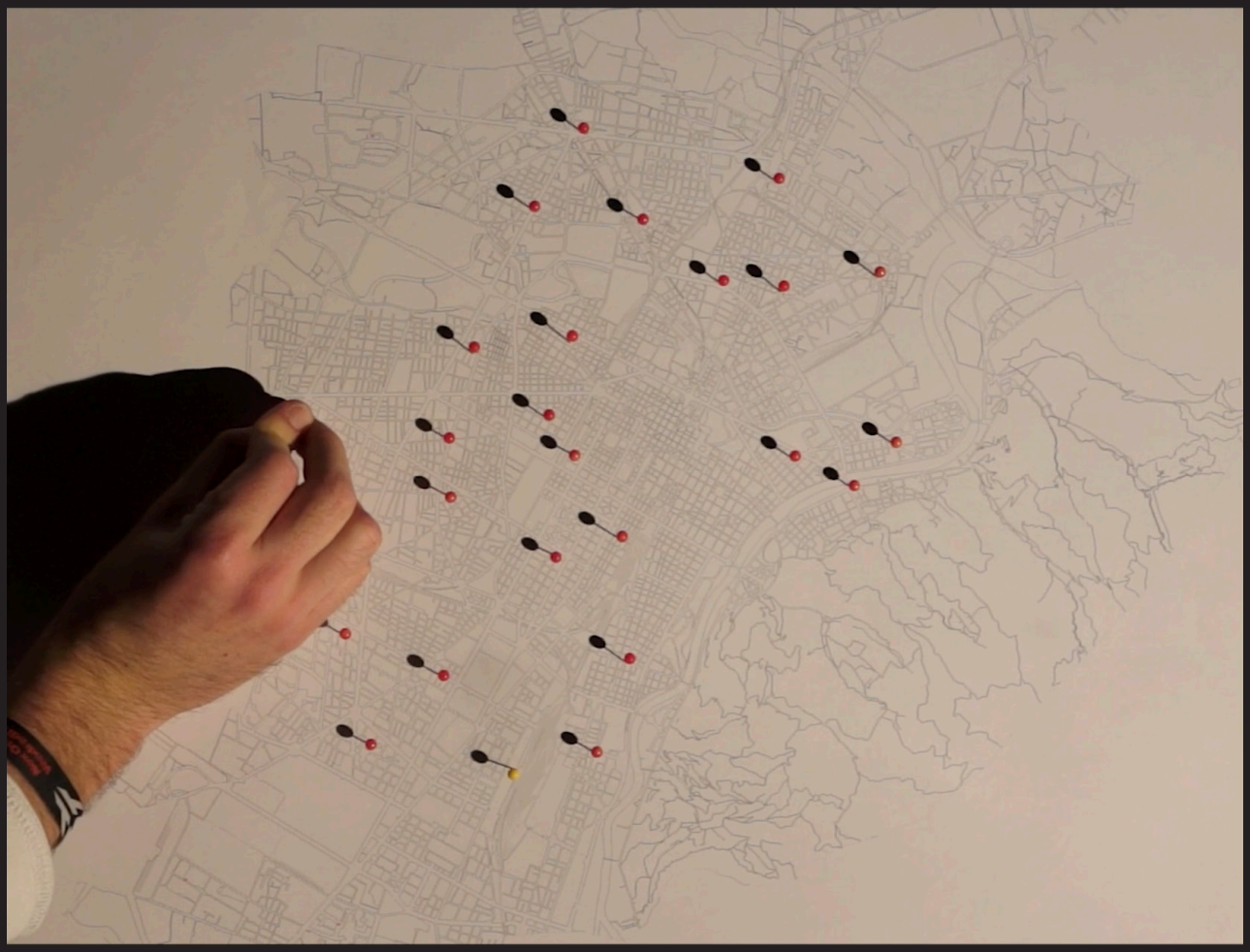

Fig. 5 to 9
Images from the film *F.I.A.T.,*
Fabbrica Industriale Alimentare Torino

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