Lisa Brunnström:
Den rationella fabriken
– om funktionalismens rötter
Konstvetenskap, Umeå Universitet
Dokuma förlag, Umeå 1990

Theme WORKSPACE DESIGN

Functionalism and the Rational Factory

Standardization! Organization! Effectivization! Those were the catchwords for the movement to rationalize American industry (or *scientific management*, as it was also known), which took off at the start of the twentieth century. Its leaders were young, energetic engineers and technicians like Fredrick Taylor and Henry Ford. With the help of the punch-in time clock, time studies, and the assembly line, they offered to revolutionize industrial production. But their importance does not end there. Their methods spread to office work, to the commercial workplace, to education, and to health care. The movement started by Taylor and Ford revolutionized modern society to an extent which is difficult to grasp fully.

Historical research has only recently begun to show an interest for Taylorism and the scientific management movement. A few dissertations have been given in the history of ideas and history of economy; less has been done in history of architecture, though the study of Taylorism's impact on the development of modern architecture would seem an urgent and tempting exercise. In fact, the most prominent work of Swedish Functionalism, *Acceptera!* (*Accept!* Asplund et al, 1931), pleaded for building standardization and effectivization in a plainly Tayloristic spirit.

Functionalism: a Logical Consequence of Taylorism?

How did Taylorism break through in planning and building? In what ways did the new ideas influence the modern concept of architecture? Lisa Brunnström addresses these important questions in her admirable dissertation, *Den rationella fabriken* (*The Rational Factory*), presented at Umeå University's Department of Art Theory in September, 1990. It is a study of the building of factories in Sweden during the period 1900–1930, but a study that takes a broad perspective of its subject. Brunnström devotes a good deal of time to foreign prototypes, but above all to the history of ideas behind the building of factories – the American schools of effectivization which began to inundate the building industry during those decades. It is an important subject, a topical subject today, and a subject which, strangely enough, has thus far been overlooked by researchers. (An important exception is Fredric Bedoire's piece on "Large-Scale Workplaces" in *S:t Eriks årsbok 1981*, which contains several clues to the period depicted in *Den rationella fabriken.*)

The first and the last that must be said of Brunnström's *Den rationella fabriken* is that it is a very attractive book, well written and researched, and richly illustrated with drawings and historical photographs. Not the least of these last are all the photographs taken in connection with the erection of buildings, giving us a unique opportunity to experience them in their original condition. Of course many of these factory buildings have by now either been torn down or dramatically altered. Many of the photographs were found in inaccessible archives and have never before been reproduced in print: the archives of Kreuger & Tolls Byggnads AB and Industribyrån had been considered lost, and were rediscovered after some veritable detective work by the author.

It is striking how much of the content – and not just the photographs – seems fresh and new. This is presumably because the period in Swedish architectural history between 1900 and 1930 has for so long been overshadowed by the 1930 breakthrough of Functionalism. But it may also be due to the lack of research into the building of factories in Sweden. *Den rationella*

fabriken might become the standard work on Swedish industrial architecture during what must be considered its golden age.

The Rational Factory

In the main chapter of the dissertation we are introduced to a series of large scale Swedish factory buildings from the time of the First World War, buildings which clearly deserve a place in the architectural history of Sweden but which until now have gone unnoticed. A few should be mentioned here, such as ASEA's impressive Mimer factory in Västerås, designed by Erik Hahr and built 1912–5. Another is Baltic Separator's workshops in Södertälje, with its 1914 early Modern facade by Lewerentz and Stubelius. I would also mention Munktell's machine shops in Eskilstuna by Cyrillus Johansson (1916), Enoch Thulin's airplane factory in Landskrona (1917, now demolished), and Barnängsspinneriet in Stockholm, also by Cyrillus Johansson (1916).

All of these factories belong to a new generation, recognizable by certain common characteristics. With the exception of the Mimer quarter, all were factory buildings of several stories with a reinforced concrete frame. The window area of the facades is maximized, the concrete frame and the exterior walls below the windows clad in brick or stucco. The roofs were generally flat; the facades often were finished along their top edge with a strongly pronounced cornice. And these were not only buildings with a striking exterior, they were also – in the words of Lisa Brunnström, "rational factories" based on American principles.

The American Daylight Factory

The prototypes for these new Swedish factories were to be found in the United States, which had in the first decades of the twentieth century seized the lead in industrial production as well as industrial building. The Americans provided the pioneering discoveries in the field of factory building. As early as 1903, the engineer Ernest L. Ransome patented the world's first prefabricated frame system of reinforced concrete. Ransome can be considered the inventor of the American "daylight factory", a model to be copied all over the world during the next two decades. Of equal or greater importance was Henry Ford's first factory in Detroit in 1908, designed by Albert Kahn.

T. A. Bergen and the American Factory

Brunnström's dissertation shows convincingly that the American factory type from the time of the First World War pushed aside the German prototypes for industrial building in Sweden. An important actor in this development was T. A. Bergen, originally a civil engineer educated in the United States. Bergen went to America several times to work, including jobs with leading industry planning consultants, returning each time to transfer his knowledge of American industrial planning to Swedish factory building. In 1914 he became the leader of Industribyrån, newly established by Federation of Swedish Industries, which was to be responsible for planning, designing, and monitoring the construction of new industrial buildings. Industribyrån's business grew rapidly: during the period 1914–30 alone, under Bergen's leadership, Industribyrån completed over a hundred commissions for new buildings as well as a large number of remodeling jobs throughout Sweden.

Bergen also wrote a book on designing industrial buildings according to scientific principles, published by Federation of Swedish Industries in 1918. According to Bergen and the American prototypes, the designs should be based on technical and economic analyses of the production process. Everything was to be studied in detail, including the location of machines, the product's route through the factory, and the location of employee facilities. Detailed quantification of spatial requirements and flow charts were produced as a basis for the layout of the floor plan. Bergen's handbook is interesting in part because he formulates a scientific program, from an engineer's perspec-

tive, for the design of buildings – a *Functionalist* program if you will – long before the breakthrough of Functionalism in 1930.

The Formal Language of Functionalism: Necessary or Not?

Lisa Brunnström's dissertation thus provides us with a new perspective on Functionalism's breakthrough. Functionalist architects argued that the movement's greatest significance lay in its introduction of new scientific methods; the aesthetic, stylistic innovations were merely a result of the new methods. That description of history has been shown by Per G. Råberg to be untenable. *Den rationella fabriken* uses new material to support Råberg's position. The fundamental revolution in factory building, like the use of functional diagrams, economic calculations, sound methods of construction, and scientific plans, occurred as early as 1914 through the work of T. A. Bergen and Industibyrån. The emergence of Functionalism at the end of the '20s had nothing more to contribute along these lines. What Functionalist architects did contribute was instead a *language of new forms.* The corporeal brick buildings of the 1910s and '20s with their simple Classical details were now replaced by smooth, white rendered facades, flat roofs with no overhang, and horizontal strip windows. The new buildings gave the impression of lightness instead of weight, of dynamic contrast and tension instead of static harmony.

Form and Content in the Functionalist Factory

The Functionalists introduced a radically new *form* for the new rational factory. But was the new form really more adequate, was it better than the old? Was it necessary? That is the main question the dissertation raises.

Brunnström gives no decided answer, but the material in *Den rationella fabriken* speaks for itself quite well. The reader has a good opportunity to make direct comparisons which can illuminate the matter. Let us compare a prominent example of factory building during the 1910s, Barnängens bomullsspinneri (a cotton spinning mill), its facades by Cyrillus Johansson, with one of the first factories to be clothed in purely Functionalist costume, KF's Lumafabrik (a light bulb factory) in Södra Hammarbyhamnen.

The Barnängen factory bears all the characteristics typical of Bergen's factories in the '10s and '20s: the simple, rectangular floor plan, easily understood and supervised from a single point, the facades glazed to nearly 80% of their surface area to enable as wide a floor plan as possible – 40 meters. The frame is entirely of reinforced concrete, and the high ceilings allow the use of mezzanine floors. Employee facilities are located near the entrances.

The Luma factory not only has a different form, it contradicts Bergen's ground rules for scientific factory building on several points. Instead of a simple and easily surveyed building volume, KF's architects chose a complicated form (a main volume with three perpendicular wings) with lots of facades and lots of nooks, crannies, and corners – which, according to Bergen, increased the risk that workers would "gå och slå dank" (roughly, "loaf around"). The facades in the production area are furnished with strip windows placed too high for the workers to see out. This comparison shows that the Functionalist factory was not necessarily more rational in terms of productivity or work environment.

Does the Functionalist factory's exterior form perhaps express its function in a more satisfactory manner? That is the conclusion one must draw from the movement's rhetoric. Let us return to the same two buildings, both of which (a mere coincidence) happen to be adorned with towers. The appearance of the towers could hardly be more different. Barnängen's tall brick tower has a classical character, crowned by a cap with curved roof surfaces. Luma's tower is extremely Modernistic, flavored by Russian Constructivism. It's top is a cube,

glazed on all sides, poised above the flat roof. This glass room is reached by means of a spiral stair. Which of these towers is an expression of a necessary function, and which is an aesthetically motivated appendage added by the architect? The answer is – perhaps unexpectedly – that Barnängen's tower is of the two the functionally necessary. Spinning mills had since the middle of the nineteenth century been given huge ventilation towers (called "dust towers") to clear out easily combustible textile fibers. The Luma factory's tower is not necessary or even functionally motivated. It contains a room in which the burning time of light bulbs is tested, a room which could be located anywhere in the building. The placement of this room above the roof was the architect's idea for making a shining advertisement visible from a great distance. Thus the Luma factory's tower is an appendage, a clever and striking promotional gimmick. The importance of the advertising idea to the architectural concept for the project is apparent from Eskil Sundahl's presentation of the Luma factory in the architectural journal *Byggmästaren*. It was for him a matter of exploiting the visibility offered by the site in Hammarbyhamnen. His goal was to make the building a kind of trademark or advertisement.

The example is cause for the testing of a new hypothesis: that the new Functionalist language of form was not caused by concern for function or construction, as the Functionalists themselves claimed, but by the will to create a striking formal composition which could support the image of modernity and effectiveness which was at that time so in demand. This was obviously the case with KF's broad concentration on modern design for shops and shop interiors, product packaging, and factory buildings. Perhaps the advent of Functionalism should be considered primarily a victory for promotional design intended to symbolize the modern age.

A Concrete Atlantis

This hypothesis can be supported by another more recent book, the late Reyner Banham's *A Concrete Atlantis* (1986), a study of the importance of factory building in the United States for the development of Modernism. In *A Concrete Atlantis*, Banham embarks upon an exciting journey back through the history of ideas and the history of architecture. His destination is the kind of structures that inspired Modernists in Europe, the early American concrete silos and factories. He follows a path that begins with Le Corbusier's *Vers une Architecture* (1923), perhaps the most influential book on architecture ever written. A good deal of Le Corbusier's now familiar illustrations are of American factory buildings. Banham identifies these and comes to the conclusion that, with but a few exceptions, these objects were of a significantly earlier date than Le Corbusier's text. Most of the pictures were taken around 1910. The background, as Banham demonstrates, is that Le Corbusier borrowed the original photographs from Walter Gropius, who had already had them published in Deutsche Werkbund's yearbook in 1911. This gives Banham cause to pose some new questions: why would Le Corbusier choose to illustrate his appeal for a new architecture with fairly antiquated pictures? Why not show more recent, more modern factories? Why didn't he use the more accessible new factories in France, Belgium, or Germany?

Banham gives a credible answer to the question. Le Corbusier was looking for pictures which could illustrate the future architecture which must come. The pictures of American factories from 1910 were perfect for their purpose because they represented supposedly anonymous, purely utilitarian buildings which symbolized the new science of engineering. Not the least important aspect was their American origin: America was the continent of technology, of large scale industry, of the future.

Banham also explains why it would have been impossible for Le Corbusier to use recent

pictures of contemporary European factories. In Le Courbusier's eyes, European architects were far too loaded down by their *beaux-arts* traditions. The architecture of the future, of the new machine society, could only come from another direction. The seeds of a new beginning lay in the anonymous American factory building. It would be a prototype for all sorts of buildings in the future, whether offices, hospitals, or homes.

The main point of Banham's writing of history is his proof that European architects advanced the new formal language (which would be christened the *International Style*) based on *photographs of buildings they had never seen in person.* Neither Le Corbusier nor Walter Gropius had in the mid '20s even been to the United States. They had no real knowledge of the production processes or construction details of the factory buildings they presented as prototypes. The primary interest of the factories was their symbolic value and aesthetic expression.

A Concrete Atlantis is as a whole an unusual event: a scientific work filled with sharply perceptive and educated observations presented in an elegant and accessible language. I strongly recommend reading it together with Lisa Brunnström's dissertation! The combination promises exciting reading with new perspectives on the birth of Modern Architecture.

Johan Rådberg, docent
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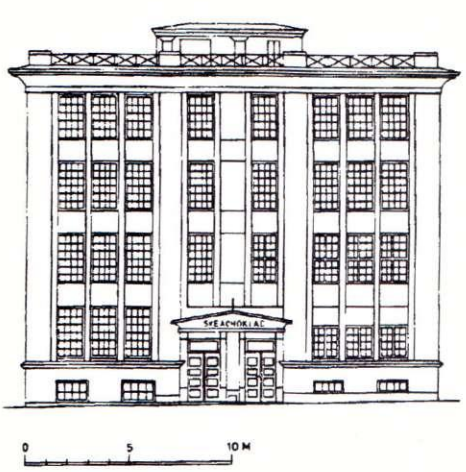

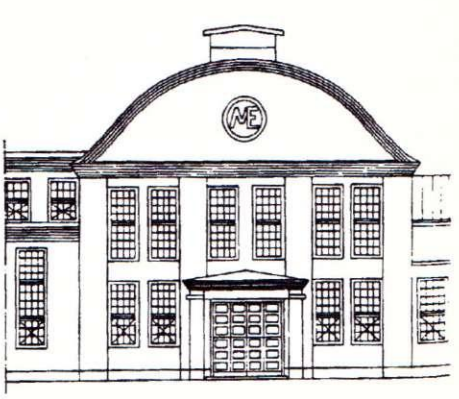

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Abstracts – doktorsavhandlingar

Lisbeth Birgersson

Creating Meaning and Space

– about processes for the development of workplace environments

Industrial Architecture and Planning
Chalmers University of Technology
Göteborg, Sweden,1996

This study sets out to re-evaluate the experience gained from two local authority schemes for revitalising industrial premises for the needs of small enterprise. Common to these schemes was the ambition that any renewal or regeneration was to be carried out on the terms of the firms concerned. The prime purpose of this reflection is to acquire an understanding of the factors in these two processes that were able to strengthen the places in question as environments for small enterprise. Expressed in more general terms: what are the qualities in a process that both can create 'space' and develop social habits and a sense of purpose or 'meaning' for the people using this space?

As a basis for this discussion an action orientated theory is presented. This identifies two fundamentally different kinds of action: 'instrumental action', and a form of action that creates its own meaning, referred to as 'meaning-in-action'. The two revitalisation schemes studied may be regarded as attempts to create arenas where meaning-in-action was given priority. Such processes can be interpreted and developed with the aid of design methods where the focus is on various dialogues between people, and between people and objects. The tacit forms of knowledge - 'to see', 'to do' and 'to be' - are in this way embraced in the process.

Such creative 'collective design' processes have to be confronted and brought into interplay with the more instrumentally controlled planning processes of, for exemple, the local authorities. The two schemes show that this can be achieved by means of special limit-regulating instruments. In this way a 'balanced' meeting between meaning-in-action and instrumental forms of action can provide a 'well-considered' process of action. Models of this kind can also be tested in other forms of locally based initiatives where changes to the built environment are envisaged.

Language: Swedish.

Per Mollerup

Marks of Exellence

– A theory of trademarks and how they work

Theoretical and Applied Aesthetics
Lund Institute of Technology
Lund, Sweden, 1995

The pupose of Marks of Exellenceis to describe what trademarks are, to explain why businesses use them and to demonstrate how they work. The book presents a grounded theory based on emperical data. Practical experience, communication theory, semiotic analysis and theoretical sampling provide a basis for findings.

An historical review shows that trademarks, or marks with the function of a trademark, have been used for at least 5000 years. These marks were motivated by need as well as desire. Early trademarks were used for marking social identity, marking property and certifying origin, the same functions for which trademarks are used today. This work examines several marks, stonemasons' marks, silver marks, printers' marks, watermarks and furniture marks.

An analysis of corporate identity examines the context in which trademarks are used today and how trademarks and identies can be organized according to two times three different principles. On one hand, corporate identities can either be organization oriented or product oriented (branded). On the other, corporate identities can be monistic, endorsed or pluralistic. ten kinds of identification are delineated.

Communication theory and semiotics offer a body of theory which is used eclectically, expanded and applied to describe how meaning is produced in trademarks. A comprehensive model of tha goals of

design programmes is presented. On the basis of practical experience and communication theory, 24 practical requirements are presented.

A taxonomy of trademarks based on material and referential qualities is a central feature of the book. The purpose of taxonomy is improved understanding of trademarks. The taxonomy includes 7 intermidiate and 13 final classes. The classes are exemplified. The final classes are: non-graphic marks, non-figurative marks, non-initial abbreviations, acronyms, non-acronyms initial abbreviations, descriptive marks, metaphoric marks, found marks, proper names, descriptive names, metaphoric names, found names, artificial names.

275 trademarks arranged on the basis of 35 popular motifs are presented and classified according to the taxonomy. The analiysis shows that trademarks which may look similar can have quite different meanings produced in different ways.

Marks of Exellence concludes by studying trademarks as a state of flux. Individual trademarks change and trademarks in general change whith changing times.

Lars-Gustaf Bjurklo:
Assessing Methods to Estimate Delivery Flows and the ERG Model

Regional Planning, Architecture,
Royal Institute of Technology
Stockholm, Sweden, 1995

The purpose of this study is to describe and evaluate methods and models which are emperically applicable in order to estimate flows of interaction between sectors and between nodes. This interaction manifests itself in the form of flows of commodities and services between the different sectors of the economy, and between spatially dispersed nodes of supply and demand. After an introductory overview of various regional and interregional interaction models, the main ideas of the ERG (Estimation of Intraregional and Interregional Goods Flows) approach are described. A specific purpose of the ERG project was to investigate to what extent it is possible to "feed" the models by using statistics published periodically. Depending on different kinds of commodity characteristics, models of generation and distribution of freight flows are presented for six different estimation groups. Experiences collected from the ERG approach applied to three different projects areas in Sweden are presented. The three projects comprise (1) the original ERG project in the county of Värmland, (2) an input-output study from the county of Blekinge, and (3) an investigation of the goods flow pattern of the Mälardalen region.

The results are evaluated by several measures. Sixteen measures of distance and similarity are defined, and the properties of the measures are discussed and compared. By utilizing these measures, the deviation between one observed reference distribution of flows and one corresponding estimated distribution are calculated. However, different methods of measurement or measure mightt give very different results and, hence, diverging conclusions about precision and accuracy. The reason for this is mainly due to three factors: (i) the functional form of the deviation measure, (ii) the character of the distributions compared, and (iii) the unit of measurement. This is demonstrated mainly through analysess based on emperical data which cmparisons between differently established regional input-output coefficients as well as between the internodal commodity flows estimates.

One important conclusion of the study is that generally available statistics are in most cases too highly aggregated to give an accurate picture of regional flow patterns and are thus not applicable to the estimation process. It is therefore necessary to add disaggregated, plant level information. From the measurement study one can, for example, conclude that the regression technique is very useful in this context. It gives several measures of deviation, and its plotting facility seves as a good illustration and disclosure tool.

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NORDISK ARKITEKTURFORSKNING – NORDIC JOURNAL OF ARCHITECTURAL RESEARCH

Strategic Physical Planning for the Renewal and Reuse of Industrial Facilities

by Ulf Ranhagen, Technical University of Luleå and VBB arkitekter, Stockholm, Sweden.

This article illuminates a field in which the author works both as a planner and as a researcher: strategic physical planning for the renewal and reuse of industrial facilities. After reviewing the thought processes underlying the planning of industrial buildings and areas during the twentieth century, he discusses how the term "strategic planning" can be interpreted for use in practical planning situations. The argument is exemplified by current planning cases.

Workplace Development as Design Work – about setting up a design theory project

by Anders Mächs, Department of Industrial Architecture and Planning at the Royal Institute of Technology in Stockholm, Sweden, Bertil Olsson, CITU, University of Dalarna, Sweden, Marie Skans, Department of Industrial Architecture and Planning at the Royal Institute of Technology in Stockholm, Sweden.

In this article the setting up of a research project is discussed. The objective of the project is to contribute to a long term development of the process for change in working life. By proposing terms which in a new way can articulate the practice of working for change we want to throw light on new aspects, and thereby contribute to a purposeful development of this practice. We attempt to formulate a perspective, where workplace development is regarded as a creative task, a design process. Apart from our earlier experience, as an empirical basis for the research project we have chosen to utlise experience from the steel industry of Dalarna, which is now in a dynamic stage of development with both new investment in technology, and attempts to develop competence and new forms of work organisation. In this article the research approach, which at the same time is the result of the research work to date, is presented. The objective is to thereby contribute to a broader discussion about how design research can be carried out.

Award-winning Industrial Architecture

by Magnus Rönn, Architecture and Urban Planning at the Royal Institute of Technology in Stockholm, Sweden

This article presents industrial building projects which have won architectural awards. The point of the article is twofold: to reflect upon the concept of architectural quality and to discuss a few notions about design work with industrial projects.

Research as Support for Design Practice

by Peter Ullmark, Royal Institute of Technology in Stockholm, Sweden

In this article the author presents a tentative paradigm for architectural research based on his experience from research within work- space design. He makes a distinction between empirical, critical and constructive research. He finds that critical research by case studies and constructive research by experimental work with prototypes are possible ways. As an illustration of case studies he briefly presents a study of the 'Konsum Building' in Stockholm.

The 'Intelligent Office' Concept Makes the Difference

Mervi Lehto, VTT, Building Technology, Automation and information systems, Finland

The 'intelligent building' concepts developed at the beginning of the 1980s formed the starting point for the construction of 'smart homes' and 'intelligent offices'. Now intelligent concepts are becoming established as the target level for all buildings, and the focus has shifted to the introduction of sustainable intelligent solutions. The study of intelligent offices by VTT proved the intelligent office concepts to have good energy efficiency. It proved also them to be, from the users' point of view, capable of increasing work efficiency and to some extent diminishing job related trips. Simultaneously, intelligence means an advantageous and comfortable working environment.

The advantages are due to the intelligent architecture and the technical solutions installed. According to the study, it seems that simply the use of the intelligent concept as a holistic approach to the building design, makes the difference between a high quality office building and the intelligent office. Consequently, the message for building managers is that even the idea of integrated and user oriented concept in planning is enough. Work efficiency, reduction of traffic, energy efficiency, health issues and cost benefit ratio, all speak for intelligent offices.

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