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A critical analysis of the tectonic concepts in the thought and work of Ludwig Mies van der Rohe

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A CRITICAL ANALYSIS OF THE TECTONIC CONCEPTS 
IN THE THOUGHT AND WORK OF LUDWIG MIES VAN DER ROHE

by

CHRISTOPHER WEST

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ABSTRACT

A Critical Analysis of the Tectonic Concepts

in the Thought and Work of Ludwig Mies van der Rohe

by

Christopher West

This study is a critical reevaluation of the conceptual basis of Mies van der Rohe's use of tectonics. It concludes that Mies's tectonic concepts developed in four phases, and that each phase emphasized specific aspects of his Transcendental thought. It determines that each phase specifically embodied the dialectical arguments of his writings during that phase. The sequence of these tectonic concepts reflects Mies's development from a representational to an ontological understanding of tectonics, and reveals his return to representational tectonics at the end of his life.
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PREFACE

Philosophy and construction merge in the work of Mies van der Rohe who considered his buildings objective translations of philosophical propositions.\(^1\) His work is remembered by architects more for its definition of space and construction achievements than for its ideas, however. The apparent simplicity of his work and accepted straightforwardness of his structures belie a complexity of theoretical intention which has not been adequately addressed by critics.\(^2\)

This purpose of this analysis is to present a connection between Mies’s theoretical positions and how he conceptualized the tectonics\(^3\) of his architecture. It will present an argument for a progression of theoretical content and how it is expressed specifically in built form.


\(^3\) In this study, the term tectonics encompasses all issues regarding to building, construction, structure, and other material concerns of architecture. Construction is specifically used to denote only the material aspects of putting buildings together. Building as an act implies an idea of construction that can have cultural or historical significance.
Construction in Mies's architectural theory functions as the objective\(^4\) basis for architecture:

"Wherever important things occurred, they were of a constructive, not of a formal nature. This is doubtless the reason for the conviction that construction has to be the basis of the building art."\(^5\)

By isolating tectonics as an objective function, the subjective aspects of his work are delimited. The clarification of construction and its actual role in the design process allows the work to be seen as a theoretical development both in ideal and built form.

This focus on construction and its conceptual basis does not claim it as the primary focus of Mies. Instead it relates the importance of construction in relation to other architectural goals. It reevaluates issues of building, structure and technology which have often been either accepted unconditionally or rejected as overly simplistic. It intends to demystify the details of this master of precision and materials.

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\(^4\)Objective connotes a material and verifiable condition as opposed to an ideal condition.

PART ONE: GENERAL INTRODUCTION
PURPOSE OF STUDY

This study is a reevaluation of work which has received much attention since its exposure. The goal of this study is to pursue two areas not sufficiently analyzed: how Mies's particular philosophy is related to his specific tectonic concepts and construction detailing; and how the formal and expressive development of the tectonics relates to his theoretical development. The intention is to determine the conceptual basis of his tectonics as well as articulate that basis as an issue of expression.

This analysis of the role of the concept of tectonics in Mies's work seeks to go beyond two tendencies in the historical criticism of Mies. One tendency is to present the work as purely formal, neglecting practical concerns of building and of the objective intentions of the work. Another tendency is to focus primarily on Mies's mastery of structure without considering any theoretical basis for his structural intentions. I propose to articulate the theoretical concerns for building and their influence on the design of tectonics.

Mies's work reflects a development of depth of philosophical and rhetorical meaning in construction itself and a significant advancement in the
development of structural rationalism. Neumeyer recently has provided a clear outline of Mies's thoughts in his writings. This study intends to further that investigation by analyzing Mies's specific philosophy in relation to building analysis.

The struggle to comprehend the differing tendencies in Mies's work have not been fully clarified by historians and critics and leave unresolved many important issues fundamental to an understanding of modernism. These inconsistencies often take the form of arguments on antithetical issues such as formal/functional, subjective/objective, classical/gothic. A goal of this analysis is to clarify some of these many inconsistencies.

Several critics have warned against the use of construction as a focus in Mies's work. They stress that construction was never the highest purpose in Mies's work. I agree with these points, however, construction as an objective element provides a focal point by which one can critically link to other goals. An analysis of the working method in conceptual drawings will describe the specific experimentation with construction and its limitations in relation to other formal issues. Focusing on construction for critical purposes does not inherently elevate it or distort it to become the primary purpose of Mies's architecture. It is, however, a method to define the limits of the various aspects of his work.

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6See discussion of Neumeyer below.

7See discussion of Tegelhoff and Honey below.
METHODOLOGY

The mode of inquiry of this research is primarily historical. It traces the development of thought as it relates to building through the conception of tectonics. In this way I am indebted to Panofsky's *Gothic Architecture and Scholasticism* for the concept of philosophical embodiment in a work of art. While the nature of the portrayal of a development in Mies is inherently teleological, it does describe Mies's own historicist world view and his perception of architecture as coming from inherent cultural forces to reflect its time. Thus the analysis thus follows Mies's influences in this area, namely Riegl and Wolfflin.

The intention in providing more analysis of Mies's work is to clarify the absolutist intentions in his architecture, and relate them to the philosophy of that period. Mies's details are often praised without a full understanding of the Neoplatonic significance they express. This topic is an addition to previous histories in that it attempts to fill a void where formal analysis alone has left off.

The structure of this research is separated into two sections. The Review of Tectonics section reviews the experimentation with construction technology sequentially through an analysis of both projects and completed buildings to provide a background discussion for the following section. The Review of
Writings section analyzes the written work of the architect to uncover the philosophy and determine relationships between the ideas in writings and built form. A final section of concluding comments will review the arguments.

The structure of the paper is as follows:

I. General Introduction

II. Review of Tectonics

1. 1921-1927
2. 1928-1938
3. 1939-1948
4. 1949-1958
5. 1958-1969

III. Review of Writings

2. "We Stand at the Turning Point of Time: Building Art as the Expression of Spiritual Decisions." 1928.
3. Inaugural Address at the Armour Institute, 1938.
5. "Where Do We Go from Here?" 1960.

IV. Conclusion

The Review of Tectonics section will focus on projects and built works. As a schematic overview, it will raise general concepts and trends throughout his work to form a background for later discussion of tectonic issues. It will focus primarily on the conceptual nature of tectonics in the projects. Arranged according to groups of buildings designed at the same time, it will address conceptual issues behind buildings which may or may not have similar structural systems. It will also analyze the work in tectonic terms from the
standpoint of contemporary building technology and it will define expression within the manipulation of construction and materials. The goal is to determine whether or not there was a consistent approach to tectonics at a certain period in time and if changes occur over time.

The reference material for this section is made up of drawings, models, interviews with Mies's associates and the buildings themselves. The nature of the presentations and the conceptual sketches are significant as they imply intentions. Thus the working method itself gives clues to the nature of the use of tectonics.

The amount of reference material varies depending on the time period. The period before 1928 is dependant mostly on what was saved to be seen by the public. After this period there are more conceptual drawings in the Museum of Modern Art Archive. The American years in that collection have extensive amounts of his drawings saved by his staff. It is clear that Mies used models extensively in the design process, but model analysis is limited to photographs.

In the Review of Writings section, selections from different periods focus on the general concepts which interested Mies at the specific time. A philosophical position and its specific relationship to tectonics will be presented. Then examples of the built work will be reviewed to determine a connection to these ideas. The philosophy will provide an avenue for the clarification of the ideas rather than a subject of investigation itself.
Mies's writings are architectonic in their own way. Each writing or lecture is so carefully put together that much like his architecture they are crystallization of ideas. He painstakingly writes small passages only to revise them slowly over the years.\(^9\) The writings are very carefully considered and presented and they represent a clear definition of Mies's personal philosophy. Changes that are evident in the writings happen over a period of years and they are very deliberate. When a way of saying something is no longer considered the best way, it never appears again.\(^10\) Thus some of the aphorisms we are familiar with appear for a certain period of his life only to be replaced by another saying with an altered intention.\(^11\) They provide a comprehensive source for a cohesive world view, just as his architecture does.

\(^9\)A single sentence was reworked again and again for page after page until being given its final form" in Wolf Tegethoff, Mies van der Rohe: The Villas and Country Houses (New York: Museum of Modern Art, 1985), 19.

\(^10\)Neumeyer, 9.

\(^11\)The fact that Mies uses aphorisms shows the desire to condense significant thoughts into a minimum of means. They strive for objectivity and clarity above all else. Neumeyer calls this the "Artless word" for that reason. Neumeyer, 26.
CANONIC INTERPRETATIONS OF MIES

Various interpretations of Mies have tended to oversimplify and categorize Mies's work\textsuperscript{12} usually taking the form of structural rationalist critique or formalist critique. Each oversimplifies the nature of Mies's tectonics by evaluating it for style rather than content.

An example of the structural rationalist author is Werner Blaser who presents the work without an analysis of the tectonics. This is best seen in his book \textit{Mies van der Rohe: the Art of Structure}, in which the presentation is in monograph form without accompanying analysis. It considers the work apart from its theoretical basis. Mies's particular form of rationalism is accepted without question. This approach prevents a comprehensive view of the work and limits the understanding of deeper sources of meaning within it.

Formalist analysis categorizes the work in purely formal terms rejecting the significance of the tectonic conception beyond its visual impression. Colin Rowe and Bruno Zevi who both reflect this thinking simplify the work into the opposing periods of 'free space' and 'classical'.\textsuperscript{13} These concepts describe a

\textsuperscript{12} Neumeyer explains the poor scholarship and anti-theoretical interest in Mies. See Neumeyer Chap. 1.

general formal tendency but they leave many contradictory tectonic problems
unquestioned. In "Neo-Classicism and Modern Architecture," Colin Rowe
skeptically describes the objectivist and Neoplatonic position of Mies only to
later describe the work as "... Schinkafflesque, Biedermeier neo-Grec." This
focuses on formal rather than tectonic goals. Tectonic questions and issues of a
practical nature are ignored as well.

Giedion is similar to these authors although he adds the teleological
notion of the development of space.14 This follows Mies's historicist viewpoint
about his own development but it also ignores the tectonic intentions in the
work. While Giedion share some aspects of Mies's own thought on the
development of architecture to represent its time and culture, it still remains
highly formal in approach.

Wolf Tegethoff who has done extensive and invaluable writing on the
formal issues of Mies's houses has denied the importance of construction. He
states that:

"... one must not focus too one-sidedly on the structural features that
Mies himself stressed so exuberantly... this is hardly paramount—unless
of course one chooses to elevate a primacy of technique for the primacy
of form. That, however, would be tantamount to granting technology a
value per se, while strictly speaking it can always be only a basic
element—a means, so to speak—in the service of other higher goals."

14Sigfried Giedion, Space, Time, and Architecture: The Growth of a New Tradition
Thus in order to emphasize the formal goals in the work, the tectonic goals are ignored. And the possibility of extracting the potential of those constructions is lost.

Neumeyer is the first author to call serious attention to Mies's philosophical positions in his writing. He has described the importance of construction in the analysis of Mies's idea of Baukunst. Neumeyer's scholarship is extensive yet it is primarily an historical analysis.

Neumeyer outlines the important Neoplatonic and rationalist positions of Mies's philosophy and provides the first complete translation of Mies's writings. He describes Mies's introduction to the world of philosophy and his development amidst the contradictory theories of the 20s which are important to his tectonic development. Also, his description of Mies's experience around 1928 which changed his philosophical direction is fundamental to an analysis of his buildings. Since Neumeyer's work is primarily historical, however, it does not attempt the analysis of the architecture itself which is crucial to an understanding of the effect of Mies's intentions.

This study is an addendum to Neumeyer's work in three specific areas. First it provides specific building analysis related to the philosophical arguments.

\[\text{\textsuperscript{15} p.20 Also Sandra Honey expresses a similar opinion.}\]

\[\text{\textsuperscript{16}Neumeyer focuses on Baukunst and construction in Chap. III, "The Ambivalence of Concepts: Construction or Interpretation of Reality? Berlage or Behren's? Hegel or Nietzsche?", and in Chap. V, "From Material through Purpose to Idea: The Long Path to the Building Art."}\]
It also analyzes the significance of Mies's working method and formal
development of material use which is completely outside of the realm of
Neumeyer's research. In addition it outlines areas of philosophy specifically
missing in Neumeyer's study including Logical Positivism and the development
of Mies's ideas after 1938.

Ford is one author writing on tectonics who actually denies any important
connection between the architect's writings and built work. He assumes an
obvious one-to-one correspondence between writings and actual construction.
This also prevents the necessary in depth analysis of the conception of
construction to uncover the important intentions. While he does provide
important technical analysis, he accepts the many contradictory aspects of
Mies's building without further explanation.

The Postmodernist critique best represented by Robert Venturi has
further led to a simplified understanding of Mies's work. In denying the
importance of tectonics in architecture these critics have proceeded to redirect
architecture to a more aesthetic and symbolic approach. This is perhaps the
critique of the entire structural rationalist school of interpretation rather than

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18 Harries argues in "Thoughts on a Non-Arbitrary Architecture," in Perspecta, that Post-Modernism is a critique based on Aesthetic preference ("less is a bore") and does not itself hold any content. It is aesthetically based within a tradition of philosophy that holds a representational view of architecture.
direct critique of Mies's ideas. It critiques the theoretical use of construction in any form other than symbolic as outside the realm of architecture.\(^9\)

Bonta critiques the manner in which history has canonized Mies. While his larger argument is unrelated to the issue of tectonics, his method of investigation into the creation of history is important. Bonta uncovers how history was created to form an argument about Mies. This is an essential attitude in the research of Mies's work because so much of it was altered in later years so that it would follow a teleological development. Original tectonic conceptions were presented in a misleading framework.

The analysis of construction and the theory behind it provides a basis for discussion of issues which are necessary to explain some of the inconsistencies left by formalist and Postmodern arguments. It also provides a discussion of issues not generally interpreted by art historians.

\(^9\)The Postmodern critique of tectonics has been criticized extensively. See Jean-Michel Savignant, "Constructional Conventions: Craftsmanship and Professionalism," in \textit{Lotus}\(^37\); Jean-Pierre Epron, "Technical Practice and Architectural Discourse," in \textit{Lotus}\(^37\).
BACKGROUND

Mies's background and development are crucial to the positions he develops at the beginning of his mature work. Schulze describes his early introduction to philosophy, his technical training, and his training in the influential offices of Paul and Behren's.\textsuperscript{19} Neumeyer stresses the importance of Rhieal as Mies's first client and his entree into the intellectual elite. In addition philosophy and other arts were understood to be aligned at this time in Germany. Through these circles Mies was exposed to a society apart from his technical background.\textsuperscript{20} These facts formulate the position that although Mies was not formally schooled in many areas he received an accelerated introduction to them at this point in his life. His associations with important figures such as Riehl and later Guardini and others suggest that Mies's

\textsuperscript{19} Schulze, see Chap.1, "Aachen: Youth in Imperial Germany, 1886-1905," and Chap.2, "Berlin: Problems of a New Century, 1905-18."

\textsuperscript{20} Neumeyer, 37.
interests in philosophy and theology were not naive. Clearly, Mies had in his own way acquired the education to fit his interests and new social standing.

The general issues facing the art world during Mies's apprenticeship included: Riegl's *kunstwollen* or will to art; Wagner and Nietzsche's *Gesamtkunstwerk* or total work of art; and Wolfflin's *Zeitgeist* or spirit of the epoch. Each of these concepts included an idea of the totality of an art object. Wolfflin and Riegl especially influenced the idea of the art work naturally reflects the inner nature of an epoch. At the turn of the century *sachlichkeit* became understood as a new sobriety in use of form in reaction to stylistic variety of the nineteenth century.\(^{21}\) Certainly these were arguments that Mies, being in progressive offices, was fully aware of at this time.

The concept of *Baukunst* or building art was also influential at the time and was most likely introduced to Mies through Berlage who published *Gedanken über den Stil in der Baukunst* in 1905. This concept found the intrinsic in building was seen as noble and pure, untainted by the stylistic excesses of architecture. Originally stemming from the structural rationalism of Viollet-le-Duc in the nineteenth century, the term *Baukunst* was used consciously instead of architecture to denote new values in architecture. This married well with the idea of the *Neues Bauen*, new building or modern architecture movement which Mies would become a part.

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With his employment in Behren's office Mies continued his development as a progressive architect in the reduced classical style. The exposure that this office gave Mies both to influential individuals, to industrial architecture, and to the arguments of modernism is fundamental. The development of Mies's theoretical conception of construction occurs in Behren's office. As he develops his own ideas, Mies changes his opinion on the nature of construction and later becomes critical of Behrens.

Mies rejects Behren's desire for the perfect style to represent its time in favor of Berlage's notion of the inherent possibilities of building to create essential architecture. Mies is often quoted as rejecting Behren's work by saying: "He who builds a factory as if it were a temple lies and disfigures the landscape." Mies gradually moved closer to his ideal of construction as the promise of art before the 20s.

Berlage, who Mies claims was the single greatest influence on his early years, continued Semper's theories on building. Semper claims: "Art knows only one master, necessity." The rational and sachlich approach to construction was a position which separated Mies from other German architects of the early twentieth century who, like Behrens, were concerned with the proper form to express modernity.

\[22\] Neumeyer, 27.
Both Berlage and Mies were both influenced by Schopenhauer. Berlage quotes Schopenhauer with: "The only permanent theme of architecture is that of support and burden."\(^{23}\) This reflects Berlage's pragmatism:

"And herewith is at once expressed the great truth, to which all architecture must respond and which has been satisfied by all good architecture--that the artistic must be the result of practical considerations."\(^{24}\)

They were also interested naturally in Plato and Hegel in their search for truth. Neumeyer writes: "the factual, rational, and therefore clearly constructed constitutes that particularly Hegelian 'region of honesty' that should form the foundation for the new art."\(^{25}\) In addition, both architects often turned to philosophy to explain their ideas.

A growing concern for sobriety and sachlichkeit grew in Germany in the twenties. The movement in art and design paralleled an empiricist movement in philosophy which emphasized objectivity and science. Rational construction apart from aesthetic debate on style was seen as an imminent necessity to prevent social dis-ease.

A general pessimistic critique of Weimar society was expressed at many levels. The turmoil is characterized by Simmel:


\(^{24}\)Singelenberg, 196.

\(^{25}\)Neumeyer, 146.
The present cultural deprivation of modern man is thus rooted in the discrepancy between, on the one hand, the objective, substantive culture of tangibles and ideas and, on the other, the subjective culture that finds itself overwhelmed by the former and incapable of keeping up with its accelerated tempo of progress.\textsuperscript{26}

Spengler, who Mies had read with interest, described the western civilization in general decline. Many cultural critics including Behne attacked architecture of the day as banal and unrelated to the social reality. An immanent solution was needed and that was construction, generally in a technological and new form. Issues of construction became the central focus for many in the movement including Hannes Meyer who declared that architecture was "a formula--function X economics."\textsuperscript{27}

The analysis of this study begins as Mies in his mid-thirties becomes involved in both the Werkbund and avant-garde circles. Mies, through the influence of Hans Richter enters the particularly revolutionary and influential circle of leftist intellectuals and artists of Berlin. Here he meets van Doesberg and others to form the G group. His associates at this time include Haring, Schwitters, Hilberseimer and others. Mies was poised in a new situation to explore new thinking.


At this time philosophy became significantly important to Mies for the purpose of the clarification of ideas. It was not an opportunity to adopt the author's way of thinking but a way of reinforcing his own ideas.29 Beginning before the 20s Mies began reading from a wide variety of sources in all areas of thought.29 This began a continual search for truth which led him to modern philosophy, medieval philosophy, morphology, and philosophy of science.


29This is evident in the Mies van der Rohe Collection, University of Illinois Library, Special Collections.
PART TWO:

REVIEW OF TECTONICS
1. Friedrichstrasse Office Building, 1921

Mies's early radical projects show a powerful focus on construction and materials. They are an introduction to the Neues Bauen and create a turning point in the history of building technology. The presentation of these dramatic images (Fig. 1) projects offers important clues to their intention as images and to the conception of tectonics.

The Friedrichstrasse building is presented as a revolutionary image of new construction. The large format perspectives as a persuasive and shocking argument. The highly expressive images focus the attention of the viewer toward the visual effect of large scale construction in new building materials.

The project does not focus attention on the explanation of actual tectonics. In fact, the plan for the skyscraper shows no structural intention (Fig. 2). In addition, no construction detail studies of these buildings exist or are known to have existed. There is no evidence of technological investigation of the systems involved. This is especially peculiar in that the building systems
Fig. 1 Perspective of the Frierichstrasse Office Building project, Berlin, 1921. Archive no. 20.6.

Fig. 2 Plan of the Frierichstrasse Office Building project, Berlin, 1921. Reprinted from Schulze, 198. Note the absence of structural intention.
were experimental. It is clear that the project presents the image\textsuperscript{30} of the Neues Bauen rather than new tectonic information.\textsuperscript{31}

The primary goal of the project is to examine the use of glass. It is a study in the optical possibilities in the manipulation of glass over large surfaces (Fig. 3).\textsuperscript{32} The purpose of the investigation is singular and focused on the visual manipulation of the cladding material (Fig. 5).

The focus on material and new construction is even more evident when the projects are viewed against some of the other entries to the competition (Fig. 6). Mies's sachlich buildings stand significantly apart from the work of other expressionist architects.\textsuperscript{33} Mies's entry, although very expressive, is clearly intended to be primarily objective in its approach to construction.

The project is successful in expressing the potential of Neues Bauen and the rejection of traditional building technology. Traditional building systems are inverted. The projects stand in stark contrast to contemporary architecture in the bold treatment of new materials. It is a statement of revolution in the conception of tectonics and openly criticizes its surroundings (Fig. 4).

\textsuperscript{30}Neumeyer, 110.

\textsuperscript{31}While these projects are now seen as visionary, they were real projects at the time. All of these projects and the projects to follow were intended to be built in that they were designed for real sites and specific clients. It is thus certain that Mies would have further developed the projects' tectonic systems. Tegelhoff, 15.

\textsuperscript{32}Shell, 18.

\textsuperscript{33}Mies's entries to the competition were disregarded. Schulze, 99.
Fig. 3  Detail of Perspective of the Frierichstrasse Office Building project, Berlin, 1921. Archive no. 20.6. Note expression of reflection.

Fig. 4  Perspective of the Frierichstrasse Office Building project, Berlin, 1921. Archive no. 1921. Note the expression of historical context.
Fig. 5  Diagram: Tectonic concept as focus on single material.

Fig. 6  Perspective drawing of competition entry by Hugo Haring for *Friedrichstrasse Office Building*, Berlin, 1921. Reprinted from Schmidt, 228.
A contradiction exists in this aesthetic approach to an objective problem. In his tectonic concept of the skyscraper Mies is criticizing a representational approach to architecture. Yet he presents a representational image to win the acceptance of new building methods. His own method is highly formal yet the intention is to be purely objective. The contradiction of subjectivity and objectivity is typical of Mies.

Other projects of this period show similar tectonic intentions. The Glass Skyscraper (1922) and the Concrete Office Building (1922-23) (Fig. 7) each are highly expressive as images of new construction. Each is study of the potential of a single material in which no technical investigations of the actual construction exists.

2. Concrete Country House, 1923

The Concrete Country house (Fig. 10) also shows a continued focusing on a single new building material as a basis for architecture. As in the skyscrapers, the construction becomes a point of departure. It presents the material of the building as the sole tectonic concept. The project, which was most likely a house for himself,\(^\text{34}\) shows the expressive possibilities of concrete as the essential concern. It declares a revolution against traditional building methods.

\(^{34}\text{Tegethoff, 33.}\)
Fig. 7  Perspective drawing of Concrete Office Building, 1923. Archive no. 46.1.

Fig. 8  Detail of perspective drawing of Concrete Office Building, 1923. Archive no. 46.1. Note expressionist use of concrete.

Fig. 9  Diagram: tectonic concept as focus on single material.
The concrete is manipulated to show the power of new technology with random punched windows, long overhangs and unsupported rcjf planes (Fig. 11). As in the previous projects, the large scale images are meant to persuade rather than instruct. While no plan or technical studies exist, it is clear that the house has been conceived to work structurally. It appears to be well resolved tectonically from the images of the model.35

The significance of the Concrete Country House (and the Concrete Office building before it) is that it is a monolithic conception tectonically.36 This is an early attempt at a method that modernism would continually attempt in the re-invention of building tectonics. Mies never actually built a monolithic building until his American years. Until then, he always used a traditional layered system of construction.37

Another house of the period, the Brick Country House (1923-24), shares a similar tectonic concept with the concrete house even though it is in brick. It attempts to describe the simple nature of brick in an expressive way. It shows the material in its radical new form as Neues Bauen.

35Wolf Tegethoff carefully describes the reconstruction of the plan and some of the architectural implications of the large cantilevers. Tegethoff, 23.

36Monolithic construction, to use Ford’s term, is where the structure and materials of construction are continuous through the section of a building, and the structure is left exposed as a part of the conception.

37Layered construction refers to the condition where the structure is covered by another finish surface intended to protect the structure from weathering. It is a traditional tectonic method.
Fig. 10 Model photograph of *Concrete Country House*, 1923. Archive vol.1, 86.

Fig. 11 Detail of model photograph of *Concrete Country House*, 1923. Archive vol.1, 86. Note expression of cantilever with concrete structure.

Fig. 12 Diagram: tectonic concept as focus on single material.
The significance of the comparison of the Concrete Country house and the Brick Country House is that they describe a particular working method of Mies. The projects were designed simultaneously allowing for a comparative design method. In fact both were designed for the same site.\textsuperscript{35} It is likely that this influenced the definition of the tectonic characteristics of each building. This comparative working method is common to much of Mies's work and shows the tendency to use a dialectic form of investigation.

In contrast to these avant-garde projects, the Mosler House (1924-26) (Fig. 13) designed two years after the Concrete House is a traditional design with little relation to the Neues Bauem designs. The inherent inconsistency of these projects presents an important clue to understanding Mies's œuvre. His use of the traditional villa style after his visionary projects seems incongruous. However this shows a particular attitude toward building in which the two country house buildings fit.

Mies had at this time been practicing in this style for twenty years (he was forty in 1925) so there would be no need to think that he would completely repudiate his earlier work.\textsuperscript{36} The way Mies understood these traditional residential projects is clear. The illustration of the Messel designed house in an

\textsuperscript{35} Tegethoff, 19.

\textsuperscript{36} Other architects including Schinkel had worked in several styles at the same time. Behrens worked in different styles depending on the program of the commission. It is likely that Mies would have reserved the more radical work was for himself or for commercial clients.
Fig. 13 Photograph of Mosler House, Berlin-Neubabelsberg, 1924-26. Reprinted from Schulze, 128. Typical of Mies's villa style in the 1920s.

Fig. 14 G, no. 3. Mies rejects stylized architecture. He considers his own buildings as good building rather than style.
issue of G (Fig. 14) shows how critically Mies viewed that type of architecture prevalent at the time. It also shows that he saw his own work at the time as completely different from the stylized traditional work of Berlin. Obviously he considered his traditional, sober designs good building.

These buildings show that Mies was very familiar with working in traditional construction conventions. The detailing of the traditional houses of the twenties show an effort at reduction and simplicity, however, and points to the kind of simple treatment of materials and joinery seen in the brick houses of the later twenties.\textsuperscript{40}

3. \textit{Lange House}, 1927-30

4. \textit{Apartment Building for the Weissenhof Housing Colony}, 1927.

These projects continue some of the experimentation of the earlier projects and begin to show how those conceptual experiments were actually built. They show a continued concern for the expressive image of new technology. Neither show a technical interest in structure although they do show a concern for the image of \textit{Neues Bauen} and new construction techniques. They continue to show an avant garde rejection of traditional building.

\textsuperscript{40}Ford, 263.
The Lange house (Fig. 17) continues the expressive use of brick with a new construction vocabulary. As in the Concrete Country house the brick house uses free spanning, undelineated lintels, cantilevering canopies and large expanses of glass as gestures of new construction. The important difference is that the Lange house as a built project is of traditional layered construction, (Fig. 15) unlike the earlier visionary projects but similar to the traditional villas. Steel, the more commonly understood modern material is hidden in the wall section (Fig. 16). Visually and expressively the Lange House is modern, but the tectonic conception is traditional.

This idea carries through to the detailing as well. The meeting of dissimilar materials in the interior shows an attempt at reduction but remains traditional (Fig. 18). Joints in the building are covered with trim. A more radically modern building would deny the covering of a joint as a means of denying traditional architecture.

The Weissenhof Apartment building (Fig. 20) shares a similar tectonic conception with the Lange House. Its image is that of a Neues Bauen building but it uses traditional layered construction. It has a steel frame which can be understood as a move toward experimentation with new tectonic systems. The

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41The Lange house designed together with the Esters house shows a further use of Mies comparative type of working method.

42Ford, 263.

43Mies also shows some experimentation in the use of movable partitions in the apartments.
Fig. 15a & b  Sectional axonometric of Lange House, Krefeld, 1927-30. Reprinted from Ford, 262. Note traditional load bearing masonry construction.

Fig. 16  Detail of wall section of Lange House, Krefeld, 1927-30. Archive no. 6.126. Note brick as veneer covering structural steel and masonry wall.
Fig. 17 Photograph of Lange House, Krefeld, 1927-30. Reprinted from Schulze, 144. Note expressionist use of ribbon windows with no visible lintel and cantilever overhangs.

Fig. 18 Details of interior millwork in Lange House, Krefeld, 1927-30. Reprinted from Ford, 264. Note simplification of trim details.

Fig. 19 Photograph of interior of Lange House, Krefeld, 1927-30. Reprinted from Ford, 265. Note traditional use of trim. Simplification of trim anticipates further reduction.
Fig. 20  Photograph of the Apartment Building for the Weissenhof Housing Colony, 1927. Reprinted from Schulze, 138. Note the expression of the rational layout with no specific expression of materials or structure.

Fig. 21  Construction photograph of the Apartment Building for the Weissenhof Housing Colony, 1927. Reprinted from Honey. Note that the construction photograph does not match the image of the finished building.
building does not attempt to express the underlying structure, as one can see in the construction photo (Fig. 21). Instead the surface is stuccoed. Its elevation is very rational and materialist with a generous use of glass and floating roof planes yet it is less expressive than the earlier projects.

Neither of these two buildings express the conceptual simplicity of the earlier projects although the Lange house is a study in a single material. Both are layered and make no attempt at describing the actual materials and structure of the buildings. Even the visual image of the apartment building is not monolithic. Like the Lange house it shows an understanding of the role of the building trades and accepted building conventions.

Other projects of this period which have similar tectonic concepts are the Monument to the November Revolution (1926) (Fig. 22) and the Adam Bank Project. The monument uses brick expressively, denying its support. The Adam Bank shows a continued interest in the reflective surface of glass with only a slight hint of structure underneath. Both utilize layered construction and are expressive of the visual potential of single building materials.
Fig. 22  Photograph of Monument to the November Revolution, Berlin-Friedrichsfelde, 1926. Archive vol. 1, 344. Note expressionist use of brick.
II. 1928-1938 The Idea of Building

1. **German Pavilion**, Barcelona Exposition, 1928-29

   The **German Pavilion** represents a shift in the use of tectonics and the expression of materials. It continues reduction but shifts its focus from the single building material to the elemental tectonic parts of the building. It is in this work that the structure becomes prominent.

   The **German Pavilion** separates the structure from the walls and displays it in front of the walls. This shifts primary importance to the columns. The walls themselves then act as screen walls and are intended to float, "freed" from the task of bearing. The roof is a separate element as well. This introduces the concept that the elementary parts of a building become the basis of architecture. Walls, columns, and roof become highly simplified and abstracted to describe the purpose of each.

   The separation of the idea of column as structural order and wall as manipulated screen is an important tectonic development in Mies's buildings. The nature of the conceptual drawings for the pavilion show that the concept is a formal one. The plans and perspective sketches (Fig. 24) show that the structure is an idea, a simplified concept which is placed to the best visual or
Fig. 23  Perspective drawing of German Pavilion, Barcelona Exposition, 1928-29. Archive no. 14.1. Note the intentional play of reflections in this design drawing.

Fig. 24  Conceptual sketch by Mies van der Rohe of German Pavilion, Barcelona Exposition, 1928-29. Reprinted from Tegethof, 79. Note the conceptual use of structure as part of formal elemental composition.
spatial end. The difference between the conceptual structure and the actual structure that was built is significant. The construction section (Fig. 26) shows that the beams were tapered to look as if they were smaller than they needed to be.\textsuperscript{44} Clearly formal goals are primary. The photograph of the building under construction shows how different that stage looks from the completed product.

It is clear from this evidence that although material and structure emerge as significant expressive elements, the importance of elemental tectonic elements is at a conceptual level. The idea of the different elements of wall and structure and their formal relationships is more important than revealing the actual nature of the building. As in the previous examples, the building appears monolithic when really it is layered.

The suppression of joints and of evidence of the human hand is most complete in this building (Fig. 28). It expresses the triumph of the new. It shows the important concern of precision and the connection of precision with ideas of new technology. The inconsistency of the intense handmade nature of Mies's buildings as seen here is often noted. Alhasani correctly describes Mies's architecture as being conceived as handcrafted architecture. It depends on high accuracy in craftsmanship and is more about the image of the machine than any potential implementation of the machine in the process.\textsuperscript{45} There is some

\textsuperscript{44}It is evident from construction photos that this section was not the final one. However, at some point in the design process, it was intended to be.

\textsuperscript{45}"Consciously or unconsciously, he worked with technology and industrialized building processes, yet thought of hand produced details." in Nadia Mehd
Fig. 25 Sectional axonometric drawing of German Pavilion, Barcelona Exposition. Reprinted from Ford, 270. Note the manipulation of roof structure, roof drainage and traditional layered construction.

Fig. 26 Construction drawing of German Pavilion, Barcelona Exposition, 1928-29. Reprinted from Honey, 45. Note the manipulation of roof structure.
Fig. 27 Sectional axonometric detail drawing of German Pavilion, Barcelona Exposition. Reprinted from Ford, 269. Note the use of layered construction and the denial of joints.

Fig. 28 Detail photograph of reconstructed German Pavilion, Barcelona Exposition Grounds, 1986. Reprinted from Calzi, 20. Note the denial of joints.
Fig. 29 Photograph of *German Pavilion*, Barcelona Exposition, 1928-29. Archive vol. 3, 159. Note the expressive dematerialization of the building and the lavish use of materials.

Fig. 30 Photograph looking down on roof of *German Pavilion*, Barcelona Exposition Grounds, 1928-29. Reprinted from Honey, 43. Note the row of classical Ionic columns directly in front of the pavilion.
Fig. 31  Construction photograph of German Pavilion, Barcelona Exposition, 1928-29. Reprinted from Tegelhoff, 10. The image of the building under construction does not match the image of the completed building.

Fig. 32  Diagram: tectonic concept as elementarist composition.
use of separation of trades with the glass and steelwork which suggests a move toward a more modern use of labor but the building remains handcrafted.

The structural intention of the building is also formal. The subjective nature of the column placement is clear from an analysis of various schemes. The columns are primarily expressive of an order off of which the freestanding elements play. It is important to note that these columns are not structurally necessary. The roof could have been held up by the wall alone.\(^{46}\) This would not have altered the separation of elements of wall and roof.

The system of elementary parts describes architecture as essentially made up of a priori elements of building (columns, wall, roof, etc.). The use of minimal structure also proclaims these buildings as steel frame, not load bearing masonry buildings.

While these buildings appear to be about a new and seamless monolithic conception of building, they are actually traditional layered construction. The image of the building and its use of technology do not match.\(^{47}\) However this use of material points to Mies's knowledge of good building technique.\(^{48}\)

\[\text{Alhasani, "Buildings as Cyborgs: Expressions of Hand and Machine Craftsmanship in Architecture" (Ph.D. diss., University of Pennsylvania, 1990), 84.}\]

\[^{46}\text{Wright recognized that Mies could have achieved the same spatial flow by requiring the walls to support the roof." Schulze, 158.}\]

\[^{47}\text{Ford discusses that in modern architecture there is rarely a connection between style of architecture and style of building tectonics. Architecture and building technology have different histories. Ford, 3.}\]

\[^{48}\text{Other modernists had discarded good technique for experimentation in monolithic tectonics, Ford, 5.}\]
The building suggests a radical shift from the earlier work in its lavish use of material. The rich use of stone diverges from the earlier objectivist approach of simplicity toward greater artistic expression. This impression is heightened by the careful detailing and use of multiple types of marble and glass together. It shows a new formal attention which differs from the earlier Neue Sachlichkeit concerns.

Another expressive aspect to the German Pavilion is its avant-garde stand toward its context (Fig. 30). Directly across from and facing the pavilion on main axis with the fairgrounds stood impressively tall Ionic columns. A visitor would have noticed this direct relationship to this historical marker. Clearly Mies was setting the Neues Bauen against the classical in an obvious tectonic contrast.

The other significant work designed at the same time is the Tugendhat House. While there are some differences, the tectonic concepts remain similar. They are both expressive of the elementary parts of a building (Fig. 32). Both are primarily formal expressions of the Neues Bauen with only limited use of new technology. Both buildings are highly expressive and show a rejection of the rationalist materialism of the earlier buildings. The material use here is quite

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49 The comparative method of design again takes place with the pavilion and the Tugendhat House. The differences play off each other. The comparison has been made of the simultaneous development of the sheathed columns which had different visual effects. Kevin Harrington, interview by author, March 9, 1993.
lavish and it appears that no expense was spared. The objectivity in construction of the earlier buildings is gone.\textsuperscript{50}

2. \textbf{Court House projects, 1930s}

The \textit{Court House projects} (Fig. 33) represent a continuation of the previous examples in that they carry the elementarization further. They more fully develop Mies's exploration of reduction and limits, and they become a testing ground for an understanding of the objective and artistic in architecture.

The Court Houses use the same tectonic concept used in the previous buildings. Composed of steel frames, floating roofs, screen partitions and glass. This system, which Mies used for ten years, is in sharp contrast to the work of the early twenties which was tectonically varied.

During this decade the structural system and a general building method are a priori and are manipulated for formal effect. He works within the same system (Fig. 34) in order to perfect its visual aspect. This reuse of systems shows a significantly different way of thinking about architecture from the earlier experimentation and is typical of Mies's later work. Very few drawings investigate construction in these projects. All of the preliminary sketches are perspectives or studies of plan relationships. With this working method the

\textsuperscript{50}Expressionistic tendencies like the retractable glass wall in the \textit{Tugendhat house} show a considerable shift away from ideas of the minimum requirements as the concern of the \textit{Neue Sachlichkeit}. 
Fig. 33  Model photograph of Courthouse Project, 1930s. Reprinted from Tegethoff, 19.11.

Fig. 34  Diagram: tectonic concept as elementarist composition.
construction is conceptually understood from the beginning and is not part of the investigation and questioning of the project.

In the Court Houses, Mies explored the relationship between the objective and subjective forces in architecture. The houses were serious intellectual games for Mies, games in which he played with the order of columns against the subjective placement of screening partitions. The possibility for this kind of study is dependant on the single tectonic solution.

The system's limited tectonic choices allow for spatial and formal experimentation. Depending on the formal effect, cantilevered or flush roof planes were used. Structure was formally driven. Bearing walls are treated similarly. There does not seem to be the technical input in the design in the early stages beyond the general arrangement of elements.

As in the earlier work, all of these projects would have been layered construction although the elementarization suggests monolithic construction. It is a continuation and refinement of the earlier work.

3. Resor House, 1937-38

In the Resor house (Fig. 35) Mies continues a pattern of extensive study of small residences. The number of drawings for the house as with other houses of the 30s is extensive.51 This is especially helpful in determining the role of tectonics in the conception of the project because all of the conceptual

51The Hubbe house in particular has an extensive number of drawings.
drawings exist. This example continues many of the ideas from the earlier buildings.

Even though the Resor house, made of wood and stone, is a different system than the previous buildings, the approach in the design drawings shows a continued emphasis on formal studies of plan relationships. When detail drawings exist they are detail perspectives rather than sections. Very little structural or technical construction questioning exists.

While this house went through many design changes of varying complexity, the final scheme seems similar to other houses in its box shape with large expanses of glass. The wood enclosure walls are similar to the brick walls in that they wrap the building, but in this case they are clearly intended to appear to be layered with the wood acting as a thin sheathing. The actual frame of the building was steel with wood finishes as a veneer.

This simplified tectonic system again allowed extensive formal study of the house. Even with the use of a new construction type the construction studies are limited to perspective views rather than sections. In the final version the house retains much of the tectonic conception of the earlier houses in that it has interior steel columns and freestanding planes within a containing frame. Essentially it is a continued idea of the play of objective aspects of the structure and subjective aspects of the veneered, space making planes.

The detailing of the house shown in this later drawing is highly simplified. The materials meet with very simple clarity. There are no extraneous elements
Fig. 35  Model Photograph of Resor House Project, 1937-38. Archive vol.7, 10.

Fig. 36  Sketch by Mies van der Rohe of plan of Resor House Project, 1937-38. Archive no. 3800.441.
internal to the wall sections. The wood sections are joined very simply without trim to hide plane changes. This approach of minimal treatment of materials is similar to the treatment of materials in the **German Pavilion** in that they require precision from the workman. As the formal elements are simplified to elemental parts so are the details with the clarity as the main concern.

Also at issue in the study of the project's conception is the use of models. Mies had always used models as a design tool and each of the projects discussed above were studied in model form. The models suggest an importance placed on the actual experience of the built project. This is also suggested in the large volume of detail perspective drawings of small scale elements. As Mies's office grew in the 40s and 50s models became a more important part of the design process.⁵²

The **Resor house** shows some new thinking about different structural assemblies for buildings in a new context. In the Resor house the importance of the structural nature of that assembly seems less important than the aesthetic and spatial effect it produces however.

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⁵²David Haid, interview by the author, March 5, 1993.
Fig. 37 Detail sketch of handrail by Mies van der Rohe for Resor House Project, 1937-38. Archive no. 3800.116.

Fig. 38 Diagram: tectonic concept as elementarist composition.
III. 1938-1948: Additive Structure

1. Preliminary Campus Plans, Armour Institute, 1939, 1941

These two planning studies show a continuation of Mies's working method and tectonic conceptualization. At the same time they represent a significant break with his work of the past. Within the different plans are two fundamentally different attitudes toward how buildings should be constructed on the campus.

The plans show the use of the comparative working method seen before. The first scheme (Fig. 39) had a campus populated with glass boxes on piloti-like columns with a ground floor set back. Against this is another scheme (Fig. 40), which was actually built, showing a rectangular brick and steel infill system. The two systems have different urbanistic and formal implications. The decision to go with the system where the buildings sat on the ground had significant implications for how Mies would approach tectonics in the later work.

\[52\] Kevin Harrington, interview with the author, March 9, 1993.
Fig. 39  Perspective drawing of Preliminary Campus Plan, Armour Institute of Technology, (later Illinois Institute of Technology) Chicago, 1939. Archive no. 3900.135. Note the exposed columns and ground floor setback which are reminiscent of Mies's earlier European work.

Fig. 40  Perspective drawing of Preliminary Campus Plan, Armour Institute of Technology, (later Illinois Institute of Technology) Chicago, 1939. Archive no. 4000.165. Note the buildings extend directly to the ground unlike the previous scheme. This scheme is the first example of the additive building system.
The actual reasoning for this decision is not clear. Johnson claims it was due to the nature of the streets penetrating the campus.\textsuperscript{54} There were probably other reasons concerning the location and material availability. The choice may have been based on the building system which offered flexibility and ease of construction. It may have been that the industrial quality of the system was appropriate for the campus.\textsuperscript{55}

The choice of the second two tectonic concept dictated a new conception of steel as a building material. This idea of exposing steel would carry on throughout the work, along with a rejection of the earlier method of covering the steel. The speed at which the campus was designed would suggest that the tectonic conception was designed for quick assembly as well. The system shows similarity to previous buildings including the Weissenhof apartments when they were under construction.

2. \textbf{Metals Research Building, 1942-43}

The first opportunity to build in this additive brick infill system was the Metals Research building (Fig. 41). It is a large frame structure with various functions, including a three story space, which are expressed in the facade. The

\textsuperscript{54}Philip Johnson, \textit{Mies van der Rohe} (New York: Museum of Modern Art, 1947), 137.

\textsuperscript{55}Danforth, interview March 12, 1993.
Fig. 41 Photograph of Metals Research Building, Illinois Institute of Technology, Chicago, 1939. Archive vol. 9, 157.

Fig. 42 Photograph of interior of Metals Research Building, Illinois Institute of Technology, Chicago, 1939. Archive vol. 9, 157.
function becomes the possibility for expression on the outside of the building. This two separate spaces interior are framed in the elevation.

The steel system acts as a rhetorical device in describing the function of the building on the elevation. This is the first time it acts in this way to describe a specific structural function. Where the steel acts as secondary structure for mullions etc, the steel is carefully presented as not touching the ground. Where is covers the structural concrete covered column, it also presents its lack of structural function at the bottom. The system then has the intention of an analogous\textsuperscript{56} building system. In apparent contradiction, however, the building also acts as a monolithic or Gothic system.

This is Mies's first use of the Gothic or monolithic system although his earlier thinking suggested it. This system shows the functioning of each part of the building from the interior of the building as well as the exterior. Each material reads through to the interior. The brick bond pattern implies its thickness. The intention of the building, in presenting its actual construction, is significantly different than the earlier buildings. It is trying to convey much more information about how the building is made than previous buildings.

Mies also was enthused about the technological nature of the institution and expressing that in the construction.\textsuperscript{57} He did this successfully with the use

\textsuperscript{56}An Analogous type of building system, to use Ford's term, uses layered construction with the cladding layer describing the structure underneath.

\textsuperscript{57}George Danforth, interview with the author, March 12, 1993.
Fig. 43  Detail sketch by Mies van der Rohe for Metals Research Building, Illinois Institute of Technology, Chicago, 1939. Archive no. 4200.161. This is a typical example of Mies's detail perspective sketching.

Fig. 44  Diagram: tectonic concept as additive unity.
of exposed steel and industrial type sash. The bay system also reflects the additive nature of industrial building. These buildings also presented an image as the earlier buildings did of new technology and industrial building, the difference was the added content in the construction itself. They had more content in terms of construction than the simple contextual negation of the early glass buildings with the way specific details describe the function of the elements. Even the use of the exposed steel shows a desire to communicate more about the actual building material itself.

The basic use of materials is simpler than the luxuriant use of materials seen earlier. This is more likely related to a new idea of minimum expression than for budgetary reasons. The new buildings reflect their new ontological expression in this reduction of expressiveness.

Mies's use of this additive structure was not necessarily linked to the use of exposed steel. The system also could have been concrete as elevation studies for many campus buildings show. This shows that the systems were not bound to a particular material and were not based on the specific structural properties of the materials used.

Mies could not always use steel because of the wartime limits.\textsuperscript{58} At the campus Mies finally had the chance to experiment with the steel which would become so prominent in his later work.

\textsuperscript{58}Danforth, interview with the author, March 12, 1993.
Mies's use of exposed steel is as a standardized building element, in a way similar to how a brick is a standardized modular element. It was used as it came in its standard shapes. His decision to paint the steel black is significant because it would weather better and not discolor quickly. There were no other reasons for the selection since Mies actually often preferred the lighter colors. It does show, however, a particular sensitivity to the building's weathering and lasting over time.

The use of the structural bay suggests an acceptance of the rational use of steel construction and framing methods as starting point for design and not a preconceived notion of the image of construction. The scheme takes on more rational connotations and makes the subjective and artistic concerns seem less important. These buildings appear to be a more rational kind of sachlich treatment, reminiscent of the earlier work except for the rhetorical nature of the structure and the careful attention paid to the formal details.

Construction thus becomes a more visible force in the IIT buildings. The steel appears to be the structural frame, and the building appears to be telling the story of its construction. The building is a monolithic structure with the rhetorical intentions of an analogous type structure. The intentions in the expression of the buildings are more complicated and developed than previous work. Frampton would refer to this as a shift from "representational tectonics" to

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59 Kevin Harrington, interview with the author, March 9, 1993.

60 David Haid, interview with the author, March 5, 1993.
"ontological tectonics." The idea of building has passed from a completely formal based tectonic to a tectonic of theoretical content of how it was made and its own existence.

The IIT Campus shows an advancement in the thinking of construction similar to the addition of the structural column in the Barcelona Pavilion. It represents the addition of more content within the construction itself. And in addition to this, the campus offers an example of a building workshop where revisions are evident in building to building. The campus itself is a testing ground for tectonic concepts and their improvement. In the campus buildings Mies sets up a new system, similar to the elemental system of the 30s, which he continues to investigate for many years. This building system is similar to his earlier systems in that it is well understood as a complete tectonic system from the beginning and is improved and developed in small scale over the course of many years. Thus the system is a self-contained series of conventions which are developed for visual clarity slowly as they are used.

This system is monolithic and no longer layered although aspects of layered construction are retained in certain areas. This is a significant break with the tectonic conceptualization of the work from the past. It shows a new significance in the use of trades. It requires high tolerances in the steelwork,

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exposed structure, and further specialized techniques beyond handcrafted buildings.

4. **Library and Administration Building, 1944**

5. **Metallurgical Building, 1945-46**

Both of these projects show a direct development of the additive tectonic systems of the Metals and Minerals Building. They provide an opportunity to view the building experiment of the IIT campus over time.

Mies shifts from the avant garde rejection of construction conventions to the creation of a new system of modernist conventions.\(^{62}\) Each building shows a slight development from one to the next in the development of clarity.\(^{63}\) It represents a new type of questioning of construction as a language. The changes reflect the semantic nature of this new language of construction elements.

The **Metallurgical Building** (Fig. 45) became the example for the classroom buildings on campus. Slowly the form of the building developed. The frame is revealed on the outside, but it is not the actual structure. The base

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\(^{62}\)By this I mean a language which can be manipulated slightly and which has its own autonomy. This is not the same idea of a system of conventions as suggested by Savignant and Thiebout who call attention to the participation of the builder in the creation of the conventional system for practical reasons. In this case Mies is not using the input from the field but is creating the whole system from scratch.

\(^{63}\)George Danforth, interview with the author, March 12, 1993.
Fig. 45  Photograph of Metallurgy Building, Illinois Institute of Technology, Chicago, 1944. Archive vol. 11, 3.

Fig. 46  Diagram: tectonic concept of additive unity
detail of these columns develop from the Metals and Minerals to show the
relation to the brick header below. They describe their non-supporting function.
The corner detail (Fig. 49) which is also an essentially analogous structure
becomes the subject of intense visual discrimination.

The amount of effort that Mies gives to these corner conditions shows
the continuation of the formal interest in structure that the earlier projects had
shown. Very few wall section or plan section type drawings exist for these
buildings. All the detail studies for these buildings are in the form of
perspectives leading one to conclude that while structure had become a
concern over the earlier tectonic conceptions, that the interest was also formally
based.

The plan section drawings of the structure for these buildings were
drawn after the construction by a few years for publication. The actual
conceptual studies do not exist in this form and thus they are misleading in the
way that they suggest a conception driven by the plan relationships of materials
(Figs. 61-63). The majority of studies are perspective details. It also is important
to note that most projects at this time were most likely studied in model form in
the design stages. No information on the models exist.

The library design brings the additive nature of this building system to a
more unified level. An example is that more of the interior structure is exposed,
and it relates to the plan. The ceiling becomes panelized and the partitions
begin to relate to the structural order as infill rather than as freestanding screen
Fig. 47 Plan section drawing (left) and wall section drawing (right) of Metallurgy Building, Illinois Institute of Technology, Chicago, 1944. Reprinted from Johnson, 151.
Fig. 48  Detail sketch of corner by Mies van der Rohe for Metallurgy Building, Illinois Institute of Technology, Chicago, 1944. Archive no. 4404.447.

Fig. 49  Detail photograph of corner of Metallurgy Building, Illinois Institute of Technology, Chicago, 1944. Reprinted from Johnson, 151.
Fig. 50  Detail sketch of material connection by Mies van der Rohe for Metallurgy Building, Illinois Institute of Technology, Chicago, 1944. Archive no. 4512.41. This sketch is atypical of Mies.

Fig. 51  Detail perspective sketch of Metallurgy Building, Illinois Institute of Technology, Chicago, 1944. Archive no.4512.89. This sketch is typical of Mies.
wall. All of these details Mies studied in perspective as he had before. The whole building starts to develop into an integrated system rather than expressive planes or simple additive blocks.

The development of materials in the campus buildings moves toward greater clarity in its detailing. Brick infill panels receive reveals so as to set them off. Glass becomes more clearly held with a reveal between the stop and the frame. Also the sheets of glass become larger and clear and simpler in an evolution of the style. The glass in the campus buildings seems to be used generally in larger and larger very clear sheets expressing the vitreous clarity and openness rather than the reflectiveness achieved in Mies's experimentation with types of glass in the 20s and 30s.\(^4\)

The earlier focus of subjective elements played against objective structure no longer exists. In this integrated building type the subjective and the objective begin to merge and come together in the same point of the design. The artistic intentions now begin to become focused on the exposed structural details rather than space-making planes.

The expression now comes in the unity of structure with formal interpretation. This locus of attention is difficult to describe as expressive because of its extreme restraint. The materials are not manipulated for expression of strength or lightness or other typical architectural goals. They

\(^4\)I am referring to the use of multiple glass types in a single building like the German Pavilion and the Glass Room at the Berlin Bauaustellung.
Fig. 52  Perspective sketch of entry by Mies van der Rohe of Library and Administration Building Project, Illinois Institute of Technology, Chicago, 1944. Archive no. 4404.97. Note the development of exposing different layers of structure to show the complexity of the whole.
Fig. 53  Sectional axonometric sketch of structure by Mies van der Rohe of Library and Administration Building Project, Illinois Institute of Technology, Chicago, 1944. Archive no. 4404.437. This sketch is atypical of Mies. Most sketches are specific perspective detail studies.

Fig. 54  Diagram: tectonic concept of additive unity.
Fig. 55  Perspective sketch of interior structure by Mies van der Rohe for Library and Administration Building Project, Illinois Institute of Technology, Chicago, 1944. Archive no. 4404.129. This sketch shows a concern for exposing more complex elements of structure within the building.

Fig. 56  Perspective drawing of interior structure of Library and Administration Building Project, Illinois Institute of Technology, Chicago, 1944. Archive nol 4404.666. The large number of detail drawings suggest that these details had significance for Mies.
Fig. 57  Detail perspective sketch of corner by Mies van der Rohe for *Library and Administration Building Project*, Illinois Institute of Technology, Chicago, 1944. Archive no. 3900.41.

Fig. 58  Perspective drawing of interior structure of *Library and Administration Building Project*, Illinois Institute of Technology, Chicago, 1944. Archive no. 4404.666. The large number of detail drawings suggest that these details had significance for Mies.
instead describe their functioning as standard, modular elements, related to each other in a balance of articulation and proportion. Each particular standard element of steel is placed against the other to describe its function as covering or structure, and each are highly reduced and objective in the sense of the *Neue Sachlichkeit*. The highly studied corner column is a reflection of the marriage of structure and expression, emphasizing the universal condition and limiting the impression of the individual artist. The corner describes more in terms of its own content than the earlier building types tended to describe and shows the overarching new concern for clarity in the expressive use of structure. The development of the visual form of this construction type is best seen over the period of the many years it was studied. This allows for an awareness of the subtle changes which are not immediately apparent in the work.
Fig. 61  Column detail of German Pavilion, Barcelona Exposition. Archive no. 1000.55.

Fig. 62. Section drawing of Resor House Project, Wyoming. Archive no. 714.63.

Fig. 63  Plan detail drawing of Metallurgy Building, Illinois Institute of Technology, Chicago. Reprinted from Johnson, 150.

Figs. 61-63  Each of these drawings were produced in the 1940s for publication. The idea of significance of the plan detail is a product of the thought of this period not earlier.
Fig. 59 Photograph of IIT Campus Classroom building. Reprinted from Papi, 75. This photo shows the advanced formal development of the additive building system.

Fig. 60 Photograph of detail of IIT Classroom building. Reprinted from Papi, 78. This photo shows the clarity Mies achieved in the separation and delineation of different elements.
IV. 1948-1958, Structure and Expression

1. Farnsworth House, 1946-51

The Farnsworth House (Fig. 65) is a further development of Mies's experiment with exposed steel and the free span concept first introduced in the Concert Hall Project collage (1942). It showed influences of American (and European) industrial buildings in its image of the heroic free-span structure. It also showed a continued use of exposed structure as in the earlier example of the move to monolithic construction. The new significance of structure becomes a point of departure for the new tectonic conception.

In the Farnsworth house the formal image of the building is very close to its tectonic concept much more so than his previous buildings (Fig. 66). It shows a development toward heavier steel detailing and emphasis on clarity and balance of elements. The subjective aspects of the design are combined in the objective structure. The reduction of the building to a spatial idea focuses special attention of what little building is actually there. While the building floats it is still rather heavy with large columns and fascias to balance it.
Fig. 64  Concept sketch by Mies van der Rohe of Farnsworth House, Plano, 1946-51. Archive no. 4505.39.

Fig. 65  Photograph of Farnsworth House, Plano, 1946-51. Reprinted from Tegethoff, 21.13.
Fig. 66  Construction photograph of Farnsworth House, Plano, 1946-51. Archive vol. 13, 81.

Fig. 67  Sectional axonometric drawing of Farnsworth House, Plano, 1946-51. Reprinted from Ford, 267.
The steel elements tend to be heavier than the earlier buildings (Fig. 70). The depth of the elements are increased to create greater articulation against the glass. While there are very few different pieces of steel combined, the few that are are in a highly studied position. This is a general trend in Mies's work toward the articulation of facades which continues with the refinement of the exposed steel construction type. The glass panels are quite large and are clearly articulated at the edges by glazing stops and reveals. While there are very few separate pieces the relationships between them suggest extreme clarity.

His use of glass is different than many of the earlier buildings. It is in its pristine clear format and at a larger scale. Like the steel it expresses its nature as a material with a clear opposition to subjective willfulness of earlier works.

The color of the building is significant only in that it is used to play up the shade and shadow of the facade articulation. Mies preferred the white steel visually, but used the black to allow the buildings to weather with the city pollution.

The type of steel connections in this building follow the type of minimal joint which continues from Mies's early work. The steel is welded rather than bolted. The welds are filed completely so that there is no visible connection. This expresses the idea of technology as precision which has continued since the Barcelona Pavilion. While the building expresses its nature as a steel building by using standard steel sections the building does not show how it was
Fig. 68 Sketch of plan by Mies van der Rohe of Farnsworth House, Plano, 1946-51.

Fig. 69 Diagram: tectonic concept of monumental free-span.
Fig. 70  Detail photograph of Farnsworth House, Plano, 1946-51. Archive vol. 13, 83.

Fig. 71  Sketch detail by Mies van der Rohe of Farnsworth House, Plano, 1946-51. Archive no. 4505.58. This sketch is typical of the extensive close-up study of details.
made, it is as if it were made by magic. The extreme amount of handcraftsmanship in the building is a clear contradiction to the idea of modern use of building trades to act only as specific assemblers.

While the building is clearly very restrained in its expression, its formal balance and precise construction have made it a symbol of modernist expression of perfection. This otherworldly perfection in the denial of its handcrafted nature and the hand of the artist is where the expression in the building exists.

The free-span system like the additive system continues to occupy Mies through his later years. As the third in the a priori construction systems Mies adopts it becomes more important to him as the years pass.

2. **860-880 Lake Shore Drive, 1948-51**

This high rise building while a separate construction type of its own shares conceptual similarities to the additive tectonic system. **860-880** (Fig. 72) was the first large scale building that Mies was able to in steel. While it is a layered building it makes an attempt to be monolithic and straddles the fence. The exterior steel plating and attached wide flange beams are directly attached to the steel and concrete frame. On the whole the building retains the character of its frame construction as an image reminiscent of the early 20s skyscrapers calling for new construction.
Fig. 72  Construction photograph of 860-880 Lake Shore Drive, Chicago, 1948-51. Archive vol. 14, 130. Note the similarity of this image with the finished building.

Fig. 73  Photograph of base of 860-880 Lake Shore Drive, Chicago, 1948-51. Archive vol. 14, 129. Note the narrow window at the end to express the module.
In this building the layer of steel skin becomes an analogous system as in the IIT buildings (Fig. 77). The steel articulates as a surface as in the Farnsworth house to create surface depth. This has been noted that it made the glass read better as a surface in order to limit the distortion created by the glass in large surfaces. It also added a layer of shadow across the facade which allowed the building to be perceived as a surface which would change at different angles. It is clearly a formal device.

The steel use in this building is fairly extravagant for the time, especially when viewed against the simplicity of the chapel. It is a reflection of the translation of the idea of how the building would express itself as a steel frame. It is also experimental and this was a bold move which could be seen as naive. Clearly the choice to use steel is an expressive decision not based in economy.

The raised slab building type first clearly expressed here will also become the pattern for the office similar to the free span type and the additive type. Its system of analogous structural reference is similar in tectonic conception to the additive type.

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65 Mies had studied the visual properties of glass in the earlier buildings but continued to do so as related to the new large scale buildings in model and full scale mock-up. Also drapery was designed to present a continuous image from the outside. George Danforth, interview with the author, March 12, 1993, and Kevin Harrington, interview with the author, March 9, 1993.

66 Schulze, 177.

67 Mies describes the use of the vertical exposed steel wide flange beams as purely a visual decision in Shell, 10.
Fig. 74  Construction photograph of 860-880 Lake Shore Drive, Chicago, 1948-51. Archive vol. 14, 131.

Fig. 75  Diagram: tectonic concept of additive unity.
Fig. 76 Schematic plan drawing of typical floor of 860-880 Lake Shore Drive, Chicago, 1948-51. Archive no. 4807.115. Note the close relationship of walls to structure grid.

Fig. 77 Plan section detail drawing of 860-880 Lake Shore Drive, Chicago, 1948-51. Archive no. 4807.126. The secondary wall framing is applied almost directly to the primary structure.
In this case the formal implications of the construction are again paramount. The bay system is altered at the end bay for visual improvement in the balance of the whole building. The use of steel is an essentially formal decision not related to economy but to expression. The building is a steel frame completely covered in concrete with exposed steel as a veneer.

Mies’s reliance on formal architectural decisions is expressed in his working relationship with his engineer, Frank Kornaker:

"I think the relationship between Kornacker and Mies was proof of exactly what Mies always thought should happen; that there was a place for structural engineers and there was a place for architects. And that you could not survive without both of them, but each one couldn’t do the other’s work."68

Obviously architectural concerns were primary in this relationship and there was no creative input from the engineer in terms of the forms used.


These projects reflect the progression of expression placed on the structure of the free span type buildings. Both show the development of the exposed steel facade detailing and the enhancement of structure for expressive effect. It shows the free span type created at large scale in a civic building. They also express the direction Mies’s interest took regarding his architecture.

68Shell, 10.
At this time he becomes more interested in the monumental free-span buildings and less interested in the additive buildings.\textsuperscript{69}

The structure pulled to the outside of the building (Fig. 78) left little else but structure to create the building’s image. The expressive and subjective elements are the columns and beams themselves as well as the space they describe. The detailing reflects the trend toward being heavier and the different pieces of steel more articulated. The skeleton also called attention to the type of exoskeletal tectonic concept. Its image and tectonic concept are more closely matched than the Farnsworth house.

The heavier detailing in steel was especially needed for the bold superstructure. This idea of structure lent new possibilities to the work which would most occupy Mies after this time.

Crown Hall is significant because it represents a conscious shift in Mies’s work. He shows the concern for the monumental free-span type over the additive unity system by rejecting the original plans for the IIT Campus. Crown Hall is the first building on campus not in the additive method. It changed the character of the campus significantly. He purposefully shifted from an additive scheme (Fig. 79) to the skeletal scheme (Fig. 81). This shows the relative growth in importance this idea of a superstructure had become to Mies by this time.

\textsuperscript{69}Gene Summers, interview with the author, March 10, 1993.
Fig. 78  Construction photograph of Crown Hall, Illinois Institute of Technology, Chicago, 1950-1956. Archive vol. 12, 211. Structure to remain exposed in the completed building.

Fig. 79  Elevation drawing of preliminary scheme of Crown Hall, Illinois Institute of Technology, Chicago, 1950-56. Archive no. 5001.42. This scheme shows an additive tectonic system. The decision to reject this in favor of the free span changed the original campus plan.
Fig. 80  Construction photograph of Crown Hall, Illinois Institute of Technology, Chicago, 1950-1956. Reprinted from Schulze, p.138. Structure to remain exposed in the completed building.

Fig. 81  Diagram: tectonic concept of monumental free-span.
Fig. 82  Detail photograph of Crown Hall, Illinois Institute of Technology, Chicago, 1950-1956. Archive vol. 12, 211.

Fig. 83  Interior photograph of Crown Hall, Illinois Institute of Technology, Chicago, 1950-56. Archive vol. 12, 209.
Fig. 84  Model photograph of Mannheim National Theatre, Archive vol. 15, 298.
The extremely expressive superstructure of the Mannheim Theater (Fig. 84) is representative of this also. Its high degree of articulation further emphasizes the use of a balanced but weighty delineation of structure in the late buildings. Its facade shows a high degree of articulation as well.

6. **Seagram Building**, 1954-58
7. **Convention Center**, 1953-54

These later buildings show the slow and deliberate progression of tectonic experimentation of the office toward the intensity of curtain wall detailing and the display of superstructure.

In terms of the skyscraper type the Seagram (Fig. 85) is perhaps the expression of the condition at full development. Mies experiments with different materials and extrusions for the skin. The skin now has been completely removed from the structure of the building. It is essentially a layered building meant to look like a monolithic building. With Mies's interest in monolithic buildings it is no surprise that he takes less interest in the additive towers after this point.\(^7\) Mies takes less interest in the additive system in general focusing his attention of the free-span projects. Despite the direction of building

\[^7\] Gene Summers, interview with the author, March 10, 1993.
Fig. 85  Photograph of corner of Seagram Building, New York, 1954-58. Reprinted from Papi, 80. The curtain wall is fully removed from the structure.
technology toward internally structured buildings, Mies chose the direction of his idea of exposed structure.\textsuperscript{68}

The \textit{Seagram} building is essentially a formal construct with the form not relating to the structure of the building. The tower is a well known example of how Mies in several cases would go to great lengths to hide the real structure to get the specific visual image he wanted.\textsuperscript{69} This continues the basic theory that even though there is a progression in Mies's work, that the basic fact that an image of structure is paramount.

The \textit{Convention Center} (Fig. 87) is Mies's expression of structure at an ultimate level. The monumentality of the building is stupendous and precedes many of large scale civic buildings which would follow by other architects. The building itself is monolithic and shows the use of exposed structure with infill panels. It is again a simplification of the type as in the early work where a simple tectonic idea is brought to life to stimulate thought. It represents a reduced and simplified tectonic concept. It clearly shows the intense level of expression which such a building type could be brought to.

\textsuperscript{68}The later highrise buildings required space at the perimeter for mechanical systems and internal structure. The major change in the later buildings is the adoption of the natural aluminum color which Mies felt was a better visual solution in the aluminum curtain wall because it looked more like aluminum and it was lighter in color. George Danforth, interview with the author, March 12, 1993.

\textsuperscript{69}Cowan describes two cases of hidden wind-bracing and hidden transfer beam in Henry J. Cowan, "The Modern Movement, Structural Honesty, and Environmental Verity," in \textit{Architecture Science Review} 35.5, 97.
Fig. 86  Collage of Concert Hall Project, 1942. Archive no. 571.63.

Fig. 87  Collage of Convention Hall Project, Chicago, 1953. Archive vol. 16, 30.
V. 1958-1967 Monumental Structure

1. Social Science Administration Building, 1962-65


In each of these later buildings the tendency toward unification of structure with formal goals is evident. There are no willful gestures apparent in the images. All of the force of the buildings is focused on the exposed structure.

The Social Science building (Fig. 88) is a late use of the additive system and shows a highly developed formal use of the system. In the Social Science building the ordering is more complete than the earlier buildings and the details are highly evolved. Each element is directly related to the whole as it articulated the gridded framework of the building.

Formally, the steel detailing shows the exposed wide flange members as heavy as the other late buildings. The rhetorical nature of what is holding the building and what is not is stressed as well. The way the different additive pieces meet is clearly resolved with an infill system of panels either brick and glass. The building is different from the free span buildings in that it is like a

\[\text{Footnote 73: Certain columns show their lack of primary structural function when they stop short of hitting the ground (Fig. 91).}\]
Fig. 88  Plan drawing of Social Service Administration Building, University of Chicago, 1962-65. Archive no. 6205.11.

Fig. 89  Photograph of interior of Social Service Administration Building, University of Chicago, 1962-66. Photo by author.
Fig. 90  Photograph of Social Service Administration Building, University of Chicago, 1962-65. Reprinted from Papi, 75.

Fig. 91  Photograph of Social Service Administration Building, University of Chicago, 1962-65. Reprinted from Papi, 75.
Fig. 92  Photograph of Social Service Administration Building, University of Chicago, 1962-65. Reprinted from Papi, 75.

Fig. 93  Diagram: tectonic concept as additive unity.
three dimensional framework of divided rooms each related to the whole in a
symmetrical layout.

The detailing reflects a further clarity of the building type. There are
fewer, simpler building components but their relationships are highly ordered
and clarified.

In the National Gallery (Fig. 95) the attempt to monumentalize the
structure is a development of the earlier structural projects like the convention
center. As the final project in the development of the free span it is clearly the
most important project to Mies of the last years of his life. The main gallery has
the monumentality of the convention center without its size. Its monumentality
comes from its heavy proportions and simple geometric structural system. The
steel elements are much larger than they need to be structurally which is the
case in all of Mies's buildings and most evident here.

As in all of the structural buildings the support elements are suppressed
and this building goes further than the others in that manner by hiding most of
the museum functions under the plinth. At this point in his career it is clear that
the setting off of the particular symbolic structure is more important than any
specific goals of construction and materials.

The presentation of the idea of structure as an image implies a return to
a representational concept of architecture differing from the additive unity of the
Social Service Building. The expression of monumental space requires the
Fig. 94  Photograph of New National Gallery, Berlin, 1962-67. Archive vol. 16, 155.

Fig. 95  Photograph of New National Gallery, Berlin, 1962-67. Reprinted from Schulze, 308.
Fig. 96  Section drawing of New National Gallery, Berlin, 1962-67. Reprinted from Calzi, 10.

Fig. 97  Photograph of New National Gallery, Berlin, 1962-67. Reprinted from Neumeyer, 234.
limitation of the rest of the building. The primary earlier goal of unity is focused completely on the structure.

The mastering of steel technology again comes into play in this building. The knowledge and understanding of the crane erection of the space frame is essential to an understanding of the structural conception and lies behind the detailing of the support points.

The Gallery gives the impression of being monolithic but it is not. As in much of the free-span work the background aspects of the architecture are used purely to set off the structure visually. Thus the majority of the museum does not have structure expressed. A selective process of revelation and concealment goes on in this work to emphasize the structure.

In a similar manner to the expressed structure on the IIT campus, the structure takes on a role of a particular kind of rhetorical expression. The other parts of the building continue to show Mies denial of joints and seamless connection of materials. So at the same time through the manipulation of construction Mies is at once denying the method of construction and celebrating it. This points to the fact that the particular exposed structure carries all significance. The structure carries the content of the architecture and a statement of the meaning and ontology of the building. This statement is primarily representational and expressive unlike the IIT buildings.
While the National Gallery appears to be structurally based, they are not. While structure is a concern, it is not the governing principle. Generally the free-span buildings are overstructured because of the formal intentions.\textsuperscript{74}

\textsuperscript{74}Gene Summers, interview with the author, March 19, 1993.
PART THREE:

REVIEW OF WRITINGS
"Building"
Published in G, no. 2 (September 1923), p. 1

We know no forms, only building problems.
Form is not the goal but the result of our work.
There is no form in and for itself.
The truly formal is conditional, fused with the task, yes, the most elementary expression of its solution.
Form as goal is formalism.
We have other worries.
It is our specific concern to liberate building activity [Bauerei] from aesthetic speculators and make building [Bauen] again what alone it should be, namely BAUEN.
(Bauerei, as opposed to Bauen, carries a disdainful overtone; furthermore it alludes to Bauer (peasant).

There have been repeated attempts to introduce ferroconcrete as a building material for apartment building construction. Mostly, however, ineptly. The advantages of this material have not been exploited nor its disadvantages avoided. One believes one has acknowledged the material sufficiently if one rounds off the corners of the house and of the individual rooms. The round corners are totally irrelevant for concrete and not even all that easy to execute. It will not do of course simply to transmigrate a brick house into ferroconcrete. I see the main advantage of ferroconcrete in the possibility of considerable savings in material. In order to realize this in an apartment building, one must concentrate the supports and reinforcements in a few building locations. The disadvantage of ferroconcrete, a I see it, lies in its low insulating property and its poor sound absorption. This makes it necessary to provide additional insulation against exterior temperatures. The simplest way to remove the disadvantage of sound transmission seems to be to exclude everything that causes noise; here I have in mind rubber floors, sliding windows and doors, and similar installation; but then also spatial generosity in the ground plan.--Ferroconcrete demands the most precise planning before its execution; here the architect still has everything to learn form the shipbuilding engineer. With brick construction it is possible, even if not particularly advisable, to let the heating and installation crews loose on the house as soon as the roof is up; they will in the briefest time transform the house into a ruin. With ferroconcrete
such a procedure is impossible. Here only disciplined work will achieve the desired result.

The model illustrated above demonstrates an attempt to solve the problem of a residential building in ferroconcrete. The main living section is supported by a four-shaft girder system. This construction system is encased in a thin concrete skin. This skin forms both walls and roof. The roof is slightly inclined from the exterior walls toward the center. The incline of the two roof planes forms a groove that permits the most simple imaginable roof drainage. All gutterwork is thereby omitted. I cut openings into the walls where I need them for view or illumination."\textsuperscript{75}

Mies lays out the fundamental position of objectivity through the materialist and empirical use construction in this essay. With the emphasis on "building problems" and the limitation of formal concerns of "aesthetic speculators," he presents architecture as a concern of economic and pragmatic forces. The stress on finding architecture in objective construction shows an interest in the \textit{a priori} condition of architecture in the material of new building.

The influence of Berlage in the \textit{a priori} understanding of construction and the \textit{Neue Sachlichkeit} concern for social change through rationalism is evident. He wants to limit all aesthetic content and formal preconditions from architecture and make "building what it alone should be, building." He describes ferro-concrete in detail as a potential solution to this problem illustrated by his concrete country house. He calls the "most elementary expression of its

\textsuperscript{75}This text appeared in G an avant garde journal the concern of which was to disseminate new ideas across disciplines especially art, industrial technology, and the New Building. Neumeyer, 243.
solution" true form. And for the Neue Sachlichkeit group the most elementary solution came in the materialist aspects of construction. Neumeyer states:

"The identification of construction with form became the premiss on which 'objective' architectural design was based; the proponents of elementary design raised this premise to their first principle, indeed the first principle of all architecture."\textsuperscript{76}

The focus on the single material shows the kind of empirical analysis emphasized by this rationalist scientistic thinking. In Mies's essay the material of study is concrete in the design for the Concrete Country House. He looks at it structurally in terms of how to best utilize the strengths of the material, as in its long spans and pliable shape and expresses its structure by boldly exposing the material.

The visual analysis of the glass buildings for optical manipulation is another example of the empirical study of material. Mies himself called attention to the fact that the projects were material experiments.\textsuperscript{77} This simplification is much like the focus of the G journal which was to examine the elementary Gestalt forms and was interested in the scientific analysis of sight and optic phenomena. Mies's drawings of the glass buildings show the concern for the new visual phenomena created by new tectonic ideas. The buildings of this


\textsuperscript{77}Shell, 4.
Fig. 98  Detail of Perspective of the Frierichstrasse Office Building project, Berlin, 1921. Archive no. 20.6.

Fig. 99  Diagram: tectonic concept as focus on single material
period become reductionist, empirical experiments in visual and functional terms.

Mies experiments with several building technologies and many building types during this time period of experimentation and objective study. The designs of the early twenties are different shapes, sizes and structural systems. The one connecting issue related to these differences is the firm belief in the a priori nature of construction and materials alone.

While the Neues Bauan is mainly concerned with the economics of simplified construction there is also the Neoplatonic in Mies's writing shown by his emphasis on the absolute a priori condition of architecture. Ironically, construction as a material concern, becomes a transcendental idea. It has more significance than its obvious primary material value. This issue of the transcendent, which he shares with Berlage, is always present in Mies's writings. The very nature of his search for truth\(^{75}\) suggests that his absolutist understanding of architecture, in all its materiality, is really a transcendent endeavor.

Objectivity is the basis for the revolution of the art world. K. Michael Hays calls Neue Sachlichkeit an attempt at the dismantling of the humanist aesthetic project. Mies as well,

"called for a 'liberation of building from aesthetic speculators,' something that sounded much like an iconoclastic battle cry aimed at mobilizing a

\(^{75}\)Gropius
crusade, as if the issue were the liberation of the building arts from thousands of years of oppression.\textsuperscript{79}

It is implied in the Mies passage that individual design expression was also to be removed in the rational and functional process. Process implied a rational and scientific basis for creation.

The removal of artistry in place of the rational is an important theme in this essay. Dissatisfaction with the arbitrariness of classicism and style in general is fundamental to Neues Bauen. These arbitrary aspects are seen as personal, having no universal value to society. Harries explains this argument as the common philosophical debate on the role of aesthetics of that time. He describes two conflicting forces stemming from Hegel's 'ontological' view of art and Kant's 'aesthetic' view of art.\textsuperscript{80} The aesthetic view became rejected during the twenties because of its dependence on subjectivity and representation. Subjectivity being synonymous with arbitrariness was rejected in favor of the absolute truth.\textsuperscript{81}

A good example of the Neues Bauen ideal of the reduction of subjectivity is the Weissenhof Apartments. It is expressive of the rejection of traditional building and it is an image of the Neues Bauen. The building is a representation of a rational solution to a building problem with the artistry removed.

\textsuperscript{79}Neumeyer, p.89

\textsuperscript{80}Harries, "Hegel on the Future of Art," The questioning of the objective versus the subjective is evident in the work of the 20s and 30s.

\textsuperscript{81}Karsten Harries, "Thoughts on a Non-Arbitrary Architecture," in Perspecta14 (New York: Rizzoli)
Mies and the *Neue Sachlichkeit* group took the nineteenth century idea of truth in construction and added to it the aspects of necessity and immanence. Translation of revolutionary immanence from the writing to built work is evident in several ways. One is its shock value through the use of particular visual signals to represent the negation of traditional construction. For example in the *Langer House* which shows the denial of particular structural elements and joints for expressive effect even when the construction techniques are traditional. Another is the way the buildings are completely at odds with their surroundings as in the glass buildings. Lastly, the prominent use of new materials like glass, steel and concrete suggest, in and of themselves, a revolutionary position at this point in time.

The influences for this theoretical position are most likely from the cultural critiques mentioned above and also from the Nietzschean position stressing action. He has taken the rationalist argument and turned it into the avant garde rejection of formalism. The philosophers and influences stressing historicist immanence such as Hegel and Spengler almost certainly would have been influential in this regard. This beginning stage of understanding of technology in this early modernism period is representational, in contradiction to the intentions. The latter part of the essay "Building" presents the facts about technology in an apparent highly rational manner. The buildings Mies designs at this time do not really use technology in special ways but instead point towards new use in their image. While there is a contradiction here, it also follows from
the historicist and materialist rhetoric that an expressionist and therefore representational type of design would develop. The investigation of new material was still to come in the future. The projects at this time are still elementary concept studies of particular materials.

Pure objectivity quickly became unsatisfactory to Mies as is evident in the next essay. Functionalism could no longer be the sole basis of architecture. The change in Mies's thought reflects a dramatic shift from the detached rationalism of the Neue Sachlichkeit years and reflects some significant Neoplatonic influences.
"We stand at the Turning Point of Time: Building Art as the Expression of Spiritual Decisions"
_Innendekoration_, 39, no. 6 (1928), p. 262.

"Building art is not the object of clever speculation, it is in reality only understandable as a life process, it is an expression of man's ability to assert himself and master his surroundings. A knowledge of the time, its tasks and means, are necessary prerequisites for the work of the building artist, the building art is always the spatial expression of spiritual decisions. Traffic increases. The world shrinks more and more, it comes more and more into view right into the remotest recesses. World consciousness of mankind are the results. Economy begins to rule, everything in its service. Profitability becomes law. Technology brings economical attitudes with it, transforms material into power, quantity into quality. Technology presupposes knowledge of natural laws and works with their forces. The most effective use of power is deliberately introduced. We stand at the turning point of time."^{62}

This essay written five years after "Building" shows both similarities and clear differences with the previous essay. Already we can see Mies's subtle revision of words for the specific intention of rejecting the _Neue Sachlichkeit_ and adding the universal ideal in architecture.

The beginning of the essay again focuses on the previous concern over aesthetic speculation with several significant concepts added to that concern.

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^{62}Neumeyer, 304.
Life, building art and spirit are all introduced. Construction is but one issue among the larger issues of economy and technology. Each statement calls man to take control of these forces as the: "expression of man's ability to assert himself and master his surroundings."

The introduction of the phrase "spatial expression of spiritual decisions" is of fundamental importance here. It shows the conscious switch of positions through the addition of the idea of spirit. It is a conscious critique of Neue Sachlichkeit concerns. The building art could not exist for Mies only in the world of economics and function, without the artistic. Neumeyer writes:

"This change in Mies's position, which represented a shift from the materialistic-positivistic What in favor of the idealistic and aesthetic How."

Mies was very clear about his criticism of the other architects who continued in this vein.

The critique of the functionalist viewpoint came after the building of the Weissenhof Exhibition. Several critics have suggested that the experience of the Weissenhof led him to see the limits of the radical anti-art aspect of the Neue Sachlichkeit. It was a fundamental shift in Mies's thinking and it

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83 The extent of change from a materialistic toward an idealistic position that had taken place between 1924 and 1927 becomes evident if one compares two statements. Whereas in 1924 Mies still saw 'the core problem of building in our time' reductively as a 'question of materials,' in 1927 he viewed the 'problem of the new housing basically as a spiritual problem.' Neumeyer, 157.

84 Ibid., 152.

85 Ibid., 154.
necessitated a shift in the work which followed. The shift was expressed publicly and pointedly which suggests that there was a need for him to be seen in this new light.

While the previous essay had construction as the transcendent aspect, this essay brings in another layer of transcendent thought: Geist. For Mies this is the beginning of a call for objectivity and spirituality, a dialectic which continues to develop in his thought. Mies cannot accept the rationalist intellectual arguments alone. Geist allows for the essential element of artistic production for him.

The German concept of Geist is a combination of our ideas of spirit and mind. The association of ideas and cognition with spirit and the spiritual has a significance in the way Mies's work develops. This brings a confluence in the understanding of rationalism and spirit. The acceptance of Spirit expresses a primary acceptance of the a priori essence of architecture and reflects the influence of Guardini.

In the late twenties Mies met Romano Guardini, an influential Catholic theologian and priest, through Rudolf Schwarz and they developed a close friendship. Guardini mixed Nietzschean ideas of the immanence of time with Catholic philosophy. His work at that time was an attempt to reconcile the

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86 Mies’s Catholic upbringing would surely have influenced him in this area. Franz Schulze, interview with the author, March 8, 1993.

87 Neumeyer, 147.
empiricism of science with a modern spirituality. Schwarz was also a strong
influence on Mies especially in his concern for spirituality and space.88

In terms of Mies's architecture there is a significant shift. This is the year
of the Barcelona Pavilion which has many aspects of both the ideal and
subjective in it. It is no longer just an expression of economy. Technology is still
primary but there are other new elements of expression changing the
significance of the work. The tectonic elements are pulled apart to suggest their
functional roles inherent in the architecture. The objective structure is separated
to engage the other elements in a dialogue and call attention to their difference.
The material selection suggests an artistic will which is quite expressive and
hardly economical.

Added meaning is in the form of the elementarized composition of the
building elements: wall, partition, support, roof. This treatment of architecture is
significantly different from the materialist conception. Now architecture becomes
the play of these different elements off of each other. It is the idea or rather the
ideal aspect of architecture which is added here.

Mies's investigation of the Platonic/Gothic nature of construction
develops at this time as well. His reading of the medieval philosophers begins
at this time through the influence of Guardini and others89. He discovers them
through secondary readings on the theory of history and then begins his own

88Ibid., 164.
89Ibid, 147.
Fig. 100  Detail photograph of reconstructed German Pavilion, Barcelona Exposition Grounds, 1986. Reprinted from Calzi, 20. Note the denial of joints.

Fig. 101  Diagram: tectonic concept as elementarist composition.
study of them. Their ideas stimulate him on the question of truth which he will spend his whole life searching for. The concern for Gothic architecture as well as the scholastic combination of the ideal and the real became an interest at the time.

The reduction of the elements of wall, column, and roof can be seen as parallel to the experiments of the Bauhaus where elemental visual analysis was the focus of study. Galison describes the influence of the Vienna circle on the Dessau Bauhaus in their parallel interest toward the reduced logical elements that were to be objective and scientific. 90 Their concern for objectivity and empiricism rejected a conceptual philosophy. This led to the focus on empirical autonomous language of primitive forms. The goal of the Vienna Circle was to "... erect a unified structure of science in which all knowledge--would be built up from logical strings of basic experimental propositions." 91 These logical elements hark back to Mies's influence as part of G: Zeitschrift fur elementare Gestaltung. The Aufbau 92 which was to be this new structure was a cognitive one presented by Rudolf Carnap and influential to the Bauhaus thinkers.

The Aufbau is a conceptual structure present in Mies's thought. It is a Neo-platonic framework which implied an absolute and pre-existing unity of the

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91Galison, 713.

92Aufbau in German means construction, structure, building. There is no single word in English with this content or significance. It is a descriptive term for a framework or universal order in which all things are related.
world through the unity of science and empirical thought. Mies's idea of organization through the structure as seen in the pavilion is an example of this. Structure and organization as a cognitive and absolute concept related to Aufbau becomes more and more important to Mies. Another example is that the pavilion tries to demonstrate a higher unity of order of the subjective structure and the subjective artistry which attempts to be empirical. Certainly for Mies, who read in all areas of science and who was very influenced by empiricism and logical positivism, would have found these ideas of unity of all science parallel to his own thoughts.93

These ideas of unity and structure continue to develop in Mies' work. The German Pavilion is the first in a series of projects in which the internal relationships of the fundamental tectonic elements is the whole concept. This work continues for ten years and is especially clear in the courtyard houses. They become an experimental ground for the relationship of subjective and objective and to create balance with the a priori elementarist building blocks.

Mies continues to use the same tectonic system for most buildings for the next ten years. This shows an essential shift in the nature of

93Colquhoun discusses this elementarism: "this elementarization can certainly be thought of as an impoverishment of the meanings carried by cultural convention. But it should be stressed that this was not the interpretation given it by the avant-garde artistic circles, where, on the contrary, it was construed as a means of attaining more profound--because more primitive--meanings and of distancing the artist from a 'degenerate' bourgeois conception of art." Alan Colquhoun, Modernity and the Classical Tradition (Cambridge: MIT Press, 1987) 73.
experimentation with construction after this essay. With the discovery of spirit and idea Mies no longer continues the same restless experimentation with construction methods. With the acceptance of the ideal and the absolute in architecture the elements of architecture itself become the Neoplatonic a priori elements. The wall, column, and roof become the tools with Mies works with for ten years. There is little investigation in construction because the tectonic system is accepted as a transcendental. Architecture at this point has the transcendent aspect to which construction alone for Mies had lost.

Another theoretical aspect introduced in this essay is the idea of morphology in the references to "life process" and "natural forces." Mies's concern for the different forces of society working together as if it were a kind of organism which grows inevitably shows this naturalist or biological thinking.94 This shows a further concern that empirical thinking in the natural sciences would also reveal the structure and order that Mies searched for. Unity is apparently the intent in the comment on world consciousness. His call to understand natural laws also reflects this.

The unity suggested by Mies is not simply the unity of correct relationships as expressed in the reduction to distinct building elements but the unity of a higher order. Neumeyer writes that Mies "was to expand his position

94Mies's reading in the twenties on morphology and life sciences is extensive. Much of the influence comes through Raoul France. New formal notions about the unity of structure and biological analogies to structure begin to emerge in his writings and will be developed in later writings.
after 1927 by an existential enlarged dimension—whether form is 'derived from life or for its own sake.' It is the suggested role of the architect to understand these natural forces, harness technology, and express this unity.

The change in focus on technology is significant here. Technology cannot in itself bring true building art. Only man who understands the "knowledge of natural laws and works with their forces," can create building art. This suggests a new approach to technology which Mies will continue to develop through his life. The individual takes on new significance in terms of these world forces. Technology itself is no longer the savior it had been in the earlier projects.

In the German Pavilion technology is still present as an image but the tectonics of the building have also become part of that image. The tectonics of the building are controlled to create a formal composition. This does not require a rational building system but the outward expression of tectonics in a specific way. The objective forces are still present but tempered by formal intentions. While the ideal aspects of the building begin to move it away from the representational it remains so in its use of a traditional layered building system which was intended to present the image of new building.

The subjective expression in his architecture would be explained by Mies as the expression of the spirit of the culture. Thus the pre-existing nature of spirit allows for the arbitrary or subjective to exist as a transcendental. With this

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95 Neumeyer, 136.
rejection of the materialist *Neue Sachlichkeit*, the artistry is there to play against the objective and the rational. The composition becomes a balance of subjective and objective like a Dionysian/Apollonian unity. This explains the lavish use of stone in the Pavilion. Like the empiricists or Wittgenstein there is an attempt to find the limits of the objective and subjective in both construction and space. All of Mies's different ideas still exist for him within a framework of rationalism.

His notion of time which is emphasized at the end of this section is important to notice. The immanence of the exact knife edge point in time is his final emphasis. Everything depends on the action taken at the moment. Again as we saw in earlier writing, it is evident that the revolution was still to take place, that building technology along with a sense of space to express the consciousness must be mastered in a completely new architecture.
Inaugural Address as Director of Architecture at Armour Institute of Technology, Chicago, November 20, 1938

"All education must begin with the practical side of life. If one wants to address real education, however, one must transcend this to mold the personality, leading to an improvement of mankind. The first aim should be to equip the student for practical life. It gives him the proper knowledge and skills. The second aim addresses the development of personality. It enables him to make the right use of this knowledge and skill. Thus true education is concerned not only with practical goals but also with values. By our goals we are bound to the specific structure of our epoch. Our values, on the other hand, are rooted in the spiritual nature of man. Our practical aims determine the character of our civilization. Our values determine the height of our culture. Different as practical aims and values are, arising out of different planes, they are nevertheless closely connected.

For to what else should our values be related if not to our aims in life? And where should these goals get their meaning if not through values? Both realms together are fundamental to human existence. Our aims assure us of our material life, our values make possible our spiritual existence. If this is true of all human activity where even the slightest question of value is involved, then it must be more true in the field of architecture.

In its simplest form architecture is entirely rooted in practical considerations, but it can reach up through all degrees of value to the highest realm of spiritual existence, into the realm of the sensuously apprehendable, and into the sphere of pure art. Any teaching of architecture must recognize this situation if we are to succeed in our efforts. It must fit the system to this reality. It must explain these relations and interrelations. We must make clear, step by step, what is possible, necessary, and significant. If teaching has any purpose at all, it is to implant knowledge and responsibility. Education must lead us from irresponsible opinion to responsible insight. It must lead us from chance and arbitrariness to the clear lawfulness of a spiritual order.

Therefore let us guide our students over the disciplined path from materials through the practical aims of creative work. Let us lead them into the healthy world of primitive buildings, where each axe stroke meant something and each chisel stroke made a real statement. Where can we find greater clarity in structural connections than in the wooden buildings of old? Where can we find such unity of material,
construction, and form? Here the wisdom of whole generations are stored. What feeling for material and what power of expression speaks in these buildings. What warmth they generate, and how beautiful they are! They sound like familiar songs. And buildings of stone as well: what natural feeling they express! What a clear understanding of the material. What certainty in its use. What sense they had of what one could and could not do in stone. Where do we find such wealth of structure? Where do we find more healthy energy and natural beauty? With what obvious clarity a beamed ceiling rests on these old stone walls, and with what sensitivity one cut a doorway through these walls. Where else should young architects grow up than in the fresh air of a healthy world, and where else should they learn to deal simply and astutely with the world than from these unknown masters?

The brick is another teacher. How sensible is this small handy shape, so useful for every purpose. What logic in its bonding, what liveliness in the play of patterns. What richness in the simplest wall surface. But what discipline this material imposes. Thus each material has its specific characteristics that one must get to know in order to work with it. This is no less true of steel and concrete. We expect nothing from materials in themselves, but only from the right use of them. Even the new materials give us no superiority. Each material is only worth what we make of it.

In the same way that we learn about materials, we learn about our goals. We want to analyze them clearly. We want to know what they contain and what distinguishes a building for living in from other kinds of buildings.

We want therefore to learn its essence. We shall examine one by one every function of a building, work out its character, and make it a basis for design. Just as we acquainted ourselves with materials and just as we must learn about the spiritual position in which we stand.

No cultural activity is possible otherwise; for also in these matters we must know what is, because we are dependent on the spirit of our time. Therefore we must come to understand the carrying and driving forces of our time. We must analyze their structure from the points of view of each material, the functional, and the spiritual. We must make clear in what respects our epoch is similar to earlier ones and in what respects it differs.

At this point the problem of technology arises for the students. We shall attempt to raise genuine questions—questions about the value and purpose of technology. We want to show that technology not only promises power and greatness, but also involves dangers; that good and evil apply to it also, and that man must make the right decision.

Every decision leads to a specific kind of order. Therefore we want to illuminate the possible orders and lay bare their principles. Let us
recognize that the mechanistic principle of order overemphasizes the materialistic and functionalistic factors. It fails to satisfy our feeling that means must be subsidiary to ends and our desire for dignity and value. The idealistic principle of order, however, with its overemphasis on the ideal and the formal, satisfies neither our interest in truth and simplicity nor our practical sense. So we emphasize the organic principle of order that makes the parts meaningful and measurable while determining their relationship to the whole. And on this we shall have to make a decision. The long path from material through purpose to creative work has only a single goal: To create order out of the godforsaken confusion of our time. But we want an order that gives to each thing its proper place, and we want to give each thing what is suitable to its nature. We would do this so perfectly that the world of our creations will blossom from within. More we do not want; more we cannot do. Nothing can unlock the aim and meaning of our work better than the profound words of St. Augustine: "Beauty is the radiance of truth."  

This essay defines Mies's mature thought. It outlines Mies's American work even though it was written in Germany before his emigration. The essay is an elaboration of previous ideas from his 1928 "Turning Point" essay in a revised and clarified state. The Neoplatonism has developed further with a focus on order and values. Each idea is broken up into a framework to handle some of the conflicting thoughts such as: goal and value; mechanical, organic, and ideal orders. Each is carefully described reflecting a refinement of purpose which is to achieve a higher unity of these various ideas.

The types of clarification of ideas in this essay are significant because they express the development of Mies's dialectical thinking which attempts to

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96 Neumeyer, 317.

97 Kevin Harrington, interview with the author, March 9, 1993.

98 Neumeyer, 200.
unify the separate ideas to find a higher order. This is the later idea of order for Mies. It is not just ordering but a philosophical position of the union of the many aspects of the real and the ideal. It reflects the influence of Neo-Thomism; of Maritain, Guardini and Aquinas himself. From Aquinas there was the questioning of the nature of truth and knowledge of the real.\textsuperscript{99} From Guardini there is the dialectic of Neoplatonic and Existentialist philosophy.\textsuperscript{100} From Maritain\textsuperscript{101}, there was the focus on natural science with an understanding of spirituality and the use of dialectical structure. The general interest in science and rationalism is fundamental to all of these positions.

Mies's emphasis on the subject of order developed after the late twenties and through the thirties. Concerned about the chaos in modern architecture, his need to create unity became apparent. The \textit{court houses} were the opportunity to question order as objective versus the subjective\textsuperscript{102}. They show an incessant pursuit through dialectic form of inquiry. Back and forth the plans move from the subjective to the delimited with the goal to produce a higher order.

Even Mies's working method can be seen as a dialectical dialogue between elements. His comparative working method of setting one project

\textsuperscript{99}Aquinas in Schulze:"truth is defined by the conformity of the intellect and the thing and hence to know this conformity is to know truth." Schulze, 172. Also Neumeyer, 70.

\textsuperscript{100}Neumeyer, 200.

\textsuperscript{101}Schulze, 228.

\textsuperscript{102}Mies spoke of this at length in his teaching. George Danforth, interview with the author, March 12, 1993.
against another to investigate a particular detail as in the Barcelona and
Tugendhat columns is repeated many times. It expresses his investigation of
ideas in general whether they are philosophical, tectonic, or formal. It is also
effective in making the analysis of highly reduced elements visible and
objective. Each distinction derived from this type of investigation is in service of
a higher unity.

His earlier writings brought up the discussion of order but from a
relatively simple level. In this essay each distinction carries significance: There
is the mechanistic order distinct from the idealistic order which is distinct from
the organic order. The mechanistic order is like his earlier critique of
functionalism in that it "overemphasizes the materialistic and functionalistic
factors." The idealistic order is also unacceptable in that it does not satisfy our
practical and empirical sense. The organic principle of order takes these limited
orders to a higher level of unity. It "makes the parts meaningful and measurable
while determining their relationship to the whole."

This shows the development of Mies's Neoplatonic thinking by way of
modern dialectical thinking. Both Guardini and Simmel are important sources of
this direction of thought in Mies as are others.\textsuperscript{100} The significance of the
arguments relegate construction and building to a less prominent position in
relation to the new \textit{a priori} ideas of structure. The significance of tectonics as

\textsuperscript{100} Neumeyer, 198.
the concept of structure is heightened since it is the entire basis for the
expression of these Neo-Platonic ideals:

"Mies's work after 1938 turned from construction to structure. It stood for
that unifying principle of order that contained not only the unity of
construction and form, but also of purpose and meaning."\textsuperscript{104}

In this unity which Mies strives to achieve, the dialectic of subjective and
objective come together. In the work of the 1940s there is much less of a play
between these elements. Instead, the locus of the two comes together. This is
expressed in the recognition of new building types. Mies leaves the elementalist
compositions of column, wall, and roof behind for a more complex type of
construction which is a more unified form of a three dimensional matrix.

The additive infill construction type at the IIT campus reflects the
development of intellectual complexity. The layers of meaning present in the
construction reflect a depth of investigation that is very different from the
German Pavilion. In this case each material, its function, its position, and its
expression become elements of study. Every part now has a relation to every
other part at many different levels both intellectual and visual. Clarity is
expressed between primary and secondary structures and between structure
and infill as well as between separate connecting elements.

Each material has specific meanings related to its specific function. For
example, differences in function are delineated for the same material when it is

\textsuperscript{104}Ibid., 225.
load bearing and when it is not. The whole assembly and its connected meanings are a complex description of their existence as ontological statements. The ideal being an "order that gives each thing in its proper place, and we want to give each thing what is suitable to its nature." And "we must make clear, step by step, what is possible, necessary, and significant."

This is most evident in the Metallurgical building with the famous exposed steel corner. The steel rhetorically describes its function as analogous to the structure. It shows its lack of structural support clearly. The composition is clarified as forming a complex whole out of simple elements.

The unity of elements is also evident in the perspective sketch for the library (Fig. 52). Through the facade many spatial and tectonic things are going on at the same time—all to be resolved to a whole. Several different layers of structure show through at many points. The entire concept for the tectonics is like a three dimensional, orthogonal matrix of multiple relationships.

As he had in the past Mies adopted this tectonic concept and continued to refine it over many years. For example the early Metals Research building shows less unity than the later projects which better refine their system. The short elevations of the Metals Research building show different types of connections and differing, unresolved amounts of depth. The later campus buildings show greater and greater refinement of the same tectonic concept toward the expression of formal unity.
Fig. 102  Detail photograph of corner of Metallurgy Building, Illinois Institute of Technology, Chicago, 1944. Reprinted from Johnson, 151.

Fig. 103  Diagram: tectonic concept as additive unity.
The unity of construction and art meet in the exposed steel detailing of this building system. It is no longer the play of subjective planes against an objective structure and enclosure. It has become an expression of unity in the exposed analogous structural elements as the conveyor of the meaning in the architecture. This exposed structure becomes the focus for the artists skill as Mies's sketches demonstrate. Although these elements were the site of considerable artistic input, the restrained nature of the detailing makes the expressive element difficult to perceive. This is better seen in the progression of the work over a period of time. The details are rhetorical rather than expressive. Details such as reveals between materials become more defined. Sheets of glass become larger and uninterrupted. The IIT campus provides a showcase for the development of the various building experiments and refinements. Even within the same additive unity tectonic concept the resolution of expression varies.

The close inspection of the inherent aspects of the construction and material are well discussed in this last essay. Here all materials have the need for attention and less specific focus on new materials. Mies discusses the clarity in the "healthy world of primitive buildings," and calls on students to learn from all the materials and their inherent lessons. He focuses again on the very practical, on the material object and its importance. In the IIT buildings a new outlook on the inherent aspects of materials, of their inner order, an order more
fundamental than that of construction is expressed. Each material is expressive only of its own inherent aspects.

This new attitude to respect the nature of material is evident in its expression. Instead of a bold expression of visual delight, the materials offer a small tale which one must enter into to hear.\textsuperscript{105} This is especially important for the minimum expression in the first use of the exposed steel at IIT. It is conceptually different from the previous work. It expresses its own being and intention through its construction rather than the image of its construction. It is ontological in that it expresses its own position functionally as material with a rhetorical function. The steel is treated as a standard shape of construction arranged against each other rather than as a pliable expressive device. It is a standard shape of construction to be interpreted.\textsuperscript{106} The treatment of the brick at the IIT campus is fundamentally different from the brick of the twenties houses because it describes its non-structural function as infill and its depth in the bond pattern. It does not hide lintels as the early brickwork did.

The base material itself has no importance without the architect’s influence. Construction here is still the basis, the Neoplatonic \textit{a priori} aspect of the architecture is but one element in a much larger unity of intention. The whole building has become a complex story of its construction through its structure. The structure is closer to the idea of \textit{Aufbau} where it is the all-


\textsuperscript{106}George Danforth, interview with the author, March 12, 1993.
encompassing organizing framework. The tectonic concept of the IIT buildings is essentially like an Aufbau where each type of element takes a specific role in relation to the whole.

This attempt at unity can be seen to be a recreation of the cosmos. To "illuminate the possible orders and lay bare their principles." Eliade would call Mies's yearning for the primitive pure building and the recreation of all the relationships in a recreation myth or eternal return.\textsuperscript{107} That is, it seeks to restore life through the recreation of myth. It is unlike the redemptive nature of avant garde anarchy.

The desire for unity brings together historically opposed ideas which are reflected in Mies's dialectical thought. Harries calls attention to modernism which he claims was a reaction to the accepted disunity of nineteenth century architecture. It attempts with religious fervor to create Platonic unity.\textsuperscript{108} This comes from Mies's interest in modern Thomists who attempted to reconcile science with religion.\textsuperscript{109} Construction attempts to objectify this unity of the ontological tectonic system as a direct negation of the representational architecture of the 19th century.


\textsuperscript{108}Karsten Harries, "The Dream of Complete Building," in Perspecta 17.

\textsuperscript{109}Modern Neothomists who influenced Mies include Maritain, Gilson, and Guardini.
The construction takes on a new process in its role of telling the story of its construction. It becomes like a language in the sense of semantics of which Valery wrote and who Mies had read.\textsuperscript{107} The conception of construction changes to this idea of a manipulation of language. This language is created as a system of design conventions which become the formal focus of the later work both in IIT Buildings and others. However this seeming acceptance of classical analogous architectural conception with both Gothic and monolithic construction is a contradiction.\textsuperscript{108}

Clearly Mies understood the aspects of his work as gothic and classical in terms of their thought. Mies intended this unity of the two ideas just as Aquinas had attempted the same unity of rational mind and experience with Scholasticism. It is the ontological nature of the tectonic system which is a rejection of classicism as a style and of representationalism. Expression within detailing thus must come largely from its intention as a source of meaning or truth.

At this point in his career Mies began to show the deeper intention of his work by presenting it in plan section. It is at this point that the notion of the whole is most evidently fundamental. Even though most of Mies's sketching is detail perspectives, the intention of understanding the work in plan section is primary. This is seen in the drawings made for the Johnson monograph. Mies is

\textsuperscript{107} Kevin Harrington, interview with the author, March 9, 1993.

\textsuperscript{108} Dal Co, 280.
trying to show the cultural significance of total meaning of architecture through
its plan section as a symbol of its totality.

This desire to reflect the totality of a time and culture through a tectonic
concept is similar to the contemporary ideas of Panofsky. The desire to create
the total work of art as an absolute truth devoid of representationalism was the
goal. The monolithic tectonic system and the significance in the plan section is
crucial to this concept. While the concept denied the representation of ideas for
the embodiment of those ideas, it still depended primarily on the visual and
formal manipulation of Mies’s working method to perfect each detail in
perspective. The reality of the embodiment of that idea had to be proven
empirically depending on the objectification and reduction to further primary
visual study.

This focus on objectification of reduced elemental parts is reflected in
Mies's idea of 'Benehne Nichts' which he began to use more frequently at the
time. It reduced the whole to its primary form to experience phenomena as
objective. In the reduction the simple intention is objectified with empirical
reasoning. The attitude of limitation of the individual artist for a more universal
expression is clear. The minimal detailing shows the attempt to define the
objective clearly and to describe the limitations of expressions and the artistic in
architecture. This was often asserted by Mies in his teaching.112 As mentioned
above the influence of logical empiricism is clear.

112David Haid, interview with the author, March 5, 1993.
Mies's ideas are parallel with logical positivism regarding the idea of empiricism and objectivity. Popper, for example, delineates objective knowledge in "Knowledge: Subjective and Objective" as that which is created by man by thought but exists as autonomous knowledge. It exists without a subject in its own world as a concept or theory. This parallels Mies's idea of architecture as autonomous knowledge.

Mies associated with the important group of Logical Positivists at the University of Chicago.\textsuperscript{111} He had read them all and included their ideas in the formation of the program at IIT. Adler was the primary American to bring the ideas of the Vienna Circle to this country. Neo-Thomism was popular at the University of Chicago at the time too.\textsuperscript{112} Philosophy was an important part of the graduate program at IIT through Walter Peterhans. Mies's reading list was varied and included scientific subjects, Plato, Augustine, and Kant. This suggests that Mies's philosophical intentions are not overstated and were evident at the time.\textsuperscript{113}

In addition to the other changes we see in this essay, there is a change in attitude toward time. Suddenly the epoch takes on different dimensions and the relationship to the past is important. The knife edge of historical


\textsuperscript{111}George Danforth, interview with the author, March 12, 1993.

\textsuperscript{112}Schulze, 228.

\textsuperscript{113}Shell, 25.
immanence is gone completely. The conception of building has changed from being identified with the immediate overthrow of culture to that no longer requiring revolution but rather evolution. The attitude toward time further exemplifies Mies's development of more universal Neoplatonic position.
"Architecture and Technology"
Published in Arts and Architecture 67, No. 10 (1950)p. 30

Technology is rooted in the past.
It dominates the present and tends into the future.
It is a real historical movement--
one of the great movements which shape and represent their epoch.
It can be compared only with the Classic discovery of man as a person,
the Roman will to power,
and the religious movement of the middle ages.
Technology is far more than a method,
it is a world in itself.
As a method it is superior in almost every respect.
But only where it is left to itself as in the construction of machinery, or as
in the gigantic structures of engineering, there technology reveals its true
nature.
There it is evident that it is not only a useful means, that it is something,
something in itself,
something that has a meaning and a powerful form--
so powerful in fact that it is not easy to name it.
Is that still technology or is it architecture?
An the may be the reason why some people are convinced that
architecture will be outmoded and replaced by technology.
Such a conviction is not based on clear thinking.
The opposite happens.
Wherever technology reaches its real fulfillment, it transcends into
architecture.
It is true that architecture depends on facts,
but its real activity is in the realm of the significance.
I hope that you understand that architecture has nothing to do with the
inventions of forms.
It is not a playground for children, young or old.
Architecture is the real battleground of the spirit.
Architecture wrote the history of the epochs
and gave them their names.
Architecture depends on its time.
It is the crystallization of its inner structure, the slow unfolding of its form.
that is the reason why technology and architecture are so closely related.
Our real hope is that they grow together,
that someday the one be the expression of the other.
Only then will we have an architecture worthy of its name: Architecture as a true symbol of our time.\footnote{Neumeyer, 234.}

This essay develops several themes beyond the previous essay. It portrays the developing conviction of the unity of the dialectic of idea and experience and clarifies the relationship of architecture and technology. The shift to a more metaphysical position places new significance on previous ideas of structure and technology. The comments also suggest a further change in perception of time.

The problem of technology which he discussed before is of greater concern at this point. He calls it "one of the great movements. . . a world in itself." It can have such a powerful form "so powerful in fact that it is not easy to name it." Technology for Mies became an ultimate philosophical proposition for man. He already believed Architecture's role was to raise technology into the realm of the spirit, as being: "in the realm of significance." Architecture's philosophical significance for him was that it was "the real battle ground of the spirit." He describes architecture as the "crystallization of its inner structure." The Neoplatonism became stronger in these aphorisms of spirit and universality. At this time the material basis of architecture was still the starting point, but the spiritual and philosophical intentions are stronger. It follows that at
this point Mies's reading has shifted from natural sciences and theology to physics and cosmology.\textsuperscript{115}

In the last essay, Mies clarified the differences between architecture and technology in the dialectic manner. Again we see an example of the attempt to create a higher unity of these two ideas. He stresses that for architecture to reach its highest goal, they must "grow together." A higher order from building and technology must occur. This argument came to hold more developed ideas on the position of technology and architecture beyond his ideas from the late twenties. Both technology and architecture became ideal philosophical propositions and his buildings were the objectification of the positions taken.

Mies's tectonic concept of this time reflects this search for further unity of these concerns in the development of the exoskeletal type structure. It becomes a concept which occupies Mies more and more in the later years to the exclusion of the previous tectonic concepts.\textsuperscript{116} This concept is the basis of the Farnsworth House and the Mannheim Theater. It attempted to form the higher unity of architecture and technology that Mies described in "Architecture and Technology." Suddenly the technology and the building process emerged to the exterior of the building, proclaiming the philosophical position of the unity of architecture and technology. As this idea of unity "crystallized" as Mies called for here, the skeleton was brought to the surface. There is no real practical

\textsuperscript{115}Schulze, 313.

\textsuperscript{116}Gene Summers, interview with the author, March 10, 1993.
reason to move the skeleton to the outside except to express the "crystallization of inner structure." The expression of structure in this way is the objective and Neoplatonic basis for architecture. It had become a representation of Mies's highest ideals. The locus of the dialectic unity became his idea of metaphysical structure and life order similar to the Aufbau. In the early project for the concert hall the structure/Aufbau floats overhead, everpresent. It is the fundamental unifying element which joins the subjective and objective aspects of the work for his most absolute and transcendent form of unity of ideal and building.

Technology is no longer the ruling factor. It holds no power in an of itself without the intervention of man. In the buildings the expression of new technology is gone and Mies no longer shows how new technological materials can make weightless structure as he had done in the German Pavilion. Technology holds no answers in and of itself. Like Heidegger's formulation on technology, man must control it completely as it is merely a product of his efforts.120 This disillusion with the power of technology is the new attitude of Mies's later architecture which was simply without the futuristic and redemptive excitement of the early work.

The later buildings develop a heaviness in detailing and proportion unseen in the earlier works. Steel was often oversized and weighty. It was as if the conception of material then required these greater proportions and added

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depth for clarity. In his new expression of the relationship to technology, steel needs its proper position in relation to every other building material, no longer completely free to float. It is bound to man's interpretation of the appropriateness of the whole.

This latest expression of the structure was claiming it as a philosophical position. Expression of structure is not a simple working method but the most important thing a man can do. For Mies this was to define this extended epoch through the complete mastery of technology.

Mies is a master of structure in this sense. Schulze points out that Mies is a master—not a virtuoso—of structure.¹²¹ Neumeyer writes:

"The poeticizing of the steel structure, rather than its constructive-technological potential, was largely to determine the building routines of the twentieth century. Even though Mies's initial statements had been in harsh contradiction to this approach, he worked it ceaselessly, from his first skyscraper project in the twenties up to his last commission, the New National Gallery in Berlin."¹²²

In Mies's buildings, "the demonstration of the idea came before the realization of the practical task. . . [and] the technical was sublimated to the aesthetic with eloquent precision."¹²³

Exactly how the idea behind the elements, which are revealed through the selective exposure of particular structural members, is expressed is important. In the monumental free-span tectonic concept, the structure which is

¹²¹ Franz Schulze, interview with the author, March 8, 1993.

¹²² Neumeyer, 129.

¹²³ Ibid., 132.
expressive of unity, is exposed through the masking of parts of the building not related to the monumental space. In this way it differs radically from the additive unity concept in which every element had a distinct relationship to the three dimensional matrix of the whole.

As Mies moved slowly into this ideal world of ideas the conception of time also developed. In the Inaugural Address this shift was expressed and in this last essay it developed further. He called attention to the fact that architecture depended on its time but this notion of time changed for him. Technology as a "historical movement" describes a whole period, an epoch which encompasses a much larger period of time than previously expressed. The idea of the new left his concern completely. The lasting ideas of architecture became his focus and that which he stressed most.

The expression of this changed attitude toward time is introduced into his work with a concern for the buildings over time. Weathering and the buildings place in the city became a focus. The choice of black for the exposed steel color shows his concern. It was a conscious choice to avoid the appearance of dirt on the building.\textsuperscript{124} The conception of the construction was the same as a Greek Temple; the building was to hold its dignity through time. Mies thought that glass was misunderstood and that it was actually one of the strongest materials man had ever made.\textsuperscript{125}

\textsuperscript{124}David Haid, interview with the author, March 5, 1993.

\textsuperscript{125}Shell, 10.
Fig. 104  Detail photograph of *Crown Hall*, Illinois Institute of Technology, Chicago, 1950-1956. Archive vol. 12, 211.

Fig. 105  Diagram: tectonic concept as monumental free-span.
This developed conception of time continued in Mies's ideas. The epoch under consideration has continued to be compared to all of history and its understanding changed the goals of architecture. The development of this idea is especially evident in the next essay which presents the final development of his metaphysical position.
"Where Do We Go from Here?"
Bauen und Wohnen, 15, no. 11 (1960), p.391
Teaching and work have convinced me of the importance of clarity in deed and thought. Without clarity there is no understanding. Without understanding there can be no orientation--only confusion.

Sometimes confusion holds even great men in its grip--as it was around 1900. As Wright, Berlage, Behrens, Olbrich, Loos, and van de velde worked, all did so in different directions.

I was often asked by students, architects, and interested lay people:"Where do we go from Here?" It is of course not necessary or possible to invent a new architecture each Monday morning.

We are not at the end but at the beginning of a new epoch. This epoch is being determined by a new spirit and driven by new technological, sociological, and economic forces, and they will come up with tools and new material. For this reason we will also have a new architecture.

But the future does not come about by itself. Only if we do our work properly can we create a good foundation for our future. In all these years I have learned more and more that architecture is not just playing with forms. I have understood the close connection between architecture and civilization. I have understood that architecture must develop out of the supportive and dynamic forces of civilization and that in its best examples it expresses the innermost structure of its epoch.

The building of civilization is not simple, since the past the present, and the future have a share in it. It is difficult to define and difficult to understand. What belongs to the past cannot be changed any more. The present must be affirmed and mastered. But the future stands open--open for the creative thought and the creative deed.

It is against this background that architecture arises. Consequently, architecture should only stand in contact with the most significant elements of civilization. Only a relationship that touches on the innermost nature of the epoch is authentic. I call this relationship a truth relationship. Truth in the sense of Thomas Aquinas: as adaequatio intellectus et rei, as congruence of thought and thing. Or as a philosopher would express it in today's language: truth means facts.
Only such a relationship can comprise the multiple nature of civilization. Only thus can architecture be part of the development of civilization. And only thus can it express the slow unfolding of its form.

This was and will be the task of architecture. Surely this is a difficult task. But Spinoza has taught us that great things are never simple. They are as difficult as they are rare.¹²⁶

The introductory notion of "clarity in deed and thought" expresses the development of Mies's ideas up to the time of this essay. They are the same essential ideas of twenty years earlier but they are clarified and strengthened. Technology, time, and the inner truth of existence are all more clearly put forth than in the past and his convictions are expressed more strongly. The dialectic of ideal and real which has always been at the core of his thought is affirmed at a new level.

The notion of time extended once again to become more universal and to consider all of civilization. He suggested in this last essay that we have arrived at a period that spans hundreds of years as a continuum. He says the "past, present, and future" have a share in civilization, that we are connected to a much larger world in terms of time, and that civilization was at the "beginning of the epoch."

Mies's attitude toward conventions and continuity are evident in this essay where he states: "It is not necessary or possible to invent a new architecture each Monday morning." This and his Neoplatonic position explains

¹²⁶Neumeyer, 332.
the acceptance of repeatable tectonic solutions to buildings. The subtle changes in them reflect a interest in perfecting objectively the theory which is itself an ideal. It represents the attempt to harness technology with a evolutionary approach to form.

The dialectic of the ideal and the real in this essay is again supported as it has been throughout Mies's writings. As the clarification of this dialectic continued the two poles of material and ideal seem to reach farther in each direction. Through this, Mies claims that one reaches a relationship with truth: "the congruence of thought and thing."

The work which perhaps expresses the dialectic of ideal and real most forcefully is the late free-span National Gallery. In this project which consumed Mies's attention for the last part of his life, the unity of the dialectic is expressed in the monumentality of the structure. It was an attempt to achieve the ultimate significance that Mies described in the essay. What is expressed is only the unity of the monumental structure sitting in philosophical repose above what is less important to the expression of his ideas, namely the rest of the building. The idea of metaphysical order through unity of structure leaves the structure to function rhetorically. It is the idea behind the form which has significance. The insistence on the use of the singular exposed steel structure apart from the experience of the rest of the building dissolves the sense of additive unity of the ontological work and again returns the work to an essentially representational quality. While it is a very different sort of representation than his 20s buildings,
Fig. 106  Photograph of New National Gallery, Berlin, 1962-67. Reprinted from Neumeyer, 234.

Fig. 107  Diagram: tectonic concept as monumental free-span.
it still places the specific image as primarily an external message rather that looking toward internal content. In the end, the monumental challenge of expressing the unity of Mies's far reaching theories is expressed in this his final building. The absolute universal idea takes on more significance than the material itself so that they are no longer in balance. And the attempted unity occurs only at the level of philosophical significance rather than the complete expression of architecture.
CONCLUSIONS
A strong correlation exists between the development of Mies's tectonics and the development of his theoretical writings. This relationship provides a vantage point from which to more clearly understand Mies's Neoplatonic architectural intentions. The buildings are a material expression of a modern dialectical argument on the transcendent and experience. They reflect the desire to objectify the ideal.

Mies's architectural development shows four clearly developed periods of specific tectonic conception. Each period is specifically related to his philosophical concerns at the time. Shifts in theoretical position are immediately related to shifts in the use of building systems. All of the work shows Mies's Neoplatonic emphasis on building as the a priori basis of architecture.

The early work and writing (1921-27) reflect the materialist concerns of Neue Sachlichkeit's revolutionary message. The built work and the writing overturn traditional ideas of architecture by employing rationalist scientific method in design. Objectivist reduction is the basis of architectural investigation. In the built work this takes the form of experimentation with single materials to study their optical potential and structural expressiveness.

The tectonic investigations of this early period remain representational much like the architecture Mies attempted to overthrow. The visionary projects
convey their intentions through images of new building technologies. They showed little technical concern for new materials but rather a fascination with the formal expression of these materials.

After 1928 Mies shifts from a materialist to an idealist position regarding architecture, and with that he changes his use of tectonics. The German Pavilion illustrates the addition of architectonic content through the functional expression of the elementary parts of the architecture. The concept of Geist, which Mies introduces in his writing at this time, shows a concern for the ideal and the transcendent. This concern represents a shift to architecture as an a priori idea in itself. This idea is directly related to Mies's adoption of a single tectonic system for the ten-year period and his rejection of experimentation with building systems.

However, while the work of this period (1928-38) contains aspects of transcendent content it still remains primarily representational. The buildings express the potential of new technology through their monolithic images, while they continue to use traditional layered construction.

Mies's use of dialectical argument develops from the late twenties in both the writing and the built work. In his writing the dialectic arises from an emphasis on the ideal juxtaposed with the material. The built work reflects this dialectic in its juxtaposition of objective structure with subjective, space-making planes. Mies even uses the dialectic form of investigation in his working method
where one project is designed opposite another to uncover the expressive possibilities of each.

Mies intensifies this dialectic process around 1938 to form a more unified theory and tectonic ideal. At the same time he pursued ideas of universal order in his writings. His concept of an Aufbau becomes clearer as the built work displays a universal ordering system. The additive unified system seen in the IIT Campus buildings reflects this dialectic unity.

One characteristic of this unified system is that is reveals the ontological nature of its content. Each element in the building's three dimensional matrix expresses its fundamental position and function in relation to the whole. The tectonics are no longer representational, and their limited expressiveness is an example of this. The buildings communicate in a less direct, more implied manner. With the additive system Mies again rejected an earlier tectonic system and worked within the new system for many years.

The idea of structure as universal began to be expressed in the additive buildings. It became the focus of the buildings where the unity of objective material and subjective artistry takes place. Structure gradually takes precedence over the total building system. And that shift led to the monumental free-span buildings.

Mies's concern for a higher metaphysical order led to a conviction that structure is the embodiment of architectural significance, and that conviction gradually appears in the writings toward the end of his life. That conviction is
manifested in the exposed free-span tectonic system, the crystallization of Mies's metaphysical ideals, which occupied his attention in his final years.

The exposure of the structure focuses the idea of dialectical unity on this one aspect of the building system. The rest of the building's system of these buildings is much like the elementalist compositions of the 30s. The integrity of the whole is compromised by locating the building's unity entirely in its monumental structure.

The presentation of the idea of metaphysical order through the building's structure shifts the conceptual basis of Mies's architecture again to the representational. The image of the structure alone presents its content. This better reflects Mies's metaphysical ideas although it contradicts the nature of his earlier work. The free-span work itself, however, becomes monumental and more expressive than the buildings using the additive system.

Mies's architectural and theoretical development reflects intentions which have important implications in the tectonics of his buildings. His reuse of tectonic systems was a fundamental part of his Neoplatonic position. In each period he discarded systems for a concept which better represented his absolutist position.

The formal expression in Mies's handling of tectonics follows this development of different tectonic concepts. The need for empirical verification of visual concerns necessitated the acceptance of a limited building system. Formal study, rather than tectonic investigation, was the primary concern of
Mies throughout his career. The formal analysis of the details of a building system expressed the perfecting of the *a priori* ideal.
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