away from its local constituency and transformed itself into a national presence. Like Wellesley and countless other colleges, Penn embraced a revivalist architecture at the turn of the century. Furness was replaced by faculty members Wilson Eyre, Jr., Walter Cope, John Stewardson, and Frank Miles Day, who all designed residential, academic, and athletic facilities in a range of revivalist styles. The four collaborated on the Italian Romanesque University Museum. Cope and Stewardson, who had worked at Bryn Mawr and would later work at Princeton, specialized in creating academic buildings in a Collegiate Gothic. Thomas and Brownlee astutely emphasize that, as the style changed, the orientation of the buildings changed as well; no longer seen as individual entities, they were lined up to create interior courtyards.

At the same time that the university was casting itself as a modern version of the English medieval college, its immediate neighborhood and its own constituency were changing. Women began attending graduate and undergraduate classes in the late nineteenth century, though they could not receive degrees, only certificates. A separate College of Liberal Arts for Women was established in 1933 and continued until the late 1960s. But with the presence of women and the changing face of the neighborhood, alumni began to urge the university to relocate. In a fascinating section on a plan that was never realized, Thomas describes how from World War I until 1959 Penn toyed with the idea of leaving Philadelphia for the suburbs, but the Depression and World War II meant a virtual standstill in university construction from 1929 to 1949.

After World War II, Penn remade itself by turning away from its top-rank football program and moving toward academics and research. Funding also shifted from local elites to the state and federal governments. The switch, Thomas and Brownlee point out, had a direct impact on campus planning and architecture. The authors examine two very different buildings as symbols of Penn’s postwar architecture: Louis Kahn’s successful Richards Laboratory and Dean G. Holmes Perkins’s unsuccessful high-rise dorms. As Furness’s library had expressed late-nineteenth-century industrial culture, so Kahn’s medical towers expressed a Modernism, unique to Philadelphia, that stressed context and function. Built adjacent to Cope & Stewardson’s English-inspired dormitories, Kahn’s three brick-and-concrete towers acknowledged the earlier building’s forms and scale, and gave expression to the laboratories’ various functions. They are now deemed among the most important architectural landmarks in the country. The second group of postwar buildings were not so fortunate. Publicly funded high-rise dormitories surrounded by green space, Thomas compares them to public housing towers.

Both of these books do an admirable job of telling their respective stories. The Wellesley volume is the better of the two. Beautifully written and laid out, it is a solid history. The Penn book is more workmanlike in its prose, and the guidebook section has a rather uninspired layout. But if there are overall criticisms, they would be about the genre itself. Institutional histories are often a tale of progress, told in a top-down fashion, with little accounting for discord or failure. Presidents and provosts are the main actors; the campuses grow and expand; everything gets better and better, leading to the glorious present. While both these volumes relate interesting tales about campus planning, they also give us this type of “happy history” that ignores controversy. For example, it may be an historical given that the majority of people who led, taught in, or graduated from Wellesley and Penn were elite white Protestants. But the policies that had ensured this did eventually change, something neither one of these books chooses to address. Likewise, conflicts within or outside the schools’ walls are also ignored. What about the people of the poor black neighborhood that eventually surrounded Penn, and their resistance to the school’s efforts to push them out? What role did donors and money have on the school’s priorities? What orthodoxies in teaching and learning are also embodied in these buildings? And how did these buildings affect the worldview imparted to students?

While these are not questions the authors choose to take up, there is still much to recommend both of these books. Each addresses one of the central issues for any campus—the fact that planning and designing are always conscious acts of relating the present to the past. The watchword in both cases is context—either the school’s understanding of its immediate environment or its associations with the larger community—and that context is crucial for understanding the university’s various incarnations. “The story of the campus,” Wellesley’s president observes, “is a lens through which we can read the story of the College’s mission, culture, and values” (x). Even if the story told in both of these books is a top-down, rosy version, it is still a useful one.

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Technology and Modernism

Gwenaël Delhumeau
L’invention du béton armé. Hennебique 1890–1914

Bernard Marrey and Franck Hamboutène, editors
Le béton à Paris

Building materials are integral to the theory and practice of architecture. From Renaissance treatises to twentieth-century manuals, architectural literature is replete with statements on the role, nature, and use of materials in the production of architecture. Yet materials are
rarely taken as legitimate or appropriate objects of study in architectural history. The relative rareness of such studies can no doubt be explained by the methodological difficulties historians encounter with these topics. Unlike most monographic or thematic studies, where the object of investigation can be pragmatically circumscribed, the architectural history of a material opens up endless questions about the real subject of the inquiry. And while materials are sometimes given a key role in the determination of architectural periods—like iron in nineteenth-century France—their status within historical narratives (wavering between neutral technical given and active protagonist) is usually ambiguous.

Unique among current research traditions is the case of French historiography. Over the last twenty years, many French scholars have concentrated on building materials as the common denominator of their work. Wood, brick, iron, reinforced concrete, glass—all have been the focus of research. Among these projects, a series of exhibitions on the materials of architecture organized by the Pavillon de l’Arsenal in Paris have attempted to make these topics more accessible to the public. Most notable of these more scholarly endeavors has been the research on reinforced concrete, a material that occupies a prominent place in most historical accounts of twentieth-century architecture. In the last decade, at least two major French studies have attempted to address the history of the material. The first is Cyrille Simonnet’s doctoral dissertation, “Matériaux et architecture. Le béton armé: origine, invention, esthétique,” a work completed in 1994 that still awaits publication. The second is Gwenael Delhumeau’s L’invention du béton armé. Hennebique 1890–1914, which derives from his dissertation completed in 1995, here under review.

In his introduction, Delhumeau writes: “Reinforced concrete is a peculiar object of study. The term is ambiguous for it designates at once a material and a construction process. Moreover, unlike stone, wood or metal, reinforced concrete is the product of invention” (17). Based on the combination of an iron armature and a mixture of cement and aggregates, reinforced concrete is indeed a very peculiar material. It is artificial rather than natural, composite rather than homogeneous, fabricated rather than found. This complexity raises the question of the material’s origin. Where does the history of reinforced concrete start? Is it with Louis Vicat’s invention of artificial cement (1818), François Coignet’s development of artificial stones (1850s), Joseph Monier’s patenting of flower boxes in reinforced cement (1867)? Is the origin of the new material derived from its primary substances—cement or concrete—or from the strategic assembly of its two main components—iron and concrete? Shifting away from the technical artifact toward its mode of production, Delhumeau proposes instead to locate the birth of reinforced concrete within the context that triggered its development: the building industry. According to this framework, it is with the emergence of the first “building systems,” a development that took place at the end of the nineteenth century, that reinforced concrete acquired its technical and linguistic identity.

L’invention du béton armé examines the development of reinforced concrete in France between 1890 and 1914, a crucial period in the modernization of architecture and construction. The main protagonist of the book is not the building material, however, but the character that masterminded its rise to fame: the entrepreneur François Hennebique (1842–1921). By the turn of the century, the Hennebique firm had become a world leader in the conception and construction of works in reinforced concrete. Placing Hennebique and his firm at the center of his investigation, Delhumeau constructs a historical narrative on the basis of a series of five thematic explorations: the “invention” of the building system; the development of the firm; the diffusion of the “product”; the relationship between architects and builders; and the development of technical regulations. Central to Delhumeau’s research is the Hennebique Archive, the single most important documentary collection for research on the history of reinforced concrete. Held by the Institut Français d’Architecture, the archive comprises more than 80,000 project files and 6,500 photographic prints, and contains documents as diverse as working drawings, calculation notes, memos, correspondence, and periodicals. It offers an exceptional resource for the study of the intricate relationship between the technical and the commercial aspects of the material’s development. The richness of the archive is reflected by the well-chosen drawings and photographs—especially the striking views of building sites—used to illustrate the book.

The first chapter devoted to the Hennebique system is indicative of the approach adopted throughout the book. Attentive to technical issues, Delhumeau examines the many steps that led to the submission of Hennebique’s first patent for a reinforced concrete beam in 1892. He explains that the basic innovative feature devised by Hennebique is the configuration of the beam’s armature: the asymmetrical disposition of the reinforcing bars and the special mode of attachment—the stirrups—that give the armature its particular configuration. Going beyond the mere analysis of the beam, however, Delhumeau brings into play the many facets related to the genesis of the system: the early experiments, the first applications, the sequence of patents, the debate on fireproofing, and the first promotional campaigns. The system itself was not limited to a single component, and it expanded rapidly into a series of constructional elements: beams, floors, posts, roofs. Yet as Delhumeau makes clear, the originality of the Hennebique system is to be found not in the elements themselves but in the commercial strategy that surrounded the development of the technology. Engaged in a heated competition with the steel industry, Hennebique used his unique “principle” to realize any structure or building type in reinforced concrete.

The depth of Delhumeau’s knowledge of documentary sources is revealed
in his chapter on the Hennebique organization. Having read all of the written sources in the archive—correspondence, reports, articles—Delhumeau carefully reconstructs the complex relationships between the firm's headquarters and the many participants in this industrial endeavor. He shows how Hennebique was not a conventional building firm, but a complex, sophisticated organization of production comprising a network of agents, concessionnaires, and entrepreneurs. While the main office was responsible for the design of all structures, the projects were executed and supervised by the concessionnaires and affiliated building firms, a system that proved central to the rapid expansion of the Hennebique firm throughout the world.

In the following chapters, Delhumeau further explores the diffusion of the Hennebique firm in the context of French building culture at the turn of the century. In chapter 3, he pays special attention to the origin and content of Le béton armé, a technical journal published by Hennebique that played a central role in the firm's commercial strategy. In chapter 4, he provides a detailed analysis of the dynamics between Hennebique and its competitors, such as the firms of Paul Cottencin, François Coignet, and Armand Considère. Finally, in chapter 5, Delhumeau examines the debates on the theory and regulation of reinforced concrete construction. With the adoption of government standards prescribed by a body of experts in 1906, reinforced concrete finally entered the public domain. These regulations brought an end to the domination of patented building systems within the market and transformed both the perception and use of reinforced concrete. It is during this period that reinforced concrete became, simply, a new "material."

Given the complexity of the Hennebique saga, with its many protagonists and its many subplots, the historian who embarks upon telling this story requires great narrative skills. It is here that Delhumeau's book reveals a few shortcomings. First among them are the many discrepancies between structure and content. While chapters and sections are well defined, their content does not always fit the titles chosen, leaving the impression that headings were superimposed on a meandering prose that needed a secondary framework to pull the narrative together. The second concerns issues of logic and clarity. Most frustrating in this regard is chapter 3. Entitled "Valorisation et diffusion," this chapter is rich in information about the way the "product" was promoted by means of publications, photographs, professional meetings, and the like. The author demonstrates the major role photography played in the promotion of the system, moving from "recording" events to "imaging" built projects. But the chronological shifts and jumps are such that the reader is left wondering about the structure and, ultimately, the logic of the argument. The third problem concerns the historical prose itself. While Delhumeau often attempts to recover the voices of the many protagonists through extensive citations, the reality effect is often achieved at the expense of the perspective that a more distant description of events would have provided, and leaves readers to make their own synthesis and interpretation.

With so much on the culture of construction, what about the culture of architecture? One of the stated aims of the book is to shed light on the building culture of what Delhumeau refers to as the "architects of eclecticism" at the turn of the century. The author does offer interesting insight into the strategic association between Hennebique and the architect Louis-Auguste Boileau, revealing the role Boileau played in the promotion of the building system. Yet except for a few circumscribed examples, the book only touches upon the issue of cross-fertilization between architectural and building cultures. The emergence of reinforced concrete at the end of the nineteenth century had a major impact on French architecture. Disrupting current doctrinal and stylistic discourses, it gave rise to unexpected arguments about the visibility and truth of materials. Conversely, architects were critical in defining the "nature" of the material. They were quick to respond to the challenge posed by the emergence of this new composite material, triggering debates on the character of reinforced concrete (monolithic, plastic, etc.) that continued well into the twentieth century. An exploration of this architectural dimension by Delhumeau would have enriched our understanding of the material as a multifaceted "invention." Despite these limitations, L'invention du béton armé is a major contribution to the history of reinforced concrete and the modernization of construction in turn-of-the-century France.

Directly addressing the issue of the relationship of materials to architecture, Le béton à Paris avoids most of the difficulties posed by historical narratives. Published to accompany an exhibition of the same title held at the Pavillon de l'Arsenal in March 1999, and fifth in a series of exhibitions related to a specific building material—after iron, brick, wood, and glass—Le béton à Paris furthers the mandate of the Pavillon to bring architecture closer to the general public. The book presents a series of projects in reinforced concrete realized in Paris during the twentieth century. The texts—brief historical summaries and personal reflections rather than scholarly essays—provide a timely update on the current state and perception of reinforced concrete architecture in France. Concerned by the negative aura associated with this material that still lingers in the French psyche, a reputation generated by the unpopularity of the "grands ensembles" (large housing complexes) built in the fifties and sixties, the authors highlight the rich contributions of concrete to the development of modern and contemporary architecture. They show that, given the many types, techniques, and textures of contemporary reinforced concrete (a variety revealed in the book's informative glossary), the material can no longer be treated in the singular. Evidence of the current trend toward exploration in the crafting of the material is the SAGP water treatment plant (1991–1998) by Jacques Ferrier and François Gruson.
What was architecture’s fate in the two decades after the end of World War II, and what led to revisions of early-twentieth-century Modernism? These two questions were addressed at a conference at the Graduate School of Design, Harvard University, in 1998, where the thirteen papers collected in *Anxious Modernisms* were originally presented. Claiming that historians have misrepresented the architecture of this period, this book sets about righting that picture with a new framework for understanding the relationship of postwar architecture to the Modern Movement. The editors argue that a focus on style must be replaced by attention to themes, and hence on how these themes emerged in the practices of architects such as Alison and Peter Smithson, the Italian Neo-realist, Richard Neutra, Eero Saarinen, Cedric Price, Paul Rudolph, Bernard Rudofsky, the Situationists, Jacob Bakema, the Japanese Metabolists, and the Atelier des bâisseurs (ATBAT).

Except for the Neo-realist in Italy, the editors assert that the architects examined here shared a desire to extend and renew rather than abandon the principles of Modernism, but they did so through engagement with key issues of the postwar period: the dominance of popular culture and mass communication in everyday life; a renewal of democratic freedom after years of totalitarianism; interest in primitivism and authenticity; attention to region and place; struggles over how to address architecture’s history; a shift in emphasis toward play and leisure (*homo ludens*); and an antiarchitectural approach as a rebellion against traditional practice. The thirteen essays are bracketed by an extensive editorial introduction outlining these themes and followed by a lengthy coda by Goldhagen, in which she offers an analysis of early Modernism and its relation to the two postwar decades under consideration.

In different ways, architects engaged one or more of these themes in the projects explored here. For example, the architects of the Hansaviertel in West Berlin aimed to propose a democratic alternative to the public housing of East Berlin’s Stalinallee. Francesca Rogier studies East-West design politics in this divided city, illustrating how Nazi-era planning principles (and even personnel) underlay the Hansaviertel, while the German Democratic Republic pointedly rejected Nazi-era planning, architectural monumentalism, and the modernism they associated with American imperialism. Especially striking is Rogier’s description of how the rhetoric played out—beyond the language of form—to construction methods, site choices, and even furnishings. When East Berlin authorities publicized volunteers picking through the rubble of the Stalinallee, at Hansaviertel, images were presented of the highest-technology equipment being used to clear the site, and in the new apartments abstract art and sleek modern furniture opposed the chandeliers and traditional furniture of the East.

Eero Saarinen’s designs for IBM’s facilities in Rochester, Minnesota, also attempted to express democratic freedom, to de-emphasize corporate hierarchy and focus on individual workers. But Reinhold Martin suggests that, whatever Saarinen’s objectives, the designs ended up complicitous with a corporate culture far less benign than the architect assumed. A poignant response to imprisonment under the Nazis was Jacob Bakema’s challenge to the Congrès Internationaux d’Architecture Moderne (CIAM) and the Modern Movement, documented in Cornelius Wagenaar’s essay. Bakema’s subsequent plans for the reconstruction of Rotterdam also aimed to enhance the liberation of the common man, a shift away from traditional elitist practice and especially from the oppressive housing estates toward a town planning that encouraged what Dutch historian Johan Huizinga termed *homo ludens*. Two apparently contradictory projects by the Smithsons illustrate ways of achieving freedom and authenticity as a challenge to the proposals of early Modernism. The sleek, high-technology imagery of the “House of the Future” (1956) seemed in open contrast with the woodsy “Patio and Pavilion” (1956), but Goldhagen demonstrates that, in both

Sarah Williams Goldhagen and Réjean Legault, editors

*Anxious Modernisms. Experimentation in Postwar Architectural Culture*