

BASICS

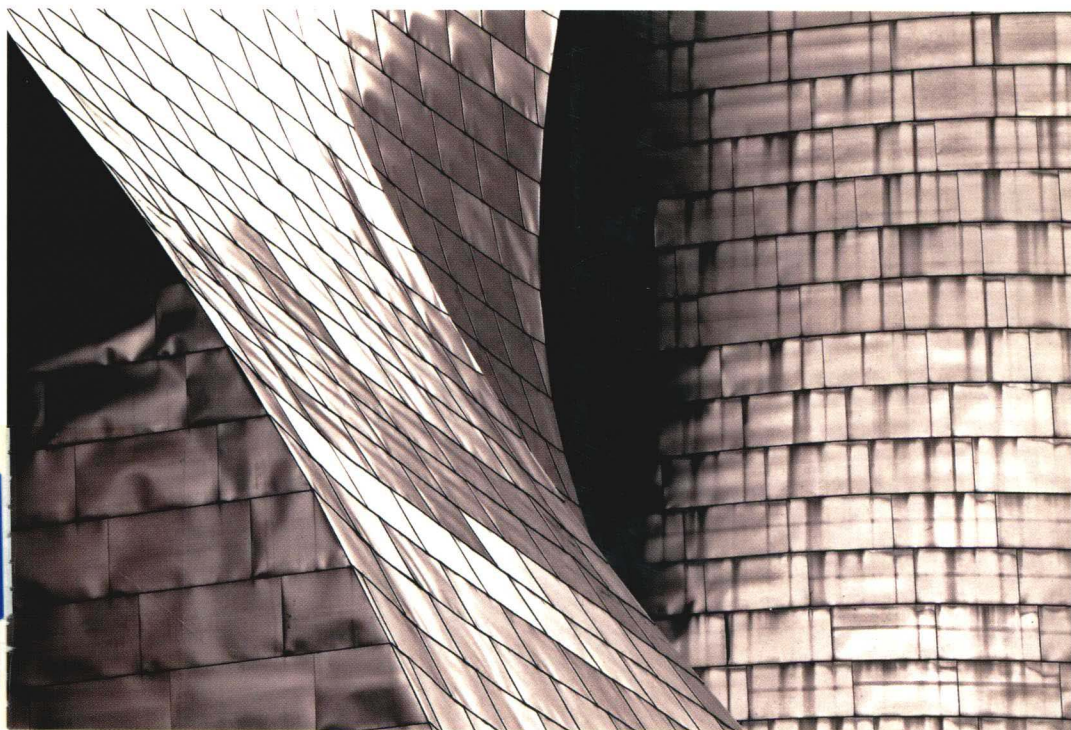
ARCHITECTURE

Lorraine Farrelly

construction + materiality

n
the action or process
of constructing a building
or other structure

n
the matter from which
something is or can be made



BASICS

ARCHITECTURE

C2

Construction + Materiality

Lorraine Farrelly

An AVA Book

Published by AVA Publishing SA
Rue des Fontenailles 16
Case Postale
1000 Lausanne 6
Switzerland
Telephone: +41 786 005 109
Email: enquiries@avabooks.ch

Distributed by Thames & Hudson
(ex-North America)
181a High Holborn
London WC1V 7QX
United Kingdom
Telephone: +44 20 7845 5000
Fax: +44 20 7845 5055
Email: sales@thameshudson.co.uk
www.thamesandhudson.com

Distributed in the USA & Canada by:
Ingram Publisher Services Inc.
1 Ingram Blvd.
La Vergne, TN 37086
USA

Telephone: +1 866 400 5351
Fax: +1 800 838 1149
Email: customer.service@ingrampublisherservices.com

English Language Support Office
AVA Publishing (UK) Ltd.
Telephone: +44 1903 204 455
Email: enquiries@avabooks.ch

Copyright © AVA Publishing SA 2009

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without permission of the copyright holder.

ISBN 978-2-940373-83-3
and 2-940373-83-3

10 9 8 7 6 5 4 3 2 1

Design by Jane Harper

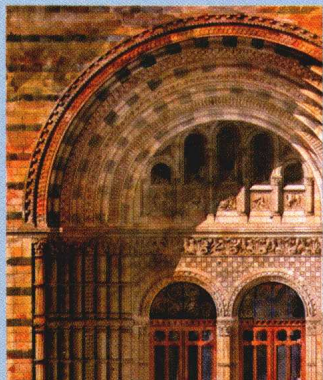
Production by AVA
Book Production Pte Ltd, Singapore
Telephone: +65 6334 8173
Fax: +65 6259 9830
Email: production@avabooks.com.sg

All reasonable attempts have been made to trace, clear and credit the copyright holders of the images reproduced in this book. However, if any credits have been inadvertently omitted, the publisher will endeavour to incorporate amendments in future editions.

Project: The Liquorish Bar
Location: London, UK
Architects: Nissen Adams
Date: 2006

The door of this venue is made from reclaimed timbers, which are set in a stainless steel frame. The surrounding wall is made from cast concrete and the building's number (123) has been set directly into the concrete façade.

- 6 Introduction
- 10 How to get the most out of this book



12 Brick and stone

- 14 Timeline: brick and stone
- 16 Origins and chronology
- 20 Cultural and material context
- 22 Application
- 26 Grand master: Antonio Gaudí
- 32 Woolf Architects | Brick Leaf House
- 36 Eric Parry Architects | 30 Finsbury Square



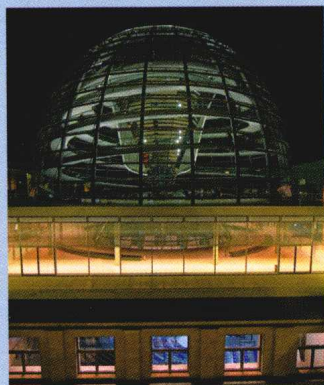
40 Concrete

- 42 Timeline: concrete
- 44 Origins and chronology
- 48 Cultural and material context
- 50 Application
- 54 Grand master: Tadao Ando
- 60 Zaha Hadid | The Central Building
- 64 Axel Schultes and Charlotte Frank |
Baumschulenweg Crematorium



68 Timber

- 70 Timeline: timber
- 72 Origins and chronology
- 76 Cultural and material context
- 78 Application
- 84 Grand master: Edward Cullinan
- 90 Sean Godsell | The Carter/Tucker House
- 94 Glenn Howells Architects | The Savill Building



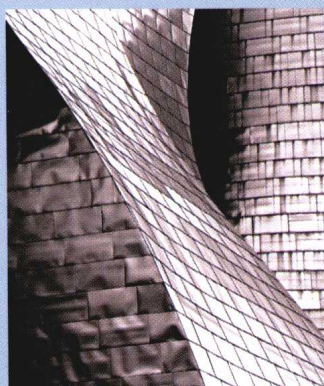
98 Glass and steel

- 100 Timeline: glass and steel
- 102 Origins and chronology
- 106 Cultural and material context
- 108 Application
- 112 Grand master: Ludwig Mies van der Rohe
- 118 Foster + Partners | The McLaren Technology Centre
- 122 Grimshaw Architects | Fundación Caixa Galicia



126 Composite materials

- 128 Timeline: composite materials
- 130 Origins and chronology
- 134 Cultural and material context
- 136 Application
- 138 Grand master: Charles Eames
- 144 Stanton Williams Architects | House of Fraser, Bristol
- 148 dRMM | The Kingsdale School



152 Innovation, sustainability and the future

- 154 Directions
- 156 Innovation
- 160 Sustainability
- 164 The future

- 168 Conclusion
- 170 Samples panel
- 174 Glossary and picture credits
- 176 Acknowledgements arttopbook.com

BASICS

ARCHITECTURE

C2

Construction + Materiality

Lorraine Farrelly

An AVA Book

Published by AVA Publishing SA
Rue des Fontenailles 16
Case Postale
1000 Lausanne 6
Switzerland
Telephone: +41 786 005 109
Email: enquiries@avabooks.ch

Distributed by Thames & Hudson
(ex-North America)
181a High Holborn
London WC1V 7QX
United Kingdom
Telephone: +44 20 7845 5000
Fax: +44 20 7845 5055
Email: sales@thameshudson.co.uk
www.thamesandhudson.com

Distributed in the USA & Canada by:
Ingram Publisher Services Inc.
1 Ingram Blvd.
La Vergne, TN 37086
USA

Telephone: +1 866 400 5351
Fax: +1 800 838 1149
Email: customer.service@ingrampublisherservices.com

English Language Support Office
AVA Publishing (UK) Ltd.
Telephone: +44 1903 204 455
Email: enquiries@avabooks.ch

Copyright © AVA Publishing SA 2009

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without permission of the copyright holder.

ISBN 978-2-940373-83-3
and 2-940373-83-3

10 9 8 7 6 5 4 3 2 1

Design by Jane Harper

Production by AVA
Book Production Pte Ltd, Singapore
Telephone: +65 6334 8173
Fax: +65 6259 9830
Email: production@avabooks.com.sg

All reasonable attempts have been made to trace, clear and credit the copyright holders of the images reproduced in this book. However, if any credits have been inadvertently omitted, the publisher will endeavour to incorporate amendments in future editions.

Project: The Liquorish Bar
Location: London, UK
Architects: Nissen Adams
Date: 2006

The door of this venue is made from reclaimed timbers, which are set in a stainless steel frame. The surrounding wall is made from cast concrete and the building's number (123) has been set directly into the concrete façade.

123



- 6 Introduction
- 10 How to get the most out of this book



12 Brick and stone

- 14 Timeline: brick and stone
- 16 Origins and chronology
- 20 Cultural and material context
- 22 Application
- 26 Grand master: Antonio Gaudí
- 32 Woolf Architects | Brick Leaf House
- 36 Eric Parry Architects | 30 Finsbury Square



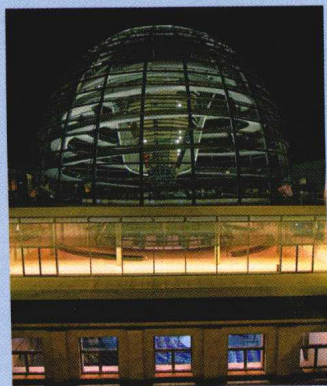
40 Concrete

- 42 Timeline: concrete
- 44 Origins and chronology
- 48 Cultural and material context
- 50 Application
- 54 Grand master: Tadao Ando
- 60 Zaha Hadid | The Central Building
- 64 Axel Schultes and Charlotte Frank |
Baumschulenweg Crematorium



68 Timber

- 70 Timeline: timber
- 72 Origins and chronology
- 76 Cultural and material context
- 78 Application
- 84 Grand master: Edward Cullinan
- 90 Sean Godsell | The Carter/Tucker House
- 94 Glenn Howells Architects | The Savill Building



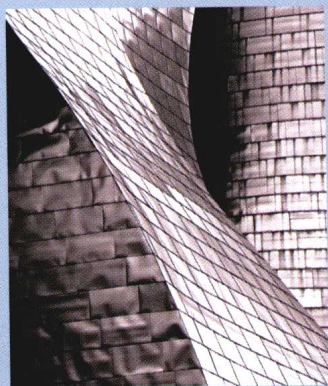
98 Glass and steel

- 100 Timeline: glass and steel
- 102 Origins and chronology
- 106 Cultural and material context
- 108 Application
- 112 Grand master: Ludwig Mies van der Rohe
- 118 Foster + Partners | The McLaren Technology Centre
- 122 Grimshaw Architects | Fundación Caixa Galicia



126 Composite materials

- 128 Timeline: composite materials
- 130 Origins and chronology
- 134 Cultural and material context
- 136 Application
- 138 Grand master: Charles Eames
- 144 Stanton Williams Architects | House of Fraser, Bristol
- 148 dRMM | The Kingsdale School



152 Innovation, sustainability and the future

- 154 Directions
- 156 Innovation
- 160 Sustainability
- 164 The future

- 168 Conclusion
- 170 Samples panel
- 174 Glossary and picture credits
- 176 Acknowledgements

Materials create an ambience and provide texture or substance to architecture. To understand how to use materials effectively, a designer needs to have an understanding of precedent or how materials have been used historically and an awareness of innovations in material application. Both can provide a useful way to develop a range of design approaches.

Construction + Materiality introduces the ideas that 'make' architecture and the materials used to create and define spaces. The structure (or frame) that supports a building can be considered to be analogous to the skeleton of a body, and the materials that the structure holds in place akin to the tissue and skin that define a body's shape and specificity. In this way, construction techniques and materials are the starting point for architectural design; they create the possibilities for shape, form and space.

For an architect to use materials effectively, a sound understanding of construction methods and practices is essential. Construction methods and materials can be expressed in such a way that they immediately reveal the architectural idea behind a building. But not all architecture is 'true' and the idea of 'truth to materials' is an essential consideration when understanding architecture.

In architectural terms, to be 'true' is to be honest. A building that uses brick to construct a wall, which in turn supports a roof, is using materials honestly. A steel-framed building that incorporates a brick wall is not necessarily true to its materials because there is a sense of 'hiding' the building's real structure and creating an illusion of another sort of architecture. A building's structure does not always have to be obviously revealed: sometimes an architect may want to create a sense of illusion as part of his or her design idea (for example, to make a heavy material appear light by introducing a steel beam), but to make a concrete or steel framed building appear like a brick building conflicts with the idea of 'truth' to materials.

In addition to the concept of architectural 'truth', some materials are strongly connected to their place or origin. Stone, for example, belongs to the ground where it is found or quarried. Similarly, timber is a resource that is part of a natural landscape. Other materials, such as concrete and glass, are much less connected to the identity of a location

Project: Leslie L. Dan Pharmacy Building, University of Toronto
Location: Toronto, Canada
Architects: Foster + Partners with Moffat Kinoshita Architects
Dates: 2002–2006

This building has been carefully designed to sensitively respond to its immediate surroundings. Its main mass is elevated above a 20-metre, five-storey, colonnaded circulation space. Two coloured pods are suspended within this space, the larger of which houses a 60-seat lecture theatre and a reading room, with the other housing a smaller classroom and the faculty lounge.



or specific place. Instead, they are part of an industry that manufactures materials, using raw ingredients that can belong and be made anywhere.

Increasingly, contemporary designers are taking materials from different contexts and environments and applying them inventively in architecture. Materials from the world of product, fashion and furniture design are being considered for interior and exterior architectural applications. The standard convention of using traditional materials for building is changing as issues of cost and sustainability become ever more important. Thinking carefully about which materials to source and specify, how far they have travelled and whether they can be recycled or reused is the responsibility of the architect when designing a building or space.

An architect needs to understand the nature of materials and their possibilities and limitations before they can be used to create buildings and spaces. This book introduces traditional, manufactured and more contemporary materials. Each chapter describes a particular material (or materials) in terms of its historical development and in the context of its application. This is accompanied by a canon of work from a 'grand master' who has championed the development of an architecture associated with the material. Practical case studies from a range of contemporary architects will demonstrate the innovative use of materials at various scales. The final chapter of the book explores issues of sustainability, innovation and the future of materials and construction techniques.

As an architect, understanding the changing nature of materials is critical. To be aware of the range and properties of the materials at your disposal is to extend the possibility of your design potential.

'Let every material be true to itself... brick should appear as brick, wood as wood, iron as iron, each according to its own statistical laws.'

Gottfried Semper

Brick and stone

Stone is found or excavated from the ground and brick is moulded from the earth. These materials have weight and solidity that belongs to a place. This chapter looks at the use of stone and brick in architecture and explores their natural colour, texture and surface.

Concrete

Concrete has the potential to be moulded and shaped to create dynamic form and, with reinforcement, can span enormous distances and achieve great heights. This chapter explores the view that concrete is *the* flexible material of the twenty-first century.

Timber

This chapter explores the many architectural possibilities that timber offers. There are many ways to apply timber because it is easily worked, its aesthetic variable depending on the nature of the wood's grain.

Glass and steel

Individually these materials are used in a range of different design contexts. In architecture, they allow a space to be light and a structure to be elegant. This chapter highlights the ways in which steel and glass have the potential to create an architecture that is both beautiful and subtly engineered.

Composite materials

These materials can be created and manufactured from a series of processes. The origin of a composite material may be natural but it can be further modified or engineered to create a material that has new possibilities, both structurally and in terms of its application.

Innovation, sustainability and the future

Manufacturing and technological advances present new possibilities for materials in architecture. This chapter looks at how these ideas suggest an exciting future for architecture.

This book introduces different aspects of construction and materiality in architecture via dedicated chapters for each topic. Each chapter provides examples of different construction techniques and materials at various stages of the architectural design process. The examples shown here are contributions from a range of contemporary architects and, together with detailed analysis in the text, form a book that offers a unique insight into the practical and professional world of architectural design.

Captions
Provide contextual information about each featured project and highlight the practical application of key principles.

Section headings
Each chapter unit has a clear heading to allow readers to quickly locate an area of interest.

Cultural and material context

Topography
Topography is concerned with local relief in general, including not only water but also vegetation and human-made features, and even local history and culture. This meaning is less common in English, where topography is made with absolute context, but made "topography" synonymous with relief. The latter series of topography is the study of place and has been in Europe.

Concrete and the era of Modernism
The prominent Modernists of the early 20th century, notably Le Corbusier and Auguste Perret, exploited the flexibility of concrete to create new forms and shapes. They designed cities for the future that contained strong, bold and tall structures all made from concrete.

Concrete

Project: Chapel Notre Dame du Haut (right)
Location: Ronchamp, France
Architect: Le Corbusier
Date: 1954

Le Corbusier's Chapel Notre Dame du Haut at Ronchamp uses concrete to create a dramatic and sculptural form on both the exterior and interior spaces. The building is punctuated with holes, filled with coloured glass, and these bring light into the chapel illuminating the interior space. The building appears as a sculptural element in the natural landscape.

Title: Ciudad de las Artes y las Ciencias (facing page)
Location: Valencia, Spain
Architect: Santiago Calatrava
Date: 2001

The Ciudad de las Artes y las Ciencias is an urban cultural centre. It reacts to the local environment and uses white concrete to contrast with the blue Spanish seas. The concrete is used with local life to connect the form with traditional industries.

Continuing this tradition, Brazilian architect Oscar Niemeyer uses concrete in his designs to respond to organic forms in the landscape. Niemeyer extends the landscape and topography with his architectural ideas, producing dramatic shapes on rolling planes or landscapes that are made from carpets of concrete.

In South America, Luis Barragán introduced colour to his architecture to connect his building designs and materials with the traditional colours found in the landscape and culture of the region. Barragán's architecture has been described as similar to an abstract painting with wall surfaces coloured to contrast against one another and sharp coloured walls framing views across landscapes. His architecture is about the surface experience, walls that are rendered in cement and then painted, to create abstract planes.

Contemporary 21st century architecture uses concrete to create ever taller, more dramatic statements. Daniel Libeskind, for example, specified the use of concrete in his designs for Berlin's Jewish Museum to dramatise and accentuate the Jewish experience in wartime Germany, producing both a provocative and commemorative result (see page 40).

Concrete is the substance of our new buildings, our greatest edifices and our skyscrapers, and it will challenge the future of architectural forms. Yet even so, the adaptation of concrete to respond to local cultural and climatic issues is essential for its survival.

48 | 49

Cultural and material context

Information panels
Provide additional information about technical terms that are used in the body text.

Introductions
Each unit's introduction appears in bold text and outlines the concepts that are to be discussed.

Chapter navigation
Highlights the current chapter unit and lists the previous and following units.

