# Table of Contents

## Section 1: Fundamental Aspects of Self-Consolidating Concrete

The Holistic Approach to Self-Consolidating Concrete ................................................................. 9
   K.H. Khayat and J.A. Daczkko

Impact of Production and Proportioning on Microstructure and Properties of Self-Consolidating Concrete ................................................................................................................................. 15
   K.A. MacDonald and M.R. Lukkarila

Pore Structure of Self-Compacting Concrete ...................................................................................... 21
   V. Boel, K. Audenaert, and G. De Schutter

Simulation of SCC Flow .................................................................................................................... 27
   N. Martys and C.F. Ferraris

A Fundamental Look at Settlement in Fresh Systems: Role of Mixing Time and High Range Water Reducers ................................................................................................................................. 31
   H. Kayir and J. Weiss

Relationships Between the Fresh Properties of SCC and Its Mortar Component .......................... 37
   J. Jin and P.L. Domone

Role of Fly Ash and Naphthalene Sulfonate Superplasticizer on Fluidity of Paste ......................... 43
   P. Termkhajornkiti, T. Nawa, and H. Ohnuma

Rheology of Cement Pastes Using Various Accessories ................................................................. 49
   M.A. Rahman and M. Nehdi

Importance of Aggregate Packing Density on Workability of Self-Consolidating Concrete .............. 55
   K.H. Khayat, C. Hu, and J.M. Laye

## Section 2: Mix Design

Mix Design Model for Self-Compacting Concrete ............................................................................ 63
   P. Billberg

A New Approach in Mix Design of Self-Consolidating Concrete ..................................................... 69
   V.K. Bui, S.P. Shah, and Y. Akkaya

Development of Self-Consolidating Concrete with Low Binder Content and Minerals Additives .......... 75
   A. Ghezal, K.H. Khayat, and D. Beaupré

Determination of the Optimum Water Content of SCC Mixes ......................................................... 81
   I. Marquardt, U. Diederichs, and J. Vala

Design of Self-Leveling Concrete .................................................................................................... 89
   J. Ambroise and J. Péra

Self-Consolidating Concrete: Design and Performance ................................................................. 95
   C. Carbó, F. Luco, S. Moreno, and R. Torrent

Self-Compacting Concrete, on the Search and Finding of an Optimized Design ............................ 101
   N. Perez, G. Hermida, H. Romero, and G. Cuellar

Concrete Mixture Proportioning Based on Rheological Approach .................................................. 109
   T. Roshavelov

The Property of Self-Consolidating Concrete Designed by Densified Mixture Design Algorithm .......... 115
   C.L. Hwang and Y.Y. Chen
Application of Minimum Paste Volume Method in Designing Cost-Effective Self-Consolidating Concrete - An Experience in New Zealand .................................................121
V.K. Bui

Self-Compacting Polymer-Modified Concrete ..............................................................................................................127
H. Geymayer, D.W. Fowler, and T. Altendorfer

Section 3: Materials, Admixtures, and Economics

Economic Impact of Self-Consolidating Concrete (SCC) in Ready-Mixed Concrete ..................................................131
T. Schlagbaum

The Role of Innovative Chemical Admixtures in Producing Self-Consolidating Concrete .............................................137
M.A. Bury and B.J. Christensen

Evaluation of the Biopolymer, Diutan Gum, for Use in Self-Compacting Concrete .......................................................141
A. Phyfferoen, H. Monty, B. Skaggs, N. Sakata, S. Yanai, and M. Yoshizaki

Economic Impact of SCC in Precast Applications ...........................................................................................................147
D.J. Martin

Effect of High-Range Water Reducer-Viscosity Enhancing Admixture Combination on Rheological Properties of Concrete Equivalent Mortar ...........................................................................................................153
A. Ghezal, K.H. Khayat, and D. Beaupré

Development of SCC with Focus on Low Cost ....................................................................................................................159
T.A. Hammer, S. Smeplass, K. Johansen, and T. Fredvik

The Effective Use of Superplasticizers and Viscosity-Modifying Agents in Self-Consolidating Concrete ..........................................................165
N.S. Berke, C.R. Cornman, A.A. Jeknavorian, G.F. Knight, and O. Wallevik

Not All Applications Are Created Equal; Selecting the Appropriate SCC Performance Targets ..................................171
D. Constantiner and J.A. Daczko

Opportunities and Challenges for SCC in Highway Structures .........................................................................................177
J.I. Mullarky and S. Vanikar

Reinforced Self-Consolidating Concrete Structural Frames ...............................................................................................181
A. Said and M. Nehdi

R. Szecs, S. Kaufman, D. Henson, and T. Abbott

Construction and Performance of Composite Self-Consolidating Concrete Piles Confined in FRP Tubes .................................................................191
M. Sakr, M. Nehdi, and M-H. El Naggar

The Optimization of Self-Consolidating Concrete ...........................................................................................................197
M. Shonaka, H. Yanamuro, D. Hamada, and T. Mizunuma

Stability Optimization and Performance of Self-Consolidating Concrete Made with Fly Ash .................................................203
K.H. Khayat, D. Lovric, K. Obla, and R. Hill

The Application of Self-Compacting Concrete in Germany under Special Consideration of Rheological Aspects .................................................................211
W. Bramshuber and S. Uebachs

The Benefits of Utilizing Fly Ash in Producing Self-Consolidating Concrete (SCC) ...............................................................217
R. Shadle and S. Somerville
Section 4: Testing and Placement

Stability of Self-Consolidating Concrete, Assumed or Ensured? .................................................................223
J.A. Daczko

Testing-SCC ...............................................................................................................................................229
O. Petersson, J. Gibbs, and P. Bartos

Study of the Flow of Self-Compacting Concretes - “L-Box Test” ..............................................................235
S. Aggoun, A. Kheirbek, E. H. Kadri, and R. Duval

Repairing Concrete with Self-Compacting Concrete: Testing Methodology Assessment ..........................241
L. Courard, A. Darimont, X. Willem, C. Geers, and R. Degeimbre

A Quality Assurance System of SCC in Taiwan .........................................................................................249
L.-S. Li and C.-L. Hwang

Methods and Techniques for Placing Self-Consolidating Concrete - an Overview of Field Experiences in North American Applications .................................................................253
M.A. Bury and E. Bühler

Evaluation of Self-Consolidating Concrete - Summary Report .....................................................................259
J.J. Hughes

Variations of Formwork Pressure of Self-Consolidating Concrete - Effect of Section Width and Casting Rate ..........................................................................................................................267
K.H. Khayat, J. Assad, and H. Mesbah

Evaluation of Deformability of Different Types of Self-Consolidating Concrete ........................................273
A. Yahia, M. Tanimura, and Y. Shimoyama

Rapid Methods for Testing Quality of Fresh Self-Consolidating Concrete ..................................................281
V.K. Bui and S.P. Shah

Digitized Slump Test System and Self-Consolidating Concrete ...................................................................287
K.H. Chen, T. Yen, and T.D. Lin

Methods for Characterization of Self-Compacting Concrete Thixotropy ....................................................295
P. Billberg

Section 5: Engineering Properties and Performance

Mechanical Properties, Plastic Shrinkage and Free Deformations of Self-Consolidating Concrete ............301
P. Turchy, A. Loukili, and K. Haidar

Creep, Shrinkage and Chloride Permeability Properties of Self-Consolidating Concrete ..........................307
K.P. Raghavan, B. Sivarama Sarma, and D. Chattopadhyay

Comparison of Two Design Approaches for Self-Consolidating Concrete ..................................................313
C. Shi, Y. Wu, Y. Shao, and M. Riefler

Chloride Transport and Related Microstructure of Self-Consolidating Concrete ......................................319
M. Westerholm, P. Skoglund, and J. Trägårdh

A Concept for Enhancing Early Strength Development in Self-Consolidating and Normal Concrete by Means of Increased Stability and Homogeneity ...............................................................325
U. Skarp, J. Engstrand, I. Jansson, and M. Reed

Engineering Properties of Self-Consolidating Concrete .............................................................................331
E.K. Attiogbe, H.T. See, and J.A. Daczko
Durability of Self-Compacting Concrete ................................................................. 337
  K. Audenaert, V. Boel, and G. De Schutter

Durability Consideration of Self-Consolidating Concrete ....................................... 343
  C.L. Hwang and M.F. Hung

Limestone Powder as Filler in Self-Compacting Concrete - Frost Resistance,
Compressive Strength and Chloride Diffusivity ......................................................... 349
  O. Petersson

Section 6: Case Studies and Application

Self-Compacting Concrete in the Netherlands ......................................................... 355
  J. Walraven

Self-Consolidating Concrete - Case Studies Show Benefits to Precast Concrete Producers .................. 361
  D.G. Hughes, G.F. Knight, and E.F. Mansky

Self-Consolidating Concrete Solves Challenging Placement Problems at the Pearson
International Airport in Toronto, Canada ................................................................. 367
  M. Lessard, C. Talbot, W.S. Phelan, and D. Baker

Self-Consolidating Concrete: Key Learnings and Their Effects on Current Applications .................. 371
  M.W. Danzinger and K. Saitoh

U.S. Regulatory Work on SCC .................................................................................. 377
  M. Vachon and J. Daczko

Design and Use of Self-Consolidating Concrete ......................................................... 381
  D. Hollingsworth

High Performance Self-Compacting Concretes for Bridge Construction ...................... 385
  F. Dehn

Self-Consolidating Concrete in Argentina: Development Program and Applications .................. 389
  G. Fornasier, P. Giovambattista, and L. Zitzer

The Use of SCC in the Sodra Lanken Project ............................................................ 395
  T. Osterberg

The Use of a Natural Pozzolan to Enhance the Properties of Self-Consolidating Concrete ................. 401
  P. Ramsburg and R.E. Neal

Self-Compacting Concrete for Light-Weight Slabs .................................................... 407
  Y. Akkaya, A. Ilki, M.A. Tasdemir, and N. Kumbasar

A SCC Application with Eccentric Sand ..................................................................... 415
  M. Vachon, D. Kaplan, and A. Fellaki

Performance of Self-Consolidating Concrete Used to Repair Parapet Wall in Montreal ................. 419
  K.H. Kayat and R. Morin