

Table of Contents

Preface

Chapter 1: Bamboo and Wood

Bamboo Mast for Lightweight Architecture L.E. Moreira, F.J. da Silva and F.C. Rodrigues	3
Analysis of the Fiber Density in Bamboo <i>Guadua angustifolia</i> Kunth by Extended Field Microscopy and High Resolution Images Processing E. Torres, A. Plata, G. Díaz-Ramírez and C. Takeuchi	10
Determination of the Delamination Percentage of Compacted Bamboo <i>Guadua</i> Using Extended Field Digital Images Processing E. Torres, P. Luna and C. Takeuchi	15
Environmental Savings Potential from the Use of Bahareque (Mortar Cement Plastered Bamboo) in Switzerland E. Zea Escamilla, G. Habert and L.F. Lopez Muñoz	21
Introducing Bamboo in the Education of the Building Engineer G. Steenput	34
Mechanical Behavior of Bamboo Species <i>Guadua angustifolia</i> under Compression along the Thickness of the Culm G. Orozco, L. Villegas and J.J. García	49
Mechanical Behavior of Glued Laminated Pressed Bamboo <i>Guadua</i> Using Different Adhesives and Environmental Conditions P. Luna, C. Takeuchi and E. Córdón	57
New Approaches to Bond between Bamboo and Concrete A. Azadeh and H.H. Kazemi	69
The Bubble Hall: Bamboo Reticular Geodesic Structure with the Shape of a Soap Bubble J.V. Correia de Melo, L.A. Ripper, J.L.M. Ripper and W. dos Santos Teixeira Filho	78
The Importance of Shear in the Deflection of Bamboo Beams M.F. García-Aladín, H. García, J.M. Mosquera and J.J. García	87
Analysis of Wood Laminated Beams Reinforced with Sisal Fibres N.T. Mascia, R.M. Mayer and R.W. Moraes	97
Connection Efficiency of Wood-Concrete Structural Floor System R.A. Sá Ribeiro and M.G. Sá Ribeiro	105
Elastic Properties of Thermo-Hydro-Mechanically Modified Bamboo (<i>Guadua angustifolia</i> Kunth) Measured in Tension H.F. Archila-Santos, M.P. Ansell and P. Walker	111

Chapter 2: Earthen Materials and Constructions

Building with Earth - Brazil's Most Popular Raw Earth Building Techniques and the Opinion of Experienced Builders C.A. dos Santos, L.I. Librelotto and C. Jacintho	123
Comparing the Environmental Impact of Stabilisers for Unfired Earth Construction D. Maskell, A. Heath and P. Walker	132
Evaluation of Physical Properties of Adobe Chemically Stabilized with Synthetic Termite Saliva A.A.R. Corrêa, B.M.R. Guimarães, M.V. Scatolino, M.G. Duarte, T.A. Lopes and L.M. Mendes	144
Evaluation of Mechanical Properties of Adobe Chemically Stabilized with "Synthetic Termite Saliva" A.A.R. Corrêa, L. Bufalino, T. de Paula Protásio, M.X. Ribeiro, D. Wisky and L.M. Mendes	150
Fabric Reinforcement for Improved Toughness of Adobe Block Wall Systems H.M. Böttger and C. Ostertag	156

Feasibility Study of the Manufacturing Process of Soil-Cement Blocks for the Construction of Masonry Aiming to Eliminate the Settling Mortar Application L. Fay, P. Cooper, L.H. Lana and D.P. Souza	166
Geopolymer Stabilisation of Unfired Earth Masonry Units D. Maskell, A. Heath and P. Walker	175
Heritage Earth Construction and Hygrothermal Comfort: The Challenge of Rebuilding in Central Chile C.J. Whitman	186
Preliminary Evaluation of the Adoption of Machines for the Partial Mechanization of Adobe Production B.d.S. Joaquim and J.M.d.A. Lopes	196
Reinforcement of Adobe Constructions with Toad Rush Mesh M.T.L. Méndez, R.S. Mora and L.G. Sosaya del Carpio	208
Stabilization of Raw Earth through Alkaline Activation L. Santos de Oliveira, N.P. Barbosa, F.S. Santos and C.M. de Carvalho	215

Chapter 3: Cement, Mortar and Concrete

Effect of High Temperature on Properties of Bricks Using Granulated Blast-Furnace Slag as Aggregate Replacement H.A. El Nouhy	227
Effect of Milling Process for Rice Husk Ash on Mechanical Strength of Blended Portland Cement Mortars E.J. da Silva, M.L. Marques, A.R.B. Vasconcelos, J.L. Akasaki, M.M. Tashima and A.M. Pereira	240
Evaluation of Compatibility between Sugarcane Straw Particles and Portland Cement A.L. Beraldo, J. Payá and J.M. Monzó	250
Effect of Recycled Concrete Aggregates and Natural Pozzolana on Rheology of Self-Compacting Concrete S. Kenai, B. Menadi, A. Debbih and E.H. Kadri	256
Evaluation of Concrete Produced with Pebble from the Region of Tangará da Serra-MT K.P. Carvalho, A.C. Albuquerque and J.S. Costa	264
Evaluation of the Influence of Heavy Metals in the Hydration Process of Mortars through Electric Measurements C. Venâncio, J.C. Rocha and M. Cheriaf	271
Hardened Properties of Lime Based Mortars Produced from Kaolin Wastes A.F.N. de Azerêdo, A.M.P. Carneiro, G.A. de Azeredo and M. Sardela	282
Influence of Recycled Aggregate on the Rheological Behavior of Cement Mortar P.R.L. Lima, R.D. Toledo Filho and O.d.F.M. Gomes	297
Magnesium Oxysulfate Fibercement C.E.M. Gomes and G. Camarini	308
Pozzolanic Reaction Effects of Red Mud on Hygrothermal and Microstructural Properties of Cementitious Composites E.P. Manfroí, M. Cheriaf and J.C. Rocha	319
Alkaline Activation of Aluminum and Iron Rich Precursors K.C. Gomes, S.M. Torres, Z.E. da Silva, N. Perazzo Barbosa and M.R.F. Lima Filho	329
Study of Geopolymeric Binders of Fly Ash/Metakaolin Mixtures Cured at Room Temperature A.S. de Vargas, R.M. de Gutierrez and J. Castro-Gomes	338
Supercritical Carbonation of Lightweight Aggregate Containing Mortar: Thermal Behavior M.R.F. Lima Filho, S.M. Torres, L. Black, A. de Araújo Porto Vieira, R.M. Gomes and K.C. Gomes	345
The Influence of Fine Sand from Construction-Demolition Wastes (CDW) in the Mortar Properties L.F. Jochem, J.C. Rocha and M. Cheriaf	357
The Influence of the Fineness of Mineral Additions on Strength and Drying Shrinkage of Self-Compacting Mortars B. Menadi, S. Kenai, S. Hammat and J. Khatib	367

Use of Compaction Tests for Defining Process Mixtures Parameters to Concrete Blocks M.O. de Almeida, J.G.G. de Sousa and L.C. Lima	375
Use of Construction and Demolition Waste in Lateritic Concrete T.G. Cândido, Y. Coutinho and M.B. das Chagas Filho	386

Chapter 4: Standards, Guidelines and Policy Issues

Science and Technology Observatory for "NOCMAT" in Brazil: Role and Proposed Framework P. Ohayon, D.S. Barreiros and K. Ghavami	399
Standards Questions when Developing a New Market; The Lessons for Non Conventional Materials A. Mione	413

Chapter 5: Composites Reinforced with Vegetable Fibers

Effect of Sisal Fiber Hornification on the Fiber-Matrix Bonding Characteristics and Bending Behavior of Cement Based Composites S.R. Ferreira, P.R.L. Lima, F.A. Silva and R.D. Toledo Filho	421
Behavior of Sisal Fiber Mat Reinforced Alkaline Activated Metakaolin Matrix under Direct Flame G. de Sá Teles e Lima, S.M. Torres, K.C. Gomes, S.R. de Barros, A.F. Leal and M.R.F. Lima Filho	433
Inclusion of Lignocellulosic Fibers in Plastic Composites R.G. de Almeida Mesquita, G.H.D. Tonoli, R.F. Mendes, A.A. da Silva César, L. Bufalino and L.M. Mendes	442
NaOH Treatment Impact in the Dimensional Stability of Banana Pseudostem Particleboard Panels B.M.R. Guimarães, L. Bufalino, J.B. Guimarães Jr., R.F. Mendes, L.M. Mendes and G.H.D. Tonoli	447
New Process for Peanut Husks Panels: Incorporation of Castor Oil Polyurethane Adhesive and Different Particle Sizes M. Gatani, V. Granero, J.C. Medina, J. Fiorelli, J. Lerda, E. Sipowicz and J. Kreiker	452
Numerical-Experimental Assessment of the Arumã Fiber as Reinforcement to the Cementitious Matrix M. Gorett dos Santos Marques, J. de Almeida Melo Filho, J.C. Molina, R.D. Toledo Filho, R.P. de Vasconcelos and C. Calil Junior	460
The Influence of Fiber Treatment on the Mechanical Behavior of Jute Textile Reinforced Concrete M.E.A. Fidelis, F. de Andrade Silva and R.D. Toledo Filho	469
Thermal, Moisture and Energy Performance of a Hempcrete Test Structure in the Northern Prairie Climate of Manitoba, Canada K.J. Dick and J. Pinkos	475

Chapter 6: Structural Integrity and Durability

Durability of High Performance Concrete in an Aggressive Environment A. Merida, F. Kharchi and R. Chaid	485
Durability of Earth Stabilized Material R. Bahar, M. Benazzoug and S. Kenai	495
Structural Integrity Assessment of Precast Concrete Slabs Employing Conventional and Recycled Coarse Aggregates via Vibration Tests R.L. Pimentel, S.M. Torres, E.T. Ferreira and A.B. de Melo	504
The Influence of Blast Furnace Slag Content on Durability of High Performance Concrete A. Talah and F. Kharchi	514

Chapter 7: Advances in Research Methodologies and Material Testing

Main Evaluation Dimensions and Indicators for Non-Conventional Materials and Technologies - NOCMAT R&D Projects

P. Ohayon and K. Ghavami 523

Development and Experimental Analysis of Ceramic Bricks Panels for Structural Masonry Construction Systems

L.R. Delgado and G.F. Moita 535

Characterization of Physical, Mechanical and Fire Properties of Fiber Glass Composite due to Weight Fraction

E.H. Hasan, M. Helal, M.A. Nour and K.M. Shokry 547

Experimental Study of Concrete Class Influence on Cracks Spacing

O. Zorkane, F. Chalah, L. Chalah-Rezgui, A. Bali and M.N. Oudjit 558

Tensile and Flexural Strength of Untreated Woven Henequen-Glass Fabric Reinforced Epoxy Hybrid Composites

Á.M. de Jesús, J.M. Olivares Ramírez, J.L. Reyes-Araiza, A. Manzano-Ramírez, L.M. Apatiga Castro, U.A. Eleazar, R. Ramírez Jiménez and M. Arroyo Contreras 569

Surface Topographical Characterization of Concrete Protected by Coal Tar Using 3D Profilometry

C. Couto Ribeiro, J.D. da Silva Pinto, C.D. de Godoy, P. Bamberg and T. Starling 576

Chapter 8: Recycling of Industrial, Agricultural and Urban Waste

Experimental Study of Granular Rubber Waste Tire Reinforced Soil for Geotechnical Applications

G.G.D. Ramirez and M.D.T. Casagrande 585

Improvement of Residual Sugar Cane Bagasse Ash by Mechanical Grinding

F. Filho Primo, S.M. Torres, N. Perazzo Barbosa, M.d.A.M. Vivian and A. de Araújo Porto Vieira 597

An Opportunity for Environmental Conservation: Evaluation of Test Material for Construction of Artificial Reefs Modules Trainers Made of Ecological Concrete

M.A. Bedoya, J.I. Tobón, T. Correa Herrera and J.D. Correa Rendón 606

Building Components Made from Recycled Plastics

R. Gaggino and R.G. Arguello 615

Characterization of Ash Sludge from Wastewater Treatment Plants: Assessment for Construction Purposes

C.M. da Silveira Thiago Rosa, J.L.P. Melges, J. Payá, J.L. Akasaki, J.R.D. Marinho and D.S. Oliveira 628

Cement Artifact Produced with the Construction and Demolition Waste-CDW

M.H.S. Santos, A.C. Albuquerque and J.S. Costa 638

Light Cementitious Composites with Wastes from the Footwear Industry

C.P. Dantas, A.F. Leal, N.P. Barbosa and S.M. Torres 648

Mechanical Performance of Asphalt Mixtures with Natural Aggregates and Recycled Aggregates for Surface Course

V.d.C. Marques, B.O. de Queiroz, D.M. de Lacerda, A.M.d.A. Gouveia and R.A. de Melo 657

Particleboards with Agricultural Wastes: Sugar Cane Bagasse and Reforestation Wood

S.L. de Castro Junior, N. Garzón, D. Williams, F.L. Guesso, H. Savastano Junior, J.A. Rossignolo and J. Fiorelli 667

Performance of Natural Aggregates and Recycled Aggregates for Unbound Granular Pavement Layers

H.K.R. de Farias Pinto, S.R.H. de Assis and R.A. de Melo 677

Preliminary Studies on the use of Sugar Cane Bagasse Ash (SCBA) in the Manufacture of Alkali Activated Binders

V.N. Castaldelli, M.M. Tashima, J.L.P. Melges, J.L. Akasaki, J.M. Monzó, M.V. Borrachero, L. Soriano and J. Payá 689

Reuse of Waste Water-Based Paint

E.C. de Souza Tavares, T.T.N. Barbosa, J.N.d.O. Filho and C.G.R. Meneses 699

Use of Coffee Plant Stem in the Production of Conventional Particleboards A.A. da Silva César, L. Bufalino, L.B. de Macedo, R.G. de Almeida Mesquita, T. de Paula Protásio and L.M. Mendes	703
Spent FCC Catalyst for Preparing Alkali-Activated Binders: An Opportunity for a High-Degree Valorization M.M. Tashima, L. Soriano, J.L. Akasaki, V.N. Castaldelli, J.M. Monzó, J. Payá and M.V. Borrachero	709

Chapter 9: Affordable Housing Using Low Cost Energy Saving Materials

A Technological Analysis Applied to Existing Building Insulated with Straw A.R. Bertorello	719
Architect Werner Schmidt's Straw-Bale Construction A. Bocco	727
A Modular System for Vertical Sealing Panels of Paper Tube G. de Cássia Salado and E.P. Sichieri	739
Blocks for Performance of Masonry Using PET Bottle Seal: Thermal, Acoustic, and Mechanical and Evaluation L.S.V.B. Chagas, U.T. Bezerra and N.P. Barbosa	753
Sustainable School-Village M.G. Sá Ribeiro and R.A. Sá Ribeiro	768
Home for Elderly People Built by the Community with Structural Elements of Laminated Bamboo Guadua in a Rural Area of Colombia P. Luna and C. Takeuchi	773
The Impact of Mineral Fillers on the Mechanical and the Thermal Properties of Polyester K.M. Shokry	783
Pastes of Plaster with Latex of Euphorbia Tirucalli: Evaluation of Plasticity, Water Absorption, Compressive Strength and Durability J.C. do Amaral Nogueira, U.T. Bezerra and N.P. Barbosa	792
Re-Start from Straw M. Restagno, G.N. Ricci and A. Bocco	801