Notre Dame University-Lebanon
Department of Civil and Environmental Engineering

Presented By: Daniel-Kees Kandiel
• Notre Dame University-Louaize is a
• > Private Lebanese Non-profit Institution
• > Catholic Institution of Higher Education
• > American System of Education

Accreditations:
Competition Participations
Objective:
Develop an innovative concrete mixture, which will have the lowest possible environmental impact while maintaining optimal mechanical and durability performances.
• Team Members
  ➢ Daniel-Kees Kandiel
  ➢ Jeffrey Jabbour
  ➢ Serge Saade.

• Advisor
  • Zehil, Gerard-Philippe, Ph.D.
Lebanon is facing difficulties with solid waste management, in addition to high levels of pollution.

- Urge to participate in the remediation of our environment.
- Minimize pollution from a civil engineering point of view.
- Excellent learning experience.

Initiatives to participate:
Methodology

- Planning
  - Comparison of mixes and selection
    - Materials Performance
    - Standards for testing materials
    - Inputs for the LCA
  - Literature review
    - Local Environmental Inputs
    - Local Material Sources
    - Waste Management Plant (Ghosta)
    - Contact Suppliers
    - Site Investigations (rivers, landfills...)
- Data/Materials Collection
  - Lab Testing of Individual Components
    - Absorption, Specific Gravity
    - Sieve Analysis
    - Bulk Density, etc.
- Mix Design
  - ACI 211.1
- Confirmation Testing at ACTS
- Concrete testing results at 21 and 28 days
  - Compressive strength
  - Resistivity
- Casting Day 2 July
  - Accelerated Curing at 38 degrees
Results:
• Environmental impact reduction of 35%:
• No quarrying needed for aggregates (crushed to natural)
• Use of river pollutants as fillers (limestone powder)
• Reduction of cement content by 40% (High Production energy-Pollution)
Our Winning mix’s results:

- Compressive strength: 40.7 MPa
- Resistivity: 17 KOhm.cm
- Environmental impact reduction: 35%
• 32 groups participated from 11 different universities.
• Held on March 2018, event organized by ASCE.
• Our winning bridge weighed 444 grams, and was able to support up to 566 Kg at mid-span.
Thank you