



بسم الله الرحمن الرحيم

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بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى

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ملاحظات: لا يوجد





Cairo University

DESIGN OF GEOPOLYMER COMPOSITES FOR 3D PRINTING APPLICATIONS

By

Passant Ahmed Mohamed Mohamed Youssef

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
in
Structural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

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Title of Thesis:

Design of Geopolymer Composites for 3D Printing Application

Keywords:

Slag; Metakaolin; Geopolymer; 3D Printing; Additive Manufacturing

Summary:

The overall objective is to propose a design methodology for a geopolymer concrete mix that can be used in the 3D printing process. The effect of size and type of fine aggregate, type of binder (either slag or metakaolin) and ratio (slag: metakaolin) and quantity and proportion of alkali solution (NaOH: Sodium Hydroxide) was studied. Sodium silicate) on the specified setting time and mechanical strength development according to the technical specifications of the 3D printing machine and finally improving the workability, extrusion and open time to achieve the flowability, shape retention and buildability of geopolymer composites for 3D printing.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Passant Ahmed Mohamed Mohamed Youssef

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Dedication

To my mom

The reason of what I become today; who taught me to trust Allah and believe in myself. Your prayers always surround me and give me the strength to never give up. All the love and respect to you for your support.

To my dad's soul

For the living memory; although I didn't get the chance to live with you these moments, your presence is still felt in my heart and your character imprinted in my personality.

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