

**THE EFFECT OF BOND ON RETROFITTING USING NEW CONCRETE
LAYERS**

Final Project Report

As one of the requirements to receive bachelor degree
of Universitas Atma Jaya Yogyakarta

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PREFACE

The research is one of the requirements of fulfilling bachelor degree of Universitas Atma Jaya Yogyakarta. This research is finished under “3+2 Program” in Taiwan, where Universitas Atma Jaya Yogyakarta and National Cheng Kung University has an agreement and collaboration. The background of this research is to study and investigate the factors affecting the bond strength between concrete-to-concrete and the use of the mechanical connectors embedded in concrete for retrofitting process. This study is a literature review by reviewing 22 papers selected.

Chapter I of the report contains the introduction, research background, research motivation and scope and limitation. Chapter II is literature review about basic knowledge. Chapter III contains the methodology of the selected paper research. Chapter IV is the discussion of the factors affecting the bond strength and Chapter V is the discussion of the use of mechanical connectors. Chapter VI contains conclusion and suggestion of this study. Author realizes that this report is not perfect and thus author apologizes sincerely.

Tainan, July 5th 2020

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ABSTRACT

THE EFFECT OF BOND ON RETROFITTING USING NEW CONCRETE LAYERS, Willy, Student Number 161316472, the Year 2020, Field of Specialization Structural and Material Engineering, International Civil Engineering Program, Faculty of Engineering, Universitas Atma Jaya Yogyakarta.

The retrofitting process of the damaged structure members is needed in order to achieve the good performance of the structure members. One of the methods to do the retrofitting process is called jacketing technique. The common jacketing technique consists of concrete, steel, and FRP jacketing. Although those three types of jacketing give some benefits, there are also some drawback. The use of UHPC jacketing can be considered to overcome the drawback of those three-jacketing technique. In order to retrofit by using jacketing technique, the bond strength between the substrate concrete and overlay concrete must be well considered. The bond strength can be controlled by some parameters such as substrate surface condition, curing condition, mechanical connectors and the use of bonding agent. The best method for the parameters is exposing the aggregate and saturated condition, normal and water curing, higher concrete substrate strength and 28 days age of UHPC, and the use of bonding agent on the smooth surface and the absence of the bonding agent on the rough surface, respectively. Besides that, the use of mechanical connectors can be considered to improve the bond strength. Some consideration such as the diameter of connectors of 22 mm, the height of the connectors of 100 mm, UHPC thickness of 50 mm, and the use of fiber and longitudinal steel rebars are proven to enhance the bond strength and achieve the ductility demand. Furthermore, the parameters mentioned above are proven to enhance the bond strength at the interface between substrate concrete and overlay concrete.

Keywords: Concrete, Retrofitting, Bond Strength, Mechanical Connectors