



TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
PULCHOWK CAMPUS
DEPARTMENT OF CIVIL ENGINEERING
M.Sc. Program in Structural Engineering

THESIS NO.: SS00145

**BEHAVIOR ASSESSMENT OF LOCALLY MANUFACTURED
COUPLERS**

Suraj Rajak

April 2010



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COUPLERS**

A thesis
Submitted by

Suraj Rajak

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

**MASTER OF SCIENCE
IN
STRUCTURAL ENGINEERING**

April 2010

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This is to certify that the thesis entitled “**BEHAVIOR ASSESSMENT OF LOCALLY MANUFACTURED MECHANICAL COUPLERS**” being submitted by **Mr. Suraj Rajak** (Roll No. 064/MSS/114) in the partial fulfillment for the award of degree of Master of Science in Structural Engineering at Institute of Engineering, Tribhuvan University, Nepal is a record of bonafide works carried by him under my supervision and guidance. The thesis fulfills the requirement relating to the nature and the standard of the work for the award of M.Sc. in Structural Engineering.

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Date: 9th April 2010

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064/MSS/F/114

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ABSTRACT

Student: **Suraj Rajak Pradhan**

Supervisor: **Dr. Prajwal Lal**

Manufacturing, fabrication, and transportation limitations make it impossible to provide full length continuous bars in some reinforced concrete structures. In general, reinforcing bars are stocked by lengths of 12-18m. For that reason, and because it is often more convenient to work with shorter bar lengths, it is frequently necessary to splice bars in the field.

Proper splicing of reinforcing bars is crucial to the integrity of reinforced concrete. ACI Code states: “splices of reinforcement shall be made only as required or permitted on the design drawings, in the specifications, or as authorized by the engineer.” Great responsibility for design, specification, and performance of splices rests with the engineer who is familiar with the structural analysis and design stresses, probable construction conditions and final conditions of service can properly evaluate the variables to select the most efficient and economical splice method.

Lap splicing, which requires the overlapping of two parallel bars, has long been accepted as an effective, economical splicing method. In projects with smaller bar sizes such as $\phi 20\text{mm}$ or smaller, lap splices have performed well over the long run. Continuing research, more demanding designs in concrete, new materials and the development of hybrid concrete/steel design have forced designers to consider alternatives to lap splices such as welded splices or mechanical connectors. However the welded splices are found to be more expensive, time consuming and need more workmanship. So in this study, mechanical connector is explored as an alternative to the traditional splicing methods.

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LIST OF SYMBOLS

<u>SYMOBLS</u>	<u>DESCRIPTION</u>
ST11	First specimen of 16mmØ reinforced bar for tensile test
ST12	Second specimen of 16mmØ reinforced bar for tensile test
ST13	Third specimen of 16mmØ reinforced bar for tensile test
ST21	First specimen of 25mmØ reinforced bar for tensile test
ST22	Second specimen of 25mmØ reinforced bar for tensile test
ST23	Third specimen of 25mmØ reinforced bar for tensile test
ST31	First specimen of 32mmØ reinforced bar for tensile test
ST32	Second specimen of 32mmØ reinforced bar for tensile test
ST33	Third specimen of 32mmØ reinforced bar for tensile test
CT11	First specimen of Coupler used in 16mmØ bar for tensile test
CT12	Second specimen of Coupler used in 16mmØ bar for tensile test
CT13	Third specimen of Coupler used in 16mmØ bar for tensile test
CT14	Fourth specimen of Coupler used in 16mmØ bar for tensile test
CT15	Fifth specimen of Coupler used in 16mmØ bar for tensile test
CT16	Sixth specimen of Coupler used in 16mmØ bar for tensile test
CT21	First specimen of Coupler used in 25mmØ bar for tensile test
CT22	Second specimen of Coupler used in 25mmØ bar for tensile test
CT23	Third specimen of Coupler used in 25mmØ bar for tensile test

CT24	Fourth specimen of Coupler used in 25mmØ bar for tensile test
CT25	Third specimen of Coupler used in 25mmØ bar for tensile test
CT31	First specimen of Coupler used in 32mmØ bar for tensile test
CT32	Second specimen of Coupler used in 32mmØ bar for tensile test
CT33	Third specimen of Coupler used in 32mmØ bar for tensile test
CT34	Fourth specimen of Coupler used in 32mmØ bar for tensile test
CT35	Third specimen of Coupler used in 32mmØ bar for tensile test
LT111	First specimen of 16mmØ bar with 100mm lap length for tensile test
LT112	Second specimen of 16mmØ bar with 100mm lap length for tensile test
LT121	First specimen of 16mmØ bar with 200mm lap length for tensile test
LT122	Second specimen of 16mmØ bar with 200mm lap length for tensile test
LT131	First specimen of 16mmØ bar with 300mm lap length for tensile test
LT132	Second specimen of 16mmØ bar with 300mm lap length for tensile test
LT211	First specimen of 25mmØ bar with 100mm lap length for tensile test
LT212	Second specimen of 25mmØ bar with 100mm lap length for tensile test
LT221	First specimen of 25mmØ bar with 200mm lap length for tensile test
LT222	Second specimen of 25mmØ bar with 200mm lap length for tensile test
LT231	First specimen of 25mmØ bar with 300mm lap length for tensile test

LT311	First specimen of 32mmØ bar with 100mm lap length for tensile test
LT321	First specimen of 32mmØ bar with 200mm lap length for tensile test
LT331	First specimen of 32mmØ bar with 300mm lap length for tensile test
SC11	First specimen of 16mmØ reinforced bar for compression test
SC12	Second specimen of 16mmØ reinforced bar for compression test
SC13	Third specimen of 16mmØ reinforced bar for compression test
SC21	First specimen of 25mmØ reinforced bar for compression test
SC22	Second specimen of 25mmØ reinforced bar for compression test
SC23	Third specimen of 25mmØ reinforced bar for compression test
SC31	First specimen of 32mmØ reinforced bar for compression test
SC32	Second specimen of 32mmØ reinforced bar for compression test
SC33	Third specimen of 32mmØ reinforced bar for compression test
CC11	First specimen of Coupler used in 16mmØ bar for compression test
CC12	Second specimen of Coupler used in 16mmØ bar for compression test
CC13	Third specimen of Coupler used in 16mmØ bar for compression test
CC21	First specimen of Coupler used in 25mmØ bar for compression test
CC22	Second specimen of Coupler used in 25mmØ bar for compression test

CC23	Third specimen of Coupler used in 25mmØ bar for compression test
CC24	Fourth specimen of Coupler used in 25mmØ bar for compression test
CC25	Third specimen of Coupler used in 25mmØ bar for compression test
CC31	First specimen of Coupler used in 32mmØ bar for compression test
CC32	Second specimen of Coupler used in 32mmØ bar for compression test
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LC123	Second specimen of 16mmØ bar with 200mm lap length for compression test
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LC222	Second specimen of 25mmØ bar with 200mm lap length for compression test
LC231	First specimen of 25mmØ bar with 300mm lap length for compression test
LC232	Second specimen of 25mmØ bar with 300mm lap length for compression test
LT311	First specimen of 32mmØ bar with 100mm lap length for compression test
LT321	First specimen of 32mmØ bar with 200mm lap length for compression test
LT322	Second specimen of 32mmØ bar with 200mm lap length for compression test
LT331	First specimen of 32mmØ bar with 300mm lap length for compression test
LT332	Second specimen of 32mmØ bar with 300mm lap length for compression test