

# Use of Mathcad as a Teaching and Learning Tool for Reinforced Concrete Design of Footings

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**ABSTRACT:** Owing to their nature, numerous and complex equations are commonly used in the design of reinforced concrete structures. This is because of the nature of reinforced concrete design. Mathcad, which possesses efficient computation and presentation capabilities, holds strong potential as a teaching tool and learning aid for education and training. This article demonstrates the use of Mathcad to supplement and enhance traditional teaching and learning methods for reinforced concrete design. The article, which focuses on the topic of foundation design, demonstrates a Mathcad program for the design of combined footings and shows its impact as a teaching and learning tool. © 1999 John Wiley & Sons, Inc. *Comput Appl Eng Educ* 7: 146–154, 1999

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## INTRODUCTION

Designing reinforced concrete elements can be a tedious task for both students and instructors who face the problem of redesigning these elements a number of times to reach an optimum design. Commercial programs such as STAAD3, SAP90, and PCA are usually used by students and instructors to speed up the design process. However, these programs present a number of shortcomings as a teaching aid. First, the

programs are not able to teach concrete design procedures to students. Second, these programs usually do not provide an environment in which the student or designer can easily modify a design according to the desired constraints. We have had such experiences with our graduating students in their senior projects, in which they were faced with the design of simple reinforced concrete elements such as slabs, beams, and columns using these commercial programs. The students complained that these commercial programs were usually time-consuming and not flexible enough to suit their design requirements.

Mathcad (1995, MathSoft, Inc., Cambridge, MA) is an efficient learning environment for technical topics

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