

MAKING DESIGN DECISIONS USING CHOOSING BY ADVANTAGES

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ABSTRACT

Choosing By Advantages (CBA) is a sound system to make decisions using well-defined vocabulary to ensure clarity and transparency in the decision-making process. Making sound design decisions aids in successful implementation of set-based design. This paper explores the use of CBA to select a design for steel reinforcement, aka. rebar, in a beam-column joint. CBA, in conjunction with set-based design, allows the engineer to explicitly consider multiple design alternatives that meet various ‘must’ and ‘want’ criteria. The factors and criteria developed to evaluate the design alternatives reflect the values of the various project team members involved in rebar design and construction. Because decision-making *is* subjective, it is important to document *why* and *on what basis* decisions are made so they can be revisited at a later time on that project, should new considerations or facts become available, and on future projects. Decision-makers using CBA list the attributes and advantages (the beneficial difference between two alternatives) of each alternative and then assign a degree of importance to each advantage relative to the one that is least preferred. The example presented herein shows that team member values may conflict, but including all perspectives in the CBA table enriches the decision-making process and cultivates a shared understanding among project team members.

KEY WORDS

Choosing By Advantages, group decision making, set-based design, reinforced concrete design.

INTRODUCTION

When designing a reinforced concrete structure, beam-column joints may require extra attention, as they tend to be congested (i.e., rebar in the joint is very dense). As such, choosing rebar for beams and columns intersecting at a joint can be a challenging task. Structural engineers tend to design reinforcement for a beam separately from that for a column then check their compatibility. The American Concrete Institute (ACI) mandates compatibility checks, including development length for the beam rebar, area ratio of rebar compared to concrete in the joint, and rebar diameter requirements. However, ACI does not impose any constructability requirements, so code-compliant joints may be difficult to build. Rebar fabricators

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