

AASHTO Fracture Control Plan and Revisions to LRFD Fatigue Design Specifications

Introduction and Background

Primarily in response to failures during the late 1960's and 1970's, the material, design, fabrication, shop inspection, and in-service inspection requirements were improved for steel bridges in general. Special provisions for fracture critical members (FCM) were later implemented in 1978 mainly in reaction to bridge collapses. These requirements were successful in transforming the industry and the design of modern bridges, so that fatigue and fracture are very rare in bridges built in the last twenty to twenty five years (i.e., post 1980-1985).

However, with the introduction of high performance steel (HPS), the issue of minimum toughness has essentially been put to rest. Among other desirable properties, HPS possess exceptionally high CVN toughness, much greater than desired by many involved with the original development of the FCP. Furthermore, in the last two decades, the AASHTO fatigue design provisions have matured considerably and by utilizing details with high fatigue resistance and the appropriate AASHTO loading, steel bridges can be effectively designed as fatigue proof. NDT techniques have also improved considerably allowing more confidence related to the detection of flaws and discontinuities in welds.

These facts coupled with the properties of HPS suggests that the current FCP should be revisited and revised as appropriate to take advantage of the advancements in materials and design realized in the past two decades in order to increase the economy of steel bridges.

Based on the results of the above two tasks, a revised fracture control plan will be developed and submitted for review. The research team suggests the revised FCP be submitted to the appropriate AASHTO committees as well as to selected recognized leaders in the area of fatigue and fracture of steel bridges. It would also be prudent to obtain the input from some of those individuals involved in the original development of the present FCP. As a subtask to this research, the existing AASHTO LRFD fatigue design provisions will be thoroughly reviewed and modified as necessary.

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