

# Automated Pin-Dot Marking Effects on A709-Gr50 Steel Plate Fatigue Capacity

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## 1 Abstract

2           During fabrication of multi-piece steel assemblies, markings are often made on the steel  
3 surface to identify/track individual pieces or to provide reference for fabrication layout or later  
4 erection. Automated marking methods such as computer numerically controlled (CNC) pin-dot  
5 marking offer fabrication efficiencies; however, for marked steel sections subjected to frequent or  
6 repeated loading (i.e. bridge girders, machinery components, etc.) many code specifications  
7 require experimental testing to verify any marking effects on fatigue capacity. In this study, the  
8 effects of automated pin-dot markings on the fatigue capacity of A709-Gr50 steel plate are  
9 experimentally investigated from 13 specimens considering 2 marking frequencies (corresponding  
10 to marking speeds of 50in./min and 10in./min), 2 applied stress ranges (35ksi and 45ksi), and 2  
11 material orientations (both longitudinal and transverse plate rolling directions). Results from the  
12 13 high-cycle fatigue tests, along with other fatigue test results from the literature indicate that the  
13 surface markings from the automated marking systems have no effect on the fatigue capacity of  
14 A709-Gr50 plate. All marked specimens achieved higher fatigue capacities than would be  
15 expected for unmarked specimens meeting the AASHTO fatigue detail category ‘A’ designation.

16 **Keywords:** piece marking, automation, fatigue, A709-Gr50 steel

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