New Code Requirements for Crane Girder Design

This work discusses the issues structural engineers must address when considering the requirements of the current American Institute of Steel Construction steel design code. The correlation between the structural design issues and the structural deficiencies found in many crane runway girders with unsymmetrical crane girder cross-sections is also described.

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Since AIST *Technical Report 13* was last issued in 2003, the American National Standards Institute/American Institute of Steel Construction (ANSI/AISC) 360-10 steel design code has been revised twice. In 2005, the 13th edition of the AISC *Manual of Steel Construction,* which includes the Specification for Structural Steel Buildings, was published. In March 2011, the 14th edition of the AISC manual was issued. These newer AISC steel design codes contain significant updates that affect the design of crane girders, including updates in evaluation for fatigue. This paper discusses the issues structural engineers must address when considering the requirements of the current AISC steel design code, and describes the correlation between the structural design issues and the structural deficiencies found in many crane runway girders with unsymmetrical crane girder cross-sections.

2005 AISC Specification

The 2005 AISC specification integrated both the Allowable Strength Design (ASD) and Load and Resistance Factor Design (LRFD) Specifications into a single set of rules for the design of steel structures. The new specification unified the design standards with the most current knowledge and design practices that focus on strength rather than on stress. One notable change is that the term "Allowable Stress Design" in the 9th edition has been officially changed to "Allowable Strength Design."

For crane runway girder design, the section regarding plate girders found in the 9th edition of the code was eliminated. Section F12 was added to cover the design of unsymmetrical structural shapes such as built-up plate girders.

2010 AISC Specification

The 2010 AISC Specification is basically unchanged regarding the design of crane girders. However, since 2005, an interesting remark is found in Section H3.3 of the Code Commentary. This is the only area of the code where crane girders are mentioned. This section deals with "Non-HSS Members Subject to Torsion and Combined Stress." Crane girders are subject to torsion stress, and the authors concur with the AIST approach to torsional analysis of symmetric crane girders. However, Section H3.3 addresses built-up unsymmetrical crane girders. AISC refers to Design Guide 9 "Torsional Analysis of Structural Steel Members" for a complete discussion on torsional analysis of open shapes. One of the big challenges structural engineers