

- 5 What modification to the frame rafters should take place in the area of monorail supports?
- 6 Is it acceptable to splice both the crane rail and the girder at the same location? Explain why or why not.
- 7 Which AISC document should be followed in the design of crane girders?
- 8 Which type of crane of those discussed in this chapter interferes least with the metal building system?

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# CHAPTER 16

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## AVOIDING CONSTRUCTION PROBLEMS

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### 16.1 INTRODUCTION

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Any metal building system, no matter how well designed, may become a continuous source of problems if installed incorrectly. Erection of metal buildings is a specialized field in which the builder's success depends on years of experience with a particular system or manufacturer. There is no single perfect way to construct a metal building, as various manufacturers suggest slightly different methods of assembly, and erection techniques of various crews differ.

The objective of this chapter is not to guide design professionals, owners, and facility managers through every minute task of a construction process. Apart from being impractical in this context, it is simply unnecessary for those readers who visit the site only periodically. Instead, our aim is to give but a general idea about how construction of metal buildings should proceed and to describe some common "red flags" that signal trouble. Learning how to tell whether the builder follows good practice—and what the good practice is—is a valuable skill for anybody involved in construction of metal building systems.

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### 16.2 BEFORE STEEL ERECTION STARTS

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At this point, we continue the discussion about the preconstruction process that began in Chap. 9. By this time, we hope, all the required submittals such as a letter of design certification and the shop drawing approval set have already been reviewed, all colors selected, and the site prepared.

Naturally, some construction—foundations, for example—takes place prior to steel erection. A slab on grade, if used, may be placed either before or after the metal building assembly. In conventional construction the slab is normally built after the building is enclosed, but in some pre-engineered buildings the slab is placed first. Such buildings include those with tilt-up walls, where slab on grade is needed for wall casting, and those which rely on slab-cast ties for lateral resistance. Some topics of slab-on-grade construction are explored in Chap. 12.

However tight the project schedule might be, steel erection should not begin before the concrete foundations are sufficiently cured: "Green" concrete will not hold anchor bolts and may crack under construction loading. Ideally, concrete should be allowed to cure for 28 days, although in practice this period is often shortened to a week. If time is critical, high-early concrete that reaches the required strength in as little as 3 days can be used.

It might be of some interest to the owner and to the engineer of record to observe the process of delivery, unloading, and temporary storing of the metal building system; a general impression from this observation, favorable or not, will likely be confirmed during construction.

Manufacturers concerned with the quality of their systems do not deliver bundles of unmarked metal and let the builders sort through it all. In fact, some building codes, such as BOCA,<sup>1</sup> require