



Things To Know When Considering A Structural Mezzanine

By David Omastiak

Structural mezzanines are custom designed and built to fit a specific area. These mezzanines can be single or multi-level and are often installed inside manufacturing and processing plants, retail stores, office buildings, industrial plants, warehouses, distribution centers, institutions, universities, government facilities and more. A structural mezzanine adds a second or third level inside the facility and thereby doubles or triples the existing area. Typically, these mezzanines create new production, office, storage or assembly space, locker rooms, parts departments, stockrooms, cafeterias, company records storage and work platforms.

Structural mezzanines can be customized to fit around existing plant equipment, building columns and other obstructions. They can also incorporate wide spans, unique column spacing, and special cantilevering. These mezzanines are often integrated with conveyors, vertical lifts, rack, in-plant offices, shelving systems and other material handling products to help maximize existing cube as well as improve product flow. The final mezzanine design is always based on application requirements.

Careful consideration should be given to specific issues, prior to selecting a company to design and build your mezzanine. A thorough evaluation of your needs and the experience offered by the mezzanine manufacturer are critical. Following are other important issues to address before selecting a mezzanine company and during the design process:

1. Determine how you plan to use the mezzanine. One of the first things you want to look at is where the mezzanine is going to be located inside your facility. Is your ceiling height greater than 15 feet? Will the mezzanine be used for storage? In-plant offices? Equipment support? Or, will it be used for multiple applications? Will the mezzanine be tied into an existing production line or assembly process? Should future expansion be considered in the initial design?

2. Know your floor slab capacity. A typical slab is 6" with some temperature and shrinkage reinforcement. If you do not know your floor slab capacity, conduct a slab and soil analysis. Determine if the slab will support a structural mezzanine or if you need to add special footings. Application requirements will greatly affect the design and subsequent mezzanine column loads so it is critical to find out early if your slab will provide the necessary support. NOTE: Some mezzanine manufacturers will conduct a floor slab analysis for you prior to designing the mezzanine.

3. Make sure mezzanine column bases plates are sized appropriately. Mezzanine column base plates need to be sized appropriately relative to specific column loads and floor slab capacity. Be aware however, that with extremely high column loads or low floor slab capacity, even large base plates will not eliminate the need for concrete footings. For example, a 6" slab

cannot support a mezzanine with a 70,000 pound column load. In a case like that, column footings would be required no matter what size base plates are used.

4. Determine an acceptable column layout that works for you. The mezzanine manufacturer should recommend a column layout that meets your needs and will work on your slab. Bear-in-mind, a custom mezzanine should meet your needs exactly. Therefore, the column layout should accommodate upper level loads as well as provide the room you need on the lower (floor) level. Perhaps you have an existing manufacturing operation on the floor level that you do not want to change or interrupt – the column layout should accommodate this need. However, fewer columns mean higher column loads, and therefore an increased likelihood that you will need concrete footings. In the final analysis, the need for fewer columns should be weighed against the potential cost of new footings.

5. Do guardrails and stairs meet code? Mezzanines that are publicly accessible need to meet specific code requirements for stairways, stair extensions, and spacing of guardrails. If the mezzanine will be used strictly as a storage room, and it is not accessible to the public, then a different set of code requirements apply.

6. Which code is applicable for your building? IBC 2006, IBC 2003, or other? Make sure your mezzanine design meets all applicable building code requirements. This is a primary concern for West Coast states like California, Oregon, Washington, Utah, and Nevada where moderate to high Seismic Zone requirements come into play. A properly designed structural mezzanine should meet IBC codes, AISC & ASTM standards and OSHA requirements. NOTE: IBC (International Building Code) is now governing in most parts of the United States. If a mezzanine job is going to be permitted, it will most likely be subject to IBC requirements. If the mezzanine is not going to be permitted, many customers will be required to use OSHA code as a minimum requirement for items like stairs and railing.

7. Are all structural calculations prepared by a professional engineer? Building plan reviewers don't always evaluate the structural calculations of a mezzanine. However, your mezzanine should be designed by a licensed, professional engineer. The engineer should also provide all structural calculations and detailed drawings that show connection and framing details, column layouts, load factors, etc.

8. Is the mezzanine PE stamped? A professionally engineered and PE stamped mezzanine will ensure you of a structurally sound design. PE stamped drawings should specify the mezzanine layout, column placement, stair runs, gate locations, connections and all other details. All drawings and calculations should be stamped by a licensed professional engineer to assure you of total safety and structural integrity. This will also provide you with peace of mind that your mezzanine is safe and built to code. NOTE: Permit requirements for structures like these are becoming common in more and more states. While permits typically add time (and aggravation) to delivering the project, PE stamped drawings and calculations will in most cases expedite the permit approval process.

9. Submit the mezzanine calculation package to your building inspector. A complete mezzanine calculation package should be submitted to your building department. NOTE: Even if the mezzanine is stamped by the manufacturer, as the buyer/end-user, you want to be certain that the design you receive (from the mezzanine manufacturer) will, in fact, meet code and that it is structurally sound. Submit the mezzanine design information to your building inspector as a final check.

10. Have you obtained the proper permits? This will vary (depending on the area). However, remember that PE stamped mezzanine drawings will help to facilitate permit approval for you, your architect or general contractor.

11. What are the mezzanine capacity requirements? Think about what is going on top of the mezzanine and pass that information onto the mezzanine engineers so they can design it to meet the right code category or liability rating. Example: A mezzanine for light storage might have a load capacity of 125 PSF; heavy storage 250 PSF; whereas an equipment platform might only have a load rating of 60 PSF. A quality mezzanine company will help you determine the capacity you need.

12. Do mezzanine materials meet ASTM specifications? Make sure that all of the materials used to build the mezzanine meet ASTM specifications - including support columns, base plates, structural framing, joists, roof deck, and handrails.

13. Are mezzanine components powder coated? Powder coated components tend to be extremely durable and more visually attractive. Powder coat paints are also available in a variety of colors – this may be important if your mezzanine is grouped with other structures (storage rack, shelving, conveyors, carousels, etc.) inside your plant and/or accessed by customers (as in product showrooms).

14. Is the mezzanine over-designed or under-designed for your application? At times, an end user may contact a local steel fabrication shop to build a mezzanine. Often this results in an over-designed or under-designed mezzanine. An over-designed mezzanine will be more costly because more steel is used. An under-designed mezzanine could result in structural failure and a potential collapse. A properly engineered mezzanine will use as little steel as possible to get you the capacity that you need. The final design should maximize material efficiency for optimum strength, using the least amount of material to achieve the desired capacity.

15. Is It A Modular Mezzanine or Is It A Custom Structural Mezzanine? Structural mezzanines are substantially different from pre-designed, modular mezzanines. Modular mezzanines are prefabricated and sold in standard sizes or modules (i.e. 10 ft x 10 ft). In essence, the end user purchases a packaged mezzanine with predetermined dimensions and specifications. These mezzanine modules do not always fit the exact area or application load requirements. A module typically includes column uprights, framing, and a deck surface. Stairs, railing, gates, kick plate and other components are usually considered options or adders. Modular mezzanines are usually installed by the end user or a local contractor.

NOTE: Manufacturers of modular mezzanines rarely offer on-site field measurements, PE stamped drawings and extended warranties.

David Omastiak is a technical writer with over 25 years of experience in the material handling industry. He can be reached at omastiak@cedar.net