

Flooring Feature November 2007

RDA Projects is a specialist structural engineering company concentrating exclusively in the design, fabrication and installation of freestanding (and sometimes partially freestanding) mezzanine floors all over the UK and in Europe.

We have been established for nearly 11 years, but the three founding directors have worked in the mezzanine industry for over 75 years collectively and are regarded as being leaders in the industry by their peers. As a design practice we maintain £3 million professional Indemnity Insurance which is a measure of our technical expertise, bona fides and superior industry knowledge.

There are many issues relating to Health & Safety which affect mezzanine floors, both from the design and installation viewpoints.

When designing a mezzanine floor, in addition to the key operational requirements of the client, we must carefully consider all aspects of the whole process from design risk assessment to construction risk assessment and everything in between.

As RDA work extensively with many leading construction professionals, we probably have a unique understanding within the industry of the myriad health and safety demands that this working environment imposes. Most mezzanines must now be erected with the use of safety netting and with temporary edge protection to prevent falls from height, both for steelwork erectors and any other trades likely to be working on the mezzanine platform during construction.

Works must always comply with CDM regulations (Construction Design Management) plus a host of other safety regulations governing use of tools and equipment. All RDA mezzanines are installed to a carefully prepared and very precise Method Statement, supported by all kinds of risk assessments for every conceivable tool or apparatus to be used.

All operatives are highly trained and have training certificates for the use of high level access equipment such as fork lift trucks, Manitou trucks, scissors lifts, cherry-pickers, scaffolding and scaffold towers. All carry CSCS cards and PAT certificates for electrical tools etc. Plus all site teams must use personal protective gear at all times, including safety boots, helmets, goggles, gloves, harnesses and high visibility jackets.

So, these days, simply knowing how to design a mezzanine floor is only a tiny part of a very sophisticated process which becomes more complex with each passing year. This is why we actively encourage clients to look very carefully at the bona fides and resources of their mezzanine designers, as so much will hinge on these ancillary aspects of the process.

Many customers over-look these or simply do not know they are relevant to their project. Apart from the all-important safety aspects, complying with the regulations is a time-consuming and costly business that can seriously deplete a project budget, so early and full attention is the best safeguard.

Mezzanine floors have become increasingly popular in the last 20 years as a very cost-effective, rapid and simple way of maximising floor space in any suitable building. Provided around 5.0 metres of clear headroom is available at the lowest point and the unit does not have a basement, then a mezzanine is almost invariably possible.

Having said that, many mezzanines are far from simple and involve bespoke engineering of the highest calibre and specifications of the highest standard.

The retail sector has enjoyed a boom in mezzanine floor installations in the past five years, but the pace of development has slowed in recent months, owing to changes in Planning Regulations which has now severely restricted the expansion of out-of-centre retail space. Before May 2007 any mezzanine floor could be fairly easily installed without Planning Permission of any description. Now, any floor exceeding 200 square metres in area must by law obtain Planning Permission.

As you would expect this has both slowed and also limited new developments, though many clients continue to specify mezzanines and deal with the Planning issues as they arise, such are the recognised benefits of these floor installations.

The industrial and distribution sectors continue to enjoy steady growth with the value of the sector rising year on year. Many major distribution firms utilise mezzanines in multi-level arrangements for large picking, packing and despatch operations. And of course, the self storage industry are massive users of two and three level mezzanines for the most cost effective space creation in new storage sites.

As the trend for the development of basic, non-serviced small starter and industrial units persists, the installation of mezzanine floors for the creation of office space is a significant growth area. The speed and ease of build, plus the flexibility to change, extend or even remove a mezzanine at a later date, ensures that this demountable build solution is a real winner for many tenants and owners.

As clients move away from more traditional build methods, such as blockwork with timber joists and decking, plus timber and plasterboard studwork walls, the demand for full fit-out of offices and other commercial and industrial accommodation also expands.

A significant proportion of the office mezzanine floors we design at RDA also now include the full design and project management of a fit-out including partitions and suspended ceiling, lighting, electrics, IT and telephony etc.

And of course, as projects of this type grow in popularity, so more of them are large enough and complex enough to fall under the scope of the CDM regulations. So, even firms who consider themselves small users are finding that they must adopt and work with these onerous rules. This has the effect of driving clients towards specialist providers like RDA, who have all of the technical know-how, experience and understanding of the regulations to manage the projects involved.

We certainly hope that, medium-term, this will force up standards in the industry and raise awareness amongst clients of the need to pay far more than just lip-service to the critical issues of Health & Safety, project planning, cost control, construction management and quality of engineering.

Because mezzanines can offer such a huge degree of flexibility in design and use, there are actually very few situations where a mezzanine solution cannot be shown to be a viable alternative to a more traditional concrete floor, for example. RDA have on many occasions offered a mezzanine specification against a concrete-decked alternative and been able to show that this solution would satisfy the client's operation, quality and durability requirements, and save them money too.

Mezzanine floors are generally at their most attractive as a solution when the imposed loads of the columns can be sat directly onto the surface of the concrete slab in the building, without the need for foundations or other slab strengthening works. Hence, a certain range of design solutions are recognised as being “standard” in this regard.

As a rule of thumb, most modern (post 1980’s) industrial units can be expected to have a slab that is minimum 150mm thick single reinforced concrete on reasonable ground. The key with mezzanine designs of this “standard” category is the presence of good ground beneath the slab, as the support to the columns depends on the ground bearing pressure below the concrete.

As this type of slab will generally accept around 100 KN (or about 10 tonnes) directly imposed, it is common to see most mezzanines with column grid layouts that work within this constraint. So, for example, a normal industrial storage floor designed to accept 5.0 KN per square metre of mezzanine floor area (equivalent to 100 lbs per square foot) would tend to have a grid layout that was a multiple of 5.0 x 4.0 metres.

This produces 20 square metres of floor area supported over four column locations and this imposes around 100 KN to the slab. Of course, any variation of grid dimensions that resulted in 20 square metres of floor area would have the same effect and therefore the grid can be highly flexibility within these specific confines.

Though RDA install many floors that fall under the scope of “standard” design, we also design many extremely special and sophisticated structures which greatly exceed all of the above design parameters in every way.

Beam spans of up to 15.0 metres are not uncommon, with joists spans of 8.0 metres or more. With exceptionally high load capacity requirements as well, imposed loads can easily exceed 800 KN or more. In such circumstances either foundations or piling are required, though occasionally builders will actually engineer a new slab to specific extra depth and reinforcement to support such massive imposed loads.

This is rare except where extremely large structures are involved, as slab strengthening across the board is generally far more costly than localised strengthening via foundations or piles. RDA of course have the technical expertise in-house to advise on all such constructional issues.

Except where a client has a very individual or highly bespoke load capacity requirement, most mezzanines are designed in compliance with BS 5950 and/or the Building Regulations. There are categories of load capacity laid down to cover all uses from the most lightweight office accommodation to either liquids or paper storage at the upper end of performance.

And, naturally, there are also many issues concerning the use of materials handling equipment on mezzanines floors, many of which vastly supersede the uniform design load for simple storage. Such equipment can involve the imposition of wheel loads, dynamic moving loads, vibration, pounding and suspended services which eccentrically load the structure. As with all things technical, it pays to consult an expert who has the breadth of experience to ask the right questions in the first place!

There are many situations where a client may favour the idea of a mezzanine floor but is unsure how to proceed or does not wish to commit until all the facts and figures are known.

This is critically important where the acquisition of a new building is involved and is especially pertinent in tenant-leasing relationships. As a consequence, slab and load issues are always highly significant matters in retail developments, where the prospective unit occupant must know before they commit to a lease of a unit that their mezzanine aspirations can be fulfilled.

Fortunately, most modern units are designed by various professionals that are able to maintain detailed technical data on the building specification in their archives and this can be readily accessible on demand. Older units pose their own set of problems when it comes to historical data.

A range of different testing options is available to establish the nature of the slab in any unit. RDA tend to favour the ground bearing pressure test method as this is more definitive than more conventional core tests, but it does depend on the magnitude of the loads involved in the mezzanine design.

All mezzanine floors require Building Regulations Approval by law and part of this process is the provision and proving of structural calculations for the mezzanine floor design and the imposition of loads to the slab. This is why, when procuring a mezzanine floor, dealing with qualified structural engineers is a good idea, though not essential.

Any reputable mezzanine designer should be able to advise a client on the likely conditions of their slab, even if hard data is not available. And it is therefore normally possible to at least conceptually design a particular mezzanine solution and enable a client to source finance and other permissions and authorities etc, even if full details on the slab are not yet known.

It is only at the commitment to the contract stage, and prior to the actual commencement of construction, that the slab conditions must be established, in case these ultimately affect the final design. It is certainly not unusual for RDA to design solutions many weeks or even months before the nature of the slab is finally known.

Each client and their project requirements are unique, so a great degree of flexibility in service and advice is called for in the mezzanine industry. There is a perception that mezzanine floors are just like giant “Meccano” and that anyone can throw one up over a weekend. This myth is grossly misleading and needs to be dispelled once and for all, especially as Health & Safety issues impinge more and more on every aspects of industrial and commercial life and activity.

With the right advice and guidance and supported by qualified professionals, procuring a mezzanine floor can be straightforward and painless process producing brilliant results that should benefit the client for decades to come. But there are many pitfalls and one hears of numerous nightmare stories where people have come to serious grief, both technically and in terms of nasty site accidents and the like.

A mezzanine floor can provide simple, low-cost, flexible, fully demountable extra space at a fraction of the cost of more traditional build methods and in a fraction of the time. But it always pays to seek professional help. Nowhere is it more true that with mezzanines, you get what you pay for.

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