

WAFFLE MOULD FLOORS

Structural Engineers design floors that are two way spanning, that is reinforcing steel laid in two directions with coffers between to reduce the volume of concrete and therefore the self weight of the floor. By using this method of design they are normally able to achieve greater unsupported spans between beams and columns.

A great deal of research was carried out before the material to be used for manufacture was finally decided.

For many years in Europe, there had been available waffle moulds manufactured from Fibreglass (GRP), Steel, vacuum formed polyester, and other various materials. Generally this was in small production batches with no standardisation of sizes. It was not until December 1971 that the working party on standardization of the British Society first published its report on Waffle Floors and Trough Floors and arrived at a recommended standard range of modules and depth of slabs. This report is available in our web site in the download section.

At this time research had shown that if standard size Waffle Moulds were to be used then this would lend itself to the manufacture of Moulds by a semi-mass producing method. It was felt that plastic injection moulding would suit this purpose very well and the best material available for the product was felt to be Polypropylene.

This form of production meant that a mould could be easily handled by one man, that the material being very tough and resilient was able to withstand rough treatment on building sites. Also any damaged moulds could be easily repaired by a simple method of low temperature plastic welding even on site.

The method of injection moulding meant that the thickness of the material in the skin and the stiffness ribs of the mould could be very accurately controlled to produce a first class product. The use of polypropylene ensured the most flexible but resistant combination was used and with the additional of UV stabilisers and production in black material, the degradation by ultra violet light is reduced to minimum. In fact during the 27 years experience that we now have of this material it is known to us that the life of a mould can be well in excess of 100 uses, and in fact there are still some moulds in use that were produced some 20 years ago.

Today there still moulds produced in fibre glass (GRP) but compared with polypropylene the life is very limited. Continued use of GRP moulds roughens the surface, or gel coat, and this exposes the glass fibre embedded in the polyester. These fibres then become trapped in the concrete and surface finish of the concrete is affected, and this also leads to a deterioration of the mould itself. Experience shows that in excess of 10 or more uses the degradation of the GRP mould means few further uses can be obtained. Also as these moulds become damaged they are almost impossible to repair economically. For these reasons it is very rare for a company in the formwork hire business to hire out GRP moulds, but there are many companies hiring out Polypropylene moulds.

The advantages of using this type of design are listed below:

1. Many engineers favour in-situ construction slabs because they provide a composite or monolithic construction. That is the floor being integral with the frame so 'tying in' the structure.
2. The low self weight of the floor produces economies in columns and foundations. Generally, the deeper the floors the greater are the savings in materials.
3. The ability to raise long unsupported spans in modern buildings, allows partitions to be located with complete flexibility and without interfering with the usable floor area.
4. Low self weight of the floor makes the system particularly suited to high rise structures.
5. The waffle slab can be used on a wide range of buildings types. Hospitals, car parks, airport structures, industrial buildings and modern office blocks contain complex air conditioning and other services. The slender structural topping to the slab provides the facility to cater for openings to accept such services. This is a significant factor from a designer's point of view, both structurally and architecturally.
6. The finished floor provides an attractive visual feature and is often left exposed or perhaps painted or spray coated.
7. Often used in multi-storey car parks because of the attractive finish to the underside.
8. Generally used on any square or near square building with more than a ground floor, the units of reinforced concrete frame structures are most economically used when spanned in two directions for which the square column grid is most economical therefore two way spanning floors are the optimum solution for such structures.