Industrial Concrete Floors with Superplasticizers

In the first blog about concrete floors, we have described undesirable phenomena that can compromise the quality and durability of the work: cracking, curling, delamination and so on.
A well-done concrete floor has nice and smooth surface, without defects: this is the outcome of a complex and virtuous combination of actions, from design, to raw material sourcing, concrete mix definition, to execution; they all must match, in order to ensure high quality and not compromising time and cost efficient construction.

The use of chemical admixtures is essential to the achievement of the best result. As already mentioned in the previous blog article, it is always recommended to adopt a Flooring System, that is the most appropriate combination of different products, each one specialised in solving a single problem. In a holistic approach, this System can tackle all the problems that can arise when creating an industrial floor, besides permitting a good control of the system and a regular progress of the work at the jobsite.

The Flooring System typically comprises the following products:

- Superplasticizer
- Shrinkage control agents
- Fibers
- Curing agent

We will discuss here the role of the superplasticizer and highlight how the selection of the proper one is of paramount importance.

In all concrete types and applications, the superplasticizer is used with the main purpose to reduce the water/cement ratio so to ensure the achievement of the desired fluidity and at the same time the expected mechanical properties.

In the case of concrete floor application, the proper choice of the superplasticizer is even more strategic, as several criteria are of high importance here, that may not be that relevant in other applications. They are listed below:

- The concrete must be very stable and not prone to segregation. A limited stability could bring about bleeding on the surface or, even worst, a separation leading to non-homogeneous composition of the concrete across the thickness of the floor, which would compromise the quality.
- The workability of concrete should be maintained for the whole time needed to transport, pump and place the concrete. A concrete that has lost fluidity will become more difficult to pump and lay, thereby increasing the time needed for the operations, requiring higher efforts for the workers and ultimately impacting also the cost. Additionally, this reduced fluidity may turn into a reduced compaction degree, that means poorer quality of the structure itself. The retention of fluidity over time is particularly demanding in the hot season.
- The finishing time of the concrete is an extremely important factor: there is a proper time-window for the operation of helicoptering. The setting of concrete must be not too fast and not too slow, as both scenarios would be inadequate. If the concrete is too fast to set, which can occur particularly in the hot climate, there is no time enough for a proper finishing, all operations must be accelerated and this can become a source of mistakes; on the other side, if concrete is too slow to hydrate, which could occur primarily in winter, helicopter finishing has to be postponed, which may cause the floor not to be finished in time, with negative impact on the work schedule
- The rheology of concrete if of key importance: easy pumping, easy pouring and laying, besides increasing the ease of work and make more comfortable the workers experience, do also contribute to the achievement of the best surface finish.
- The content and quality of air in concrete must be fully under control. An excess of air, particularly when it is entrapped inside the. floor, represents a source of defects and can reduce the compressive strengths.

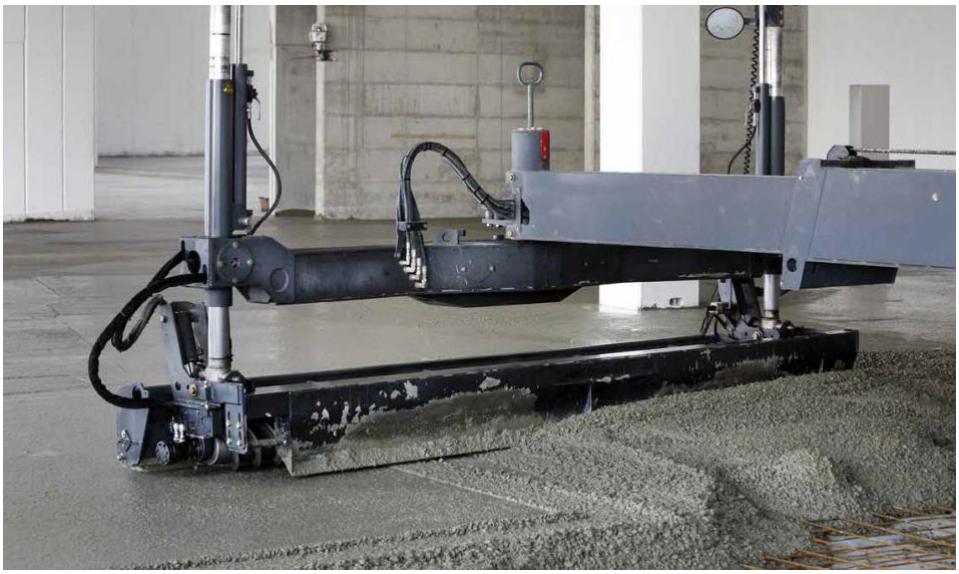
For the above-mentioned reasons, not every superplasticizer is suitable for the concrete utilized for the production of concrete floors. The proper one must be carefully selected, under the guidance of experts.

Master Builders Solutions offers superplasticizers that are specifically designed for their use in concrete destinated to floor applications; they offer the following benefits:

- improve the rheology of concrete, so as to allow better pumpability and superior ease of laying;
- Ensure a very stable concrete, without bleeding and segregation
- facilitate concrete compaction and strike-off operations;
- significantly reduce the helicoptering time of floors, especially in winter;
- increase the initial and final mechanical strengths;
- improve the durability of flooring

Winter and summer, or cold and hot climate, pose different challenges: in the first case the concrete must be accelerated, whereas in the summer it may be difficult to maintain good workability. We recommend to use different superplasticizers in the two cases.

The next article will be dedicated to shrinkage, a phenomenon that may be especially insidious and detrimental of the quality and durability of the concrete floor. The avoidance, or at least the minimization of shrinkage, require proper actions in the design as well as in the execution phase of the concrete floor, as we will see. Keep on following us!



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Master Builders Solutions creates technologies for the construction industry inspiring people to build better. We are active in 36 countries and operate 35 production sites with over 1,600 employees. We develop, produce, and market high-quality chemical admixtures, cement additives, underground technologies, and construction systems to master the challenges of today and tomorrow.

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