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Benefits of Polyurethane Cement in the Food Processing Industry.

Finding the right floor design and specification in food and beverage manufacturing facilities is a challenging job. To determine properly and accurately what is the best solution for your environment you should understand the difference between the alternate systems and their respective advantages and benefits. Equally important (or maybe more important) is to understand the relative disadvantages of each system.

You need to factor in criteria such as potential likelihood of high impact, overall traffic, potential chemical exposure and potential exposure to high or low temperature as well as thermal change. Other important considerations might include life expectancy, installation time frame and cost.

All of the above need to be addressed in the specification process to arrive at the most suitable floor for a given facility.



So, what are the alternative systems most often used in food and beverage facilities and what are their relative advantages, disadvantages and other features?

Tiles

Tiles have been used for many years in the food & beverage industry mainly due to the fact that industrial grade tiles are durable and impervious to water and stains when first installed. There are also many design options and they are easy to maintain. Tiles can also be relatively cheap, depending on the type and style chosen, although specialist tiles can be more expensive than other options.

There are, however, a number of issues with tiles. They are difficult and time consuming to install and are very hard underfoot, making it uncomfortable to stand on for long periods. Tiles are also colder than the alternatives and this can be difficult on your feet.

And, because tiles are so hard, they can get slippery very easily which is a major issue in any environment exposed to water or other liquids.

Additionally, exposure to constant water and chemicals causes normal grout to degrade and become porous. This allows the ingress of moisture or chemical into the cement screed the tile sits on and can harbour bacteria. Normal grout also degrades when exposed to some chemicals and animal fats (an exception is epoxy grout but this is expensive). This will lead to the subbase screed breaking down. The result is tiles de-bonding and creating a non-hygienic environment which becomes a haven for bacteria. When this happens, the entire floor has to be removed and a new floor installed in its place which is a very costly and time-consuming process and will result in lost production and further costs.

Vinyl

Vinyl has been a popular choice for flooring in medical facilities, schools and commercial kitchens as it is, if installed correctly, highly water resistant and can be used in a wide range of areas. Vinyl is durable and resilient to most oils and chemicals, is easy to clean and maintain, and doesn't break or shatter like tiles.

Like most options, there are a number of disadvantages with vinyl.

As vinyl is not very thick, it is prone to wear. And because it is not seamless, it also has a tendency to lift or become distorted, so in these areas and where it has worn away, bacteria can breed and spread rapidly, and mould and mildew can grow.

This in turn results in delamination of the vinyl from the substrate resulting in a significant hygiene issue, making vinyl inappropriate for anywhere where strict hygiene standards need to be met.

Vinyl can be patched, however, once the bond has been breached the floor will progressively delaminate and cause hygiene issues as well as creating trip hazards.

Furthermore, while the flexibility of vinyl may be an advantage during installation, this also means it can't withstand heavy loads or impact so some distortion is to be expected. Any bumps or indents on the substrate underneath that have not been properly attended to during preparation will eventually be seen through the vinyl. Vinyl is also very susceptible to softening and failure when exposed to higher temperatures such as from kettles or bratt pans.

Epoxy Resin Floors

Epoxy resin based floors fall into the category of "seamless" resin floors. This type of floor is a two or three part product mixed and then applied on site. There are a number of options when it comes to coatings and clients can select a product based on its chemical, impact and slip resistance to meet the needs of the area.

Epoxy floors are very well suited for use in many areas of food facilities. Epoxy coatings are also 100 per cent seamless which makes them completely impervious to liquids and leaves no place for bacteria to breed.



Dry goods packaging, clean rooms and amenities areas are typically suitable for epoxy applications. In fact, you will find that epoxy coatings may be suitable in most areas where light to medium duty requirements are present.

Areas that may not be suitable for epoxy flooring include wet area production areas where there is impact and high abrasion, thermal shock, constant hot water, chemical exposure, or a combination of these. Also, the demands of typical heavy processing or manufacturing take a toll on a resin that is not able to withstand this for the medium to long term.

Another disadvantage of epoxy flooring is for projects where time is tight and down time is critical. Application and curing times are measured in days and exposure to water and chemicals early in the curing process can result in discolouration and, possibly, early chemical attack. Also, epoxy is not UV stable or colourfast when exposed to sunlight.

Methyl Methacrylate (MMA)

Methyl Methacrylate systems are designed for use where fast curing is required and/or where low application temperatures exist. These systems can be put into service for traffic after as little as a few hours which is generally not possible with epoxy and polyurethane flooring systems.

MMA can also have antimicrobial qualities, varying degrees of slip resistance, crack bridging capability and high durability. They also have high UV stability making them perfect for outdoor applications or other areas that may be exposed to direct sunlight.

However, a disadvantage of this type of product is potential adhesion problems to damp substrates, but, most importantly, the issues surrounding their odour. The product requires specialised handling and application techniques as they can potentially taint foodstuffs if exposed. And the environment needs to be well ventilated to control the odour although this is short lived. Only experienced applicators should be entrusted to manage the issues of MMA.

Polyurethane Cement (PU)

As the name suggests, this technology is a mix of water-based polyurethane and cement technologies and this brings together the benefits of both chemical reactions.

The cement portion brings the properties of concrete to the flooring system while polyurethanes provide the resistance of poly-resin. Add them both together and you have a highly durable and seamless floor protection solution.

PU Cement delivers properties very well suited to food and beverage production. Impact resistance comes from its ductility,



thermal shock and high temperature range resistance (-20°C to +120°C) comes from the cement component. And Polyurethanes exhibit excellent UV-resistance with the addition of a special top coat for UV protection. This special top coat can also be used as a topcoat over epoxy to protect the underlying epoxy from yellowing over time.

PU Cement also provide a high degree of chemical resistance to the normal range of food acids and cleaning chemicals used in the food and beverage industries. Low VOC compliance for exposure to foodstuffs provides safety for any surrounding trades or employees.

Polyurethane is much more resistant to high temperatures (up to 120°C) so is particularly suitable for areas under the cookline e.g. ovens, fryers, Bratt pans etc and can be installed on green concrete so less time waiting for concrete to cure.

Depending on the thickness applied, you would expect roughly double the life span for a polyurethane floor as opposed to an epoxy floor. And Polyurethane finishes can range from satin to semi-gloss to high gloss. Optional wear and safety additives can be incorporated into the topcoat texture.

Whilst not being as rapid to cure as a reactive based resin like MMA, PU Concrete is faster than epoxy and can be accelerated to execute short down time applications, such as smaller turn around projects in addition to isolated infill and repairs.

PU Cement has a proven history in Europe for 30 years, however they were expensive to produce and costly to import to Australia. With the advent of local production of the product from some manufacturers the cost to install is very competitive with all other floor options.

This cost competitiveness, together with these performance features, produce a very tough, fast to install and long-lasting floor system. In most cases Polyurethane Cement is the best all round flooring solution for the food and beverage environment.

Contact Us

We hope that this information has given you some snippets regarding product selection for food and beverage industries. If you require more in-depth information, or some advice on a project, please feel free to contact us. We are always happy to help.