

WHITEPAPER



ADVANTAGES OF POLYURETHANE OVER EPOXY IN BREWERY PRODUCTION AREAS



An overview of flooring
solutions in brewery
production environments.



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Advantages of Polyurethane Over Epoxy in Brewery Production Areas



The brewery industry in Australia continues to grow, innovate and adapt to the needs of the marketplace. From the domestic growing of over 600 tonnes of hops to the production and sale of quality beers, the industry is estimated to have contributed \$4.3 billion to the Australian economy in 2010–2011. Beer brewed in Australia accounts for 93% of the nation's consumption. With statistics like this hygiene should be highlighted as a key factor for a successful brewery in order to ensure consistent high standards despite making such large volumes of beer.

All brewing and keggling rooms need a floor that can provide substantial protection against the challenging on-site conditions it will be faced with on a daily basis while also complying with the sanitation regulations and surface characteristics of the Australia New Zealand Food Standards Code.

Synonymous with the beer industry is the patience, planning and effort that goes into making the optimal brew — and as such it is pivotal to the success of a brewery that it ensures everything is in place to facilitate excellence on a consistent basis.

As new breweries open and existing businesses expand, it is vital that the flooring material in the production area is of the highest possible standard. Which then begs the question of which type of flooring is most suitable for the brewing environment?

Two of the most common are polyurethane and epoxy resin, both of which have various pros and cons and as such a strong case can be made for both types of flooring systems in a brewhouse production area.

Chemical Resistance

Polyurethane boasts unrivalled resistance to corrosion, inorganic alkalis, organic alkalis and solvents and it has a low porosity of just 0.5%. In contrast, epoxy resins have a reasonable resistance to some acids and its porosity is largely dependent upon the

seal coat used. Epoxy systems offer limited resistance to the organic acids that are found in a large quantity of beers.

Should corrosive substances find their way onto the floor, such as the incredibly important sugar solution used in the brewing process, then this can cause a problem. If the finish is not sufficiently chemically resistant then corrosive substances can erode the floor, leading to an unsanitary surface. To avoid this occurrence, a system must be able to withstand long-term exposure to such chemicals.

Hygienic Properties

Another all important theme within breweries is ensuring that, in spite of the heavy workloads and adverse conditions, the floors are able to maintain a clean space that avoids unwanted bacteria ruining the beer.

It is often the floor that becomes the most contaminated area of a production site, as dirt can enter the building beneath feet, bacteria can fall on the floor and get trapped within cracks and gravity will cause most of the contaminants on walls or stationary objects to end up on the floor. Floors and drains in breweries consistently generate a high percentage of positive test results for bacteria and can lead to cross-contamination throughout the facility.

Polyurethane is a phthalate-free material and it can also have a silver ion-based antimicrobial additive incorporated within the finish to reduce the spread of bacteria and other harmful pathogens.

Floors should be without cracks as seams, joints, grout lines and gaps can become an ideal breeding site for contaminants such as bacteria, fungi, mould and mildew. All of these could spoil the beer and potentially lead to illnesses that could irreversibly damage a brand's reputation and ability to function.

Having a seamless floor finish is vital to ensuring an effective cleaning program that can easily remove contaminants. Polyurethane flooring solutions can ensure a smooth, monolithic and crack free surface that will not only dramatically improve hygiene but also protect the building's concrete substrate and provide a level, reliable platform for the day-to-day operation of the facility.

Temperature Resistance

The hot temperatures required to create beer and the potential steam cleaning carried out to remove stubborn substances can also present a challenge to the brewery's floor. That said, polyurethane is resistant to boiling water and production by-products up to 120°C.



TIP:

Choose a finish that withstands attack from cleaning products and corrosive ingredients.

**TIP:**

Cementitious PU is durable enough to withstand heavy plant machinery and forklift traffic.

The robust build up of polyurethane avoids floor failures from extreme temperatures and as its thermal coefficient of expansion is similar to that of concrete it will move with the underlying substrate during thermal cycling conditions, avoiding cracks and gaps appearing in the floor's surface.

Epoxies offer less resistance to thermal shock, making them more susceptible to cracking and de-bonding in rigorous brewery environments.

Epoxy resin cannot handle steam and temperatures above 60°C, meaning that it is a more suitable choice for non-processing zones of brewery facilities that are not subject to the same high protection demands.

Slip Resistance

In the vast majority of breweries, an anti-slip flooring system is required that will remain slip resistant for the long-term despite high foot and rubber wheeled traffic conditions.

Employees and visitors to the site can bring in remnants of bad weather underfoot or an area may be subject to wet service conditions, cleaning processes or spillages – all of which can result in the floor becoming slippery, increasing the risk of falls and as such any liability to the building owner.

Polyurethane systems are available at varying levels of slip resistance with matt, glossy and textured surfaces, meaning that breweries can tailor their flooring to the specific needs of various areas of the plant.

Abrasion Resistance

Abrasions caused by hose ends, kegs and pallets are likely to inflict physical harm to the floor. Alongside these factors a brewhouse facility's interior will also contain exceptionally heavy machinery, forklift trucks will need to drive around the site and the staff may be carrying (and potentially dropping) tools, mechanical parts and a number of other items.

All of these factors could eat into the floor finish. If the floor coating is too thin then this initial impact could expose the substrate, becoming an area where oils, water, chemicals, by-products and greases can access the substrate and undermine the coating. In general, the thicker the system the longer its service life and the better it will withstand damage.

Epoxy is often described as the tried and true of resinous flooring systems, with solutions available in thin film applications of 0.3mm thickness for light duty applications all the way up to thick overlays of 5mm. However a 4–9mm thick polyurethane floor finish is a more common sight in breweries, as it will have a better chance of dissipating impacts and should a chip occur then it is less likely to progress down to the substrate.

Anticipated traffic loadings need to be particularly accounted for, as just a hand pallet truck when fully loaded could weigh in excess of 1 metric ton, putting a lot of pressure through the wheels and into the floor. The compressive strength of the floor system can be used to determine the suitability of the floor to the task at hand.



TIP:

Maintain hygiene with a seamless finish that contains an antimicrobial additive.

Moisture Vapour Transmission

Moisture vapour can be a serious concern for any brewery and the substrate needs to be analysed to ascertain if any measures need to be taken to avoid blistering in the floor finish.

Epoxy resin systems may allow moisture to penetrate directly into the underlying concrete, whereas polyurethane systems installed at a typical 6mm nominal thickness boast superb protection from water and liquid intrusion.

Installation & Maintenance

Polyurethane systems are ideal for projects with short installation and cure windows because they require only a limited amount of downtime before the floor can be in use, whereas epoxy resin systems require a minimum of 48 hours cure time in production facilities and a total of seven days before all of the full benefits can be utilised.

Significant lifecycle cost savings over a ten year period are standard fare with polyurethane, but should any flooring problems occur throughout the lifetime of the system then dilapidation work can be completed within a twenty-four hour window at a fraction of the cost of epoxy resin systems, and they can be installed over the top of an existing floor finish if needs be.

Regulations

The Australia New Zealand Food Standards Code states that “floors must be designed and constructed in a way that is appropriate for the activities conducted on the food premises”.

The code also stipulates that floors must “be able to be effectively cleaned; be unable to absorb grease, food particles or water; be laid so that there is no ponding of water; and to the extent that is practicable, be unable to provide harbourage for pests.”

**TIP:**

Polyurethane floor systems help in the implementation of HACCP food safety programs.

The Hazard Analysis and Critical Control Points (HACCP) Food Safety Management System has been embraced by many food and beverage businesses eager to prove that they comply with regulatory demands. HACCP has been developed to inform the design of food and beverage facilities so that they minimise the risk of contamination incidents as much as possible. This is achieved by providing a tried-and-tested advisory framework for each aspect of a food and beverage plant — including the floor.

The HACCP guidelines emphasise the importance of seamless and impervious coatings while also requiring floors to allow for adequate drainage and cleaning to facilitate the fast and effective removal of excess liquid and slippery contaminants from the area.

As a globally accepted benchmark of food safety, HACCP is also important for businesses eager to gain access to lucrative export markets, as many other nations will require food to have been produced according to a HACCP standard and it also means that clients abroad can rest assured that the food has been manufactured to a hygiene standard that they recognise.

Polyurethane systems are more than fit for surpassing the industry's red tape. Epoxy floors also meet the regulatory requirements of being seamless and impervious, however because they are more likely to fail when subjected to a brewery's operational activity they could result in a once compliant brewery falling below the necessary standard over time.

Aesthetics

Chances are the next time you visit your local brewhouse, you'll encounter specialist polymer flooring systems throughout the facility rather than the typical tile or ceramic finishes traditionally found in these environments.

You'll find these systems not only behind the scenes where the beer is brewed, but also in the tasting rooms where it is being consumed. Polymer flooring systems are being used more often in these environments owing to a combination of excellent performance attributes and design versatility.

Aesthetic appeal is something that polyurethane systems offer in abundance, with an array of vibrant colours and eye-catching finishes available. Site visitors, customers and even company employees should all leave with an excellent impression of a brewery in order to maintain a quality brand image.

Epoxy systems are also available in a number of different colours and patterns, making them an equally stylish choice in the first instance but when wear and tear is taken into account, the more resilient nature of polyurethane means that it maintains its visual appeal for far longer.

Overall, a polyurethane system provides a stronger, more robust, reliable and aesthetically pleasing option for production areas, with its reduced maintenance needs yielding long term cost savings. There is definitely a place for the more lightweight epoxy resin systems within tasting lounges of brewery facilities but in terms of production areas, polyurethane has all the right ingredients to brew up a winning formula.

This guide has been produced to provide an overview of flooring solutions in brewery production environments.

Detailed recommendations and advice are available from our network of regional technical and sales representatives.

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