Holding it all together

Ray Brennan advises on the considerations engineers should take into account when specifying a sealant for a construction project.

The Great Palmhouse at the National Botanic Gardens: 28,000 metres of a very specialised form of MS polymer sealant were used for the glazing, to metal and teak, coated with both polyurethane and acrylic paints.

What are buildings made of? Glass, concrete, brick, stone, metal and wood obviously spring to mind. Sealants are often an afterthought. Yet these are crucial elements in any successful building project. In the restoration of the Great Palmhouse at the National Botanic Gardens in Glasnevin, for instance, some 28,000 metres of sealants were used to link the metal, glass, and painted teak that constituted this wonderful structure.

Specifying the wrong sealant for a particular job or using insufficiently high quality workmanship in its application can have serious financial implications, resulting in excessive maintenance, premature replacement, or, in some instance, even requiring the whole building to be re-sealed. One common example in Ireland is migration of plastisers into stone facades. This problem arises due to specification of an inappropriate sealant for that particular application. The result can be unsightly disfiguration of the stonework, which, in some cases, can only be addressed by costly re-sealing of the building.

Factors to take account of

When specifying a sealant, it may be necessary to consider a number of the following factors, depending on the project involved:

Movement capacity: Consult with your supplier with details of movement, so that s/he can pinpoint identify a product with the technical properties necessary to fit your specifications It is important to be assured that the sealant recovers after reaching its limits of movement capacity.

Life expectancy: The supplier should be able to guarantee the product for at least 25 years. If not, major maintenance may be required down the road.

Guaranteed adhesion: Your supplier should have the knowledge to confirm to you, in writing, that a particular substrate requires a particular sealant. In the case of it being an unusual substrate, a laboratory adhesion test should be carried out.

Resistance to chemicals: Ask your supplier to confirm to you that the spillage of a particular substance will not affect the sealant. Bear in mind, however, that under ISO14001 and IPC Licence, you are required to deal with spillages in the fastest and safest possible way.

FDA approval: The FDA has approved a number of sealant formulations based on their non 'out-gassing' properties. In other words, there is nothing in their chemical constitution that could result in the release of emissions to the atmosphere. These sealants are also suitable where similar guarantees are required in cleanroom facilities and in certain food industry applications. Note, however, that the FDA only calls its standards on this matter into play in the food industry where food is in direct contact with the sealant. When required, it is important to have a number of food-grade sealant options available in order to mesh with the multitude of substrates found in a typical production facility and are tough enough to withstand what can be an aggressive processing environment.

Submersion in water: Submersion in water will always shorten the life expectancy of a sealant. Therefore, it is important to factor drainage into design and to implement a regular inspection schedule where this risk is present. Where the nature of the application means that the sealant will inevitably be submerged in water, for example, in a swimming pool, high-performance sealants are available. But substrate

preparation and application workmanship is particularly critical in ensuring long-term integrity in these instances.

Paintability: Just as you expect a certain movement capability from your sealant, you will need to choose a paint that will move to the same degree; otherwise cracks will results. There are multiple options for exterior paintable grade sealants. However, technical support from your supplier is crucial in pinpointing appropriate paint-sealant combinations. Be aware that paint companies are not obliged to announce whether changes in the chemical composition of their paint will impact on specific sealants; therefore, a pre-test is generally required.

For success, the product must be formulated to very stringent quality control standards, and it must be the

Technical advances

There have been significant advances in the field of sealants over the past 25 years. In particular, the focus has been on improving polyurethane, silicon and polysulphide sealants. Traditionally, polyurethane-based sealants offered good adhesive strength, but their UV resistance was poor, which reduced their life expectancy. On the other hand, silicone based sealants had excellent UV stability, but had a poorer adhesive strength.

During the 1970s, work got underway to address these limitations through the formulation of what are known as MS (modified silicone) polymer sealants. Production commenced in Japan in 1979, and followed elsewhere, with a new breed of sealants combining the best characteristic of silicone and polyurethane. These new products offered both strong adhesion and UV stability, as well as other important properties such as paintability, traditionally a problem with silicone; absence of bubbling, which had been a problem with polyurethane-based sealants; non staining; low environmental impact; odourlessness; low viscosity at low temperatures; and high durability even in low modulus formations. The palmhouse restoration project in the National Botanic Gardens is a good example of an advanced formulation of MS polymer technology satisfying all of the requirements of project.

Despite technical advances, however, it is important to note that the use of an MS polymer in itself is not a guarantee of quality. For success, the product must be formulated to very stringent quality control standards, and it must be the correct sealant for the particular job. When choosing between competing products, ask to see examples where the particular sealant has been in place for a number of years in similar project. It is also crucial to ensure the correct standard of workmanship. At least 90 per cent of sealant failure relates to poor quality application or work methods.

Ray Brennan is MD of Seal Systems Ireland. (www.sealsystems.ie)