

## **Casting Decorative Building Panels**

There are two potential uses where **Repel 64** is expected to excel but which have never been adequately tested. Both are in making decorative finishes – massive on-site pours and precasting of colour-sensitive decorative panels.

In 2005 there was an embarrassing, very annoying failure of a conventional mould release on a new public building in western Sydney. This was a **massive pour** – 44 cubic metres in a single block, intended to form an outstanding building frontage, two storeys high. Colour and texturing materials were incorporated in the pour, and the whole thing was designed to look impressive and finished as soon as the moulds were removed. The trouble was that the contractor couldn't remove the moulds because the heat exuded by this massive pour destroyed the mould release agent, so the moulds stuck firmly to the concrete as it set. The moulds had to be prized off, destroying both the moulds and the concrete surface. The concrete then had to be refaced at great expense and loss of time.

The chemical reactions in setting concrete – download [Chemistry of Cement and Concrete](#) – give rise to a lot of heat. This is rarely a problem, usually not even noticed, because the concrete is relatively thin and exposed, so the heat is quickly dissipated. However, when concrete is poured in thick blocks it traps a great deal of heat which, as it cools, creates stresses which crack and weaken the structure. When the Hoover Dam was built in the 1930s engineers estimated that if the dam had been a single pour it would have taken 125 years to cool, and the dam wall would have been so distorted and cracked as to be dangerously weakened. Therefore, that wall was built in sections no thicker than 150mm. More about managing that chemistry and heat can be read at [en.wikipedia.org/wiki/Hoover\\_Dam#Concrete\\_pouring](http://en.wikipedia.org/wiki/Hoover_Dam#Concrete_pouring).

No doubt, the mould release agent in this failed Sydney pour boiled out of the mould-concrete interface in the same way as filmed by Hunter Concrete in their early efforts to manufacture pipes – download [Making Big Pipes](#). Petroleum and vegetable oils used in oil-based mould release agents boil, char and fail at about 340°C. Yes, curing concrete can get that hot, especially when made in big lumps. **Repel 54** and **Repel 64** are cruising at that temperature – they can stand up to about 600°C.

The Hoover Dam engineers' respect for the necessary chemistry had been overlooked 70 years later at this massive pour in Sydney. Although such pours are not recommended because of stresses caused by differential shrinkage, **Repel 54** and **Repel 64** have the capacity to withstand these extreme temperatures in unavoidable situations such as those encountered every day as described in [Making Big Pipes](#).

The other factor about this 2005 Sydney failure was that the architects could not deliver intended significant benefits in both cost and appearance – a large decorative moulding with **uniform colour and texture**. Colour variations can be seen from a distance, and are particularly apparent on darker surfaces. It was obvious for many months that the concrete panels on the upper storeys of one of Melbourne's tallest buildings were meant to look the same, but they didn't until weathering and pollution gradually took their inevitable toll.

This problem is not really one of colour but rather of reflectance – variations in gloss. Even the best selection and mixing of surfacing materials cannot compensate for variations in absorptive capacity. A small amount of absorbed oil will cause a significant increase in the surface reflectance, making the surface appear brighter but darker. Precast factory-made panels moulded using petroleum or vegetable oils can look the same at every point of inspection, but the truth about how little or how much oil was absorbed will not be known until the panels are erected and seen in sunlight from a distance.

**Repel 54** and **Repel 64** are not absorbed. They dry as a tiny amount of dry dust on the concrete exterior. This kind of mould release agent would seem to offer the best way to prevent colour variations on decorative panels. This lack of absorption, together with extreme resistance to heat, would seem to offer architects a new approach to designing cost effective decorative concrete panels.