



## **Carillion selection of more sustainable flooring: linoleum vs. vinyl**

### **Organisation information/involvement**

#### **Summary**

Through a series of hospital developments, Carillion has made a transition to greater use of linoleum flooring versus alternatives. It considered the sustainability of a wide range of flooring materials as a part of this process – including linoleum, rubber, polyvinyl chloride (PVC) and chlorine free vinyl.

#### **Tools and process for testing sustainability parameters of flooring material**

During the early stages of selecting the greenest floor material Carillion utilised The Natural Step and its' System Conditions (SC's) to help ascertain the most sustainable material. The SC's were incorporated as part of the Option Appraisal system and the system looked at the following parameters:

1. Cost
2. Life cycle
3. Maintenance
4. Buildability
5. Durability and
6. Sustainability

Using the system conditions Carillion was able to ascertain which products offered the best performance under the sustainability banner. Linoleum was found to be the best at the time and is increasingly being recognised by other green groups as a more sustainable option.

Carillion has recently executed an independent Streamlined Lifecycle Assessment (SLCA) exercise, looking at products' environmental impact from raw material extraction to end of life, and are currently in the process of verifying the results. The intention is to do the same exercise with vinyl for the purposes of comparison between the two products.

Material use and disposal were just some of the critical sustainability areas of product impact and therefore Carillion sought products that extended the life cycle, thus reducing the requirement for disposal and using materials that were easy to maintain. Although Carillion managed to reduce the need for replacement due to the superior life expectancy of linoleum, the company still had to address the issue of disposal, whilst looking for materials that could be safely handled in the future. Linoleum, due to its natural makeup, is easy to dispose and can be landfilled safely as it biodegrades. Linoleum can also be incinerated where it releases over 65% more energy than it consumes during production. This means that if biomass boilers are available on sites Carillion was responsible for, linoleum could be used as bio-fuel at disposal as post installation waste or the end of the product's life.

#### **Achievements and Outcomes**

The key environmental benefit of linoleum over vinyl was its use of natural and renewable raw materials, superior life expectancy and its biodegradability.

Forbo Flooring had undertaken an independent study looking at the rate of 'Aerobic Biodegradation under controlled composting conditions' of uncured linoleum powder and ground marmoleum (Forbo's trade name for Linoleum). The report concluded that for uncured linoleum powder the biodegradation percentage was between 51.2% and 56.8% after 150 days and for ground marmoleum it was between 21.7% and 22.5% after 45 days, and projected it would be in excess of 50% after 150 days. The report also noted the biodegradation percentage of uncured linoleum powder after 150 days is similar to a biodegradation percentage, 50%-60%, of oak leaf and wood chip when tested after a period of 180 days. Moreover, like uncured linoleum and cured marmoleum, biodegradation of these natural materials continued at a moderate rate after 180 days.

Linoleum typically has a longer life than vinyl: typical lifecycle projections for linoleum exceed 30 years whereas vinyl has a lifecycle projection of approximately 15 to 20 years. Linoleum therefore offers greater sustainability in terms of less frequent replacement intervals, and requiring similar maintenance to vinyl and other resilient floor materials. This ultimately leads to reduced waste to landfill, and reduced transportation of that waste than the PVC alternative.

Where Carillion has a use for vinyl much is done to ensure the environmental profile for PVC products is as optimal as possible. Carillion has been working with Forbo Flooring as they are proactively looking at waste streams and also focussing on raw materials, for example plasticisers. DOP is replaced by a more environmental friendly alternative, DINP. In addition recipes are being altered to eliminate/decrease harmful components where possible. Many innovative initiatives are targeting the replacement of questionable components through substitution of materials and improved material make-up. However, these alternatives are often unfortunately more expensive.

Linoleum is inherently bacteriostatic and feels nicer under foot as it is a natural product and therefore is well suited for use within hospital patient areas. Integrated coving solutions and multi coloured welding make linoleum a complete solution where high hygienic standards are required. Linoleum can be renovated and repaired in case of damages or accidents, extending its useful life. Linoleum is compliant to all existing indoor air emission regulations, ensuring a safe indoor air climate. In addition linoleum is permanently anti static making it very user friendly.

Furthermore, the package price for flooring was £1.55m, as compared to £1.76m for the PVC-based flooring option. This resulted in £110,000 in overall savings for construction of the hospital development, and approximate projected lifecycle savings of £1.15m during the 30 year concession period due to the lower replacement rate. Landfill taxes and disposal costs will also be reduced during the concession period.

### **SLCA – Its Future Use in the Business**

The SLCA can be applied to a wide range of construction product types, for example, steel, timber and glass. Carillion is now exploring the opportunities for improved sustainability performance across other areas of the supply chain using SLCA. Carillion has integrated these products into the building design specification of its operators, supporting their consistent use in developments. Carillion is sharing knowledge of opportunities for sustainable products with its other commercial operations (e.g. schools), so that the benefits may be delivered across the business sectors.

Carillion is examining ways to develop the SLCA further. For example, it is creating a user-friendly SLCA pack that can be subdivided into different sections, expanding its possible use and understanding across different stakeholders who have interest and understanding of different product lifecycle impacts.