



Product Group Report: Floor tiles

A study of the remanufacture and
refurbishment of textile-based floor coverings in
the UK

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1 Overview

Floor coverings are found within most global building environments where they are utilized in both domestic and commercial applications. A mature market, the floor coverings industry is considered robust with replacement purchases maintaining sales. The combined UK floor coverings sector was valued at £2.1 billion at manufacturers selling prices in 2004, with commercial applications representing approximately 45% of this figure.

Over the previous three years the overall floor coverings market has experienced minimal rates of growth, in the region of 1-2% p.a. This is due to a reduction in business and consumer spending confidence; a result of unstable economic conditions following events in 2001. Forecasts predict that this low rate of growth will continue until 2008 when it is estimated that the sector will be worth around £22 billion (AMA Research Report, 2005).

In contrast, the contract floor coverings market has shown moderate growth over this period and in 2005 the sector was valued at £996 million; a 2% increase on 2004 figures. Demand for floor coverings in the commercial market is dependent on a number of factors including the strength of business confidence, a high level of business investment, and growth of commercial new build and refurbishment activities (AMA Research Report, 2006). All of these factors have contributed to market success in recent years. In particular, there have been high levels of spending on public sector construction and refurbishment programmes in recent years which has led to an increase in the demand for floor coverings in these areas

The overall product base is diverse and includes carpets, vinyl, wood flooring, linoleum and ceramic tiles. Broadloom carpet sales dominate the sector with a market share of £1.3 billion (Keynote, 2004). This figure is down 3% on the previous year and factors influencing this decline include a shift in the product mix, with threats arising from the growing popularity of other floor covering types (i.e. wood and laminate flooring), and the decline of the UK carpet manufacturing base. In addition to this, the commercial broadloom carpet sector has been outmoded by the increased use of carpet tiles in some sectors. Carpet tiles form part of the larger carpet products sector, and in the UK the majority of sales are attributed to commercial applications (i.e. offices, retail, leisure, health and education). Offices and commercial buildings are the primary end-user of carpet tiles pertaining to around 21% of the market share; this sector will therefore form the focus for this particular study.

There is still a significant manufacturing base for carpets in the UK which has been traditionally centred around the Yorkshire and Lancashire regions. However, the high value of sterling has destabilised the ability of some manufacturers to compete in certain areas of this increasingly price driven market. Imports of carpets are contributing to further erosion of the UK manufacturing base, with some factory closures and job losses occurring. In contrast, there remains an established UK production base for carpet tiles with the leading international manufacturers, Milliken and Interface seemingly unaffected by the threat of low cost imports. The strength of the leading companies, combined with strong growth of tiles purchased for commercial



markets makes a strong case for the inclusion of remanufactured products in the market.

Floor coverings are an international market, with high levels of import and export activity across all sectors. On a global scale, the UK is ranked 5th internationally for carpet production and is responsible for around 150 million m² per year. UK exports have been declining as the international market becomes increasingly competitive. Leading export destinations are the USA and the Netherlands, with imports primarily from China, India and Belgium.

With regards to remanufacturing and refurbishing programmes within the UK, evidence suggests that these are only conducted by the industry leaders, Interface and Milliken. Carpet tiles have the strength and durability to last several lifecycles, making them a renewable asset and an ideal product for both remanufacturing and refurbishment programmes.

1.1 Milliken

Milliken is a leading worldwide supplier of commercial carpeting and offers the only remanufactured product for the commercial sector: the Earth Square™ carpet tile. The process is based on proprietary technology and the tiles can be produced at half the cost of new.

Milliken's Earth Square™ programme reclaims used commercial carpet tiles and remanufactures them to 'as new' quality using a three step process that super-cleans, retextures and then overprints the original tiles to disguise any irregularities or marks. Following this process, the tiles are then sent back to the original customer for second usage or resold through the company at up to half the price of new products. One drawback is that patterns can be added but not taken off, as this involves the use of substantial amounts of bleach which would be counterproductive to the overall aim of reducing the environmental impact of the product. This process allows for the product to achieve multiple life cycles and also incorporates a ten year guarantee at the beginning of the next usage period. If the recovered carpet is not able to be remanufactured it is then donated to social enterprises.

Customers using Milliken's Earth Square™ products include Newbury Race Course, the Environment Agency, West Oxfordshire District Council and Sustainability Northwest and by using the Earth Square™ products can help businesses to become environmentally responsible and achieve environmental performance targets

Milliken was the first commercial carpet manufacturer to achieve an Ecopoints environmental profile rating, a worldwide industry standard measuring the environmental impact of building products. The Earth Square carpet tiles have an Ecopoint rating of 1.44 – 1.70 (depending on the pattern) indicating a low impact. The Ecopoint score is based upon the product meeting a number of criteria with regards to environmental impacts occurring across the entire lifecycle.



1.2 Interface

InterfaceFLOR is the European division of Interface Inc., the world leader in the production of environmentally responsible floor coverings. The company has an underlying commitment to reduce the environmental impact of their business activities and this is achieved through numerous initiatives and strategies including a leasing service (Evergreen™) and a carpet reclamation process (Re-Entry™).

The Evergreen™ carpet leasing system can significantly reduce the initial capital expenditure for businesses through a monthly payment plan, equating to significant cost savings over the entire product lifetime. It also enables closed loop material cycles as the company retains ownership of the product. The service includes maintenance, cleaning and replacement of tiles over the lease period. For example, tiles are rotated between high and low wear areas, eventually replacing worn tiles. The maintenance service includes cleaning using the correct products, thus avoiding fibre degradation. Overall, this service substantially increases the lifespan of carpet tiles in comparison with standard carpeting solutions, and dramatically reduces the amount of waste that is sent to landfill.

The Re-entry™ scheme reclaims old broadloom carpet and carpet tiles from businesses. Carpet tiles are then sent to social enterprises who then refurbish and sell or donate them to the voluntary sector. Increasingly, repurposed tiles are being used in small businesses and are even being specified by commercial architects. Where tiles are not fit for re-purposing they are, where possible, recycled into new products or down cycled into other products. This scheme has now been running for 5 years in the UK and Interface are expanding into other European markets.

Interface's customer base includes major corporate clients such as Royal Mail, Aberdeenshire Council, Defra and Boots Plc. Interface have not gained the market share that they had hoped for by providing a leasing service, although the company has a long-term commitment to shifting consumption from products to services. They are leading the way in the industry and with their committal will hopefully help businesses to realise the benefits of leasing over outright purchase. These benefits include costs savings over the entire life cycle, inclusion of maintenance and repair in service agreements and meeting corporate environmental targets. This has also helped Interface to meet EPR requirements as they are able to retain ownership of the product over its entire lifecycle, thus helping to avoid take back issues at end of life.

1.3 Social enterprises

Both Interface and Milliken have enlisted the help of 3rd party social enterprises to channel used carpet tiles to charities, low-income households, etc. As well as helping to divert waste from landfill these schemes have additional benefits by bringing employment and skills training to disadvantaged people. One organisation that is engaged in this process is Spruce Carpet Tiles in Glasgow. Interface donates carpet tiles to the organisation so that they can either clean them and sell or sell as is. This particular set up has been running since May



2006 and takes in around 10-15 pallets of carpet tiles from Interface per month, equating to around 5-7.5 tonnes. They are hoping to increase this number to 15-20 pallets. Any tiles that cannot be repurposed are advertised on the Glasgow Freecycle website.

2 The product

Carpet tiles are a low-tech product that can be described as a modular system used to provide a durable and comfortable floor covering solution. The base product comprises two components, the face fibre and backing material, which are manufactured using a medium-high technology continuous process. Sizes of individual tiles vary slightly but typically they are dimensionally stable squares in the region of 500mm² with thicknesses ranging from 4mm – 9mm, depending on the required performance levels (i.e. acoustic quality, insulation, durability, etc.) The tiles themselves are subject to varying degrees of wear and tear, which is affected by the location of the tile within the room; for example tiles in the corner of a room are less subject to wear than tiles placed along a busy thoroughway.

One overarching benefit of carpet tiles over broadloom is that individual components are easily maintained and replaced in order to maintain a uniform floor covering, as highlighted in the previous section. Carpet products are generally made using synthetic materials or synthetic/wool blends – typically nylon, polyester and polypropylene, with backing material mainly comprising of polypropylene fabric and latex. Natural materials account for a smaller proportion of products in the market with wool the most commonly used. Products containing other natural materials such as cotton, grasses and reeds (i.e. sisal, jute, hessian and coir) are beginning to increase their market share.

Various environmental impacts occur across the lifecycle of all carpet products, adding to the embodied energy of the product. These include:

- Non-renewable resource use in fibre production; the industry is heavily reliant on petrochemicals.
- High energy and water consumption during the manufacturing process.
- Impacts arising from wool production (i.e. scouring).
- Chemical use during the dyeing process.
- Off-gassing of VOC's from backing adhesives.
- Waste going to landfill; carpet accounts for 2% of all waste that is sent to landfill (Greenspec, 2006).
- Impacts arising from transportation of the final product to retail stores and the end user.



At a commercial level these environmental impacts are considerably higher due to the scale of all industries involved, with approximately 400,000 tonnes of commercial carpet being disposed of every year. Therefore remanufacturing has the potential to substantially reduce a number of these impacts.

With regards to product pricing, carpet tiles are generally priced slightly higher per m² than traditional carpeting although this is offset by lower installation costs and company downtime, lower maintenance levels, ease of replacement and a reduction in waste generated over the entire life cycle.

3 Evolution rate

Functionally, carpet tiles are a simple product with little scope for development with regards to shape or size. However, it is the materials used in these components that are evolving; with new products coming to market that contain recycled content, sustainable fibres, etc. Further innovations in these areas can be expected to develop over the coming years as the sustainability agenda becomes incorporated into consumer requirements. Disassembly methods are being incorporated into designs such as the use of chemical 'zippers' which make carpet easier to reuse, remanufacture and recycle by allowing the different layers of material to be taken apart easily.

4 Potential

Given the significant environmental impacts of carpet tiles, particularly those arising from disposal to landfill (i.e. it takes around ¼ million years for nylon based carpet products to fully breakdown in landfill sites), there is definitely potential to increase the amount of remanufacturing of carpet tiles undertaken in the UK.

The demand for carpet products is expected to increase at a rate of 2.5% per year. This coupled with a significant growth in demand for recycled products, increasing landfill tax and extended producer responsibility (EPR), proves that there is a case for the development of methods to reduce the overall impacts of the carpet tile sector. Around 60% of carpet tiles are able to be remanufactured, so for the remaining 40% the recovery of high quality raw materials such as polyamide, polypropylene and wool should be undertaken.

The further development of schemes involving social enterprises would benefit not only the businesses involved but also the wider community. This study has highlighted the need for more funding to develop these schemes across the UK. There may also be scope for the social enterprises to target the commercial



building sector with regards to increasing sales of remanufactured tiles, currently the main customers are the voluntary sector and schools, churches, etc.

There is also potential to develop the market for the conference and exhibition sector as it is estimated that over 55% of all waste from exhibitions is carpet. There are a few firms already undertaking recycling work in this area, but there are opportunities to use remanufactured tiles in this area, this would provide a substantial demand for these products.

The further development of tile-to-tile recycling is also a key area, with Interface having implemented recycled nylon into some of their products as a backing material.

The carpet tile sector is an ideal candidate for remanufacturing activity as the main material used for the pile, nylon, is virtually indestructible. As illustrated by Milliken's Earth Square process, the tiles are able to be cleaned, retexturised and reprinted. However, a large proportion of carpet currently in use is based on a bitumen and PVC backing, which is not suitable for this treatment, and only modern carpet tiles based on PU can handle these treatments. Therefore, it may be some time before significant remanufacturing levels are able to be achieved in the carpet tile sector.

It has been previously estimated that remanufacturing of tiles saves less than 100,000 m² of carpet per year, or around 3,800 barrels of oil, or 500 tonnes per year, or, 1610 tonnes CO_{2e} (a new carpet tile consumes five barrels of oil per 100m² whereas a remanufactured carpet consumes 1.2 barrels, including the cost of transport). The potential could be ten times higher.

Following the success of the Mayors Green Procurement Code, introduced in London in 2004, there is certainly scope to extend this to other cities and regions within the UK. The code was initiated as a sustainable purchasing programme funded by the London Development Agency and delivered by London Remade to encourage London businesses to purchase recycled or refurbished goods which are of high quality and competitively priced. This has stimulated the demand for these products. All 33 London boroughs and 400 London organisations and businesses have signed up to the code. To date (2007), the initiative has used 19,150 m² of recycled/remanufactured carpet.

5 Value

Carpet tiles present a significant capital expenditure for companies although this cost can be spread by purchasing flooring through leasing schemes or by using remanufactured carpet tiles. Social enterprises currently engaged in repurposing and remanufacturing schemes are selling their carpet tiles at up to 50% of the new product price.



6 Recommendations

- **Purchasing** – Use public purchasing policies to encourage use of remanufactured carpet tiles in public sector buildings.
- **Purchasing** – Implement Green Procurement Code, as exemplified by the Mayors London initiative, across UK cities and regions.
- **Awareness** – Improve public perception of remanufactured goods through an awareness campaign. This is timely given the amount of current media coverage on climate change issues.
- **Awareness** – Promote the benefits of using remanufactured goods as a fundamental part of corporate social responsibility objectives of businesses.
- **Accreditation** – Ensure that extended warranty periods are provided with the remanufactured product.
- **Accreditation** – Develop Ecolabel to identify remanufactured tiles which are of a certain standard i.e. ‘as good as new.’
- **Accreditation** – Through existing certification systems, e.g. BREEAM and Ecohomes, encourage the use of remanufactured tiles or a certain percentage of remanufactured tiles in order to achieve a specified rating.
- **Market development** – Develop carpet take back and recycling programs across the whole carpeting industry, and not restricting this to certain types of carpets in order to encourage the re-use, recycling or refurbishing of all kinds of carpeting products.
- **Market development** – Establish a central collection facility for carpet tiles perhaps set up as a joint venture between industry and social enterprises.
- **Market development** – Fund social enterprises to set up carpet tile remanufacturing schemes nationwide thus enabling training and employment opportunities for socially excluded groups.
- **Fiscal policy** – Implement tax credits for purchasers of remanufactured goods, particularly beneficial for commercial customers.



7 Model

Assumptions:

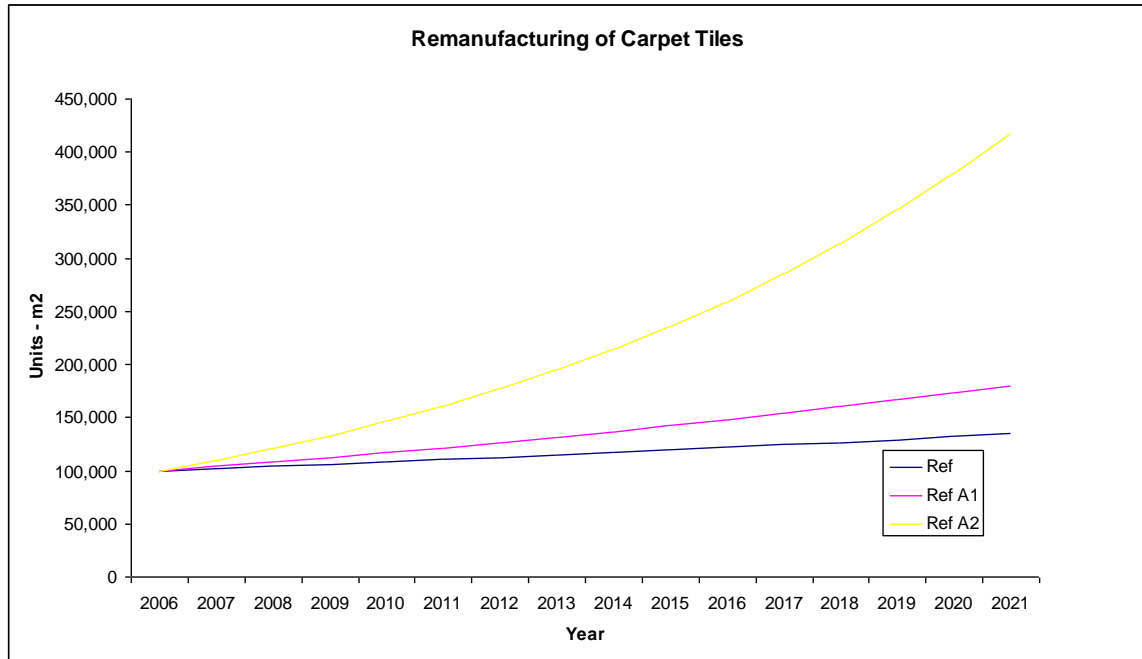
- Growth in sales of carpet products of 2.5% per year
- Remanufacturing 10-15 pallets per month (.5 tonnes per pallet)
- 60% of which are remanufacturable
- Retailing at £4.00 per m²
- Expansion of customer base to include architects, public sector and households
- Investment of £500,000 for new start up remanufacturers
- Company reselling at 30 – 50 % of original price
- Saving 72 tonnes of carpet tile from landfill per year

Table 1: Scenario assumptions

Scenario	Overall output and assumptions	Possible policy Interventions	Units Saved From Waste Stream ('000)	Tonnes diverted From Waste Stream (t)	CO ₂ E Saved (t)	£mil Spent On Reman Products
Ref	Levels of remanufacturing increase at 2% in line with predicted rate of industry growth	None	1,864	9,320	30,009	932
A1	Remanufacturing increases at 4% per year	Increased funding of social enterprises to increase number of carpet tile remanufacturing operations	2,182	10,912	35,137	1,091
A2	Best case scenario remanufacturing increases at a rate of 10%	Green purchasing policies and guidelines introduced driving demand for remanufactured carpet tiles	3,595	17,975	57,879	1,797



Figure 1: Scenario outcomes



8 References

AMA Research Report 2005 – Floor coverings Market UK Report 2005

AMA Research Report 2006 – Contract Floor coverings Market 2006

Keynote 2002 Report – Carpets and Floor coverings 2002 Market Report

