REDUCE WASTE: IN FLOORING  
EASY STEPS TO REDUCE YOUR SHARE

REMINDER OF WASTE STATISTICS

BRE waste statistics showed

* 30m tonnes was materials off-cuts,
* 24m tonnes/year was packaging,
* 23.7m tonnes/year soil & rock,
* 10m is temporary materials

Environment Agency’s (EA) 2007 statistics showed 10m tonnes (£1.5bn)/year was over ordered and never needed.

OVER ORDERED NEVER NEEDED, LOST, STOLEN AND REORDERED

Its little wonder that so much is over ordered:

* Quantity required for the design
* QS inaccurate take off: +/-10%
* Requires re-measure by contractor
* SMM7 Wastage factor: 5-20%
* Over-order safety margins x%
* Minimum order quantities +++
* Multiple colours or differences +++
* Call-off extra % JIC Just in Case
* Merchant delivers % more than required
  + in the hope nobody is checking,
  + invoiced accordingly
* Lost on site
* Stolen from site for PJs 20% (BRE)
* Reordered to replace lost or stolen
* Off-cuts: 33%
* Damage & Poor quality work 3%
* Spares for on going maintenance

JOINED UP THINKING?

In 2004 the site waste management plan (SWMP) voluntary code of practice was launched when the UK construction industry was using 400 m tonnes of materials and generating 113 m tonnes of construction, demolition and excavation waste per annum. The inclusion of waste reduction requirements in EcoHomes, BREEAM, Code for Sustainable Homes and subsequent introduction of the SWMP Regulations had been very effective in reducing the waste stream to 77 m tonnes by 2010.

So effective that UK Government that is renowned for lack-of joined up thinking has added the SWMP Regulations to the ‘red tape challenge’ a list of legislation to be considered for annulment in its quest to reduce red tape during the financial slump. The financial sector has so much to answer for.

GOVERNMENT FRUSTRATION

It’s little wonder then that UK government from time to time asks why are we as an industry so inefficient, and rather than put in place legislation, it scrutinises and reports in the hope we will read and act to sort out our act.

1987 NEDO reported on Quality on Building Sites highlighted the disorganisation in information flows and drove an industry shift towards Co-ordinated Product Information (CPI).

The Latham Report encouraged us to build better co-ordinated project teams.  
The Egan report called for year on year cost reductions, that is reliant upon an efficient streamlined construction industry and the Constructing Excellence Programme moved us along towards more streamlined procurement but the designers failed to engage in this movement.

The latest attempt to drag us up and drive down costs is procurement using BIM which the design professions appear to be embracing in droves, but until the classification and data organisation protocols are resolved to accept product data to enable the building of Big Open Data and until the design and decision tool Apps are created to interrogate the data using artificial intelligence to react with parametrics in an intelligent way, we will continue to be resource inefficient or wasteful in plain English.

OLD WASTE HIERARCHY  
In order of priority: (most important top)

* Reduce (waste by design);
* Reuse (materials to avoid adding to waste streams);
* Recycle (materials that cannot be reused);
* Recover (Energy: e.g. combustion with heat recovery; or nutrients: e.g. composting, anaerobic digestion, etc.);
* Reject (stuff that has no other use, send to landfill)

NGS NATIONAL GREEN SPECIFICATION WASTE HIERARCHY:

We use 42 Rs, (which could be the subject of a second article).

2011 WASTE HIERARCHY

(interpreted by NGS 2013)

* Prevention (design out waste)
* Preparing for re-use (reclaim and package for reuse)
* Recycling (segregation for recycling)
* Other recovery (materials, nutrient, energy but not incineration see below)
* Disposal (of residual waste for later re-mining)
* Incineration (last because of the toxicity of plastics combustion and high potential for pollution of land and oceans where our food is grown)

IT IS JUST COMMON SENSE AFTER ALL

Most of what follows is common sense but unless all are applied comprehensively and consistently we will not make progress, all these issues must be in the head of the designer to jab their conscience each time they design.

DESIGN GENERATES WASTE

EA (Anglian)’s SITEwise II Waste Campaign discovered waste is not a key issue for design professionals and only ranked 8th out of 12 issues

**Waste reduction is not a site issue, it is a design issue. It becomes a site issue, if it was not seen as a Design issue.**Designer have plenty of excuses and will use them, the obvious one is there are too many conflicting requirements and others get prioritised.

Designers need to join in or more procurement may end up in the hands of the Design and Build sector.

DRIVERS?: BREEAM V SKA

Whilst BREEAM has contributed to waste reduction it can and should go further, its scope of resource efficiency measure reflect the authorship, their different priorities and understanding of projects.

BREEAM smacks of Business as Usual and addresses the minimum K40 (ceiling tiles) and M50 (carpet tiles) reuse.

Ska: make a significant difference it picks up on the obvious and goes much further and challenges the designer’s default actions and addresses:

* K40 (suspended ceiling tile & grids) reuse;
* K41 (Platform floors deck & supports) reuse;
* M10 (screed), Reuse insitu, don’t remove;
* M40 (Tiles), ditto;
* M50 (sheet and tile flooring);
* M51 (Carpet) reuse.

SCHOOL FUNDING DICTATES WASTE

Funding rules set out to control costs but ends up costing more due to high wastage factors that its method dictates.

Money available is based on number of pupils with a space per pupil multiplier sets the room sizes.

But the rules do not permit size variation to suite the size of components preventing the opportunity to minimise waste from offcuts.

GEOMETRY DICTATES EVERYTHING

In reality because ever more sophisticated CAD gives greater freedom to fly kites, designers are seduced to use geometry for its own sake.

“I Can CAD, CAD Can, So I Do” seems to be the motto, which can lead to lazy thinking and lazy design and generates more waste when we should be going in the opposite direction.

GEOMETRY IN DESIGN

Circular & radial geometry demands bespoke parts or creates cuts & waste

Plasterboard ceilings and plywood floors do not fit, curved corridors, screed and plaster can.

When I challenge designers about the appropriateness of their choice they think I am mad.

NATURAL MATERIALS HAVE NATURAL VARIATIONS

We need to accept natural variation in natural materials or choose again, don’t choose a highly figurative species or cut if you want a neutral timber floor.

Rejection rates can be high if the specification is too onerous, an 85% rejection rate experienced at a slate quarry where a green copper ore seem ran through the quarry and the British Library designers limited the number and size of the green spots accepted. This was after the normal wastage of 1 tonne of slate generating 100 tonnes of waste due to the explosive method of extraction.

Interger house at BRE only uses reject floor boards from a project with too high a spec

REDUCE DEMAND ON MATERIALS

Co-ordinated modular design wastes less by co-ordinating the size of off the shelf components to the size of spaces, e.g. 3 x 300 mm. tiles equals a 900 mm. wide corridor.  
MANUFACTURERS GETTING IT WRONG

They now make 900 mm square ceramic tiles, because they know-how, can and do, because they will sell a lot to designers who will choose them because they are big, without realising they will waste even more materials in rooms that are not multiples of 900 mm. modules; selling more tiles for the manufacturer, wasting larger tile offcuts to landfill.

WHAT WE NEED

We really need is flooring products of appropriate sizes to suit the room and/or smaller sizes for use at the perimeter to reduce waste at edges.

Of course these must all be co-ordinated sizes, from the same batch for consistency of appearance or complimentary colours for contrasting borders.

We also need designers to engage, this can be prompted by manufacturers literature including guidance on resource efficiency: tables of dimensions of numbers of tiles, just like the brick development association sheets.

CENTRED SETTING OUT

One of the first rules designers are taught is to set out modular components from the centre of the room in both directions and cut at all 4 edges and a variation is to set the joint or the tile at the centre of the room. This accommodates tolerances in non-straight walls and diverts us from thinking about the size of stuff and working with them, into a habit of cutting components by default in every space which results in 30% of waste being offcuts.

SEGAL APPROACH

Appealing to Architects respect for past heroes may allow them to engage with the Walter ‘Segal Approach’ which acknowledges the size of a product, off the shelf, used full size, abhors all cutting and reduces waste to zero, it dictates a need to co-ordinate design, something we seem unable to do very often or very well.

CO-ORDINATION OF SERVICES  
Covers, Drains & Chambers

Recessed covers of inspection chambers do not have to follow the orientation of the drain or the chamber, they can be rotated and positioned to fit the floor finish above so there is no or less cutting but may need to be larger to suit.

RESPOND TO STRUCTURE OR FINISH?

A chicken and egg dilemma potentially here, do you design the structural grid to suit the finishes?

The answer is of course you do or of course you should, and visa versa.

Structural grids, partition sub-grids, ceilings services and fixings, platform floors and floor outlets should all be considered at the same time.

And of course somebody substitutes the finishes specification and the logic is lost on all that follows.

BAD DESIGN IGNORES EDGES:

Respond to structure and to room perimeter, floor finishes should not ‘pass under’ loadbearing wall.

Coordinate the scale of the components to the grid and if not then change the scale of the components at the perimeter to minimize cutting and waste.

Creating contrasting borders is only beneficial if there is a change of scale of components, if you want let the craftsmen work it out, but its better if the designer thinks it through first, and hence no surprises.

CHANGE MATERIALS AT PERIMETERS

One way to minimize perimeter off cut waste is to change at the perimeters:

* Skirting: overhang perimeter tolerance gaps
* Coved skirtings: set in to fit, or sit on to cover
* Reduced size: in the same floor components
* Smaller size: to reduce the size of offcut waste
* Mosaic: at boarders permit infinite adjustment and minimal waste.
* Create a gap: tiled perimeter set in screed and whole carpets laid on screed
* Change materials to fill gap around modular floors, using strips of non modular materials

But care must be taken to avoid an error I often encounter: a change at the perimeter without any understanding of its purpose and cutting at the perimeter of modular components as well, potentially two sets of waste not one.

DESIGN OF EDGES JUNCTIONS & ABUTMENTS

Today we need to focus on the performance of building more than we seem to have ever done in the past and so the junctions become more complicated and even more important to get right.

A wall to floor abutment must ideally be airtight junction and not permit thermal or acoustic bypass.

With complex procurement we need to be aware of who is doing which bit of the detail: is it by the flooring contractor or by others? Who gets there first and who needs to do what for the final detail to be competent in all respects.

On top of that we need to think about:

* Tiles first and under v tiles second against
* Skirting: set in v sit on v wall mounted
* Same material v special fitting
* Whole tiles v cut tiles
* Contrasting colour
* Change of scale

WASTE COST® *lite*

NGS are acutely aware of the amount of materials that the industry generates and wastes and whilst others are interested in data about the quantity and tonnes diverted from landfill, NGS are interested in how the industry engages in the costs of waste, NGS created a simple cost calculator that demonstrates that spending money on waste segregation can and should save considerably more; allowing QS and buyers to engage with the issue and not dismiss it as an expensive overhead.

WASTE COST® *flooring*

NGS have ambitions to develop the calculator to engage specifically with flooring waste issues and include a reporting mechanism to report to designers bypassing the barriers in the supply chain; advising designers about waste percentages, quantities and embodied carbon; but this development has to be funded and need patronage.

SITE WASTE MANAGEMENT PLANS

NGS have promoted SWMP since 2002 in workshops where we developed pre-edited checklists, making them quicker and easier to use with many cells blacked out or part completed with guidance on available solutions including:

* Surplus to requirements return to stock,
* Off-cut minimisation
* on or off site segregation practices,
* reuse, recycling,
* packaging baling and return to producer
* material and packaging exchange websites or businesses
* recovery of energy or nutrients.

These can be used to add value to tenders and sub-contract bids and are increasingly being asked for by Main Contractors.

NGS SWMP documents include:

* SWMP Site Waste Management Plan Checklist
* SWMP Guidance Notes explaining which existing processes and documents will provide the information requested
* SWMP Waste Prediction Chart
* SWMP Data Sheet which could assist in whole sector data collection

SWMP Appendix listing a range of related issues:

* Logistics and consolidation centres
* Materials exchange website and services
* Take back schemes
* Recycled content material databases
* Refurbishment and remanufacturers
* Re-users
* Architectural Salvage and Reclaim sector
* Pallets, Pallet boxes and Crates suppliers
* Packaging recyclers
* European Waste Catalogue reference Nos.

SITE CONSIDERATIONS

LEAN CONSTRUCTION PRACTICES

Manufacturing aspires to JIT (Just In Time) principles whilst our industry seems to dwell in JIC (Just In Case) or JTL (Just Too Late):

* Over order JIC: generating waste,
* Deliver early JIC: expose to spoiling and damage
* Stored materials need to be cared about and risks of spoiling and damage avoided
* Deliver JTL Just Too Late and get out of sequence and risk inadequate construction
* Deliver to the wrong place: lost on site and disappeared to do a PJ ‘Private Job’
* Excess to requirements one day maybe usable another day, so should go back into stock not skipped
* Logistics or consolidation centers can convert supply chains into demand chains; manage materials and deliveries, reduce packaging, material loss and waste.

SITE WASTE CHAMPIONS

Ideally a paid volunteer, with resource efficiency in the blood, who abhors skip loads of materials leaving site everyday;

* can work with the:
  + crane driver: they can see everything,
  + fork lift/dumper driver they go everywhere,
* they can challenge inefficient practices
* Prevent material collapses and spoils before they happen
* monitor and promote better solutions with toolbox talks,
* enable onsite waste segregation to help divert from landfill.
* Off-cut segregation between trades ensures offcuts are not spoiled by other materials
* Organization of offcuts by size and shape and can be used to complete tasks with less new materials packs.

FOLLOW UP & DEVELOPMENT

This article is inevitably limited but it is expanded upon, and linked to guidance documents, published papers, websites, databases, specifications, checklists, calculators, CPD seminars, toolbox talks, etc. at:

<http://www.greenspecdownload.co.uk/index.php?cID=1179>

2525 words

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* Interviewed by Alan Best for CFJ March edition on show at EcoBuild’13
* Presented to:

CRUK at EcoBuild 2013

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The Flooring Show 2013