Work package	3
Task	3.3 – Creation of a matrix of re-workability
Deadline	11.07
Status	Completed
Work package leader	Dr Alistair Bromhead

Objectives

Development of a matrix for use by remanufacturing organisations and manufacturers offering take-back services to aid the evaluation of batches of EOL furniture.

Method

Discussions and practical evaluation work were undertaken with the Green-Works management and sales team

Executive summary

This work package has led to the development of a practical methodology for the evaluation of end of life furniture by management with a view to quickly identifying the optimum EOL route.

Task 3.3 Matrix of re-workability

1 Introduction

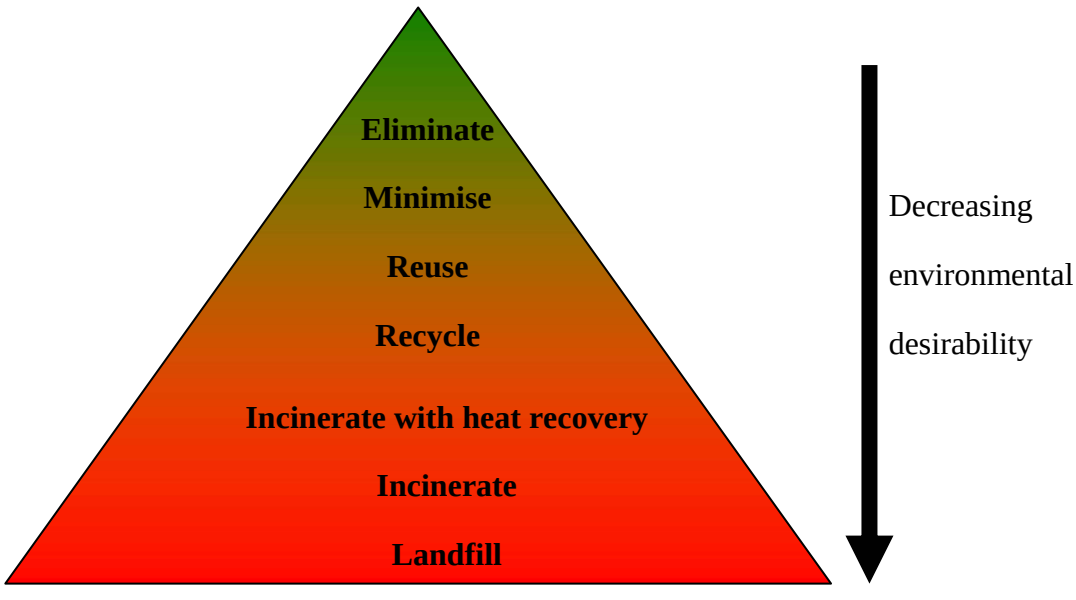
The optimum point in the supply chain for the identification of the best end of life (EOL) option for furniture, is prior to removal. The aim of this work package is to develop a standard procedure which could be used by Green-Works and adapted by other organisations. The work has concentrated on three main product groups:

- Operator chairs
- Office desks
- Pedestals

1.1 The waste management hierarchy

When looking at an EOL product or any material which is deemed to be unwanted by the owner, it is useful to consider options in terms of the waste management hierarchy - a series of options in decreasing order of environmental and economic desirability. When faced with a waste stream or unwanted product of any sort, the hierarchy provides a template to review the opportunities available.

Figure 1: The waste management hierarchy



From an environmental and economic perspective, it is always preferable to eliminate waste / unwanted goods at source, i.e. to not produce it in the first place. Attention should turn to the minimisation of the waste and the consideration of the potential for

reuse. The latter has the benefit of preserving the value of the embodied materials and energy.

If there is no scope for further elimination, minimisation or reuse of waste, attention should turn to recycling. This involves reprocessing the waste to enable its use in a new product. However, it should be remembered that this option will typically be less beneficial than reuse as it will involve the reprocessing of the materials for reuse – thereby loosing some or all of the embodied energy and the value of the materials.

After recycling comes the recovery of value in some other way, examples include composting and incineration with heat recovery. The final and least desirable options in the waste management hierarchy are those of disposal such as incineration without heat recovery and landfill. The latter has historically been relatively cheap in the UK, which explains why a large proportion of industrial and municipal waste has ended up in a hole in the ground.

2 Matrix

A wide range of variables affect the desirability / worth of a piece of EOL furniture to the collector. These include:

- Type of item (chair, desk, pedestal etc)
- Age
- Condition
- Number arising
- Location and lead time before they are available
- Style – modern or dated
- Brand name
- Size
- Demand vs supply at that moment in time
- Warehouse capacity

Consequently, any monetary values provided in this report are illustrative and subject to a wide range of fluctuation.

2.1 Operator chairs

Vast numbers of operator chairs are consumed in the UK each year, with 1.5 million new operator chairs being sold each year in addition to the reuse of existing ones. The vast majority of chairs are standard / low end varieties with limited resale potential at the end of their first useful life. Newer chairs and those in good condition might have a resale value of £10 to £50, but older or poorer condition items will solely have value through recycling. As the items will invariably have been designed for assembly

rather than disassembly, the labour involved in dismantling may be such that the items have a negligible or negative value through recycling. An alternative outlet for chairs with limited domestic reuse is export as a charitable donation.

At the top end of the quality market are prestige chairs such as the Herman Miller Aeron. A good example will have a second hand market value of around £250.

Table 1 below provides a quick guide to the potential use of chairs of different quality ranges. The timescale within which a chair is deemed "old" is relatively short, reflecting the deterioration of the soft elements of a chair – i.e. the foam and fabric.

Table 1: Matrix of re-workability for operator chairs

	Good condition &/or <2 years old	**Medium condition &/or 2-5 years old**	**Poor condition &/or >5 years old**
Standard chair	**Reuse or recycling**	**Recycling / overseas**	**Recycling**
Mid range chair	**Good reuse potential**	**Reuse**	**Reuse or recycling**
Premium chair	**Excellent reuse potential**	**Good reuse potential**	**Reuse**

Key:

High value: £250	Some value: £10-50
Good value: £100	No value: £0 to -£20

Consequently, the bulk of EOL operator chairs arising, will have limited value. Budget chairs make up the bulk of new sales (and hence the bulk of EOL arisings) and they are the least likely to be retained within organisations. Conversely, premium chairs will be considered for internal reuse, staff sales or direct sales (e.g. via Internet) – therefore being less likely to arise in EOL containers.

However, some companies prefer not to undertake internal sales for reasons including:

- Heath and safety at work – staff manoeuvring items of furniture for collection
- Storage issues after sale and before pick up
- Collection problems – opening the office out of hours
- Payment problems – most companies have no easy cheap mechanism of securing payment

- Items sold in error multiple times; arguments and disharmony in the ranks result.

2.2 Office desks

The potential lifespan of desks is significantly greater than that for chairs. Replacement will normally occur for aesthetic and functional reasons rather than due to any damage to components. The desking market has been subject to significant change in the past 10 years. Whereas large corner desks with curved fronts used to be a key element of the market, customers now want smaller rectangular desks with a maximum width of 1600mm. Consequently, many more corner desks arise than are required for reuse – with remanufacture into alternative products being a useful constructive outlet. Items in demand from a reuse perspective are those with an element of versatility – e.g. height adjustable desks. Other trends affecting the desire for desking include the increased popularity of remote working and the use of hot desking.

For damaged and obsolete desks the best practical option will be recycling or recovery. Similar routes applied to old designs – e.g. grey formica / plastic finish.

Table 2: Matrix of re-workability for office desks

	Good condition &/or <5 years old	**Medium condition &/or 5-10 years old**	**Poor condition &/or old design >10 years old**
Old style desk (corner shape &/or large)	**Reuse, remanufacture, recycling or recovery**	**Remanufacture, recycling or recovery**	**Remanufacture, recycling or recovery**
Modern desk (rectangular, 1600mm wide or less)	**Good reuse potential**	**Reuse, remanufacture, recycling or recovery**	**Remanufacture, recycling or recovery**
Premium desk (height adjustable)	**Excellent reuse potential**	**Good reuse potential**	**Reuse**

Key:

- High value: £250
- Good value: £50-£100
- Some value: £10-50
- No value: £0 to -£20

2.3 Pedestals

The design of pedestals changes much less than that of desks and chairs. Size tends to remain constant with the main variables being the colour and the number of drawers (2 or 3). Surfaces receive relatively light levels of wear (compared to desk tops). One potential problem is the difficulty of locating keys to pedestal locks, though the mechanisms are easy to replace. Consequently, there is a reasonable corporate resale market where suitable batches are available.

Table 3: Matrix of re-workability for office pedestals

	Good condition &/or <5 years old	**Medium condition &/or 5-10 years old**	**Poor condition &/or old design >10 years old**
Small batch size (1-10)	**potential**	**or recovery**	**recovery**
Medium batch size (10-100)	**Good reuse potential**	**Reuse, recycling or recovery**	**Recycling or recovery**
Large batch size (>100)	**Good reuse potential – corporate reuse**	**potential**	**Recycling or recovery**

Key:

Good value: £50

Some value: £10-50

No value: £0 to -£20