Topic 4: Manual handling

This *Topic* (dated November 2015) is an updated version of *Topic 4* which appeared in the 3rd edition of *Topics in Safety* (ASE, 2001). It has been updated in detail and in line with the latest guidance from the HSE but the practical effects of the changes are small.

Much more detailed guidance will be found in the Risk assessment filter, Appendix 3 of Manual Handling: Manual Handling Operations Regulations 1992 (as amended) - Guidance on Regulations[1] published by the HSE.

4.1 Introduction

'Manual handling activities [involve] the transporting or supporting of a load. This includes lifting, lowering, pushing, pulling, carrying or moving.'[2]

Both employers and employees often dismiss the problems caused by manual handling operations as not relevant to education because it does not appear to involve continuous heavy manual labour as seen in heavy industry. Some years ago, HSE stated that manual handling activities were responsible for over 40% of RIDDOR[3]-reported injuries amongst employees in education against 0.5% for accidents in laboratories and chemical handling[4]. It is unlikely that the figures have changed much. The consequences of injuries caused by manual handling operations going wrong are expensive both in time and money to the science team and the employer (eg, in employing supply staff).

A legal case may be brought against the employer, either through prosecution or civil action. A 60-year old employee injured her back lifting a 10 kg bucket of water out of a sink, resting it on the sink edge and lowering it to the floor. Compensation of £7920 was awarded[5] because a risk assessment would have revealed that the lifting process could have been avoided by the use of a hose. In another case, damages of £384,497 were awarded to an office worker who suffered severe back injuries when forced to carry boxes of stationery up staircases. The Metropolitan Police had failed to carry out a suitable risk assessment and provide training[6]. Either of these activities might well have been carried out by technicians or teachers.

Risk assessment for manual handling operations does not involve just the mass of the load. It needs to examine the nature of the task, the environment in which the task takes place and the individual's capability. The study of work operations is known as **ergonomics** and the aim of the assessment is to fit the operation to the individual, rather than the other way round.

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1 *Manual Handling: Manual Handling Operations Regulations 1992 (as amended) - Guidance on Regulations*, HSE Books, (3rd edition, 2004). ISBN 978 0 7176 2823 0. Available as a free download from **http://www.hse.gov.uk/pubns/priced/l23.pdf**

2 See footnote 1, above.

3 *Reporting of Injuries, Diseases and Dangerous Occurrences Regulations,* 1995 HSE Books, ISBN 0717610128. Now replaced by *Reporting accidents and incidents at work. A brief guide to the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR),* HSE Books, 2013. ISBN 9780717665747. Available as a free download from **http://www.hse.gov.uk/pubns/indg453.pdf**

4 HSE reported statistics for 1996/7.

5 Warren v Harlow DC (1997), *Health and Safety Briefing, No 166*, Croner.

6 Clark v Metropolitan Police. *Safety Management*, October 1999.

4.2 What the law requires

4.2.1 What the law requires of the employer

In schools, manual handling operations are best assessed by a team including senior management, safety representatives, teachers, technicians (who have hands-on experience of the problems) and other ancillary staff working together to provide recorded guidance to other members of staff. At such meetings staff will find that many of the tasks they carry out (eg, moving piles of text books) are common to many workers in education and model risk assessments already provided by the employer will apply. Information, assessment reviews, training sessions and keeping accurate records of accidents are important aspects of the team's work. Special tasks (eg, asking the technicians to clear laboratories for redecoration), need particular attention and last-minute risk assessments are unlikely be 'suitable and sufficient'.

The Regulations demand that, as far as is reasonably practicable, employees should avoid carrying out hazardous manual handling operations. In the first place, this should be done by redesigning the task, if possible. For instance if an activity requires moving fifteen, 7 kg microscopes down a flight of stairs to another laboratory, moving the students to the room where the microscopes are kept reduces risk of injury to the technician. A reluctance to move by teachers because 'it is not my room' is a poor excuse as the over-riding concern is for health & safety although student movement and behaviour in an unfamiliar location may be an issue.

A second stage is to examine whether any mechanical aids can be introduced. Schools should seriously examine the provision of hoists (especially when designing new laboratories or refurbishing old buildings) for moving material between floors and supplying suitably robust trolleys.

If avoidance of the task is impossible, then the employer has a duty to see that suitable risk assessments are prepared and, from these, deduce the steps required to reduce the risk of injury to the employee so far as is reasonably practicable.

The term 'reasonably practicable' has financial implications. The employer has to show that 'the cost of any further preventative steps would be *grossly* (ASE italics) disproportionate to the further benefit from their introduction.'

Just as hazardous chemicals are labelled with hazard symbols to inform the user that control measures are required, so a particularly heavy load should be labelled with its mass and if the load's centre of gravity is not positioned centrally, then this should be indicated too. Items, which can be considered particularly heavy, include vacuum pumps, autoclaves, water baths, low-voltage supply units, ramps, larger fire extinguishers, gas-cylinders, large containers of distilled water, weights, rocks, microscopes and 2.5 l bottles of chemicals. However, it should not be forgotten that small items can be piled up into a particularly heavy load. Five reams of A4 paper can weigh over 13 kg and a pile of text-books can be even heavier!

4.2.2 What the law requires of the employee

There is a duty in the *Manual Handling Regulations* to make 'full and proper use' of any system of work set in place by the risk assessments carried out by the employer. If trolleys, step ladders or bottle carriers are provided by the employer, that member of staff should use them!

4.2.3 Assessing the risk in manual handling activities

How do people with responsibility for examining manual handling in schools and colleges know when a risk assessment is required? It is necessary to filter out the tasks which present a minimal risk from those that could cause injury. For each recognised activity, the following table should be checked. If the answer is 'yes' to any of the statements in *Table 1*, then a more-detailed risk assessment needs to be carried out, initially using a list of the employer's model assessments

which then may be adapted to the school environment and personnel. Failing this, a special risk assessment with more-detailed control measures needs to be obtained and adopted.

Table 1 Manual handling tasks likely to require a risk assessment

Task	Load	Environment	Individual capability
The load has to be held away from the trunk (1). Twisting is involved. Stooping is involved. Reaching upwards is involved. The load is carried through a large vertical distance (2). The load is carried over a long distance (3). Frequent handling operations are involved (4). There is insufficient rest or recovery (5).	The load is heavy (6). The load is bulky (7). The load has a large surface area (8). The load is difficult to grasp. The load has sharp edges. The load is unevenly distributed. The load is continually moving inside the container. The load is toxic or corrosive.	There are constraints on posture (9). There are poor floors (10). There are stairs. There is poor lighting. The load is taken outside the building during inclement weather conditions. It is a windy day (11). There are students in the vicinity (12).	The load requires exceptional strength. The load is a hazard to those with a health problem. The load is a hazard to those who are pregnant. There is a need for special training.

Notes

(1) Not keeping a load close to the body increases stress to the spine and to the stomach muscles.
(2) Lifting from floor to shoulder height will involve a change of grip. Lifts from the floor should finish at waist height.
(3) If a load is carried more than 10 m, then the physical demands of the task could cause distress.
(4) 'Frequent' means the operation is repeated within two minutes.
(5) Two minutes recovery time is a reasonable guide.
(6) See section 4.3.
(7) If the dimension of a load exceeds 75 cm in any direction, then it could pose a risk.
(8) For example, poster boards and sheets of hardboard.
(9) Low work surfaces, low headroom or obstacles may lead to twisting, stooping or other poor postures.
(10) Wet floors are a particular hazard in laboratories.
(11) Crossing playgrounds can be a particular problem.
(12) Students create a number of obstacles, especially on stairs.

4.3 Assessment of a person's capability

4.3.1 Introduction

Design of the workplace is usually more important than the manual handling capability of individual staff. However, there are some important facts to consider about those involved in manual handling operations.

The lifting strength of women is generally less than that of men.

An individual's capability generally increases until the early 20s and declines in the mid-40s. Those in their teens and over-50s generally have similar capabilities.

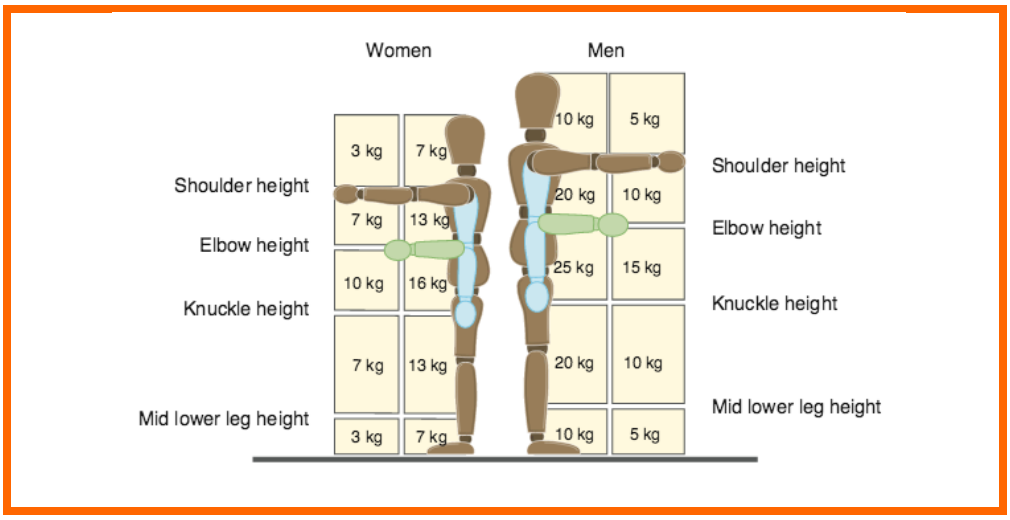
General fitness is important. Pregnancy seriously affects a woman's manual handling capability. Hormonal changes and posture problems (especially in the last 3 months of pregnancy) further reduce capability. It must not be forgotten that time is required after giving birth for full fitness to return.

The individual may have a disability or other health problem that affects his or her manual handling capability.

4.3.2 Guidelines for lifting, lowering and carrying loads over a short distance

Figure 1 gives a guideline to the masses of loads in various positions, relative to the body, that can be safely lifted or lowered for which it is felt that detailed risk assessments are **not** required unless environmental or health factors exist (see Table 1). The guideline figures are for infrequent lifting and lowering tasks. A fit man of average height/mass can cradle in his arms a load of 25 kg close to his body and carry it a distance of 10 m. A fit woman can carry a bucket, in each hand, each containing 6.5 kg (ie, a total of 13 kg) a distance of 10 m. The capability of carrying a load decreases the further the load is held away from the body. Those who are over-50 or under-20 should multiply the data in Figure 1 by 0.7. Those who are pregnant, disabled or have any other health condition should obtain medical advice as to what tasks they should not tackle which involves manual handling.

Figure 1 Suggested guideline figures for lifting and lowering tasks[7]



[7] From *Manual Handling: Manual Handling Operations Regulations 1992 (as amended) - Guidance on Regulations*, HSE Books, (3rd edition, 2004). ISBN 978 0 7176 2823 0. Available as a free download from **http://www.hse.gov.uk/pubns/priced/l23.pdf**. Diagrams are public sector information published by the Health and Safety Executive and licensed under the Open Government Licence.

People who take regular exercise and are very fit may be able to cope with heavier loads than those given in Figure 1 but even these individuals, working under good conditions, should not attempt loads more than twice as heavy as those shown. Injuries have been known to occur when far-heavier loads have been lifted in order to impress others.

Students up to 16 years old have an even lower capacity to carry loads and are not classed as employees. The use of students as gang-labour should be resisted. It has also been established that students who repeatedly carry heavy books (and science books can be heavy) and equipment to and from school and between lessons can consequently suffer musculoskeletal problems.

Sensible shoes and clothing should be worn for these operations. Also, if the weather is hot, there should be more breaks between tasks and plenty of water should be drunk.

If a risk assessment requires two people to lift the object as a team then they should not attempt to lift a load which is greater than two thirds of the sum of their individual capabilities. The team members should be of similar build and physical capability. If the load is uneven, the strongest member of the group should cope with the heavier end.

4.3.3 Guidelines for pushing and pulling trolleys

The knuckle-height values (in Figure 1) can be used as a guideline for the force required to move a trolley. If it is thought that a trolley is particularly difficult to move or a fire door requires a lot of effort to open, a Newton meter can be attached to a handle to check the force required to initiate movement. This should be no more than 250 N for men and 160 N for women. The force required to keep the load in motion should be less than 100 N for men and 70 N for women.

Trolleys should be used for the work they were designed to accomplish. A shelf-trolley with small wheels is unsuitable for pushing over rough ground between sites. For this work, materials and apparatus may have to be placed in boxes and transferred on sack trolleys, which have larger wheels and can cope with rough terrain. Trolleys should be regularly maintained, (eg, axles should be oiled).

4.4 Model risk assessments

Many tasks that are carried out in schools are very similar, so much so that a list of control measures can be produced after only a few minutes consideration. Naturally, as each establishment is different in layout, uses different apparatus and the capabilities of the personnel will vary, the control measures should be tailored and customised further. A list similar to Table 2 can be developed for the departmental health and safety policy. (It may also serve as a blue print for other departments and ancillary staff.)

Table 2 Control measures for manual handling operations

Hazardous situation	Control measures
Carrying equipment and materials to and from outside stores and laboratories	Avoid times when there may be ice on the pathway or high winds. Trolleys for outdoor use should have large robust wheels but should not be used if the surface is very uneven.
Carrying large bottles of chemicals around the department	Use special bottle carriers.
Carrying loads up and down stairs	Classes can be moved to laboratories where the special equipment is kept. In the short term, make sure that the load does not obscure one's view of the steps, the steps are in good condition and free of obstacles. Avoid busy times. In the long term, purchase additional sets of equipment regularly used so that movement up and down stairs is no longer necessary.

Hazardous situation	Control measures
Cluttered floors	Before the task begins, all clutter from prep room and laboratory floors should be removed. Doorways should be kept clear.
Congestion in corridors, etc	Items should not be moved between laboratories & prep rooms at change of lesson times, when substantial numbers of students are moving around. Another person could accompany the carrier to clear a path.
Damaged floors	Damaged floors which increase the risk of slipping or tripping, should be reported in writing, to the manager.
Moving equipment through heavy fire-doors	Fire doors with magnetic catches that release in the event of fire are available. Check the force required to open fire doors with a Newton meter to see if they need adjusting. The forces required should be less than those quoted for pushing and pulling trolleys (section 4.3.3). Another person could accompany the carrier to open doors. However, if alone, use wedges to keep the doors open while the task is carried out. Place small tables near doors to limit the amount of lowering and lifting being done.
Lifting awkwardly-shaped objects including vacuum pumps, large autoclaves, piles of text books etc	A two-person lift may be required. Particular care and extra help or guidance will be required if using stairs. Students should not lift heavy objects.
Lifting heavy objects	If possible, the mass of the load should be written on these objects. Consider taking heavy objects apart and make extra trips. (eg, separate a pile of text books).
Lifting objects from high-level storage, including ……	Store heavy frequently-used items at waist level so they can be moved sideways to a trolley. If rarely-used items need to be stored at a high level, use a suitable step ladder to reach them. Do not store one item behind another on shelves.
Moving gas cylinders between laboratories & prep rooms	Cylinder trolleys should be used. Cylinders should never be rolled along the floor. Moving medium-sized cylinders up and down stairs will involve more than one person in the lift. Larger cylinders are recommended for school use.
Moving general equipment between laboratories & prep rooms	Equipment trolleys should be used whenever possible. Trolleys should not be used for the temporary storage of exercise books etc. The need for security, ie, locking the store or prep room after removing equipment, requires the possibility of placing a heavy object on the floor. Small tables could be placed near doors to limit the amount of lowering and lifting being done.
Moving general equipment up and down stairs	A hoist is recommended especially in new and refurbished laboratories. Do not attempt to carry heavy objects (eg TVs) on one's own; classes should swap rooms instead. Any procedure involving stairs has a medium to high risk of injury. Special stair-trolleys are available but are not easy to use.
Moving general equipment along the same floor but with variations in levels	Consideration should be given to placing gentle slopes to avoid steps, thus allowing trolleys to move over a greater distance without being unloaded. However, this could cause problems during icy conditions.
Wet floors	Before the task, ensure spills are mopped up quickly until dry.

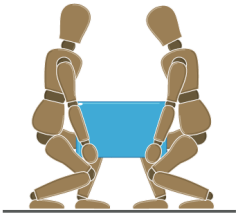
4.5 Special risk assessments

If the initial assessment of the task raises issues not covered in Table 2, a special risk assessment should be obtained, the findings of which should be circulated to all involved. Some activities which might precipitate such action are listed below.

- Laboratories are relocated to new buildings.
- Laboratories are being stripped down for redecoration.
- Rooms are being cleaned up after a serious fire.
- Time-table changes result in more practical periods being taught, resulting in more heavy loads to be moved about.
- The number of hours worked by technicians is reduced. Help for certain tasks will be less available and technicians will carry heavier loads to attempt to make up time.
- There are medical reasons for restricting the tasks being carried out.

4.6 Training

Training is an important part of the employer's duties. These should be organised regularly, especially when new staff join the department. It is also a suitable time to label heavy objects with their mass and review existing practices. Often it is only by doing a task that new and safer work practices can be established.



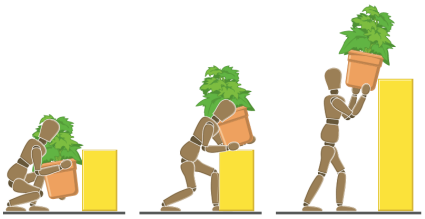
Techniques to practice include general lifting techniques (see Figure 2) and team-lifting (left).

The senior biology teacher could provide basic information about the spine and muscles and the senior physics teacher could provide information about mass and forces. Local authority health & safety advisers can sometimes provide suitable training (see Figure 2, see below).

Figure 2 Ten steps for safer manual handling[8]

1. Stop, think and plan the lift. Where is it going to be placed? Remove obstructions before you start.

2. Test the load by rocking it gently from side to side. Some loads are heavier than expected and some bulky loads may be lighter. If the load is beyond your capabilities, don't move it, seek help.



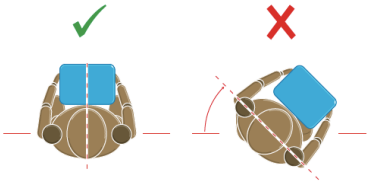
3. For long lifts, consider resting the load mid-way, in order to change grip.

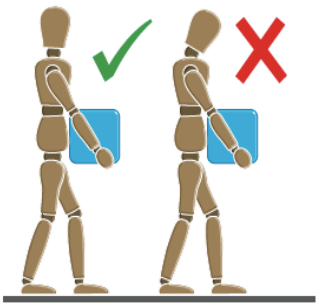
4. Place the feet apart, with one leg further forward than the other.

5. Adopt a good posture, bending the knees and keeping the spine in an upright position (tucking in the chin helps). It may be necessary to lean forward over the load. Stooping should be avoided.

6. Grip the object firmly. Where possible, hug the load close to the body. Keep the load as close to the waist for as long as possible.

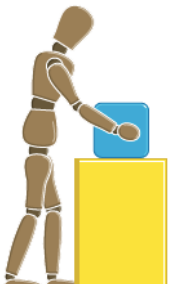
7. Lift the object smoothly using the thigh muscles, raising the chin in the process.





8. Do not twist the body, but move the feet if required. Do not jerk or snatch the load. Can the gap in the text be avoided?

9. Keep the head up when handling. Look ahead, not down at the load, once it has been held securely.



10. Place the object on the table and then slide it to the correct position.

[8] Adapted from *Manual Handling: Manual Handling Operations Regulations 1992 (as amended) - Guidance on Regulations*, HSE Books, (3rd edition, 2004). ISBN 978 0 7176 2823 0. Available as a free download from **http://www.hse.gov.uk/pubns/priced/l23.pdf**. Diagrams are public sector information published by the Health and Safety Executive and licensed under the Open Government Licence.