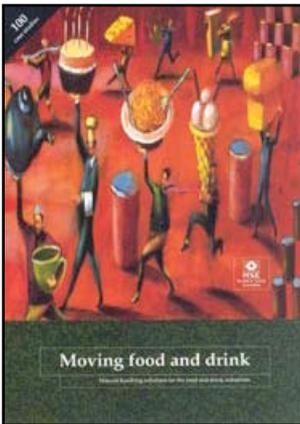


Moving food and drink

Manual handling solutions for the food and drink industries



**HSG196 (Second
edition, published 2014)**

This book is for all employers in the food and drink industries whose work might be putting their employees' muscles and joints at risk of damage. It shows simple and cost-effective ways of reducing both acute and chronic injuries – the solutions described were successful answers to actual problems experienced by companies.

The case studies cover raw materials handling, production, packing into containers, stacking/moving containers, handling equipment and off-site delivery.

The introduction in this new edition has been revised but the case studies remain unchanged.

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Introduction

These case studies are for all employers in the food and drink industries whose work might be putting their employees' muscles and joints at risk of damage. Work injuries may be acute, such as backstrain from lifting a heavy or awkward load. Or they may be chronic, such as backache, sore shoulders or elbows, or numb or tingling wrists and hands caused by repetitive work.

These examples show simple and cost-effective ways of reducing both acute and chronic injuries.

These are 'real life' cases – the solutions were successful answers to actual problems experienced by companies. The table starting on page 8 sets out a summary of each case study.

Who is at risk?

Risk of damage to muscles and joints ('musculoskeletal' risks) is not confined to particular sectors of the food and drink industries or types of people. In the food and drink industries, around one-third of reportable injuries are acute injuries caused by handling and lifting – over half of these injuries involve lifting heavy objects. Studies have shown that three-quarters of these injuries are preventable.

Additionally, back injuries account for around one-third of cases of occupational ill health in food and drink manufacture. Also workers carrying out lighter repetitive tasks, such as on production lines, can suffer from chronic (persistent) injuries, such as work-related upper limb disorders (WRULDs) which account for almost a quarter of cases of occupational ill health.

For both acute and chronic injuries the back, neck, shoulders and upper limbs are particularly at risk.

What are the main causes of injury?

In the food and drink industries, most musculoskeletal injuries arise from just five causes:

- stacking/unstacking containers (such as boxes, crates and sacks);
- pushing wheeled racks (such as oven racks and trolleys of produce);
- cutting, boning, jointing, trussing and evisceration (such as meat and poultry);
- packing products (such as cheese, confectionery and biscuits);
- handling drinks containers (such as in delivery of casks, kegs and crates).

Many of the case studies in this book deal with these five causes. By concentrating on these first in your workplace, you will maximise the effects of your efforts.

How do we know if we have a problem?

Injury and health problems show up in different ways, such as:

- cases of injury to backs and limbs;
- aches and pains;
- poor product quality;
- high material waste;
- low output;
- frequent employee complaints and rest stops;
- do-it-yourself 'improvements' to workstations and tools (eg seat padding);
- employees wearing bandages, splints, rub-ons, copper bracelets.

Talk informally to employees. Their comments may suggest you need to assess the risks in more detail. Some of these conditions are chronic and develop slowly. It is very important to catch them early. Make sure you have a system for employees to report problems, aches and pains. Encourage them to do so.

Why do we need to take action?

Regulations require you to assess health and safety risks to your workers. The most relevant ones for moving food and drink are the:

- Management of Health and Safety at Work Regulations 1999;
- Manual Handling Operations Regulations 1992;
- Workplace (Health, Safety and Welfare) Regulations 1992;
- Provision and Use of Work Equipment Regulations 1998.

On top of this, such problems are probably costing you money, from sickness absence, high staff turnover, retraining, loss of production etc. Compensation cases are increasing, and problems may affect your insurance premiums.

Adapting jobs to suit the individuals doing them often reduces fatigue and increases motivation and satisfaction. This leads to increased productivity and better health and well-being, as many of these case studies show.

How far do I need to go in implementing these case studies?

Employers are required to implement the most effective solution to eliminate or reduce the risk of manual handling injury. But you are not required to implement every applicable solution shown in this document – you are only required to implement solutions that are 'reasonably practicable'. Deciding what is reasonably practicable means balancing the level of risk against the measures needed to control the real risk in terms of money, time or trouble. However, you do not need to take action if it would be grossly disproportionate to the level of risk.

For example, you may find that the most expensive option is not reasonably practicable but that the cheaper option is the answer. Each manual handling task needs to be assessed separately, as a solution which may not be reasonably practicable in one part of the factory (eg because of low throughput) may well be reasonably practicable in another, busier part.

When HSE inspectors visit, for example to investigate a manual handling injury, they will look at the musculoskeletal risk the worker was exposed to and whether there are known solutions which are 'reasonably practicable'. If there are, you will be expected to have implemented them.

How do I implement solutions?

Good management is the key to analysing the problems and implementing solutions. This must include consulting with trade union safety representatives or other employee representatives. Some useful principles are given in the following list.

- Prioritise your efforts by giving precedence to tackling serious risks affecting a number of employees rather than an isolated complaint of minor discomfort.
- Try to consider a number of possible solutions – don't always take the first idea put forward. As well as looking at hardware options, also consider the importance of training, instruction, supervision and health surveillance in reducing injuries.
- When considering workstation design and systems of work, don't forget the importance of the general work environment such as the condition and slip-resistance of floors, workplace temperature, lighting etc.
- Simple solutions are often the best and can have a marked impact on reducing injuries.
- Try solution ideas out on a small scale and modify them if necessary before you move on to full implementation. What works in one situation may need adapting a little for another – and, importantly, check your solution has not caused new risks.
- Consult effectively with trade union safety representatives or other employee representatives and significant improvements in health and safety standards can be made. Apart from being a legal requirement and a useful input to the discussions, this will assist in workers having some ownership of the eventual solution which is then more likely to succeed.
- A team approach or task force helps a lot.
- The success of solutions depends on sensitive management of their implementation. Imposed solutions often don't work.
- Monitor the situation to make sure solutions are still effective at a later date and keep abreast of new technological developments. The solutions you implement now may be superseded by better ideas in months and years to come – but these case studies can help you now.

Table of case studies

Raw materials handling

Case study	Problem	Body area affected	Solution	Case study number	Page
Handling sacks of raw materials	Carrying 50 kg sacks	Back Shoulders Arms	Sack weights reduced to 25 kg	1	15
Tipping sack contents into sieves	Manually handling 50 kg sacks to hoppers	Back, Neck Shoulders	Scissor lifts with rotating turntables provided. Sack weights reduced to 25 kg	2	16
Emptying sacks into hoppers in a blending room	Lifting 50 kg sacks	Back Shoulders Arms, Hands	Sacks replaced with 1 tonne bags	3	17
Handling dry ingredient sacks	Lifting 25 kg sacks to hoppers	Back, Hands	Sacks replaced with 1000 kg bags	4	18
Emptying sacks	Lifting 25 kg sacks off pallets	Arms Shoulders Back	Vacuum bag lifter installed	5	19
Bag handling	Lifting 25–30 kg bags off pallets	Arms Shoulders Back	Big bag hopper using 350 kg bags provided	6	20
Powder bag handling	Lifting 25 kg bags off pallets and up steps	Back, Neck Arms Shoulders	Bags placed on new platform by lift truck. Vacuum bag lifter installed	7	21
Tipping ingredients into a hopper	Tipping 30 kg ingredient tubs into hopper	Back Wrists	Platform installed next to hopper to rest tubs on	8	22
Handling dry ingredient tubs	Lifting and tipping 25 kg tubs into hopper	Arms Shoulders Back, Hands	Tub weight reduced to 15 kg. Process to be automated	9	23
Lifting boxes and bags to a hopper	Carrying 15 kg boxes and bags from pallet to hopper	Back	Vacuum lifter installed. Increased working space provided	10	24
Rolling jam barrels	Rolling 250 kg barrels from delivery area to process area	Arms, Hands Back, Feet	Rolling barrels replaced by 1000 kg bin carried on lift truck	11	25
Emptying kegs	Lifting 25 kg kegs from pallet to hopper	Back Shoulders Arms	Kegs now lifted by vacuum lifting device	12	26
Drum delivery	Rolling 220 kg drums outside	Shoulders Back, Neck Hands	Drums now handled by fork-lift truck	13	27
Lifting rolls of plastic packaging materials	Lifting 60–75 kg rolls onto spindles	Back Shoulders Arms, Hands	Mobile electric reel lifting machine provided	14	28
Manoeuvring shrink-wrap film	Lowering heavy rolls of film from vertical to horizontal	Arms, Hands Back	Supplier asked to deliver rolls laid horizontal	15	30
Shrink-wrap lifting	Lifting 80 kg rolls of shrink-wrap from pallet onto a carrier	Back Shoulders Arms, Hands	Vacuum lifters installed	16	31

Case study	Problem	Body area affected	Solution	Case study number	Page
Handling reels of foil and plastic	Carrying the reels	Shoulders Upper back Neck	Battery-operated reel lifter supplied	17	32
Lifting reels of inner lining	Lifting 25 kg reels onto carrier	Back, Hands	Mechanical lifting aids with expanding chucks installed	18	33
Transport and loading of wrapping film reels	Lifting 75 kg reels from pallet onto machine	Arms Shoulders Back, Feet Hands	Overhead electric crane installed. Special lifting trolley to be purchased	19	34
Loading flat-pack boxes	Moving flat-pack boxes from delivery cage onto conveyor	Back, Hands	Lifting machines purchased to raise delivery cages to correct height	20	35
Lifting potato bin boards	Handling heavy boards in order to empty bin	Back Shoulders Arms	Bin-emptying process automated using water jets	21	36

Production

Case study	Problem	Body area affected	Solution	Case study number	Page
Putting stoppers into high-value whiskies	Manually inserting cork stoppers	Shoulders Hands, Wrists	Custom-made machines built to insert stoppers	22	37
Bottle-wrapping and wire-trimming operation	Trimming brass wire with hand clippers	Arms Shoulders Hands, Wrists	Machine provided to twist the wire and cut off excess	23	38
Wheeling racks of product around the plant	Strains and sprains from pushing/pulling racks	Arms Shoulders Back, Legs	Maintenance programme implemented for rack wheels	24	39
Moving pies in and out of ovens	Wheeled baskets used to move pies in tins had wheel problems	Arms Shoulders Back, Hands Wrists	Wheels and wheel-bearings changed	25	40
Transportation of processed meat	Moving heavy bins on roller-type pump trucks	Back, Legs Feet, Arms	Battery-operated trucks now provided	26	41
Cake decorating	Stooping and repetitive hand/arm movements	Arms Shoulders Back, Neck	Seats provided. Cake turntables now used. Job rotation	27	43
Lidding and de-lidding tins	Placing and removing 6 kg lids on baking tins	Arms Shoulders Back, Neck Hands	Machines installed for placing and removing lids	28	44
Tin-changing operation	Changing 10 kg tins on bread production line	Arms Shoulders Back, Neck Hands	Automatic tin store machine installed	29	45
Transporting pastry tailings	Carrying 30 kg bins to weighing scales	Back, Arms Shoulders Hands, Feet	Wheeled metal carts provided	30	46

Case study	Problem	Body area affected	Solution	Case study number	Page
Manual handling during potato inspection task	Arm fatigue from outstretched arms	Arms Shoulders Hands, Wrists	Ceiling-mounted arm supports provided	31	47
Lifting lids on a potato-blanching line	Lifting and opening heavy hinged lids on vessels	Arms Shoulders Back, Neck	Lid size reduced, counterbalance weights fitted on lids	32	48
Cleaning the rollers on a flake roller-drier	Risk of injury to upper limbs from reaching with heavy scraper	Arms Shoulders Wrists, Hands	Mechanical device installed to reduce physical effort required	33	49
Stirring cooking pots	Stirring large pots with heavy metal paddles	Arms Shoulders	Larger pots with mechanical paddles provided	34	50
Handling fish fillets	Lifting boxes of fish and lifting fish out of bins	Back, Arms Shoulders Neck	Boxes phased out. Hoists installed to lift and deposit bin contents onto production line	35	51
Abattoir job rotation system	Manually lifting quarters of beef and lamb	Arms Shoulders Back	Job rotation introduced	36	52
Beef quartering	Manually raising carcass portions to a ceiling rail using a rope	Arms Shoulders Back, Neck	Air-operated quartering hoist installed	37	53
Beef boning and trimming	Stretching and pulling to transfer meat from conveyor to trimming table	Arms Shoulders Back	New line installed which reduces manual handling	38	54
Removing waste during carcass processing	Shovelling waste off trimming line into container	Arms Shoulders Back	Waste conveyor and waste hopper with hoist installed	39	55
Handling and cutting pig carcasses in a butchery department	Manual lifting, pushing/pulling required to move carcasses	Arms Shoulders Back, Neck	Semi-automated handling system and new working procedures introduced	40	56
Reducing injuries at a meat-processing plant	High injury rate at slaughtering and butchering operations	Back Shoulders Wrists, Arms Hands	Formal training regime introduced using departmental trainers	41	57
Butchery department job rotation	Higher injury rate when returning from holiday	Arms Shoulders Hands, Wrists	Voluntary 'lighter duties' regime introduced	42	59
Hooking chickens onto a shackle line	Strenuous and repetitive work handling chickens	Arms Shoulders Back, Neck Hands	Process automated to transfer birds from one line to another	43	60
Hand-trussing of chickens	Excessive force required to truss chilled birds	Arms Shoulders Hands, Wrists	Birds now chilled after trussing	44	61
Loading bacon into a curing machine	Lifting trays above shoulder height to tip meat into hopper	Arms Shoulders Back, Neck	Trays replaced by stainless-steel tub lifted by hoist	45	62
Packing sliced meat	Packing of sliced meat causing repetitive strain injuries	Arms, Wrists Hands	Induction training, occupational health monitoring and job rotation introduced	46	63

Case study	Problem	Body area affected	Solution	Case study number	Page
Sharing manual handling best practice between sites	Multi-site company needed better communication of best practice	Back Upper limbs Lower limbs	Formal scheme set up to share best practice	47	65

Packing into containers

Case study	Problem	Body area affected	Solution	Case study number	Page
Biscuit tin packing	Upper limb injuries caused by denesting moulded inserts, packing biscuits and taping tins	Shoulders Arms, Wrists Hands	Packing workstations redesigned. New denesting and taping machines developed	48	66
Changes to working practices on a biscuit-packing line	Change in work practice led to upper limb problems	Arms, Wrists Hands	Working practice altered to suit employees	49	68
Savoury snack packing	Lifting 4 kg boxes onto shoulder height conveyor	Arms Shoulders	Conveyor lowered and workstation redesigned	50	69
Custard powder packing	Height of packing table necessitated staff working with arms above shoulder height	Arms Shoulders	Working height of packing table and conveyors lowered	51	70
Packing pork cuts	Lifting cuts of meat from bottom of large bin	Back Shoulders	Hydraulic bin lifting device provided	52	71
Skinless-sausage packing	Packing sausages into trays	Back, Arms Wrists, Legs	Job rotation and staff selection. Mechanical aids to be installed	53	72
Crating of chickens	Loading chickens into crates and lifting crates onto pallets	Back Shoulders Arms	Workstation redesigned with roller workbench and conveyor to prevent bending	54	73
Packing fish into boxes	Making up cardboard boxes, packing fish and carrying boxes	Back, Arms Shoulders Wrists, Hands Legs	Cardboard boxes replaced with plastic bins which are transported by pump trucks	55	74
Making up whisky bottle cartons	Upper limb problems caused by hand assembly of the cartons	Arms Shoulders Wrists, Hands	Hydraulic ram now used to help assemble the cartons	56	76
Packing bottles	Packing bottles into boxes caused upper limb problems	Arms Shoulders Back, Neck	New packing line redesigned to reduce upper limb problems	57	77
Palletising cases of whisky	Lifting cases from conveyor onto pallet	Back Shoulders Arms, Legs	Automated palletisers and scissor lifts with rotating turntables installed	58	78
Packing vending machine cups	Upper limb and back problems from loading cups into boxes	Back, Arms Shoulders Wrists	Custom-built packing machines installed	59	79
Package labelling	Applying adhesive label tape around polystyrene packaging trays	Arms Hands Wrists	Trays replaced with cardboard trays with label information ready printed	60	80
Picking customer orders in a warehouse	Picking and loading orders onto pallets, shrink-wrapping and moving pallets on pallet wagons	Back, Arms Legs	Metal-sided roll cages now replace the pallets, shrink-wrapping and pallet wagons	61	81

Stacking/moving containers

Case study	Problem	Body area affected	Solution	Case study number	Page
Palletising of finished product	Machine-paced task requiring twisting posture to load pallets	Back, Arms Shoulders	Scissor lift and turntable installed	62	83
Loading cases onto pallets	Machine-paced task requiring stooping posture to load pallets	Back, Arms	Vacuum hoist installed	63	84
Lifting wrapped product from conveyors	Lifting boxes from conveyor and stacking on pallets	Back Shoulders Neck, Arms	'Pick-and-place' robot installed	64	85
Loading sacks onto pallets	Machine-paced task requiring stooped posture to load pallets	Back, Arms Shoulders	Computerised palletiser installed	65	86
Palletising cases	Fatigue and strain injuries from loading pallets	Back, Arms Shoulders Neck	Conveyor system installed which eliminates manual handling	66	87
Pallet converter	Manual handling loads up to 50 kg from one pallet to another	Back, Arms Shoulders Legs	Pallet converter machine installed	67	88
Moving vegetable drums after weighing	Manually handling heavy drums	Arms Shoulders Hands, Back Feet	Wheeled steel bins introduced to replace drums. Weighing scales sunk into floor	68	89
Moving drums of tomato paste	Manually rolling 210 kg drums onto roller conveyor	Back Shoulders Arms, Hands Feet	Drum hoist installed to load roller conveyor	69	90
Finished product packaging	Carrying 25 kg kegs containing flavourings	Back, Arms Hands	Kegs replaced with easier-to-carry 10 kg boxes	70	91
Moving trays on wheeled trolleys	Pushing heavy trolleys of medicinal sweets caused injuries	Back Shoulders Neck, Arms	Improved trolleys purchased and load on trolley reduced	71	92
Transporting waste glass	Strain injuries from pushing 250 kg bins	Arms Shoulders Neck	Mini-skips provided, moved by fork-lift truck	72	94
Handling crates of miswrapped chicken	Carrying crates on slippery floor	Back, Arms Hands	Dolly wheel handtrucks provided	73	95
Trolley selection for easy manual handling	Wooden trolleys not adequate for the task	Legs, Feet	New design of trolley purchased which prevent loads falling off	74	96
Shrink-wrapping pallets	Weight of shrink-wrap and holder caused back and wrist aches	Back, Arms Wrists	Automatic shrink-wrapping machines installed	75	97
Improving handling during multiple picking operation	Injuries caused by multiple lifting of loads from shelves onto pallets/roll cages	Back, Arms Shoulders Neck, Hands	Warehouse and task redesigned to reduce injuries and improve efficiency	76	98
Unloading and transporting frozen foods	Awkward handling postures posed risks	Back, Arms Shoulders	Trolleys, job rotation and training stopped injuries	77	100
Handling of kegs	High injury rate caused by moving kegs in warehouse	Back, Arms Shoulders Neck, Hands	Keg handling procedures introduced and training given	78	101

Case study	Problem	Body area affected	Solution	Case study number	Page
Small keg handling	Backache caused by moving sample kegs at brewery	Back	Keg truck provided	79	102
Upending large kegs	Injuries caused by handling large sample kegs	Back, Arms Hands, Legs Feet	Specially designed metal lever provided to reduce effort	80	103
Upending whisky casks	Manually upending whisky casks weighing 500 kg	Back, Arms Shoulders	Portable cask-upending machine developed	81	104
Reorienting whisky cases in storage racking	Moving 500 kg casks caused back and shoulder strains	Back Shoulders Arms, Neck	Specialised ratchet hoist lifting aid device developed	82	105
Destacking cases of whisky	Destacking cases from pallets and loading them into shipping containers	Arms Shoulders Back, Neck	Loading now done by fork-lift truck using fork 'slip mats'	83	106

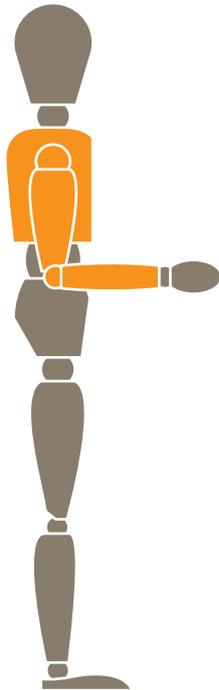
Handling equipment

Case study	Problem	Body area affected	Solution	Case study number	Page
Changing star wheels	Lifting 20 kg star wheels on and off machine	Back Shoulders Hands, Feet	Star wheel redesigned to halve its weight	84	107
Changing bottling machinery on-line	Carrying machine parts weighing up to 40 kg to machine	Arms Shoulders Back	Special parts trolleys purchased to move/store machine parts	85	108
Fitting chiller unit into vending machine	Lifting chiller units weighing 15–30 kg into vending machine	Arms Shoulders Back	Special adjustable-height trolleys provided to allow chiller units to be slid into position	86	109
Loading autoclaves	Lifting 20 kg baskets into top-loading autoclaves	Back, Arms	Top-loading autoclaves replaced with front-loading autoclaves	87	110
Carrying empty pallets	Removing 24 kg pallets from high stacks and carrying them up to 20 m	Back Shoulders Arms, Hands Feet	Pallet stack height reduced. Layout and stack locations improved	88	111
Removal of empty pallets	Carrying 35 kg pallets down steps	Arms Shoulders Back, Hands	Empty pallets now stored on a newly-built platform for subsequent removal by fork-lift truck	89	112
Handling waste bins	Lifting and moving bins of stones weighing 50 kg	Arms Shoulders Back, Neck	New method adopted using lighter bins, wheeled mini-skip and fork-lift truck	90	113
Handling stainless-steel fittings	Stooping to put fittings into floor-level soak baths	Arms Shoulders Back	Soak baths raised to waist height	91	114
Carrying maintenance toolboxes	Carrying 30 kg toolboxes long distances	Arms Shoulders Back, Neck	Engineers fabricated toolbox trolleys	92	115

Off-site delivery

Case study	Problem	Body area affected	Solution	Case study number	Page
Training in drinks delivery	Training draymen on-site caused difficulties	Back, Arms Shoulders Neck, Legs	'Training cellars' installed at main distribution centre	93	116
Delivering drinks to cellars	Lowering kegs into cellar with ropes	Back, Arms Shoulders Legs	Cellar hoist installed	94	117
Loading kegs	Loading 'returned' full kegs onto lorry using ramps	Back, Arms Shoulders Neck, Legs	Ramps replaced with swing-lift hoist fitted to vehicle	95	118
Moving cases of beer	Carrying cases of beer in shop and to customers' cars	Back, Arms Shoulders	New system of purchasing beer instituted, reducing carrying of cases	96	119
Delivering vending machines	Sales consultants lifting 50 kg vending machines out of estate cars	Back, Arms Shoulders Neck	Delivery outsourced to specialist removals company	97	120
Delivering chilled food products	Carrying boxes from van to retail outlets	Back, Arms Shoulders	Training course for drivers developed and implemented	98	122
Lifting egg boxes	Lifting 25 kg boxes of eggs onto trolley	Back, Arms	Egg box weights now reduced to 13 kg	99	123
Emptying fruit and vegetable boxes	Lifting 19 kg boxes on and off flat-bed trolleys	Back, Arms	Foot-operated hydraulic lift-trucks provided	100	124

Raw materials handling



Back
Shoulders
Arms

Case 1 Handling sacks of raw materials

Task

Suppliers delivered raw materials (eg sugar, crystal gum, gum arabic, pectin and liquorice) to the company's warehouse on pallets in 50 kg sacks. The pallets had to be unloaded manually, and the sacks carried to the hoppers at the start of the lines. The sacks did not have good handholds, and the contents were likely to shift unpredictably. The workforce in the delivery area needed to carry up to two dozen sacks per shift and pour the contents into the hoppers on the four lines.



Problem

The weight of the sacks and the distances over which they needed to be carried were regarded as representing a significant risk. Health and safety staff were aware of back strain injuries associated with the task.

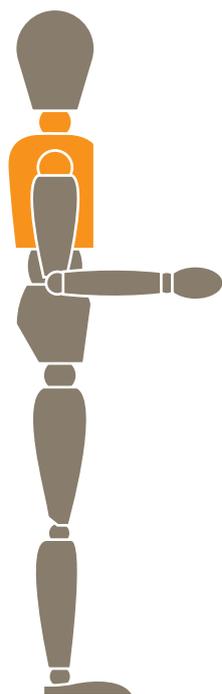
Finding solutions

The safety manager was aware of the Manual Handling Operations Regulations 1992, and that 50 kg was considered to be an unacceptable weight to repetitively lift in this situation. The company considered several solutions, including 'bulk' handling and mechanical lifting to the hoppers. However, both solutions were rejected – it was impossible to move to a bulk handling system for the raw materials, due to the small quantities needed for each run, and mechanical devices were difficult to operate in the often cramped conditions around the lines.

Eventually, the company put pressure on their suppliers to deliver the raw materials in smaller sacks. On its own, the company was too small (130 people in total) and did not buy in large enough quantities to exert significant leverage. But around the same time, many other companies were making the same demand and the manufacturers eventually started to deliver in 25 kg sacks.

Results

- The weight handled per sack was halved.
- The risk of injury and accident decreased.
- The number of complaints from staff reduced.
- There was no cost to the company. The decision removed the need for the company to consider capital investment. It was a better economic decision for their suppliers to change their quantities, as the cost to the supplier was then spread over many customers.
- No additional space in the warehouse and manufacturing areas was taken up as a result of the change.
- Although the smaller bags generated more paper sacks, the company was able to recycle them, which avoided extra cost in terms of landfill tax.



Back
Neck
Shoulders

Case 2 Tipping sack contents into sieves

Task

Raw materials such as flour, cocoa powder, sugar and oats were delivered to the site in 50 kg sacks, stacked on pallets. All these materials had to be sieved before they could be used. Staff had to lift the sack onto their shoulder and pour the contents into the hopper of a sieving unit. The top of the hopper was approximately 1.5 m above ground level.

Problem

The health and safety manager for the site recognised that manually handling 50 kg sacks at the hopper heights was risky, and could result in back, neck and shoulder injuries. Loads such as demerara sugar were delivered in plastic sacks, which were particularly hard to grip and handle, needing a two-person lift. When the level of the sacks on the pallet had dropped, staff would be stooping and bending to pick up the sacks from a low level. Dust and spillages also created a risk of respiratory problems and slips. The injury and accident rate for the area was thought to be high, although at the time there was no structured method for recording such incidents.



Finding solutions

A number of risk controls were put in place. The purchasing controller put pressure on the manufacturers to deliver the raw materials in 25 kg quantities. Two large scissor lifts, each with a rotating turntable on the top, were purchased. Ventilation equipment was fitted into place over both sieves.

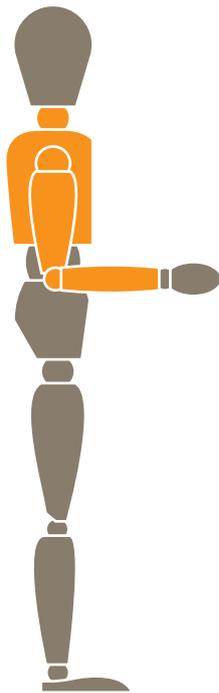
As a result, the task was changed considerably. A fork-lift truck delivered the pallets straight onto the rotating turntables. Staff operated the scissor lift to bring the top of the stack up to a comfortable working height. They lifted each 25 kg sack across to the sieve unit, placed it on a small shelf in front of the sieve hopper, and emptied the sack while resting the weight of the sack on the shelf. Safety footwear was provided to reduce the risk of slipping, and a clean-as-you-go policy was put in place for spillages.



Results

- The weight handled per sack was halved.
- The awkward postures associated with lifting the sack onto the shoulder were eliminated, as was the static loading associated with emptying the sack.
- General housekeeping in the area was better as the process was less prone to spillage.
- There was no longer a risk from dust inhalation.
- There was less raw material wastage.

Over the whole of this particular site, the reportable accident rate decreased from 40 per 1000 people to 10 per 1000 people within seven years. The health and safety manager believed the greatest benefit was attributable to the provision of good quality safety footwear. As a result of the decrease in accidents, the company's insurance costs halved.



Back
Neck
Shoulders
Arms

Case 3 Emptying sacks into hoppers in a blending room

Task

The task consisted of loading powdered drinks materials such as sugar, powdered milk, coffee and tea, into hoppers for dispensing into cups, which were destined for vending machines. Previously, the raw materials were delivered in sacks weighing up to 50 kg. Staff would have to slide the sacks from a pallet, slit them, and pour the contents manually into the hoppers. Some materials needed to be blended before they could be used, for example whitener and sugar. These would need to be tipped into a bin, which was then placed in a tumbling machine for mixing, before being transferred manually into the hoppers.



Problem

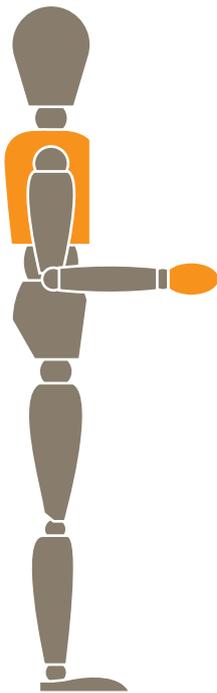
There were manual handling problems associated with lifting the 50 kg sacks repetitively over the course of a 12-hour shift. Other problems included dust from the sack slitting, and from raw materials falling out of the blending machine. Cuts and lacerations from the slitting operations also posed a risk to health and safety. The working environment was very difficult to keep clean. Several incidents of accident and injury had been recorded, associated with the operations in the blending room. The process was quite slow, and consistency of product quality was difficult to maintain.

Finding solutions

Following risk assessments, the company decided to get rid of the manual handling completely. They put into practice a 'big bag' method. The raw materials are now delivered in quantities of 1 tonne. These are lifted up and positioned over the hoppers using fork-lift trucks, and the materials are dispensed directly into the hopper funnels. The main cost was in modifying the discharge points above the machine.

Results

- The heavy, repetitive manual handling was completely removed.
- The risk of cuts and lacerations from the sack slitting was prevented.
- Throughput times were increased.
- Product delivery from the hoppers was more consistent in quantity and quality.
- Problems with dust and a dirty working environment were eliminated.
- Less wastage of raw materials left sticking to the inside of the sacks, and fewer waste sacks to deal with.



Back
Hands

Case 4 Handling dry ingredient sacks

Task

At a soft drinks company, 25 kg sacks of dry ingredient were manually lifted from a pallet to a hopper, slit open and poured in. Two operators (in rotation) would repeat this task approximately 160 times a day.

Problem

- The sacks were prone to unpredictable movements as they emptied.
- The operators were forced to twist and stoop when lifting sacks from the pallets.
- The sacks were difficult to grasp.
- Operators complained of backache.
- There was a potential for minor cuts when slitting sacks.

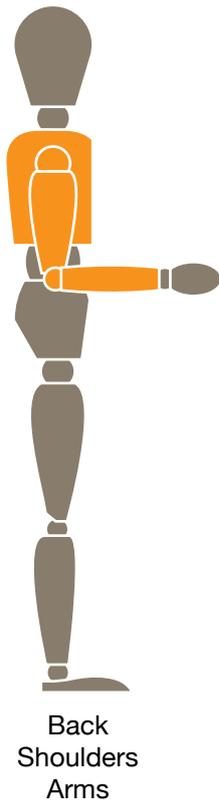
Finding solutions

Following a departmental risk assessment, the company installed a bulk bag unit. The dry ingredient arrived in 1000 kg bags and a fork-lift truck lifted the bags onto a hopper. The contents were automatically emptied into the hopper as and when required.



Results

- The manual handling element of this task was removed.
- Dust levels were greatly reduced.
- Operators had more time to concentrate on other areas of their jobs.



Case 5 Emptying sacks

Task

In the mixing section of a bakery, raw materials (malt flour, salt, improvers, etc) contained in 25 kg sacks were lifted manually from a pallet and carried a few paces to a workbench. The sacks were slit open and the contents tipped into a hopper. Each operator repeated this procedure approximately six times during a shift. In the event of the automatic flour silos not working, necessitating the manual emptying of white and wholemeal flour into hoppers, this task would increase to approximately 40 sacks per hour.

Problem

The first sacks were relatively easy to pick off the pallet, but as the height of the layers decreased, the operators found it more and more difficult to reach the product. The weight of the sacks dictated that the operators were predominantly fit males. Complaints were received by staff with regard to the weight of the sacks and the postures required (stooping, reaching, twisting) to lift the sacks from the pallet.

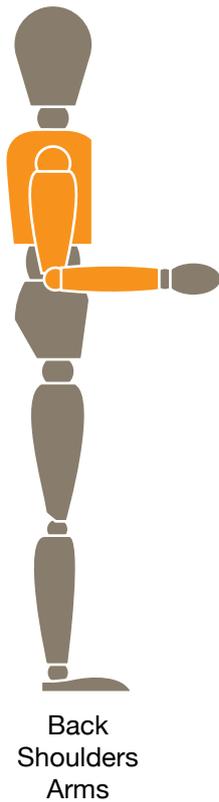
Finding solutions

The company installed a vacuum bag lifter which assists the operator in transporting the sacks from the pallet to the workbench.



Results

- The largest manual handling portion of the task was removed.
- There was an increase in productivity.
- All complaints associated with the task were removed.
- There was a reduction in strains and sprains.
- Any member of staff could perform the job without discomfort.
- Installation of the vacuum bag lifter reinforced employees' belief that the company cared about their safety. This has improved morale.
- There was improved organisation of the work area because the task could be carried out where the bag lifter was situated.



Case 6 Bag handling

Task

At a brewery, bags of filter powder (weighing between 25 and 30 kg) were lifted manually from a pallet to a yeast press hopper. The bags were slit and the contents were tipped into the hopper. This procedure was repeated approximately 40 times per day.

Problem

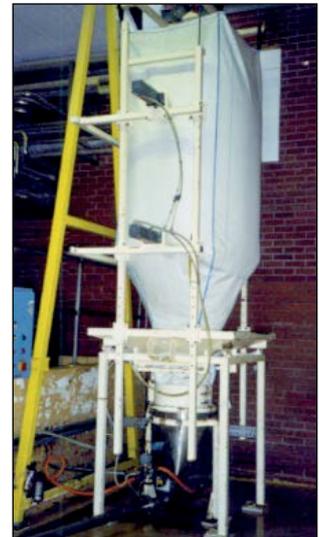
- The repetitive nature of the task.
- The weight of the bags.
- The unpredictable movement of the contents of the bags as they were tipped into the hopper.
- The brew house operators were required to stoop to pick up bags from the lower levels of the pallet.

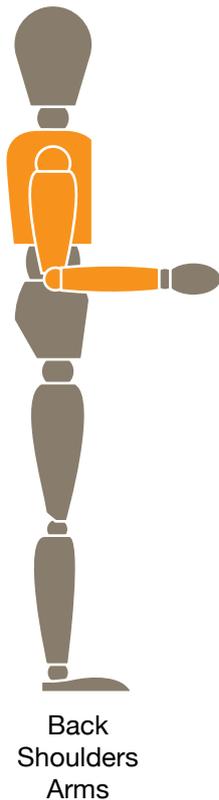
Finding solutions

Following a risk assessment, the company installed a big bag hopper. The filter powder arrived in 350 kg bags on a pallet, a pallet truck lifted the bags onto a hoist and the contents were automatically emptied into the hopper.

Results

- The manual handling portion of the task has been removed.
- Operators were no longer required to stoop.
- The company noticed an increase in productivity.
- There was an improvement in general housekeeping, with fewer bags to dispose of, and less dust.
- The company reduced the labour costs, as the sack splitter could be used on other tasks.





Case 7 Powder bag handling

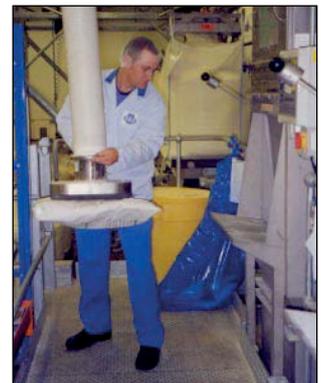
Task

In the powder handling department of a yellow fat spreads manufacturer, 25 kg bags of powdered milk-based ingredients were delivered on a pallet. An operator carried the bags, at a rate of 12–16 per hour, up seven steps to a platform containing a hopper.



Problem

- Operators were suffering from muscle strains/sprains and tiredness.
- Occasionally bags would be dropped resulting in wastage.
- There was a possibility that operators could slip or trip when transporting the bags.
- The operators had to stoop to reach bags from the lower layers of the pallet.
- The operators were holding loads away from the body when lifting bags from the middle of the pallet.
- Complaints had been received from the workforce.
- The operators were spending many days off ill.
- Compensation claims had been received.

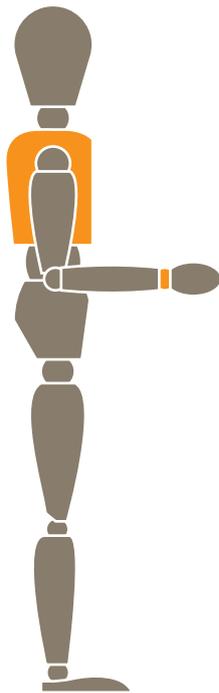


Finding solutions

The company built a platform and associated racking on a level with the hopper, on which the full pallets could be placed by a fork-lift truck. They also installed a vacuum lifter, which was used to transfer the bags from the pallet to the hopper.

Results

- The manual handling associated with the task was reduced.
- No further complaints were received from the workforce.
- Operators no longer suffer from muscle strains/sprains and tiredness.
- There was reduction in dropped bags and wastage.
- The operators no longer had to stoop to reach bags from the lower layers of the pallet or hold loads away from the body when lifting bags from the middle of the pallet.
- No further compensation claims had been received.
- There was an increase in efficiency, productivity and quality.



Back
Wrists

Case 8 Tipping ingredients into a hopper

Task

Operators tipped tubs of starches and spices into a hopper approximately 150 times per shift. Each tub weighed up to 30 kg.

Problem

- Operators complained of wrist and back injuries.
- Occasionally drums were dropped by the operators.
- Several minor injuries had occurred.

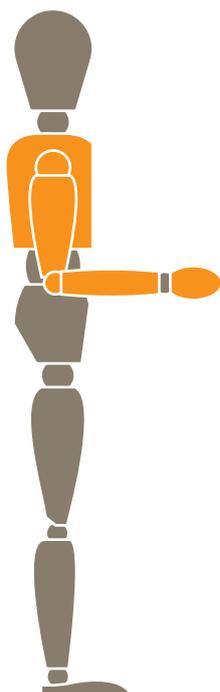
Finding solutions

The company installed a platform next to the hopper on which drums could be rested while the contents were tipped into the hopper.



Results

- There were no further wrist and back injuries.
- There is a reduced risk of dropping a spice drum.



Back
Shoulders
Arms
Hands

Case 9 Handling dry ingredient tubs

Task

In a bakery, dry ingredients such as salt, sugar etc were decanted into plastic tubs. The plastic tubs, weighing over 25 kg, were tipped into a hopper by an operative at the rate of ten per hour.

Problem

Following complaints that the tubs were difficult to grasp and tip into the hoppers, a risk assessment was carried out which identified the tubs as being too heavy. The operators had to stoop, twist and hold loads away from the trunk in order to carry out this task.

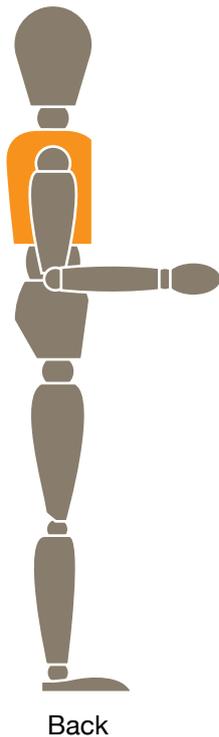
Finding solutions

The company plans to automate this task, but in the meantime they are using smaller tubs, which weigh approximately 15 kg.



Results

- The company achieved compliance with the Manual Handling Operations Regulations 1992.
- There was a reduction in hand injuries.
- All complaints associated with the task ceased.
- There was improved employee morale.



Case 10 Lifting boxes and bags to a hopper

Task

Boxes of chopped onions, weighing 15 kg, and bags of whole onions, weighing 15 kg, were manually carried from a pallet to a hopper. This task was carried out several hundred times per shift.

Problem

- The weight of the boxes and bags was a problem.
- Operators were required to stoop to pick up boxes and bags from the lower levels of the pallet and reach to pick up boxes and bags from the upper levels of the pallet.
- The work area was cramped.
- Operators complained of back strains.
- There were several reportable injuries.

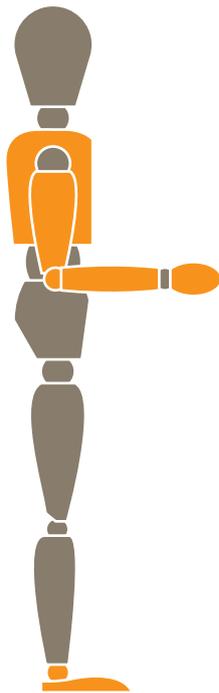
Finding solutions

The company installed a vacuum lifter that helped the operator in transporting the boxes and bags from the pallet to the hopper. The company also opened up the work area to increase space.



Results

- The largest manual handling part of the task was eliminated.
- The increased workspace allowed easier movement during the task.
- All complaints associated with the task ceased.
- There was a reduction in back strains.



Back
Arms
Hands
Feet

Case 11 Rolling jam barrels

Task

A brand of marmalade and jams is manufactured and packaged at a particular food manufacturer. Part of the process used to involve manual handling, by rolling 250 kg barrels of preserves from a palletised delivery area to a tank area. Once in the tank area, the jam was pumped from each barrel into a 'Skerman' where the product is heated up before going into the production lines.

Problem

There was a high incidence of cuts and bruises, slips and trips, abrasions, trapped fingers and feet, and back discomfort associated with this task.

Finding solutions

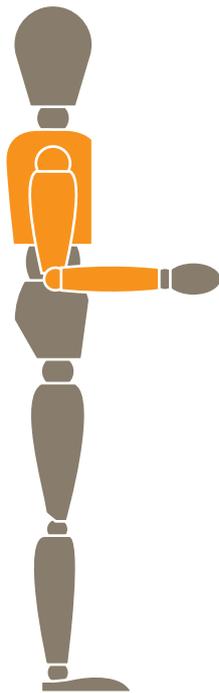
The company's management wanted to remove the need for manually handling the barrels. The solution was to have a 1000 kg 'flow bin' designed, which could be lifted into place beside the Skermans with a fork-lift truck.

Results

The benefits of the changes meant that:

- no manual handling of barrels was required;
- the injury and accident rate decreased considerably as a result of eliminating the manual handling of barrels;
- the replacement of four barrels by one flow bin greatly reduced the time spent on this part of the process;
- productivity/efficiency increased;
- the delivery and tank area were cleaner;
- there was better housekeeping as, without the barrels, there was more space in the area.

Many companies, particularly in the food industry, require amounts of product to be manually handled within the factory. The modifications described are a good example of how minor accidents, injuries and discomfort can be eliminated by changing the type of process used to carry out a certain part of the operation, ie using equipment which can be lifted mechanically rather than needing human input. As a result, not only has the risk of accidents and injuries been considerably reduced, but there have also been several other benefits in terms of increased productivity, better housekeeping and increased efficiency.



Back
Shoulders
Arms

Case 12 Emptying kegs

Task

At a flavourings company, 25 kg kegs containing raw materials were lifted manually off a pallet, carried to a hopper, and the contents were tipped into the hopper. Up to 24 kegs would be handled per shift.

Problem

Following an ergonomic assessment, several problems were found:

- the contents of the kegs were prone to unpredictable movements and a shift in weight as they were being tipped into the hopper;
- the kegs were difficult to grasp;
- the operators were required to hold the load away from the trunk, stoop to pick up the kegs, and reach up to the hopper;
- operators had to support the weight of the kegs while tipping.

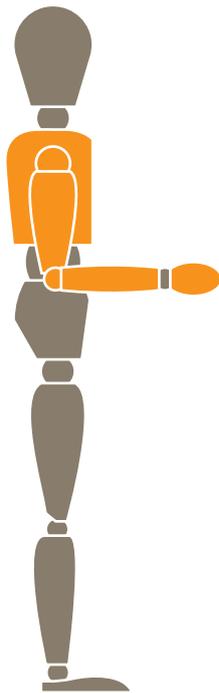
Finding solutions

The company bought an attachment to an existing vacuum lift that was designed to pick up kegs by suction.

Results

- The manual handling portion of the task was removed.
- There was a reduced risk of manual handling injuries.
- Productivity was increased.





Back
Shoulders
Neck
Hands

Case 13 Drum delivery

Task

In a flavourings company, 220 kg steel drums (1 m in height) containing liquid flavours were delivered to site by a supplier and rolled approximately 10 m, by an operator, to the liquid charging area. Two batches, each of six drums, were delivered daily.

Problem

- The drums contained liquids of varying densities and were prone to unpredictable movements.
- The drums were difficult to grasp and could easily slip out of the operator's hands.
- As the drums were rolled across concrete, metal splinters occurred.
- The operators had to reach and stoop to counterbalance the weight.
- Rolling the drums required technique and experience.
- The workforce complained about this task being 'awkward'.
- During winter months, the operators occasionally slipped on snow and ice.

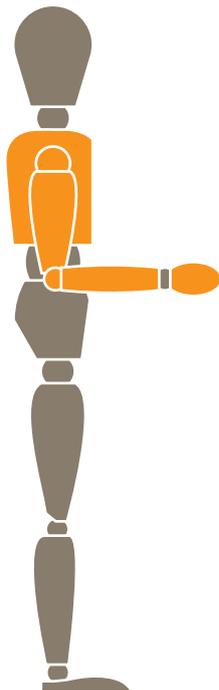


Finding solutions

The company arranged for the drums to be delivered into the plant (through steel shutter bays) by fork-lift trucks, directly to the liquid charging lines.

Results

- The manual handling portion of the task was removed.
- There was improved productivity.
- Operators did not have to go outside in bad weather.
- No further complaints were received from the workforce.



Back
Shoulders
Arms
Hands

Case 14 Lifting rolls of plastic packaging materials

Task

Sliced cooked meat was packed into 'thermoformed' plastic pouches, which consisted of a moulded plastic base and a plastic film lid. The plastic sheeting that goes through the thermoformer was delivered in rolls that fitted on an upper and lower spindle of the machine. The upper roll fed the film which made up the lids, the lower fed the film which made up the moulded plastic base.



The rolls of plastic film weighed between 60 and 75 kg. The rolls were between 420 and 560 mm wide, with a diameter of approximately 450 mm. The machine had to be loaded a couple of times per day. The rolls were difficult to grasp, had no good hand-holds and presented a risk of finger-crushing as they were loaded onto the spindles. The spindle heights were below knee level and above shoulder level. It was a two-person lift to get the rolls into place on the spindles, and changing the rolls required the lines to be stopped, so speedy replacement was also important.

There was also a risk of dropping the roll. If this happened, and it was damaged in any way, it could not be used because the film was then likely to jam in the thermoformer. At a cost of £500 per roll, this represented a significant and unnecessary loss. Staff often had to carry the rolls over significant distances to the lines, and the areas around the lines were cramped, so the rolls were difficult to manoeuvre. The whole operation took place in a chilled room, at a temperature of 8–10 °C.

Problem

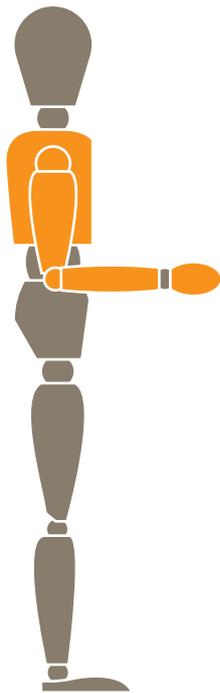
There had been several staff complaints about the difficulty of this manual handling task. One member of staff suffered a crushed finger injury when fitting the roll onto the spindle.

Finding solutions

The occupational health sister had brought the problem up at a safety co-ordinators meeting (held for all safety personnel across the company's sites). An electrically operated 'easy-lift' reel lifter had been in use at one of the company's other sites. The easy-lifter could pick the reels from the loaded trolleys, and then was pushed to the line, where the reel was slid across onto the spindle. She asked the manufacturer to give a demonstration to a team consisting of the production manager, the safety engineer, and a couple of employees from the line. This resulted in a week's free trial of the product, to try out in the cramped conditions of the packing lines.

The standard product turned out to be too wide to use on one of the packing lines. The manufacturer agreed to build a customised product to the company's required dimensions, and duly supplied it. They also



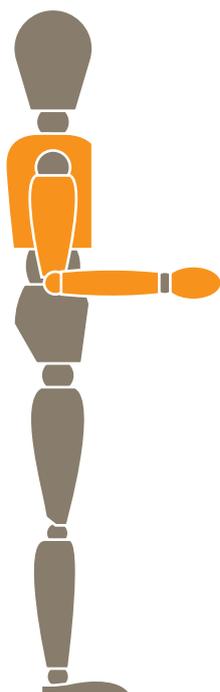


Back
Shoulders
Arms
Hands

designed and built a trolley for wheeling and storing an extra roll of laminate behind each line, ready for when the previous roll ran out.

Results

- The rolls could be handled more safely.
- Fewer people reported problems with backache associated with this task.
- The risk of finger-crushing was eliminated.
- A decreased risk of a major accident (the safety manager thought it would only be a matter of time before there was a serious accident associated with this activity).
- A decreased likelihood of dropping the roll and wasting the material.
- The solution has increased the flexibility of the workforce, as now anyone can do the task, on their own. Previously, it took two strong, fit people to change the rolls.
- As a spare roll is always in place, the line does not have to be stopped for so long when the reel is replaced.



Back
Arms
Hands

Case 15 Manoeuvring shrink-wrap film

Task

Rolls of shrink-wrap film, weighing 75 kg, were delivered to a packing department on pallets stacked two high. The rolls were presented standing upright (vertical) and had to be manoeuvred onto their side to load onto a carrier for transport to a wrapping machine.



Problem

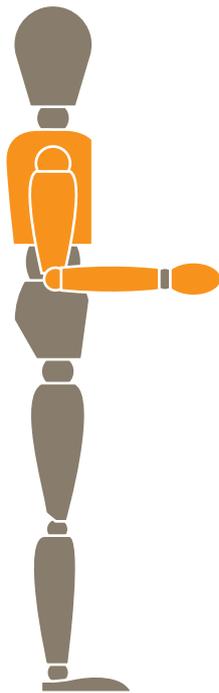
- The heavy reels had to be turned over to load onto the lifting device.
- Operators complained of excessive manual handling.
- The level of physical exertion needed to manoeuvre the reels was high.
- There was potential for trapped fingers.
- There was a risk of the reels slipping.
- There was a risk of dropping the (expensive) reels.

Finding solutions

The company asked the shrink-wrap film supplier to deliver the rolls on their side (horizontal). This was achieved at no additional cost to the business.

Results

- The physical exertion required to carry out this task was removed.
- Operators no longer had to stoop or reach.
- The potential for dropping the reels, or the reels slipping, was greatly reduced.
- Operators no longer complained of backstrain.



Back
Shoulders
Arms
Hands

Case 16 Shrink-wrap lifting

Task

Reels of shrink-wrap film, weighing 80 kg each, were delivered to a soft drinks company on pallets, stacked two high. The reels were turned onto their side using a metal pole and manually lifted onto a carrier for delivery to a wrapper machine. This task was carried out ten times a shift .

Problem

- The operators had to reach up to move the top layer of reels from the pallet, and stoop down to move the bottom layer.
- Operators complained of backache.
- The physical exertion needed to transfer the reels was high.
- There was potential for trapped fingers.
- There was a risk of the reels slipping.
- There was a risk of dropping the reels.

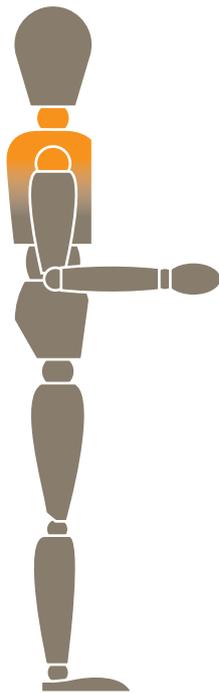
Finding solutions

A risk assessment was carried out as part of the company's policy to reduce manual handling. The company installed two vacuum lifters that fitted onto the end of the reels and lift them by suction. The reels are then transferred to the carrier.

Results

- The physical exertion required to carry out this task was removed.
- The operators no longer have to stoop or reach.
- The potential for dropping the reels, or the reels slipping, has greatly reduced.
- Operators no longer complain of backache.





Upper back
Shoulders
Neck

Case 17 Handling reels of foil and plastic

Task

After quality checks, medicinal sweets, eg for sore throats, were packed into 'blister' packs mechanically. The blister packaging was made up of PVC film underneath the sweets, and a sheet of foil on top to seal the packet. The foil and PVC were delivered in large reels. The foil reels weighed approximately 20 kg per reel, and the PVC (or PVDC) 35 kg. These reels had to be lifted onto the spindles of the packing machine. The spindle for the foil wrap was at approximately shoulder height, and that for the PVC below knee height and very awkward to access. The reels needed to be changed approximately six times per shift, depending on which products were being packaged.

There were no handholds on the reels, and consequently they were difficult to grasp. This presented a risk of dropping the roll. If this happened, and it was damaged in any way, it could not be used because the film was then likely to jam in the packaging machinery. The reels were delivered to the packaging area on pallets by fork-lift truck, but because of space constraints in the packaging area, staff often had to carry the reels over significant distances (5–10 m) to the lines.

Problem

There had been many complaints about the difficulty of this manual handling task. There had also been upper back, neck and shoulder strains and injuries associated with the task.

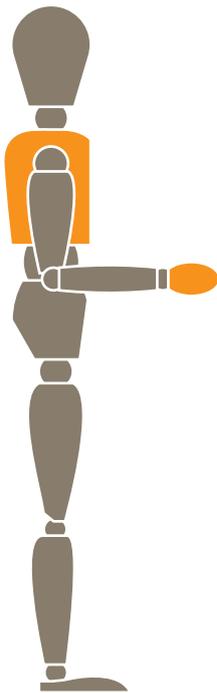
Finding solutions

The problem was discussed at the company's monthly health and safety meeting. The company had tried out a reel-handler three years previously, which had not worked well. However, they decided to look on the market again, to see if an improved product was available. They located a mobile, battery-operated reel lifter that lifted the reel to the correct height, where it could be slid easily into place by the operator.



Results

- The rolls could be handled much more safely.
- Staff in the area were delighted with the solution.
- The risk of injury and accident decreased.
- The likelihood of dropping the reel and wasting the material decreased.



Back
Hands

Case 18 Lifting reels of inner lining

Task

Reels of inner liner, weighing 25 kg each, were delivered to a cereal manufacturer on pallets, stacked three high. The reels were turned onto their side manually and either rolled to a packing machine, or lifted onto a carrier using a mandrel and hoist. This task was carried out every two hours.

Problem

- The operators had to stoop to roll the reels to the packing machine.
- The reels were difficult to grasp.
- Some back injuries had occurred.
- There was potential for trapped fingers.

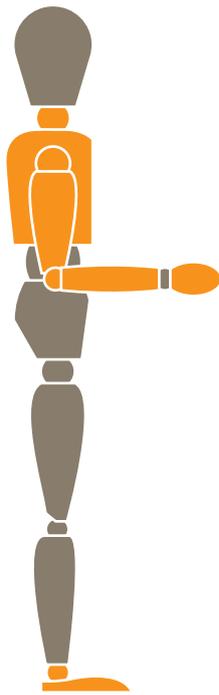
Finding solutions

A risk assessment was carried out as part of the company's policy to reduce manual handling. The company installed two lifting aids with expanding chucks which are inserted into the core of the reels and, by means of compression, the chucks tighten against the core and the operator is able to lift the reel.

Results

- The physical exertion required to carry out this task was removed.
- Operators no longer had to stoop.
- No further back injuries occurred.
- The company saw an efficiency increase.
- There was improved morale among the workforce.





Back
Shoulders
Arms
Hands
Feet

Case 19 Transport and loading of wrapping film reels

Task

In the filling room of a yellow spreads manufacturing company, reels of film used to produce the base (pot) and top (lid) of individual portion packs were manually turned and lifted, by two operators, from a pallet and placed on the filling machine. Each reel weighed 75 kg.

Problem

- There was a high incidence of strain injuries.
- The task was extremely strenuous.
- Occasionally reels would be dropped, resulting in wastage.
- There was a possibility of hands and feet being trapped.
- When turning the reels, the edges of the film would occasionally be damaged.
- There was a temptation for operators to carry out this task alone.

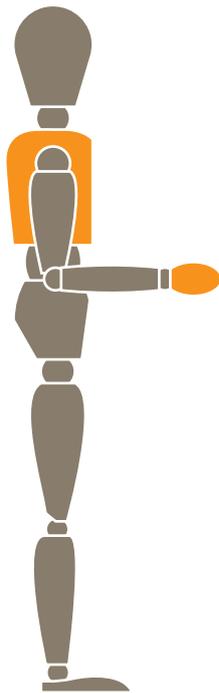
Finding solutions

The company installed an overhead electric crane. The crane was used to lift the reels from the pallet and onto the filling machine. The company also plan to purchase a lifting trolley that would be used to lift and turn the reels on the pallets.



Results

- There was a reduction in injuries.
- There were efficiency and quality increases.
- The task can be performed more speedily, resulting in less downtime of the filling machine.



Back
Hands

Case 20 Loading flat-pack boxes

Task

Packing line operators loaded flat-pack cardboard boxes onto a conveyor for transport to the packing machine. The flat-pack boxes were delivered in a metal cage. The operators loaded 20–40 boxes at a time. This was a continuous task.

Problem

- The repetitive nature of the task.
- The task was machine-paced.
- Operators were forced to hold loads away from the trunk and to twist.
- A stooped posture was required when picking boxes from the lower layers of the metal cage.
- The operators had to reach upwards when picking boxes from the top layers of the metal cage.
- There was a risk of cardboard cuts.
- Operators were complaining of backache.

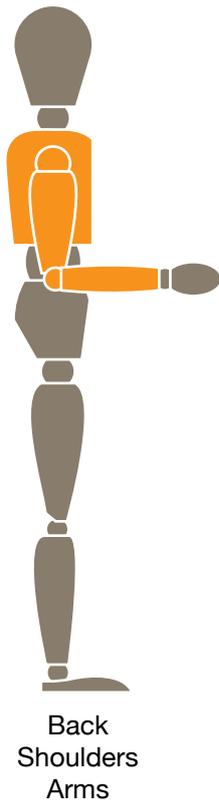
Finding solutions

After studying accident reports and liaising with safety representatives, the company realised that this task involved incorrect methods of lifting. The company purchased 17 lifting machines to move the metal cages to the correct height.



Results

- There was a more satisfied workforce.
- Reaching and stooping postures were removed.
- No further complaints of backache were received.
- There was a productivity increase.



Case 21 Lifting potato bin boards

Task

In a potato factory, potatoes were bought in and stored in potato storage bins, the size of a small room. When they were ready to be used, three of the heavy wooden boards that covered the entrance of the bin were removed and a hose was inserted. A worker would enter the bin and use the hose to force the potatoes into a flume to travel to the washing stage. If they could not be moved with the water, workers would use a tool, similar to a rake, and move the potatoes manually. Two people were involved in the task during each shift.

Problem

The task presented a manual handling risk as it involved stooping and reaching upwards while lifting the heavy 2.4 m wooden boards. There was a risk of splinters from the wooden boards and a risk of injury from operating the hose on the wet, uneven surface of the storage bin.



Although no manual handling injuries were directly associated with this task, the manual handling instructor identified a risk to upper limbs and back during a risk assessment and sought to implement preventive measures.

Finding solutions

The task was mechanised. A ground valve with a flexible hose was installed. The controls were situated on the wall outside the storage bin and when the water was turned on, two jets of water were sent around the bin at different angles. The water washed around the whole bin and was able to push all the potatoes into the flume. When the valve was opened, automatic plates at the front of the storage bin dropped down, providing a gradient to ease the access of potatoes into the flume.

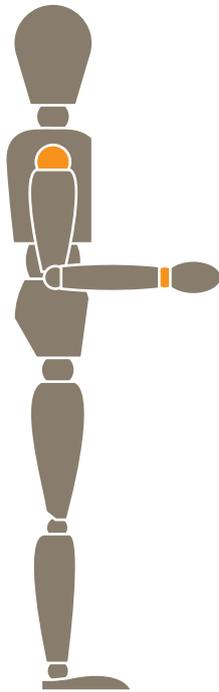
The wooden boards at the entrance of the storage bin remained in place to allow access to the bin if required, but they were reduced in size and weight to make them easier to handle.

Results

- The manual handling risk was reduced as the wooden boards did not need to be removed to perform the task.
- The number of workers required to perform the task was reduced.
- Workers found the task much less physically demanding as their role has changed mostly to one of supervision.

Production

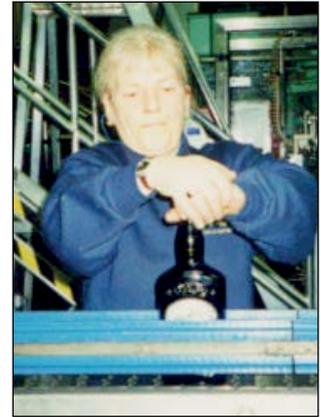
Case 22 Putting stoppers into high-value whiskies



Shoulders
Hands
Wrists

Task

'Mushroom'-shaped cork stoppers were used to seal high-value bottles of malt whisky. Cork was a difficult material to use mechanically, so the stoppers were inserted by hand. Staff put a leather patch onto their palms, locked their hands together and, raising their shoulders, used considerable force to push the stopper into the whisky bottle. Six people were involved in this operation, inserting anywhere from 3 to 14 stoppers per minute.



Problem

Staff hated this job. There were numerous complaints about hand and wrist ache, and also a risk of shoulder discomfort.

Finding solutions

The company purchased small mallets to tap the corks into place. However, this proved unsatisfactory on several counts:

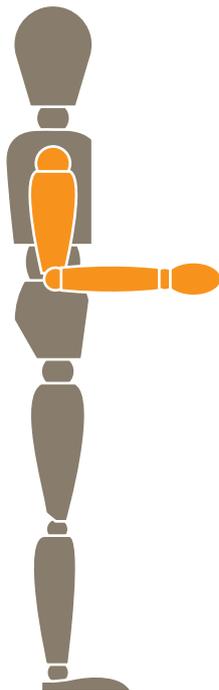
- Staff trapped their fingers between the stoppers and the bottle.
- They occasionally hit their fingernails with the mallets.
- The cork often split, so that when the customer took it out, pieces of cork would drop into the whisky.
- If the cork split, and the bottle was laid on its side, the contents could leak out.



In consultation with the staff on the line, the company engineers built machines that could insert the stoppers mechanically. The operators pushed the full bottles into the machine, inserted the stoppers into the machine, closed the machine guard, and a piston then pushed the stoppers slowly into the bottle. Some machines were designed for single bottles, where the operator held the cork in place, and using a foot pedal, a piston pushed the cork slowly into the bottle. The machines were all made in-house.

Results

- The risk of wrist, hand and shoulder discomfort was eliminated.
- Quality improved as the corks were no longer damaged by the insertion process.
- The amount of damaged product returned from the customer decreased.
- Staff morale improved, and they were very happy with the new method of cork insertion.
- The risk of finger crushing and nail bruising decreased.

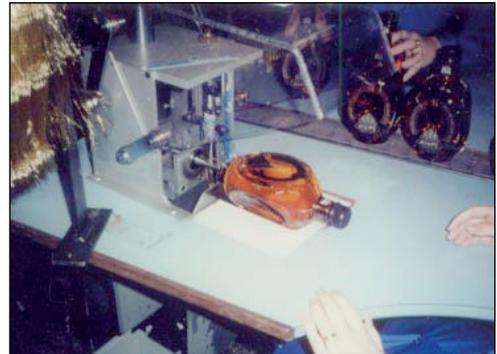


Shoulders
Arms
Hands
Wrists

Case 23 Bottle-wrapping and wire-trimming operation

Task

At a whisky-bottling plant, the packaging of one brand required a brass wire mesh to be placed over the bottle. On a conveyor line, operators wrapped the wire netting over the top of the bottle, fitted the excess wire into a machine, and pressed a button to activate the machine to twist the wire. At the next stage on the line, two operators used clippers to trim the remaining wire from bottles passing at a rate of almost one per second. Each operator performed the task for four hours per day.



Problem

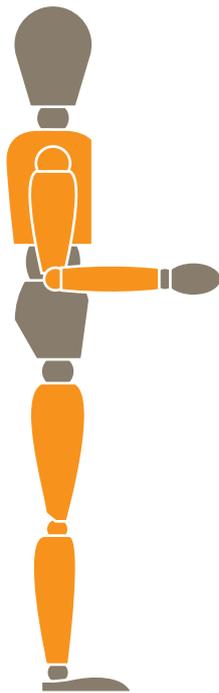
The operator held the clippers laterally with the blades pointed to one side because of the orientation of the bottles and the height of the conveyor. This caused the operators to bend their wrists downward as they repeatedly applied pressure on the clippers. The combination of such repetitive motions, poor wrist posture and high gripping forces presented a risk of upper limb injuries such as carpal tunnel syndrome or tenosynovitis. Some operators were reporting early symptoms of these disorders.

Finding solutions

A modification was made to the bottling line so that the operators placed the wire mesh over the bottles and then placed the bottles into a new machine that both twists the wire and cuts the excess wire. Six of the new machines were installed.

Results

- The need for manual trimming of the wire was totally removed.
- Productivity increased, and one less operator was needed to perform the wrapping operation.
- The number of operators reporting upper limb discomfort has reduced.
- There was 20% less waste from the excess brass wire clippings which represented a significant cost saving.
- The cost saving was significant through reduced wastage of wire, fewer staff and greater line efficiency.
- There was a significant reduction in the overall noise level, from over 90 dB(A) with the old wire-twisting machines to less than 80 dB(A) with the new machines.
- Quality gains were achieved through a more secure wrapping of the bottles, resulting in fewer re-workings.



Back
Shoulders
Arms
Legs

Case 24 Wheeling racks of product around the plant

Task

Full racks of pork cuts and empty trays were wheeled on trolleys around the plant to where they were needed. Nearly all members of the production staff would carry out this operation at some time during a daily shift.

Problem

Strains and sprains associated with pushing and pulling racks of product were common. The cause of these problems was often associated with damaged rack wheels. It was often difficult to determine whether a set of wheels was faulty until the rack was fully loaded, and the temptation was then to push it anyway, rather than unload and reload another rack.

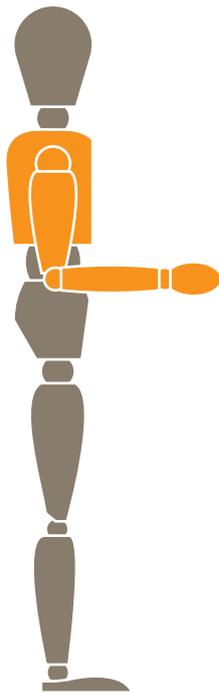


Finding solutions

The company implemented a preventive maintenance programme, and employed a 'fabricator' whose main job is to repair, maintain, and replace faulty wheels. All production staff were trained to report the slightest problems with any wheels to the maintenance department, and to put a marker on the faulty rack so that it would not be used. The costs were associated with employing a new member of staff on the maintenance team.

Results

- A dramatic decrease in accidents and injuries associated with pushing and pulling the racks.
- Fewer staff complaints.
- An increase in productivity. The higher standards of maintenance save time in loading/reloading, and searching for undamaged racks.



Back
Shoulders
Arms
Hands
Wrists

Case 25 Moving pies in and out of ovens

Task

Pre- and post-processed pies in tins were transported to and from ovens in metal baskets on wheels. The operation could require up to 140 baskets to be moved to and from the ovens. This could be up to 300 basket movement per shift, over a distance of 10–20 m.

Problem

- The baskets were awkward to push, pull and manoeuvre.
- The wheels on the baskets frequently seized up.
- There were several accidents and injuries.
- Complaints had been received from the workforce.
- The detachable pulley handle could come out of the coupling.

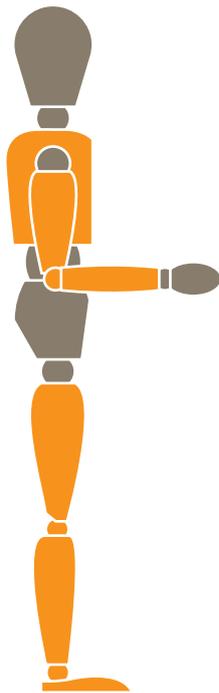
Finding solutions

The company changed the wheels and the wheel-bearings on the baskets.



Results

- The baskets were generally easier to push, pull and manoeuvre.
- The wheels no longer seized up.
- The pulley handle was located more securely on the coupling.
- There was a reduction in accidents and injuries.



Back
Arms
Legs
Feet

Case 26 Transportation of processed meat

Task

The company processes approximately 3200 pigs per day. Various cuts of meat need to be transported around the factory from one department or process to another. They were being transported in bins using roller-type pump trucks. The total weight of a bin could be more than a tonne, when full of the heaviest loads, pigs' heads. The company carried out a risk assessment of the pushing and pulling task in response to a perceived risk. They found several problems:

- A high pulling force was needed to start the load moving.
- A high pulling force was required to keep it moving.
- High braking forces were required for stopping the trolley.
- Part of the flooring, for example in the loading bay, consisted of ribbed aluminium that has a high coefficient of friction.
- The bins had to be pushed up an uphill gradient into the delivery vehicles.
- The bins had to be pushed over distances of up to 100 m, round corners etc.
- Conditions were cramped in certain areas, leading to considerable stop-start activity while moving the product.
- There was a tendency to use the hydraulics as a braking system. Occasionally people's feet would get trapped under the load as it hit the floor.
- There were sometimes stability problems with the loads.

Problem

The company had experienced injuries and accidents associated with this task. A back injury had occurred while pulling a heavy load. Staff had reported problems with backache and leg ache, and on several occasions foot-trapping had resulted from stopping the trucks with the hydraulics.

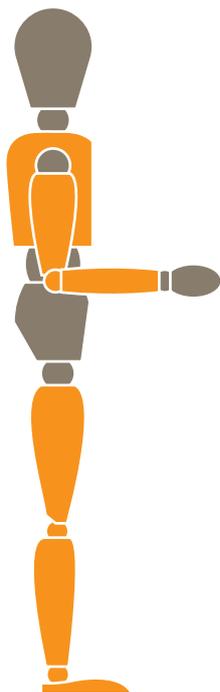
Finding solutions

The company wished to identify a cost-effective solution. They asked their supplier of fork-lift trucks if they knew of a suitable product that would make the task easier. Their supplier had a solution in the form of battery-operated power trucks. They rented 11 trucks and sent their staff on a half-day training course in the safe use of these trucks. Fifty people were trained to use them, and about a dozen people would be moving product around the factory at any particular time. The rental cost included daily inspection of the trucks by the supplier, and included any maintenance required. A reporting procedure was put in place and people use it to report any faults with the trucks on a daily basis.



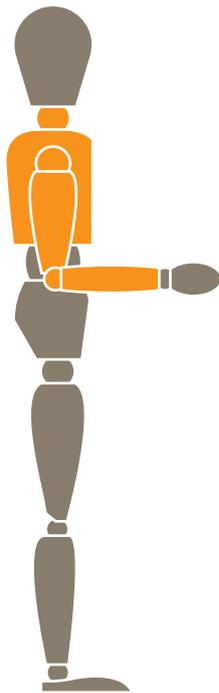
Results

- The forces required to start, stop and move the new trucks were negligible.
- The trucks were much easier to use, and could even be operated one-handed, if required.
- There were fewer complaints about the job.



Back
Arms
Legs
Feet

- Staff greatly preferred using the electric trucks to the pump trucks. The pump trucks were still used for some smaller loads.
- Changing the nature of the task reinforced employees' belief that the company cared about their safety. This improved morale.
- It gave management greater flexibility in the use of staff. Previously, only the strongest and fittest people could use the pump trucks. Afterwards, the task was so easy that any member of staff could do it without discomfort.
- Foot-crushing injuries were prevented.
- There were no accidents or injuries reported from the use of the electric trucks.



Back
Neck
Shoulders
Arms

Case 27 Cake decorating

Task

Operators at a confectionery company producing miniature gift cakes used an icing bag to add decorative swirls of icing (shelling) around the border of the cakes.

Problem

- To use the icing bag effectively, operators had to adopt stooped and static postures.
- Repetitive movements were required.
- The operators had to adopt static and fully flexed arm postures while supporting and squeezing the icing bag.

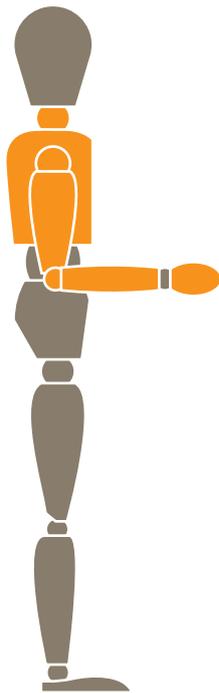
Finding solutions

The company provided stools (to perch on) and seats (with back and footrests). They also provided cake turntables which raise the cakes 10 cm above the work surface and allow cake rotation. A job rotation scheme was established.

Results

- Operators were able to choose between different standing and sitting postures.
- The cakes were nearer to the operators, therefore less stooping was required.
- Operators changed jobs on a regular basis.





Back
Shoulders
Arms
Neck
Hands

Case 28 Lidding and de-lidding tins

Task

One or two operators placed lids on baking tins and removed lids from baking tins at a rate of 650 tins per hour. Each lid measured approximately 0.7 x 0.6 m and weighed 6 kg.



Problem

Staff had been complaining about the repetitiveness of the task and also the weight of the lids. Putting lids on and taking lids off the tins caused the operators to stoop, twist and hold loads away from the trunk. Operators also had to reach up to the stacks of lids and were suffering burns when taking hot lids off the tins. If lids were placed on the tins incorrectly, the oven would jam.

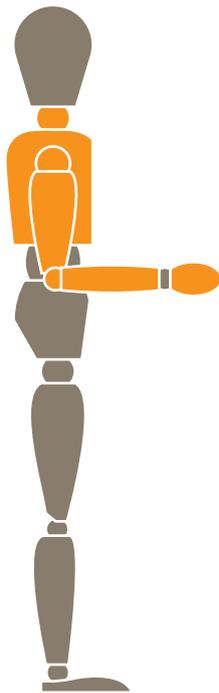
Finding solutions

The company installed a machine which put on the lids and a second machine which took off the lids.



Results

- Lids were placed on the tins correctly ensuring no oven jams.
- There was redeployment of the operators.
- All complaints associated with the task stopped.
- There was less noise.
- Burn injuries were eliminated.
- There was less congestion of workspace.
- Employee morale was enhanced.
- A significant annual cost saving.
- A reduction in damage to the lids, and the extended lid life reduced costs.



Back
Shoulders
Arms
Neck
Hands

Case 29 Tin-changing operation

Task

When a bakery altered the type of bread being produced, the tins on the line would need changing. Two to four operators would change 650 tins per hour. Each tin measured approximately 0.7 x 0.6 m and weighed 10 kg.

Problem

This operation was seen as one of the worst tasks within the factory. Staff had been complaining about the repetitiveness of the task and also the weight of the tins. Changing the tins required the operators to stoop, twist and hold loads away from the trunk. Tins and conveyors were often damaged by operators 'throwing' the tins onto the line. Operators were suffering burns when taking hot tins from the conveyor.

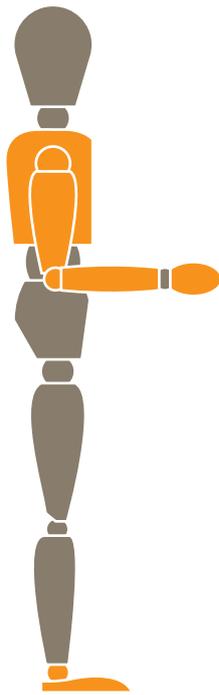
Finding solutions

The company installed automatic tin stores that remove tins from the line and place tins on the line.



Results

- Less tin and conveyor damage.
- Consistent tin throughput.
- All complaints associated with the task stopped.
- Burn injuries were reduced.
- Staff could be redeployed to other tasks.
- Lower noise levels.
- Tin wear was reduced, and the extended tin life reduced costs.
- There was improved employee morale.
- Consistency of stacking improved.
- Less congestion of the workspace.
- Significant annual cost saving.



Back
Shoulders
Arms
Hands
Feet

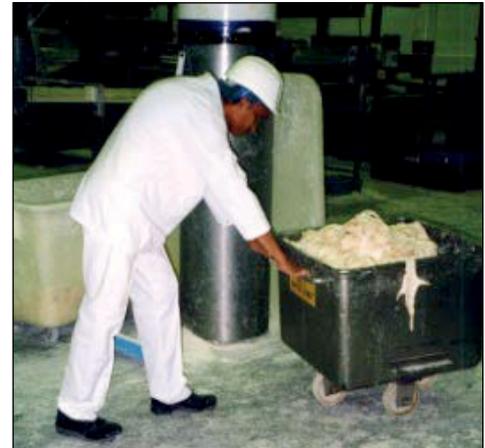
Case 30 Transporting pastry tailings

Task

Pastry remnants (tailings) left over from the cutting of pie lids were deposited into plastic bins. When full, the bins weighed up to 30 kg, and were then carried a distance of approximately 10 m to weighing scales. The tailings were then tipped into a mixer bowl for reuse. This task was carried out approximately 140 times per shift.

Problem

- Operators were suffering from backstrain.
- There were several accidents and injuries.
- Complaints had been received from the workforce.
- There was a tendency for hands and feet to be trapped while moving the bins.

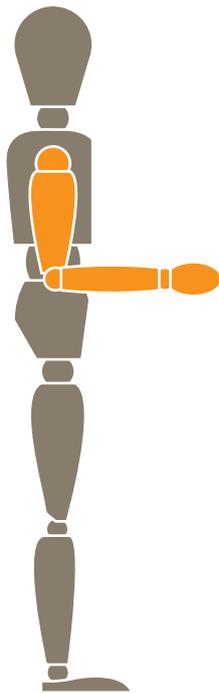


Finding solutions

The company replaced the plastic bins with wheeled metal carts that became available when a conveyor was installed in another part of the factory. The carts, weighing approximately 45 kg, are pushed by the operators to the scales and the required pastry is manhandled into the mixing bowls.

Results

- Manual handling was reduced.
- There was a reduction in accidents and injuries.
- No further complaints were received from the workforce.

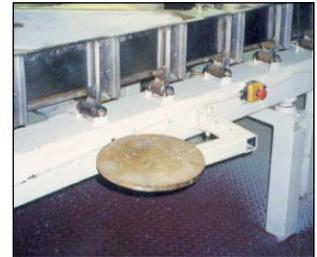


Shoulders
Arms
Hands
Wrists

Case 31 Manual handling during potato inspection task

Task

Inspectors in a potato factory inspected potato flakes on a vibrating inspection table and removed those that did not meet the specifications. Six inspectors were involved in the task and worked in eight-hour shifts.



Problem

The manual handling instructor noticed that the inspection task was similar to one in the packing area of the factory, where staff had complained of arm fatigue. The inspectors had been trained not to touch or rest their arms on the inspection table while working. However, the manual handling instructor realised that the inspectors needed a way of supporting their arms to prevent static loading of the muscles and to offer relief. He also noticed that the seating provided for the task, a wooden stool fixed to the vibrating table, was inappropriate as it would channel the vibrations to the inspectors.

Finding solutions

The manual handling instructor decided to install a long arm support, a 'Lady Penelope', which hung from the ceiling above the inspection table and was spring-loaded. The tension of the arm support could be customised to the weight of the inspector's forearm.



A stand stool (pedestal stool) was also provided for inspectors to rest on while performing the task. This was not connected to the vibrating table.



Results

- The inspectors were satisfied with the solution as it reduced arm and standing discomfort.
- All female inspectors used the Lady Penelope, but some men did not feel it was very 'macho' and refused to use it.
- The cost of the solutions for the Lady Penelope and stand stool were inexpensive.



Back
Neck
Shoulders
Arms

Case 32 Lifting lids on a potato-blanching line

Task

In a potato factory the potatoes were steam-peeled, cleaned, cut and then blanched in large vessels before being made into French fries. Workers needed to lift the lids off the vessels to load them with potatoes, and test the temperature. Nine workers were involved in the blanching process.

Problem

The blanching lids were large and insulated, which made them very heavy. As a result the task involved strenuous pulling to lift the lids, followed by strenuous pushing over a large distance to open them fully. The workers complained that the lids were too heavy and that they were finding the task difficult.



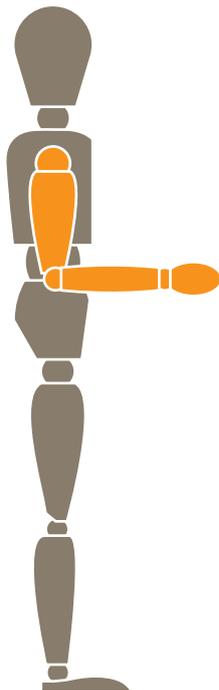
Finding solutions

An in-house risk assessment was performed and the manual handling risk to workers was identified. The problem was solved in two ways. The first part of the solution was to add a counterbalance to the lids to reduce the effort needed to lift them. With this system in place, the workers could lift the lids with little effort, ie move them up and down with their fingertips.

As a second measure, the size of the lid was reduced. A 6 m long vessel, which was originally covered by three lids, was now covered by four. This also helped reduce the weight of the lids.

Results

- Workers were happy with the solution and the complaints ceased.
- Manual handling risk was reduced.



Shoulders
Arms
Hands
Wrists

Case 33 Cleaning the rollers on a flake roller-drier

Task

In a potato factory, the potato mash was placed on large, 4 m-long roller-driers to remove the starch and transform the mash into potato flakes. Three rollers were used for the operation. The potato mash travelled down from the top to the bottom roller and was squeezed through the space between them to form the thin sheet of potato flake. Moving the product from one roller to the next was done manually using a 2 m metal scraper. Six workers were involved in this process.

Problem

The scraping task presented a risk of injury to upper limbs as it involved strenuous reaching and stretching while holding a heavy scraper, weighing approximately 10–12 kg. Workers identified the problem and one of them put forward a solution as part of the 'bright idea scheme' run by the factory.

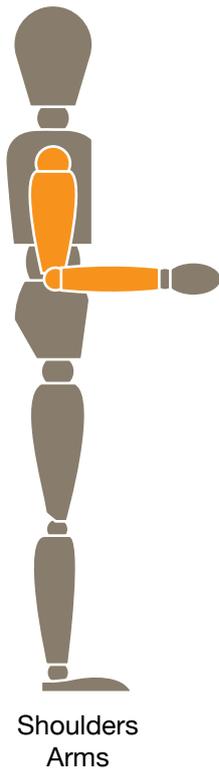
Finding solutions

The solution was to attach a stainless-steel bar with a number of thin metal rods or 'fingers' parallel to the rollers. The metal fingers were of different lengths to enable them to rest on the top and second roller. These fingers dragged the product off the roller and onto the one below it.



Results

- Mechanisation has reduced the risk of injury.
- Workers were satisfied with the solution as it reduced the physical effort required to perform the task.
- Fewer workers were required to perform the task.
- The worker who had thought of the idea was given a financial award. His idea also won 'bright idea of the year' for which he received an additional financial award.



Case 34 Stirring cooking pots

Task

Meat and vegetable fillings ('slurry') for pies and pasties were cooked in twelve 125-litre stainless-steel cooking pots for between 40 and 60 minutes per batch. The slurry was brought to the boil. Every five minutes, an operator would lift the lid and stir the pot with a large metal paddle, to stop the slurry sticking to the sides, and to distribute the heat evenly throughout the mixture.

Problem

The size of the pots necessitated a considerable reach to stir it correctly at the rear of the pot. If the slurry was viscous, stirring the pot could be quite difficult. There was a high turnover of staff associated with the production process in this area. Shoulder and arm discomfort had been reported.

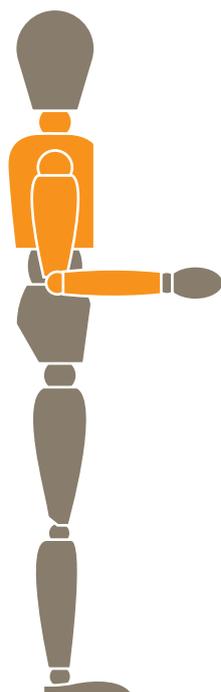
Finding solutions

Production of these products was due to increase. Instead of buying more of the 125-litre pots, the company identified an automated solution that could handle the larger quantities. It purchased three 300-litre pots second-hand from another of the companies in the group, which had a system of mechanically operated paddles for stirring the mix.



Results

- The company was able to handle the larger quantities required without increasing the manual handling risk.
- The company reduced the number of 125-litre pots from ten to four. Fewer staff were required to watch and stir the pots, and they could be redeployed to other tasks.
- There was an increase of 3% in yield associated with the larger pots.
- The risk of neck, arm and shoulder injury was decreased.
- The number of complaints and staff turnover in the area were reduced.



Back
Shoulders
Arms
Neck

Case 35 Handling fish fillets

Task

Frozen fish fillets were stored in bulk plastic bins (1.2 m long, 1.0 m wide, 0.75 m high) which hold 227 kg of fish, or cardboard boxes (60 x 38.5 x 30 cm) which hold 23 kg of fish. These bins/boxes were transported to the various process lines. The fish were then lifted out of the bins or tipped out of the boxes, and deposited onto the process line.



Problem

When using the bins, the first pieces of fish were easy to pick out, but as the height of the fish layers decreased, the operator found it more and more difficult to reach the fish product. When using the cardboard boxes, the operators found them difficult to lift.

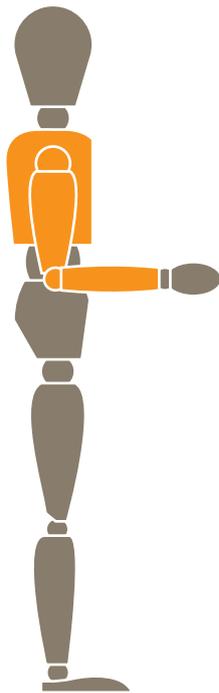
Finding solutions

The company phased out the use of cardboard boxes. To remove the reaching associated with the bins, they worked with a local engineering firm to design and build a hoist that lifted the bin to process line height and tilted the bin to deposit the fish onto the line. The company purchased 15 of these hoists.



Results

- There were fewer complaints about the job.
- The risk of back injury was removed as the leaning and lifting element of this task no longer existed.



Back
Shoulders
Arms

Case 36 **Abattoir job rotation system**

Task

Jobs in abattoirs often involve considerable amounts of strenuous manual handling. Even with a roof-rail system in place, fore and hind quarters of beef and lamb may still need to be lifted, pushed and pulled to different locations. Whole carcasses sometimes need to be loaded into vans for onward delivery to customers. The ten or so people who moved the carcasses around in one company abattoir were known as 'humpers'.

Problem

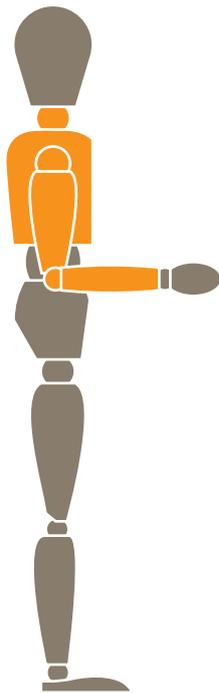
The company had recognised that the abattoir tasks involved a lot of strenuous lifting and handling. They had also noticed a high turnover of humpers in this department.

Finding solutions

The company put a job rotation system in place. There were other tasks in the abattoir that the humpers and other abattoir staff could alternate between. These included tagging and bar-coding the carcasses (so each carcass can be tracked from farm to customer); weighing them; moving product to holding chillers; and operating hand trucks to move pallets. People were moved from the most strenuous jobs before they became fatigued, and all took turns at the heavier and lighter jobs over the course of an eight-hour shift. This solution did not cost the company anything to implement.

Results

- There was a noticeable reduction in labour turnover among staff working in the abattoir department.
- The company recorded improvements in productivity.
- The variety in people's jobs improved, as they carried out several different tasks during the course of a shift.
- The staff in the abattoir operated more as a team. Staff morale and satisfaction also improved as a result of the changes.



Back
Shoulders
Arms
Neck

Case 37 Beef quartering

Task

Beef quartering involved cutting a beef carcass in half using a hand-held air saw. The carcass was suspended from a ceiling rail using a hook through the H-bone. It was cut horizontally through the middle, to separate the fore and hind portion. When the carcass was severed half way, the operator attached a rope to the forequarter, then, using his body as a counterweight, the operator swung the rope and lower portion of the carcass up onto another hook on the ceiling rail. Once on the hook, the cutting of the carcass was resumed until the fore and hind portions were severed and on different hooks. Eight men (humpers) worked in the quartering hall and quartered up to 200 carcasses during their eight-hour shift.

Problem

An in-house risk assessment identified the high manual handling risk as the task involved twisting, bending, and strenuous pulling of the carcass to swing it onto the adjoining hook. The loads were also very heavy, up to a quarter of a ton. The working environment was chilled to 3 °C, which increases the risk of injury to muscles. Accidents and injuries had occurred to operators quartering the carcasses.

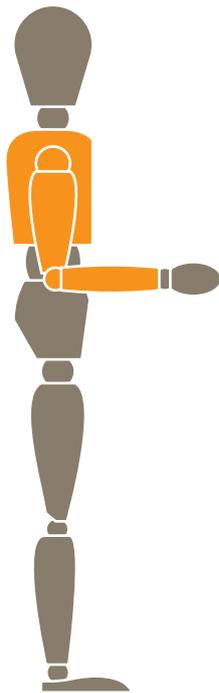
Finding solutions

An air-operated quartering hoist was installed which lowered a small portion of the ceiling rail containing a hook. The beef was cut half way and then the operator attached the piece of rope to the forequarter as before. Instead of hauling the carcass onto the second hook manually, the operator used the hoist to lower a section of the overhead rail. The loose end of the rope was fitted over the hook. Using the hoist, the rail, hook and carcass were raised up to a comfortable height for cutting through the rest of the carcass until the two portions were separated.



Results

- The manual handling risk was reduced as the weight of the forequarter is taken by the hoist.
- The need to bend and twist was reduced.
- Time taken to complete the task was reduced.
- There was a considerable reduction in the number of accidents.
- The number of compensation claims lodged against the company reduced by 95%.



Back
Shoulders
Arms

Case 38 Beef boning and trimming

Task

In the boning hall of a meat factory the beef was boned (meat cut away from the bone) and then trimmed (the different 'cuts' of meat are prepared, and fat and gristle removed), before being sent to the retail packing stage. During this process the quartered beef carcass was transported by a ceiling rail to a platform where a worker cut it into smaller pieces before lifting it onto a conveyor belt situated in front of the platform. The boners/trimmers stood behind tables at both sides of the conveyor belt and, using a meat hook, pulled the pieces of meat towards them. From this large piece of meat they would prepare and trim several joints. Once finished, each joint was lifted back onto the conveyor belt. The leftover bones were carried to a waste container. A team of up to 15 operators was involved in this process.

Problem

This set of tasks presented a manual handling risk because it required the lifting of large pieces of uncut carcass in awkward postures. The boners/trimmers had to stretch with the hook to reach the meat, followed by strenuous pulling of the meat to transfer it from the conveyor belt to their trimming table. They also had to support part of the weight of the meat in one hand during boning and to lift the joints back onto the conveyor at the end of the process.

Although no manual handling injuries were directly associated with this task, the health and safety manager identified a risk to upper limbs and back and sought to implement preventive measures.

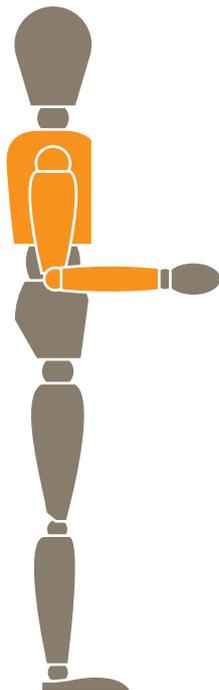
Finding solutions

The company designed and installed an 'eez-away' line to reduce the amount of manual handling. The quartered beef is transported on a rail system, the speed of which can be controlled by the operator. A hook is attached to the main bone in the carcass and, as the operator cuts, it gradually pulls away the bone. As the operator cuts out each joint, they are placed on the table in front of the trimmers, who are situated at right angles to a removal conveyor. At the end of the line, the bone drops directly into the waste container.



Results

- The 'eez-away' line greatly reduced the amount of manual handling and the physical effort required to perform the task.
- The ceiling hook takes the weight of the meat during boning.
- The need to stretch and pull large pieces of meat with a hook was removed by placing smaller cuts directly onto the butchery and trimming tables.
- The new location of the tables also reduced the need to stretch to place the meat on the conveyor belt.
- Workers found the task much less physically demanding.
- They also expressed satisfaction with the placing of the meat directly on the tables as, unlike the conveyors, the meat was located within easy viewing distance.
- Productivity on the line improved.
- There were fewer knife cuts.



Back
Shoulders
Arms

Case 39 Removing waste during carcass processing

Task

During preparation of joints of beef and lamb, fat and gristle was removed from the cuts of meat before being sent to the chilling stage. The waste fat and gristle was shovelled from the trimming line into a waste container.



Problem

The waste removal was a repetitive, strenuous task. Operators had to bend to shovel the materials off the trimming line, lift the shovel-load to waist height, and empty it into a waste container.

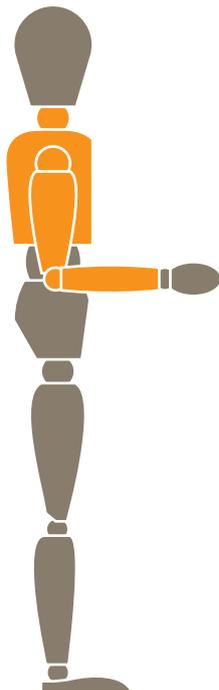
Finding solutions

The company installed a conveyor, a waste hopper and hoist to reduce the amount of manual handling. The conveyor transports the waste fat and gristle along the trimming line and drops it directly into the hopper. When the hopper is full, it is lifted hydraulically and tipped into the waste container.



Results

- The risk of manual handling injury from the repetitive shovelling was reduced.
- Productivity improved, as the shovelling operator could be used on other tasks.
- Housekeeping in the area improved as there was less chance of spilt waste materials causing a slip hazard.



Back
Shoulders
Arms
Neck

Case 40 Handling and cutting pig carcasses in a butchery department

Task

Quartered pig carcasses from the chiller room entered the butchery department one by one on overhead rails. Each butcher took a side of meat off the rail and made a series of smaller cuts from the piece. They placed the smaller cuts into an 'asheet' (deep plastic tray) which was then lifted onto a conveyor belt and lifted off at the end and stacked before further processing. Over 100 people were employed in the butchery department.

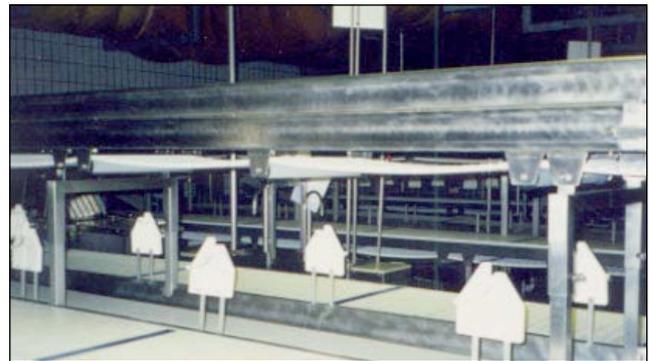
Problem

The task required manual lifting, strenuous pushing and pulling to move the pig carcasses along the rail, and considerable force to cut the meat into smaller joints. The quartered cuts of meat were heavy, cold, and difficult to grasp. The operation was also noisy, at over 90 dB(A).

Finding solutions

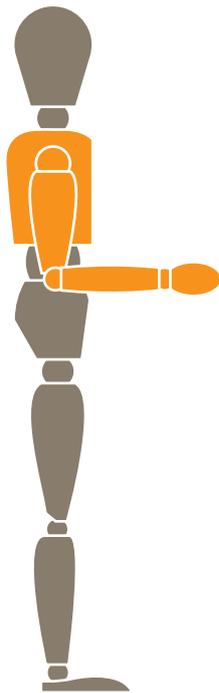
The butchery department was fitted with a semi-automated system of equipment and new working procedures. Half-carcasses were transferred automatically from the chiller room onto a conveyor belt. An operator manoeuvred the carcass into the correct

position for a circular saw to remove the hooves, back legs and loins. A second, closed saw made further cuts. The resultant joint of meat was lifted onto a conveyor, and a team of eight butchers on the line would each then make a smaller cut from each joint. A system of task rotation was implemented so that the butchers took turns to carry out different cutting and conveyor-loading tasks. Each workstation had a knife-sharpening device to help keep the knives in top cutting condition. Instead of stainless-steel, the conveyors were made of hygiene-standard plastic, designed to stop the meat sliding about, to make the cutting operation easier.



Results

- Pushing and pulling associated with moving the carcasses were eliminated.
- Joints that the team members had to lift were smaller and lighter.
- The number of accidents and injuries associated with the operation decreased.
- Product quality improved, and line efficiency improved slightly.
- Noise levels decreased from over 90 dB(A) to around 85 dB(A).



Back
Shoulders
Arms
Hands
Wrists

Case 41 Reducing injuries at a meat-processing plant

Task

The company produced joints of meat for various retail customers. Cattle and sheep were slaughtered in an abattoir. The carcasses were cleaned, chilled, and quartered. They were transported to a boning hall and butchery department, where 'primal cuts' of meat were made from the quarters. The meat was trimmed, then packed for onward delivery to the retail customer.

Problem

Prior to the purchase of this plant there had been little formal training, either in terms of the correct job techniques, or health and safety. People learnt the tasks by trial and error, and by working alongside more experienced staff. The accident and injury rate was high, and correspondingly, the number of compensation claims against the company was also high.

Finding solutions

The personnel manager and training manager worked together to put in place a site-wide set of task procedures. Using input from experienced operators at the site, they developed a procedure for each task that described the most efficient and safe way to complete the task. A full-time trainer is attached to each of the main departments in the processing plant.

On joining the company, a new employee goes through a three-month training period with the trainers in each department. They practice each procedure until both the trainee and the instructor are comfortable with their performance. The trainee signs a form that states that they have been trained and are aware of any risks associated with the procedure. The instructor countersigns the form.

ABATTOIR

PROCEDURE FOR THE SAFE MOVEMENT OF BEEF SIDES FROM HANGING STATION TO CHILLER.

CAUTION: ENSURE THAT ONLY ONE SIDE OF BEEF IS PUSHED THROUGH, DO NOT ATTEMPT TO PUSH GROUPS

METHOD:

- 1 Clear sides from the hanging station by standing on the outside of the overhead rail and push the side to the overhead rail lift.
- 2 Once the side has been raised on the overhead rail, pushing from the outside, travel the side along to the required chiller.
- 3 Decide which overhead rail is to be used inside the chiller and close or open the gates in the rail to determine the direction of travel.

NOTE: IF GROUPS OF SIDES ARE PUSHED THROUGH AT ONE TIME THERE IS THE RISK OF AN ACCIDENT.

I UNDERSTAND THAT I HAVE TO WEAR A HARD HAT AT ALL TIMES.

I HAVE BEEN INSTRUCTED IN THE SAFE WORKING METHODS FOR THE MOVEMENT OF BEEF SIDES.

DATE

NAME HAS BEEN SHOWN AND UNDERSTANDS THESE BASIC TRAINING PROCEDURES.

SIGNATURE

NAME

TRAINING INSTRUCTOR

VERSION 1-1

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ISSUE DATE 22.09.98

IDENTIFICATION CODE DCSAMSB

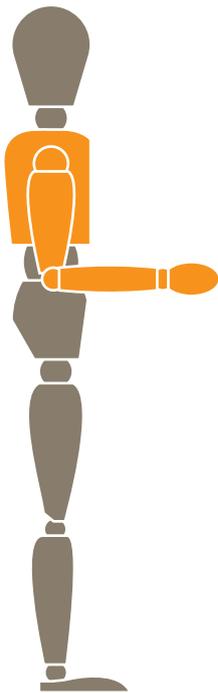
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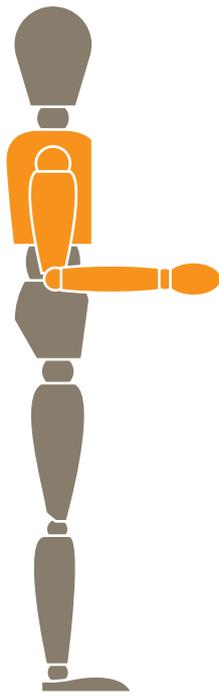
Results

- The 'safety culture' within the company improved. The new procedures represented a visible commitment to health and safety, as well as to development of personal and job-related skills. As a result, employee morale also improved.



Back
Shoulders
Arms
Hands
Wrists

- There was better record-keeping. Managers knew who had been trained for certain tasks and to what standards. Individual staff knew much more about the risks of each procedure and piece of equipment than before the system was implemented.
- As people were trained on the different procedures in most areas of the factory, the company created a flexible, multi-skilled workforce. Task variety for the operators improved considerably.
- The system received considerable support from the qualified and experienced slaughter/butchery operators. Their job was to process the carcasses, not to teach trainees. With the new system, they spent less time trying to teach other people, and more time doing their own jobs.
- The rate of accidents and injuries decreased. Similarly, the number of compensation claims against the company reduced dramatically.
- Staff turnover reduced.



Shoulders
Arms
Hands
Wrists

Case 42 Butchery department job rotation

Task

In the butchery department there were several different cutting tasks associated with processing the meat into cuts suitable for the company's customers. Between 80 and 100 people worked in the butchery hall at anyone time. All the cutting tasks required repetitive movements of the arm, hand and wrist, and high forces in cutting through the meat.

Problem

The company had noticed that there was a higher rate of injury and discomfort reported in the first few days when people had just returned from holiday.

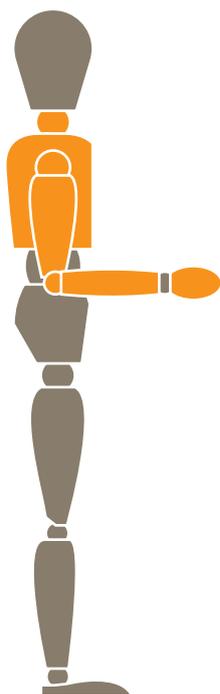
Finding solutions

The company implemented a 'light duties' regime for staff returning from holiday. It was voluntary, but employees knew that if they started to experience discomfort, they could report it and be moved onto lighter duties for about a week until they felt they had 'bedded back' into the tasks.

This did not cost the company or the employees (paid on a piece-work basis) anything to implement. Approximately 25% of the workforce take advantage of this regime after taking leave.

Result

- This simple job rotation solution reduced the number of reports of upper limb discomfort and injury from the butchery hall.



Back
Shoulders
Arms
Neck
Hands

Case 43 Hooking chickens onto a shackle line

Task

Birds attached to a shackle by their legs were knocked off onto a conveyor. Six operators would lift the birds, which weighed approximately 1.5 kg and hook them onto another shackle line ready for the next process.



Problem

- The birds could land at any angle which made it difficult for the operators to pick them up.
- The birds were wet and slippery.
- The operators were prone to minor cuts from sharp bones.
- The task was physically strenuous and highly repetitive.

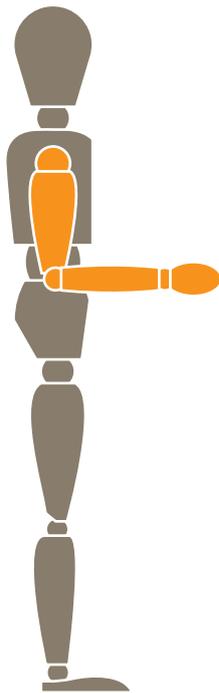


Finding solutions

The company installed automatic change-overs which transfer the birds from one line to another.

Results

- The operators were redeployed.
- There was an efficiency and productivity increase.
- There was a housekeeping improvement.



Shoulders
Arms
Hands
Wrists

Case 44 Hand-trussing of chickens

Task

Following evisceration, birds were chilled to between 0 and 2 °C and passed to the trussing department. Twenty staff were trussing the birds by hand-tucking the wings under, forcing the leg shank into the cavity and wrapping round with a trussing band.

Problem

- Excessive force was required to truss the chilled birds.
- The operators were complaining of hand/wrist discomfort.
- Operators were suffering from work-related upper limb disorders.

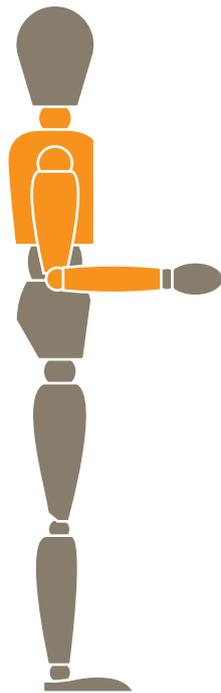
Finding solutions

When setting up a new site, the company changed the working procedures so that the birds were chilled after, rather than before, trussing ('hot' trussing).

Results

- At 32 °C the birds were easier to truss.
- The operators did not complain of hand/wrist discomfort at this site.
- Strict job rotation was relaxed.





Back
Shoulders
Arms
Neck

Case 45 Loading bacon into a curing machine

Task

Cuts of bacon were loaded into a 'Metalquimia injector' to cure them in brine. Staff had to lift a plastic tray containing up to 30 kg of bacon cuts into the machine. The area around the in-feed for the machine was restricted, so that there was space for only one person to lift the tray. The machine needed to be reloaded every half an hour.

Problem

The weight of the cuts and the restricted area around the machine posed a manual handling risk. The trays had to be lifted to above shoulder height to tip the meat into the machine. There had been accidents and injuries associated with the task.

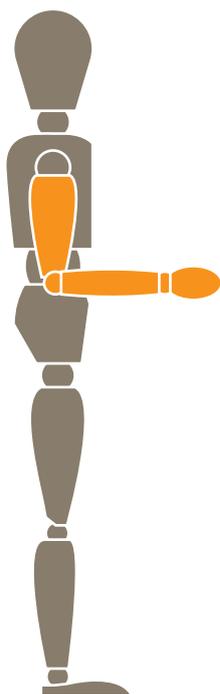
Finding solutions

The production manager identified a hoist that could be fitted to the in-feed which would lift and tip a stainless-steel tub of bacon cuts into the machine.

Results

- The manual handling risk was eliminated.
- The task could be completed more quickly and efficiently, as larger quantities could be lifted into the machine using the hoist.
- Staff morale in the area improved.





Arms
Hands
Wrists

Case 46 Packing sliced meat

Task

Sliced cooked meat was packed into 'thermoformed' plastic pouches, which consisted of a moulded plastic base and a thin lid. The meat was sliced mechanically and emerged from the machine in a 'shingled' form, ie with say six slices of meat overlapping slightly for attractive display in the pouches. Forty employees moved the cooked meat off the slicer conveyor into the plastic pouches at a rate of approximately 80 packs per minute. Each pack weighed between 100 and 200 g.

The packing operation was quite skilled. As well as keeping up with the speed of the slicer, staff on the line were responsible for quality and inspection tasks as they packed the cooked meat. They had to ensure that the exact

number of slices were placed in each pouch, that there were no blemishes or tears on the product, and that the slices sat squarely in the pouch (if they overlapped the sides the product was wasted). It was a two-hand operation, staff were required to wear gloves, and the meat was not particularly easy to grip. The working environment is kept at a temperature of between 8 °C and 10 °C. Many of the employees on the line were agency workers, not permanent employees.



Problem

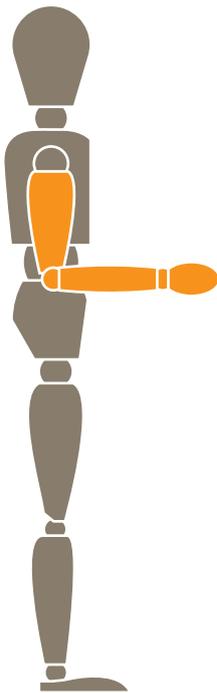
Occupational health and safety staff had recognised that there was a potential risk from the high line speeds and the repetitive handling operation. Staff on these ten lines were complaining of wrist and forearm discomfort.

Finding solutions

It was impossible to find an automated solution to the packing task. Instead, the company implemented a comprehensive programme of induction training, occupational health monitoring and job rotation.

First, each line was set up to be a multi-skilled operation so any member of staff could do any task on the line. In consultation with the production managers, a programme of job rotation was implemented to ensure that exposure to the most repetitive tasks was limited. Managers have been trained to recognise the risks associated with repetitive operations, and to encourage their teams to rotate between tasks on the line.

As each new person joined the workforce (either in a permanent role or from the agency), the occupational health sister provided an individual induction and training programme lasting half a day. It was made a condition of employment that they would report any symptoms of discomfort experienced, and the mechanism for reporting symptoms was made clear to them. If a new employee experienced discomfort, they were immediately taken off the task, and were put on a different process with less repetitive work. They were monitored on the new task for 3–4 days by the occupational health department, and at the end of that time, if they were completely clear of any discomfort, they were put back on the original task. If they then experienced problems again, they would be deemed unsuitable for



Arms
Hands
Wrists

repetitive work. Overall, approximately 10% of new staff are identified as unsuitable for this type of work.

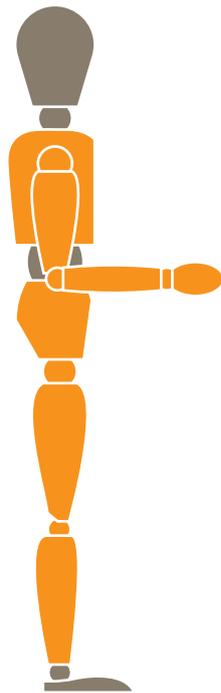
The occupational health sister also worked closely with the agency managers to try to ensure that any temporary staff who were identified as unsuitable for repetitive work were not offered other work of a similar type.

The only costs associated with these changes were in staff and management time, particularly that of the occupational health sister.

Results

- Fewer symptoms of wrist and hand discomfort were reported to the medical staff.
- There have been no recent compensation claims against the company. The health and safety staff reported that they believed there would have been many claims if this programme had not been put in place.
- Overall absenteeism has been reduced as the situation is closely monitored and people experiencing symptoms are put on a different type of work wherever possible.

Packaging operations have been identified as one of the high-risk operations in the food industry. As this case study illustrates, the operator is required to work at high speeds, which can lead to upper limb discomfort. The company has benefited in terms of reduced staff absenteeism, as well as improving well-being and physical comfort, by recognising risks within the task and investing in changes to the production operations.



Back
Upper limbs
Lower limbs

Case 47 Sharing manual handling best practice between sites

Task

The company stored and distributed food to various customers. The jobs staff carried out involved a high proportion of manual handling tasks. It had many sites, each of which faced various health and safety and productivity problems.

Problem

Managers wanted to involve employees in providing solutions to manual handling, health, safety and productivity problems. They also believed it would be beneficial for sites to share ideas and thus enable them to solve any similar problems they encountered. In this way best practice would be shared among sites. They also wanted employees at all levels to be active in suggesting improvements for the company. Suggestions were desired on all aspects of the company.



Finding solutions

An Opportunity For Improvement (OFI) scheme was set up. If staff had an idea they thought could benefit the company, department, depot, employees or the environment, they completed a form and posted it in a box in their workplace. The completed form gave the employee's personal details, a description of their idea for improvement, the current situation and the expected benefits. All ideas were logged with the OFI co-ordinator and the decision to act was made by a steering group/management team that was made up of employees from different departments.

A verbal acknowledgement of receipt of the idea was given within 24 hours. The initial response to the suggestion was provided within seven days and if the idea was accepted it was actioned within one month, unless the originator was informed otherwise. No financial rewards were provided for accepted ideas, but details of accepted ideas were pinned on the staff noticeboard, acting as a form of recognition for the originator.

Results

- The OFI system allowed the sharing of best manual handling practice between sites.
- Staff generated many useful ideas. One 'OFI' day produced over 1500 suggestions!
- It has increased morale as employees believed their ideas were valued and that they could make a difference.

Packing into containers

Case 48 Biscuit tin packing

Task

Plastic-moulded inserts were used to pack biscuits before they were put into tins. The inserts were delivered in stacks, which had to be destacked (or 'denested') by hand and placed singly on a conveyor belt. Biscuits were then packed into the plastic-moulded inserts on the moving conveyor by hand, at a rate of between 17 and 30 biscuits per minute. Staff stood up or sat on non-adjustable chairs to carry out the task.

The filled inserts were placed into the tins, which were then fitted with lids. Sticky tape was then stuck around the join between the tin and the base, to seal the tin and to prevent moisture entry. This task was performed at a rate of 18–20 tins per minute.

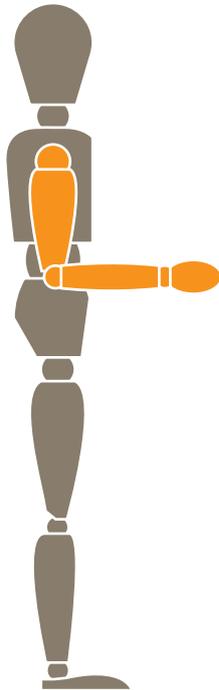
Problem

There were several issues associated with this set of tasks. Denesting the inserts was a fiddly job, and needed to be performed at a high rate. The rate of biscuit packing was also high. Awkward arm and shoulder postures were required to wrap the sticky tape around the tin lids, and this task was viewed by staff as particularly difficult and unpleasant. All three tasks required upper-limb intensive motions, presenting a risk of work-related upper limb disorders, particularly in the wrists. There was a quality issue associated with the tin-taping. If the tape was not absolutely flat, moisture could enter the tin and ruin the biscuits.

Finding solutions

Several solutions were implemented to reduce the risks of repetitive handling. The workstations were redesigned, using anthropometric data, to present the biscuits at a comfortable angle and to set the conveyor at a comfortable height for standing. Fully adjustable seats were provided, which had integral footrings. An additional footrest was provided under the conveyor.

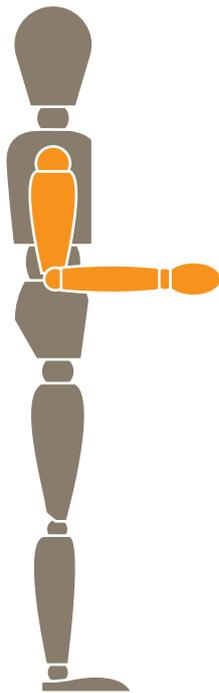
The company wanted to automate the tin-taping and denesting tasks. However, there was no equipment available on the market at that time which could do the job. The company entered into collaborative partnerships with two mechanical engineering companies to design two new machines. The prototypes were built and tested, and proved successful.



Shoulders
Arms
Hands
Wrists

Results

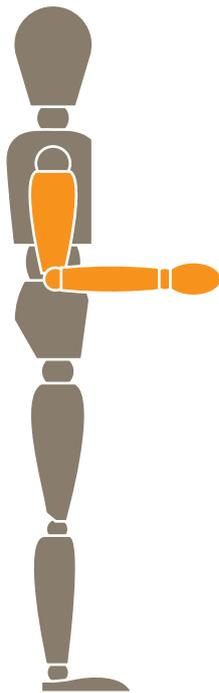
- Repetitive risks associated with the tin-taping and denesting operations were prevented.
- The quality of the sealing of the tins was far more consistent, leading to fewer returns from customers.



Shoulders
Arms
Hands
Wrists

- The job was more comfortable for the biscuit pickers, with fewer reports of discomfort associated with these lines.
- There was a labour saving of four people per line associated with the automation of the denesting and tin-taping tasks. With three of these lines in operation, the overall cost saving was very significant.

Packing tasks such as these are common in the food industry. Staff are often required to use positions of the hand and wrist which can lead to upper limb discomfort, especially when combined with high work rates. The company has benefited in terms of quality, labour savings and staff comfort by recognising risks within the tasks, and investing in ergonomic changes to the work process and the machinery.



Arms
Hands
Wrists

Case 49 Change to working practices on a biscuit-packing line

Task

Biscuits were placed into plastic-moulded inserts before they were put into tins. The line ran at a constant speed, and 22 operators placed biscuits into alternate inserts. The line had been in operation for many years without any significant problems. The decision was taken to move a biscuit-packing line operating in one factory, to another similar factory across the country. The line was moved to the other factory, and the same work methods and running speed adopted.

Problem

At the second factory, employees were having to undergo a change in working practices. The normal strategy for other lines in this factory was that machine speeds would be exactly half, and they used 11 operators, each filling every insert that passed their workstation. There was no difference in the overall amount of work completed at both sites, and because the length of the conveyor was suitable to accommodate 22 people, the original configuration was considered to be suitable and therefore adopted.

Over the period of the next two days, involving four shifts, there were more than 40 incident reports of upper limb discomfort to the occupational health department, all complaining of pains in their wrist, arms or fingers, and some showing physical symptoms.

Finding solutions

The machine speeds were checked and found to be correct. Between the two lines, the differences were:

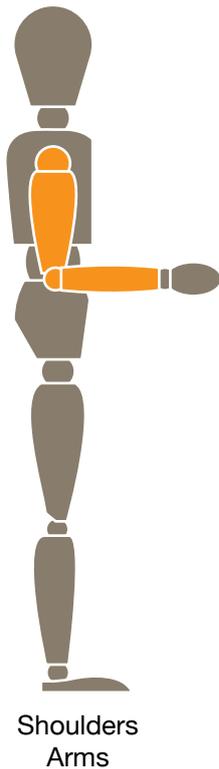
- more people on the line, perhaps giving a perception of overcrowding;
- packing into every other insert (rather than every insert), perhaps giving the impression that the inserts were arriving at the workstation at twice the speed.

Psychologically, these factors may have placed extra stress on the operator. Furthermore, the imposition of a new working practice, outside their control, may have affected their thinking and behaviour, resulting in the adverse symptoms of discomfort.

After consultation with the employees, the machine speed was halved, employee numbers were halved and individuals packed into every insert, ie to mimic the working practice with which they were familiar.

Results

- With the alteration, the upper limb symptoms disappeared.
- There were no further reports of discomfort.



Case 50 Savoury snack packing

Task

The company produced frozen savoury hand-held snacks such as sausage rolls, pasties and pies. The frozen snacks were packed into boxes by hand for onward delivery to wholesaler customers. Predominantly, female staff stood at a packing workstation, made up a cardboard box from a flat pack, picked the product off a conveyor and packed it into the box, in quantities ranging from 36 per box for larger items, such as traditional Cornish pasties, to 72 per box for smaller items, such as sausage rolls. When the box was full, they lifted it up onto a shoulder-height conveyor for removal. One removal conveyor served several packing stations. Ten people packed at an average rate of 40 boxes per hour, for the duration of an eight-hour shift. The maximum weight of a box was 4 kg.



Problem

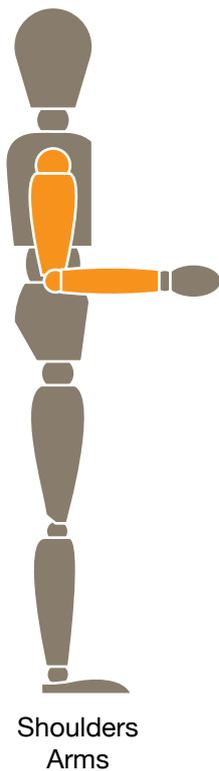
There were many complaints about the job, particularly reports of shoulder and upper arm discomfort. The safety manager and site engineer identified that the worst element of the task was lifting the filled boxes onto the shoulder-height conveyor.

Finding solutions

The company reorganised the workstation layout and lowered the conveyor so that staff could slide the full boxes down onto a lower conveyor, rather than lifting them onto the high conveyor. The layout alterations took place over two weekends, and while changing the layout, they also created more space per packing station.

Results

- Staff reported that the task was 'much easier', 'much less strenuous' and 'ten times better than it used to be'.
- Absenteeism was reduced by 10%.
- The awkward reach to the conveyor was eliminated.
- Productivity increased by approximately 15 boxes per hour, as operators no longer had to wait for a 'free' slot to place their box onto the removal conveyor.



Case 51 Custard powder packing

Task

A food manufacturing company produces and packages many different types of foodstuffs. One of these is custard powder. Two operators at each end of the three production lines pack four 3.5 kg bags of the custard powder from the conveyor into a 14 kg bag, carry the 14 kg bag a short distance to another conveyor and then place the filled bag onto this second conveyor to be palletised in another part of the factory.

Problem

To fill the 14 kg bags with the 3.5 kg bags of custard powder, operators had to work on a metal table 70 cm in height. The depth of the bags meant that many of the staff were working with their arms and hands raised above shoulder height. Several operators had been off work for periods varying in length from two to seven weeks. Most staff reported that the task was physically very tiring, and a number had reported shoulder and elbow discomfort.

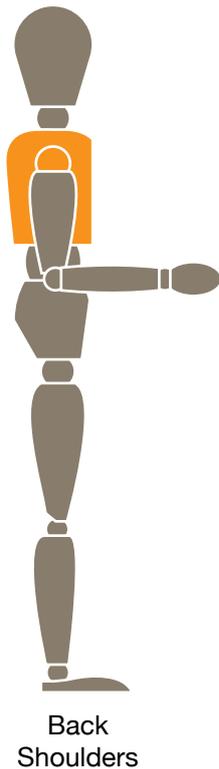
Finding solutions

The solution was to lower the height of the feed conveyor by 50 cm, and to provide a small (40 cm-high) table on which to fill the 14 kg bags rather than the 70 cm table so that the operator was filling the bags at waist height rather than shoulder height. The second conveyor was also lowered and the small table bridged the gap between the two, reducing the necessity for staff to lift and carry the bags. Staff also rotate to another task after 30 minutes.

Results

- Operators reported a considerable decrease in fatigue when filling the bags at the lower table.
- There was a marked reduction in time off work in this part of the production line.

Many companies in the food industry use largely automated processes where the human input is mainly in packing the finished product. The modifications described are a good example of how discomfort can be decreased by observing the task and using principles of human anthropometry (in this case, the varying heights of different sections of the population) to develop a simple, cheap, effective solution to the ergonomic problems which can be caused by product packing.



Case 52 Packing pork cuts

Task

The company processed approximately 3200 pigs per day. Butchering the carcass into primal cuts of meat was one of the company's most frequent operations. After butchering, the various cuts of meat (which weighed 6–7 kg each) were stacked into big plastic bins holding up to 600 kg of cuts. These bins were transported to the packing area. Each piece of meat had to be lifted out of the bin and packed into a cardboard box for onward delivery to the customer.



Problem

Although there were no accidents or injuries associated with this packing task, from his risk assessments, the company safety manager had identified risks with the activity. The first layer of meat was easy to pick out of the bin, but as the height of the cuts decreased, the packer would be leaning over the edge of the bin, stooping, and reaching further and further down to pick the meat out. Each piece of meat weighed between 6 and 7 kg, and these loads were usually cold, wet and floppy – not particularly easy to handle. Two people would pack around 150 cuts of meat per hour.

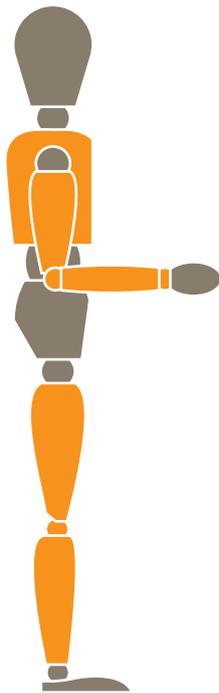
Finding solutions

The safety manager wanted to eliminate the leaning, stooping and reaching associated with the packing task. He identified a company that supplied hydraulically operated wheeled devices that could lift bins weighing up to a tonne. The device tilted the bin, and presented the meat cuts to the operator at a comfortable height. The company purchased six of these machines.



Results

- There were fewer complaints about the job.
- The risk of back injury was greatly reduced, as there was much less bending and stooping with the new machinery.
- The company could use a wider range of people on this job as it was so much less tiring.
- Packers could pack 30% more cuts per hour.
- Employee morale in the area improved, as the new equipment represented a visible commitment to improved health and safety.



Back
Arms
Wrists
Legs

Case 53 Skinless-sausage packing

Task

Chilled cocktail sausages were ejected from the skinning machine onto a stainless-steel conveyor. Staff stood at the conveyor, picked the sausages up, and packed them into trays containing ten sausages, at a rate of 8–12 trays per minute, for the course of an eight-hour shift .



Problem

The level of staff complaints about the operation was high, particularly from taller people on the line, who had to stoop to pack the sausages. There were reports of wrist and upper arm discomfort associated with the task. Standing near the skinning machine was particularly disliked, as the sausages were at their coldest, and the machine would spray the operators with cold water. People also reported leg discomfort from standing all day on a cold stone floor .

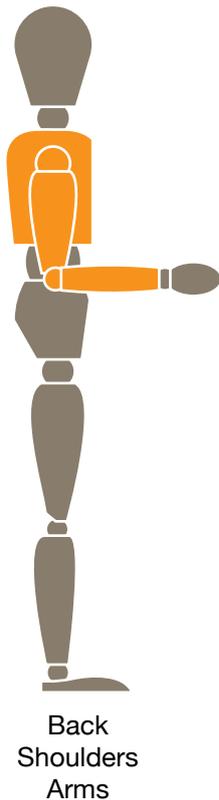
Finding solutions

In consultation with staff, the firm implemented a system of job rotation within the line, so that people took turns at the 'worst' positions next to the skinning machine. Furthermore, the managers of the unit try to use people of average height on the line who do not have to stoop to pack the product. These changes cost nothing to implement.

The company is attempting to find anti-fatigue matting that meets hygiene requirements. It also intends to implement footrests under the conveyor, and leaning aids, so that the task can be carried out in greater comfort.

Result

Since the job rotation scheme was implemented there have been fewer complaints about the job.



Case 54 Crating of chickens

Task

Operators picked up an empty plastic crate (60 x 40 cm) from a pallet placed at their side and filled it with eight birds. They then lifted the crate, which weighed 15 kg, turned around, stepped down from a working platform and stacked the crate on a pallet. When the pallet was full, the operator would hold the rear of the stack of crates and help push with another operator who was picking up the pallet with a pump truck. Eight operators carried out this task at a rate of 50/60 crates per hour.

Problem

- When putting the full crates onto the pallet, the operator was forced to hold the load away from the trunk, stoop down to the bottom layer, and reach up to the top layer.
- The operator was required to twist to the side when picking up empty crates.
- There was a variation in levels causing slips and trips.
- Operators were suffering from backache and back injuries.
- Slips from wet floor surfaces were also a problem.
- Injuries were occurring from full crates falling when they were being moved by the pump truck.
- There was a general lack of space.

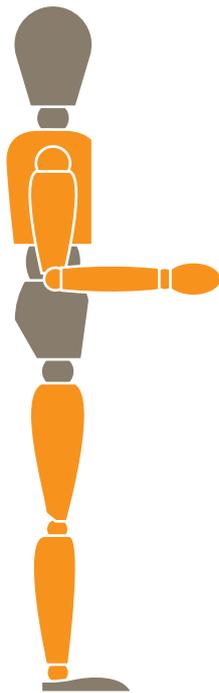
Finding solutions

The company relocated this process to a purpose-built room. The empty crates/boxes are picked from a moving line behind the operator and placed on a roller workbench. The crate is filled and then pushed forward onto a conveyor via these rollers. The full crate was then transported automatically to the despatch area.



Results

- There was an efficiency, productivity and quality increase.
- The manual handling element of the task has been greatly reduced.
- Operators no longer suffer backache and back injuries.
- The floor is even and it is easier to control wetness and debris.
- The possibility of injury from falling crates when transported has been removed.
- There was a housekeeping improvement.

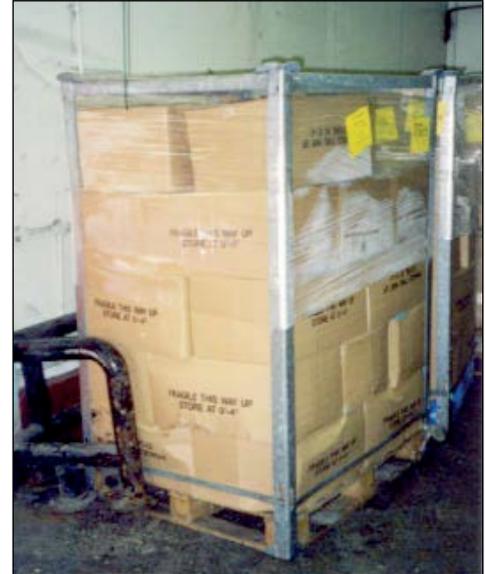


Back
Shoulders
Arms
Hands
Wrists
Legs

Case 55 Packing fish into boxes

Task

The company received fish from the docks that were filleted and then placed into frozen storage until required for processing. The filleted fish were stored in cardboard boxes (60 x 38.5 x 30 cm) with a plastic bag liner. The company bought 200 000 boxes each year. An operator would make up a box and another operator would line the box with a polythene plastic bag. The filleted fish were placed in the box (which would be sealed with a polypropylene band) and an operator carried the box 5–7 m to a pallet. The weight of each box was 23 kg. Each pallet held 25 boxes and weighed 568 kg. The pallets were then moved to frozen storage using a fork-lift truck. When the filleted fish was required for processing, the pallets were transported to a process line. An operator removed the boxes from the pallet, carried them 5–7 m and then emptied them manually onto the line. The box would then be broken down and placed in a skip. Twenty operators were required to carry out these tasks.



Problem

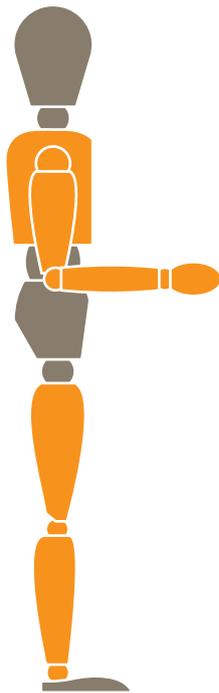
The company carried out a risk assessment of the tasks associated with using the cardboard boxes in response to a perceived risk. They found several problems:

- The making up of the cardboard boxes required repetitive movements of the shoulders, arms, wrists and hands.
- The insertion of the plastic bag liner required repetitive movements of the shoulders, arms, wrists and hands.
- The boxes had to be carried by an operator to a pallet awaiting frozen storage.
- The boxes had to be carried by an operator from a pallet to a process line.
- The boxes had to be emptied manually onto a process line.
- The breaking down of the boxes required repetitive movements of the upper limbs.
- The company had experienced injuries and accidents associated with these tasks.
- Staff had reported problems with backache, arm ache, groin ache and strained muscles.



Finding solutions

The company wanted to identify a cost-effective solution. They recognised the benefits of bulk plastic bins that they were using elsewhere to store raw materials



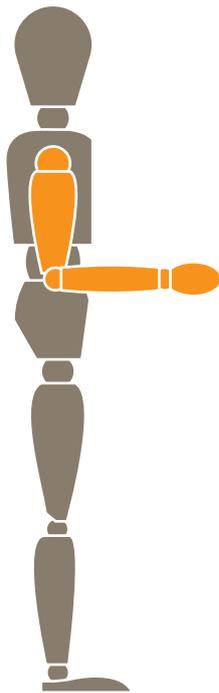
Back
Shoulders
Arms
Hands
Wrists
Legs

from their suppliers. With this in mind, they sourced bulk plastic bins to replace the cardboard boxes. The boxes were 1.2 m long, 1.0 m wide and 0.75 m high and held 227 kg of fish. They bought 4500 bins that are expected to last between seven and ten years.



Results

- The repetitive movements of making up/breaking up boxes and placing the plastic bag liners into the boxes were removed. The operators who carried out these tasks and placed the plastic bag inners into the boxes were redeployed.
- All manual handling of the boxes was removed by the use of the bins. The bins are now transported using pump trucks.
- All accidents associated with pallet assembly (such as tripping injuries/dropping injuries) were removed.
- There were fewer complaints about the job.
- It gives management greater flexibility in the use of staff. Previously, only the strongest and fittest people could perform the manual handling of the boxes. Now, with the use of bins, any member of staff can do it without discomfort.
- There have been no accidents or injuries reported from the use of the plastic bins.
- A significant annual cost saving.
- The company has noticed several other benefits:
 - a staff and cost reduction in waste handling (redeployment of staff, reduction in skip hire costs);
 - a space saving in cold storage (pallets of boxes could only be stacked three-high due to instability, bins can be stacked ten-high);
 - a reduction in slip/trip hazards (less debris on floors, such as broken-down boxes, used plastic bag inners and polypropylene bands);
 - a reduction in packaging costs (cardboard boxes, plastic bag liners); the removal of possible product contamination by cardboard and polythene.



Shoulders
Arms
Hands
Wrists

Case 56 Making up whisky bottle cartons

Task

Expensive malt whiskies were sold in presentation boxes. The boxes were delivered to the factory as a flat-pack, which had to be bent into shape. The boxes had to be made of tough cardboard, to prevent damage during delivery and retailing.

Problem

The cardboard was so tough it was difficult to push and fold into shape. It required considerable force to 'lock' it into the correct place. Staff would wedge the box under their upper arm to squeeze it into the correct shape. Across the eight lines, 100 staff would be exposed to this task, packing boxes at a rate of 10–12 per minute. They were reporting complaints associated with the task, and some staff had been off sick with upper limb discomfort.

Finding solutions

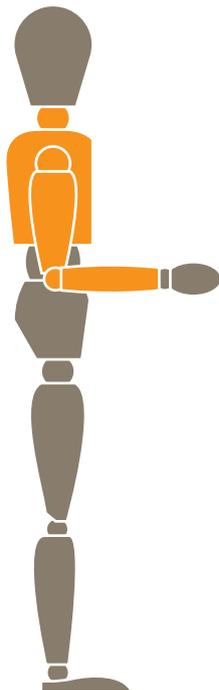
The firm carried out a consultation exercise with an ergonomist, the team engineer, and several staff from the lines. Recesses were cut into the surface of the line, and a hydraulic ram fitted underneath. When staff inserted the flat-pack box into the recess, a photocell would detect the box, and the ram would operate to push the box into shape. A range of different height platforms was also provided so that staff could choose one to stand on that set them at a comfortable height for using the line. The cost of the changes was minimal as most of the components were lying around in the company's workshops as scrap.

Over the years the company has put pressure on the box manufacturers to redesign the box so that it locks into the correct shape much more easily, without needing to apply so much force.



Results

- There was an instantaneous drop in the number of complaints from the line.
- Involving staff in the redesign process helped to ensure that the solution worked well from the operators' point of view, and helped improve morale.
- There was a decrease in absenteeism, which was attributed to the changes.
- Packing efficiency on the line improved.
- Product quality, in terms of less damage to the boxes during delivery and retailing, could be maintained by continuing to use the 'tough' boxes, by making the task easier to carry out.



Back
Shoulders
Arms
Neck

Case 57 Packing bottles

Task

At a large bottling plant, operatives on a conveyor line packed filled bottles into divided cases. The original design of the line had three levels: a top level where the empty boxes were delivered and stored, a middle conveyor level on which the bottles were delivered, and a bottom level where the bottles were packed into the boxes and pushed onto a roller conveyor for removal. Four operators packaged up to 120 bottles per minute in this manner, reaching up to grab an empty box from the top conveyor after every 12 bottles.

Problem

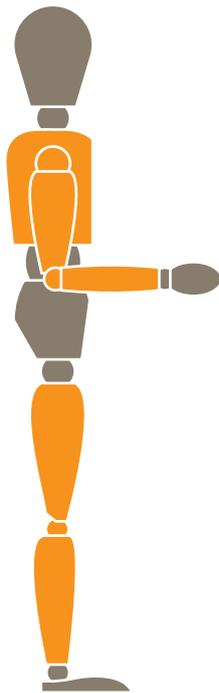
As a result of the design of the packaging area, the operators had to reach overhead each time they obtained a new empty box. This presented a risk of injury, particularly to the shoulder, from the repetitive reaching. Furthermore, the height of the lowest (packing) level meant many operators had to stoop down while packing the boxes. Holding this poor posture for long periods presented a risk of back injury. Finally, a guard-rail at the lowest level was located slightly to the outside of the packing platform, which forced the operator further away from the operation and encouraged forward bending throughout the task.

Finding solutions

The company was building a new plant that needed, as part of the operations, a similar packing line. The layout of the new line was altered so that the new empty boxes were delivered at packing level, removing the need to reach overhead to pick up a box. The level of the packing table was raised, and the guard-rail was moved to the inside of the packing platform. Using information on anthropometry (the range of sizes of members of the population) gained during training in ergonomics, the designers succeeded in removing the overhead reach for the empty box and specified a new height for the lowest platform. The relocation of the guard-rail allowed the operative to stand closer to the work and perform the task with less forward bending.

Results

- The manual handling risks were reduced. The use of anthropometric data during the design phase ensured that most packers were not forced into awkward postures while packing the boxes, thus reducing the risk of injuries.
- Feedback from employees indicates that it was much more comfortable than the original workstation.
- An unexpected benefit was that it improved the communication between the operators.



Back
Shoulders
Arms
Legs

Case 58 Palletising cases of whisky

Task

Full cases of whisky, usually containing 12 bottles, were transferred from the end of the conveyor onto wooden pallets. Depending on the contents, the boxes weighed between 15 and 25 kg. Staff lifted each box by hand from the line to the pallet. The line produced 55 bottles per minute, resulting in a pallet-building rate of four to five cases per minute. The shift length in the plant was at least eight hours, with a 15-minute break in the morning, half an hour for lunch, and another 45 minutes taken as and when required. Thirteen people would be occupied on this task across the eight lines in the bottling plant.



Problem

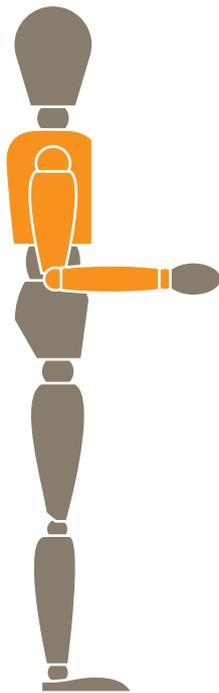
The task involved considerable heavy, repetitive lifting. Staff would bend down to stack the lowest levels on the pallet, and would have to reach forward to place boxes at the back of the pallet. There had been reports of backache from staff, and the company had received some compensation claims associated with the palletising task.

Finding solutions

Management and trade unions at the site were keen to minimise the risks of manual handling. They commissioned a survey of the tasks and the plant, and a detailed report from a local ergonomics consultant. Part of the ergonomics survey included questionnaires and consultation with the line staff. Three main improvements were investigated: three of the lines were fitted with a fully automated palletising machine; two lines were provided with powered scissor lifts with rotating turntables; and job rotation was implemented at all the lines so that no one person would be palletising for more than two hours.

Results

- Manual handling at three of the lines was eliminated completely.
- Scissor lifts allowed staff to handle the boxes at waist height, and to rotate the pallet so they did not have to reach forward holding the load.
- No claims and no accidents or injuries were associated with the automated lines.
- The filler lines ran faster, resulting in a productivity increase of approximately 10%, depending on the whisky.
- Staff morale improved.
- There was a financial benefit in terms of a labour saving on the automated line.
- Job rotation was more easily implemented with the new line facilities.
- The only disadvantage has been that the handling equipment is more likely to damage the box, if it is out of alignment, than a human stacker.



Back
Shoulders
Arms
Wrists

Case 59 Packing vending machine cups

Task

At the end of a production line for vending-machine cups, the filled cups had to be packed into boxes. A 'stick' of 25 filled cups was wrapped mechanically, then delivered in a horizontal orientation to a packing station at a rate of 20 wrapped sticks per minute. A packing operator would grab three sticks at a time, turn them through 90° into a vertical orientation, and place them into a box. Each 'stick' weighed about 500 g. When a box was full (approximately 20 sticks), the operator would seal it, pick it up, twist through 90° and place the filled box on a conveyor belt to go to the palletising area. Six operators would carry out this activity throughout a 12-hour shift.



Problem

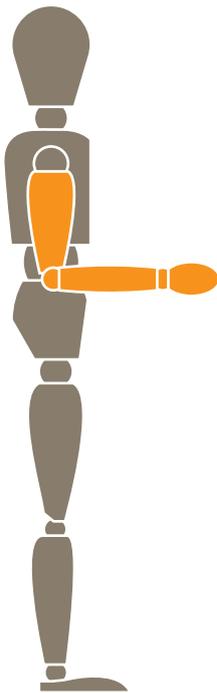
The task was identified through risk assessment as having a high risk of upper limb and back injury. The throughput rate was high, and the task was machine-paced rather than under the operator's control. The wrist postures necessary to turn the sticks through 90° were awkward. The stooped back postures seen when tall people were working at the fixed-height packing stations were also identified as risky. Twisting to place the filled box onto the conveyor belt also presented a risk of back injury.

Finding solutions

The company decided to automate the task completely. They purchased two custom-built prototype machines, tested them out, then purchased four more. These machines pack the sticks straight into the boxes. Finally, they replaced the two prototype machines.

Results

- The repetitive manual handling risk was removed.
- There was greater 'accuracy', ie the correct product placed in the correct box.
- There was a better 'presentation' of the goods when the customer opened the box.
- It freed up staff to carry out more meaningful activities. Instead of packing all day, these operators could carry out a number of tasks which enriched the job and created more task variety. These included keeping the machines running, conducting quality checks, scheduling, getting the raw materials ready, and minor maintenance tasks.



Arms
Hands
Wrists

Case 60 Package labelling

Task

Polystyrene packaging trays were placed on a workbench and twisted round while adhesive tape containing the brand name was stuck to their edges. All staff in the department were involved in this labelling task on a rotation basis. An average of 13 000 trays was labelled per week.

Problem

- The operator was forced to twist while turning the tray.
- The task was highly repetitive .
- As the tape was cut with a knife, minor cuts could occur.
- Staff described the task as 'boring' and the one they least enjoyed.
- Operators complained of hand/wrist discomfort.
- Several operators were diagnosed with upper limb disorders.



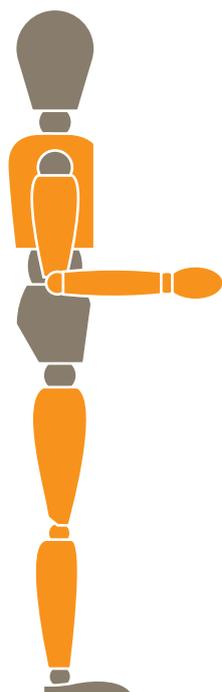
Finding solutions

The company replaced the polystyrene trays with cardboard ones that already have the brand name printed on them.

Results

- Operators were redeployed to other tasks.
- No further cases of upper limb disorders were diagnosed.
- The possibility of cuts was removed.
- There were no further complaints about the task.
- Lower levels of seasonal temporary cover were required.

A further benefit is that the cardboard trays also contain barcode information which was previously put on by operators following the brand name labelling. This has resulted in a significant annual cost saving.



Back
Arms
Legs

Case 61 Picking customer orders in a warehouse

Task

In a food warehouse 'pickers' collected the items ordered by customers. Drivers then delivered them to the customer's premises. A pallet was used to hold the selected items, and this was transported round the warehouse on pallet wagons and/or pump trucks. Pickers loaded the pallets, wrapped them in shrink-wrap and the drivers loaded them on their lorries. At the delivery point the pallets were either unloaded or left to be unloaded and collected later. A total of 120 workers (75 pickers and 45 drivers) were involved in the task.

Problem

An individual pallet sometimes contained items for more than one customer. When arriving at the customer's premises, the driver removed the shrink-wrap from the shared pallet and lifted off the items for the specific customer. The items were either placed in a sack barrow and transported to the customer or carried off the truck. If there were many items on the pallet for one customer, this process had to be carried out several times. This task presented a manual handling risk as it required stooped postures and the lifting of loads weighing up to 32 kg. This presented a risk of injury to the lower back. There was also a risk from the remaining items as, with the shrink-wrap removed, the goods often fell off the pallets during transportation and could injure the driver when he opened the truck door.

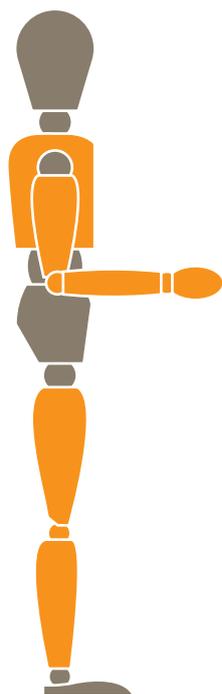


Finding solutions

To reduce the manual handling risk to pickers and drivers, roll cages were purchased. The shelving in the warehouse was reorganised so that heavier items were placed at a comfortable height, and light and/or infrequently used items were placed at a higher level. The roll cages were four-sided metal cages on wheels with a drop-down internal shelf. The pickers selected the items in the warehouse and placed them in the cages, located on picking trucks. The loaders loaded the cages (with a fork-lift truck/vehicle tail lift/loading dock) onto the trucks for delivery and upon arrival drivers pushed the cages to the customer's premises. If a cage had items for more than one customer, it was pushed with all its contents to the unloading point and only the relevant items were unloaded. The remaining items were then returned to the truck in the cage. There was a lock on the door so cages did not open during transportation. Frozen and chilled products were handled separately to preserve the 'cold chain'.

Results

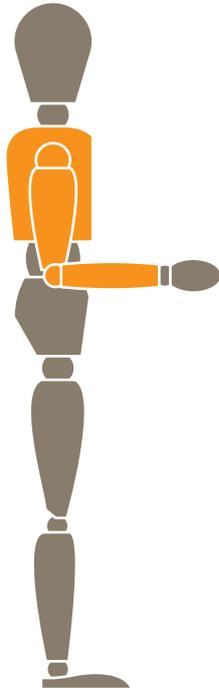
- The manual handling risk was reduced, as items are not lifted from shared pallets/cages.
- The incidence of lower back injuries dropped dramatically.
- The task was safer for the driver as items in the shared cages do not fall out during transportation.
- There was less physical contact with the product, which is beneficial for chilled produce.
- The roll cages were more durable than pallets and were easier to pack and store.



Back
Arms
Legs

- The need to use shrink-wrap has reduced, which has lowered costs and is more environmentally friendly.
- Workers found it easier to load, deliver and handle the cages.
- The metal on the cages was more hygienic than the wood on the pallets.
- The cost of the cages was approximately ten times the cost of the pallets but this was worthwhile.
- Some customers still asked for their items to be delivered on pallets. They are slowly being educated in the advantages of roll cages. Large bulk deliveries or single-drop delivery points can still be more efficiently dealt with on pallets.

Stacking/moving containers



Back
Arms
Shoulders

Case 62 Palletising of finished product

Task

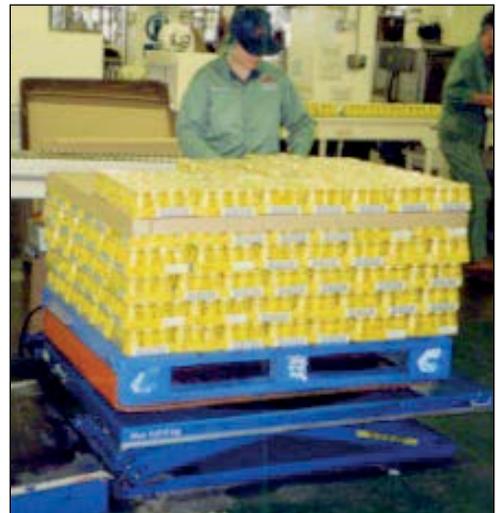
At a company which manufactured sauces, 1 kg and 2 kg packs containing glass jars of finished product were manually lifted from a conveyor belt and placed on a pallet. Operators carried out this task on a job rotation basis.

Problem

- The repetitive nature of the task.
- The task was machine-paced.
- Operators were forced to reach forwards and twist with the load to stack the pallet.
- A stooped posture was required when stacking the lowest layers of pallet.
- Operators complained of backache.
- Lost-time injuries were occurring.

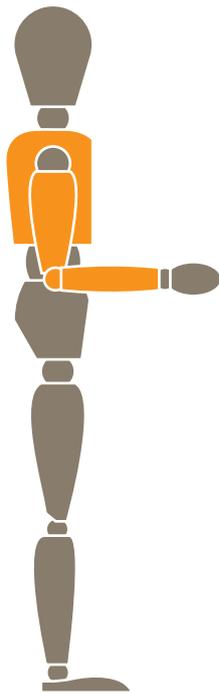
Finding solutions

The company carried out a major assessment of the manual handling tasks to see which ones could be simplified or removed. It was decided that this particular task could be simplified by the use of a scissor lift and turntable. The company installed two low-profile scissor lifts on which the pallets were placed.



Results

- The operators no longer had to reach or twist to stack the pallet.
- Operators no longer had to stoop to reach lower levels.
- All complaints associated with the task stopped.
- There was a reduction in lost-time injuries.



Back
Arms

Case 63 Loading cases onto pallets

Task

At the end of a bottling line an operator transferred full cases from a conveyor at waist level to a pallet at floor level. The cases weighed 22.5 kg each and the operator lifted between 600 and 900 cases during an eight-hour shift.

Problem

The job involved repetitive lifting of a significant weight. Because of the location of the pallet, the operator stooped down when filling the lowest layers of the pallet. The operators reported pain in the lower back which they attributed to the task.

Finding solutions

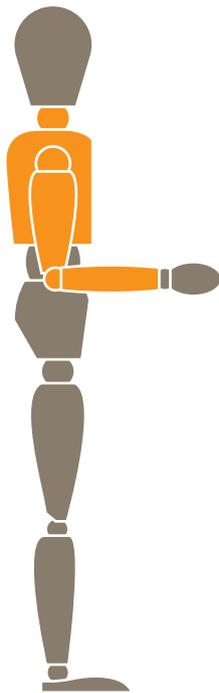
A vacuum hoist was installed that supported virtually the entire weight of the case. The operator only had to exert a relatively small lifting, pushing or pulling force to manoeuvre the load. Also, the operator was in a less stooped posture when placing the cases on the lowest layers of the pallet. More hoists are planned for installation at the other packaging lines in the plant.



Results

- The level of physical effort necessary to transfer 600–900 cases from the conveyor to the pallet was greatly reduced.
- The operators no longer experienced back pain from this task.
- Although the palletising was performed slightly slower when the vacuum hoist was first introduced, eventually the operator could perform the task at the same rate but with much less physical effort.

The palletising of goods is widely performed in the foods industry. By supporting the weight of the load, and allowing the operator to move the load with less effort and in an improved posture, vacuum hoists can greatly reduce the compression on the back and the risk of long-term injury. In addition to handling boxes, the hoist can be used to move items in sacks.



Back
Arms
Shoulders
Neck

Case 64 Lifting wrapped product from conveyors

Task

In the wrapping section of a bakery, boxes containing finished product were manually lifted from a conveyor belt and placed on a pallet in a 'brick' stacking order. The boxes were 40 cm long, 28 cm wide and 18 cm high and weighed 5–6 kg. The pallets held 70 boxes. At any one time, up to three different product lines might be coming off the conveyor; each different product had to be stacked onto a different pallet. Each operator handled 1200 boxes (17 pallets) per shift.



Problem

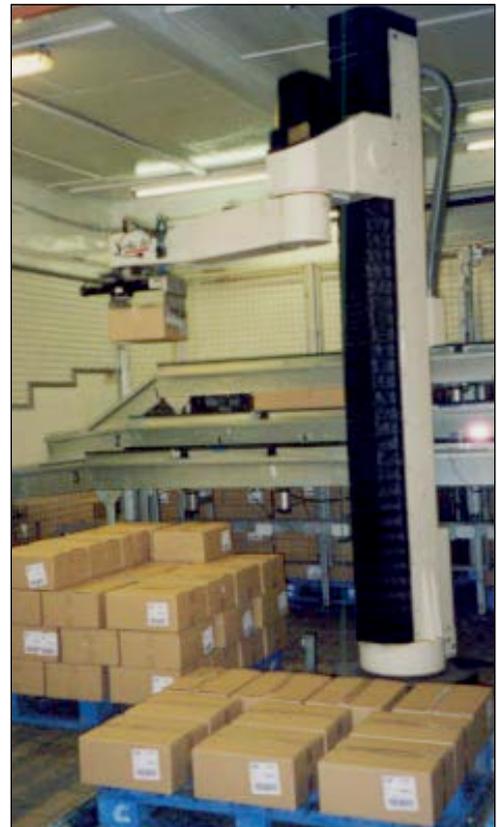
Following proactive discussions with the workforce, the company identified several problems associated with this task:

- the repetitive nature of the task;
- carrying distances of up to 5 m, depending on the destination of the pallet;
- operators were forced to reach forwards with the load to stack the pallet;
- a stooped posture was required when stacking the lowest layers of pallet;
- twisting of the upper body due to loading of different pallets.

Many complaints were received by staff with regard to the postures required (stooping, reaching, twisting) to place the boxes on the pallets.

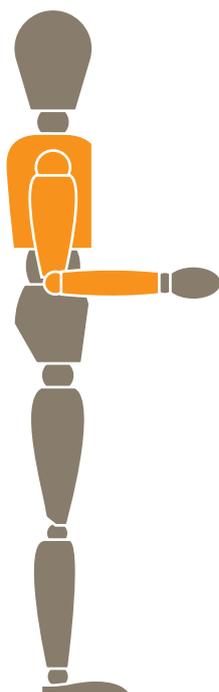
Finding solutions

The company installed a 'pick-and-place' robot which lifts the boxes off the conveyor and palletises them to the correct height, pattern and variety.



Results

- Manual handling of the boxes at this stage of production was removed.
- Operators were redeployed to other tasks.
- Complaints associated with the task ceased.
- A reduction in injuries.
- An improved consistency of stacking.
- Improved product presentation and box damage reduced.



Back
Arms
Shoulders

Case 65 Loading sacks onto pallets

Task

In a 'flavourings' company, 10 kg sacks containing finished product were manually lifted from a conveyor belt and placed on a pallet in a 'brick' stacking order. Each operator, wearing PVC gloves, would handle approximately 660 sacks per day.

Problem

- The repetitive nature of the task.
- The task was machine-paced.
- Operators were forced to reach forwards with the load to stack the pallet.
- A stooped posture was required when stacking the lowest layers of pallet.
- As the sacks were relatively light, operators were inclined to move more than if they were heavy, thus tiring the operator.
- There were complaints from the workforce regarding boredom and the repetitive nature of the task.

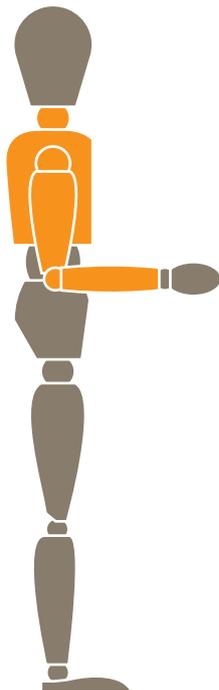
Finding solutions

The company's design engineers designed and installed a computerised palletiser, which lifted the sacks off the conveyor and palletised them to the correct height and pattern.



Results

- All manual handling of the sacks at this stage of production was removed.
- The operators were redeployed onto other tasks.
- All complaints associated with the task stopped.
- There was an increased stability of the load.
- An efficiency increase was recorded.



Back
Arms
Shoulders
Neck

Case 66 Palletising cases

Task

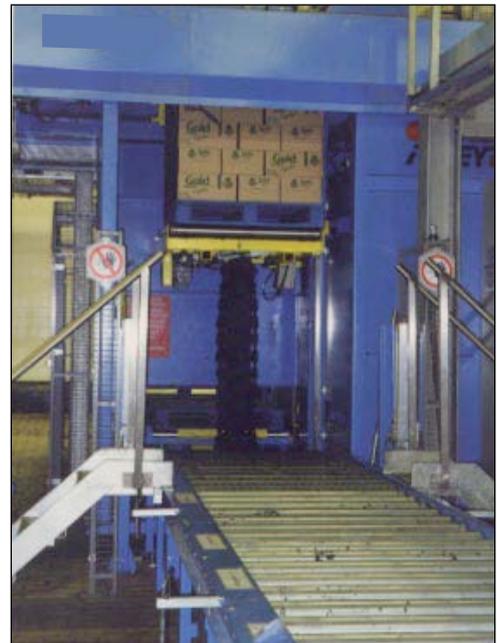
In the case-packing department, cases of finished product (weighing about 12.5 kg) were manually stacked onto a pallet.

Problem

- There was a high incidence of reportable strain injuries.
- Complaints had been received from the workforce.
- Fatigue among the operators was high.
- Occasionally cases were dropped, resulting in wastage.
- The operators had to stoop to place cases on the lower layers of the pallet.
- The operators were holding loads away from the body when placing cases in the middle of the pallet.
- Compensation claims had been received.

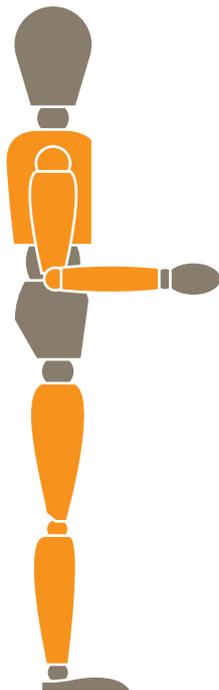
Finding solutions

The company installed a conveyor system that transported the cases directly from the packing machines to a central palletising room. In the palletising room, the cases are automatically stacked onto pallets.



Results

- There was a 95% reduction in manual handling.
- A reduction in injuries and fatigue.
- No further complaints were received from the workforce.
- Operators no longer had to stoop to place cases on the lower layers of the pallet or hold loads away from the body when placing cases in the middle of the pallet.
- No further compensation claims were received.



Back
Shoulders
Arms
Legs

Case 67 Pallet converter

Task

A warehouse received and stored food from producers. When orders were placed, workers selected the items for delivery to the customer's premises and loaded them onto pallets. Customers often requested the use of a certain type of pallet due either to the engineering constraints of their premises (eg ships), or the transportation used to reach the premises (eg helicopters).

Problem

If the order was originally loaded on a pallet different from that requested by the customer, the items had to be removed manually and placed on the desired pallet. This subjected the workers to a manual handling risk as the task involved repetitive bending, twisting and lifting of loads of up to a maximum of 50 kg.

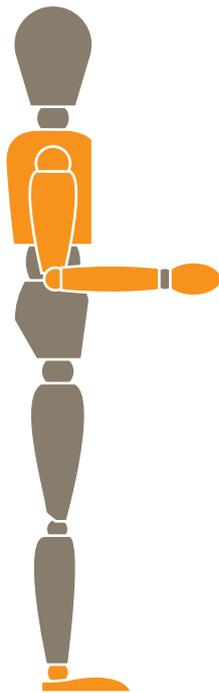
Finding solutions

A pallet converter was purchased. The correct type of pallet was placed upside down on top of the customer's order on the incorrect pallet. A fork-lift truck was used to lift this structure ('pallet sandwich') into the pallet converter. The converter had four metal parts, consisting of an upper and lower panel, a back panel and a right panel. Once the structure was in place, the operator pressed a button on the control box to lower the upper panel of the converter onto the structure. This panel was equipped with a pressure sensor to ensure it was lowered to a height that held the structure in place, without damaging its contents. When the four sides of the converter retained the structure, the operator activated the machine. The converter slowly rotated 180° in a clockwise direction and its contents were turned upside down, such that the original bottom pallet was at the top. The upper panel of the converter was then raised and the structure removed from the converter using a fork-lift truck. The upper pallet was then removed manually.



Results

- Manual handling of the product was eliminated.
- The task was reduced from an eight-man to one-man operation.
- The time taken to complete the task reduced considerably.
- Worker satisfaction increased as the task was easier and less tiring.



Back
Shoulders
Arms
Hands
Feet

Case 68 Moving vegetable drums after weighing

Task

Raw vegetables were dispensed into metal drums, which stood on scales, until the required weight was achieved. The drums were then manually pushed/pulled/rolled across a platform and loaded onto trolleys.

Problem

- The operator was required to twist, stoop, strenuously push/pull, and hold loads away from the body.
- The drums were not completely controllable while being rolled.
- The operators complained of backache and muscle strain.
- There was a possibility of trapped fingers/feet.
- There was a hazard from metal splinters.
- There was a fall hazard from the raised platform.

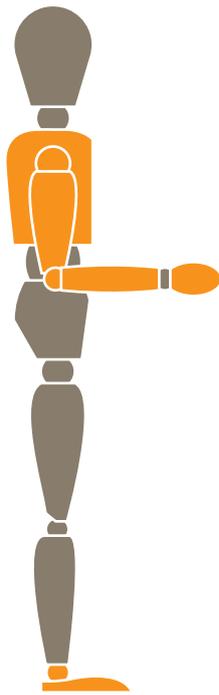
Finding solutions

The company put in place a programme to progressively replace the drums with wheeled bins, and to sink the weigh scales into the factory floor.



Results

- There was a reduction in manual handling of awkward product drums.
- The trip/fall hazard of drum platforms was eliminated by bringing all operations to a common floor.
- There was a reduction in the risk of trapped fingers and metal splinters.



Back
Shoulders
Arms
Hands
Feet

Case 69 Moving drums of tomato paste

Task

Drums of tomato paste, weighing 210 kg each, were manually rolled onto a roller conveyor for transport to a hopper. Operators carried out this task 60 to 70 times per shift.

Problem

- The operator was required to twist, stoop, strenuously push/pull, and hold loads away from the body.
- The drums were not completely controllable while being rolled.
- The operator complained of backache and muscle strain.
- There was a possibility of trapped fingers and feet.
- As experience and technique were required, only a few operators could carry out this task.
- There was a hazard from metal splinters.

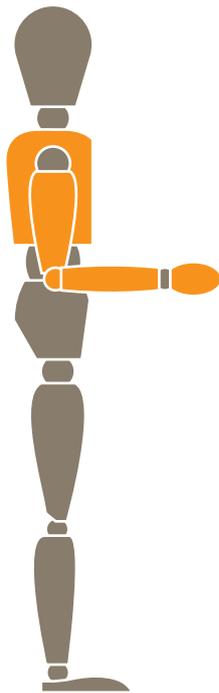
Finding solutions

The company installed a drum manipulator that consisted of a hoist which attached to the rim of the drums and transferred them onto the roller conveyor.

Results

- Fewer complaints were received from the workforce.
- The operators were no longer dependent on fork-lift drivers and could move the drums as desired.
- Fewer strain injuries occurred.





Back
Arms
Hands

Case 70 Finished product packaging

Task

In a flavourings company, 25 kg kegs (75 cm high, 50 cm diameter) were filled, by hand, with finished product. The kegs were then lifted and carried approximately 10 m to a pallet and stacked two high. This task was carried out 80–100 times per shift.

Problem

- The kegs were difficult to grasp and carry.
- Operators were forced to hold the load away from the trunk, to stoop, twist and to reach upwards.
- Complaints had been received from the workforce regarding the weight of the kegs and the carrying distances.

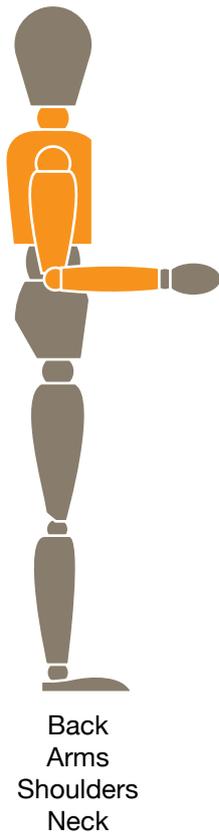
Finding solutions

The company carried out a risk assessment and held discussions with the workforce. It was decided that alternative packaging should be sourced to bring the task in line with the Manual Handling Operations Regulations 1992. The company encouraged its customers to receive product in 10 kg cardboard boxes (37.5 cm square) instead of the 25 kg kegs.



Results

- The boxes were easier to handle than the kegs.
- The boxes stacked more uniformly on the pallets.
- All complaints associated with the task were removed.
- There was a quality improvement in terms of better presentation of the finished product.



Case 71 Moving trays on wheeled trolleys

Task

The company operated a 'batch' manufacturing process for producing medicinal sweets, such as throat pastilles. As the product is medicinal, they needed to carry out tests on the levels of active ingredients in each batch of product. The product was held in plastic trays for up to three weeks, awaiting testing. As each tray of product came off the line, the trays were stacked on trolleys, up to 20 trays high. An extra, empty tray was placed on top of the stack to act as a lid. They were then pushed to the air-conditioned and dehumidified holding area. When the product had passed the quality control tests, the stack was wheeled to the packing area. Staff would pick each tray off the stack, and tip them into the hoppers of the packing machine.



The weight of each tray was between 5 and 10 kg, and the dimensions of each tray were 75 x 40 x 10 cm. The total weight of a stack of trays could be as much as 200 kg. Trays were often overloaded, and/or asymmetrically loaded so they were heavier at one end than the other. There were no (designed) hand holds on the trays, although the sides were relatively easy to grip. The total height of a stack of 20 trays and a trolley was 215 cm.

Up to 70 people in the manufacturing and packing departments would be involved in this operation. They handled 120 trays per shift in the packing department, and 360 per shift in the manufacturing department.

Problem

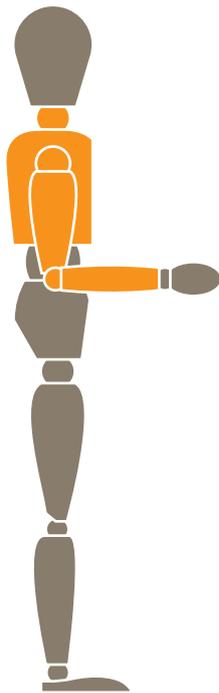
There had been shoulder, neck, back and upper limb injuries associated with this task. There were many complaints from staff.

Finding solutions

The difficulties with this task were discussed at the monthly health and safety meeting. The task was assessed and several problems were identified.

- The visibility was poor, as staff could not see over the stack.
- The wooden trolleys had small 5 cm diameter wheels, making them difficult to move.
- The flooring in parts of the factory was uneven, and in certain areas staff had to manoeuvre the stacks up and down slopes.





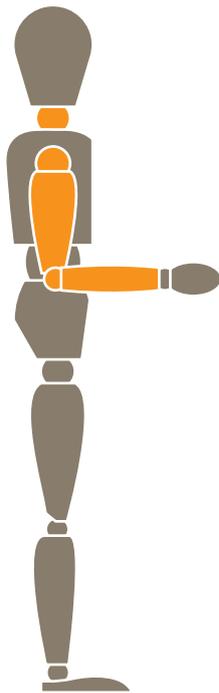
Back
Arms
Shoulders
Neck

- There was a particular problem in the sugar-boiling department, which manufactured the heaviest product.

The company purchased 86 new trolleys, and put in a procedure to limit the height of the stack to 15 trays. The new trolleys had larger diameter wheels (10 cm) which were easier to pull and push. They also purchased special 'lids' to put on the top of the stack. The height of the stack was thus limited to 1.6 m.

Results

- Staff were highly satisfied with the ease of use of the new trolleys.
- The risk of manual handling injuries and accidents reduced.
- There was better visibility due to the decreased height of the stacks.
- The larger diameter wheels made the trolleys easier to move, and less susceptible to poor flooring.



Arms
Shoulders
Neck

Case 72 Transporting waste glass

Task

In a bottling department, waste glass was deposited into a wheelie bin. When the bin was full, it was pushed over a distance of 50 m and tipped manually into a skip outside the building. The full bins weighed approximately 250 kg. This task occurred two to three times over the period of a shift.

Problem

- There was a high incidence of strain injuries.
- Complaints had been received from the workforce.
- Several minor first-aid injuries had occurred.

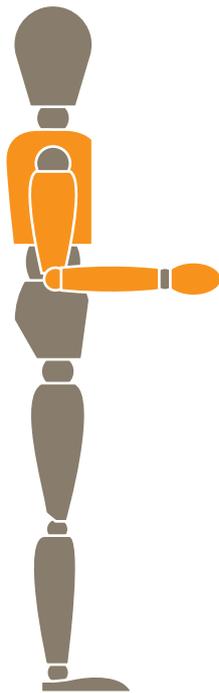
Finding solutions

The company bought six mini-skips to replace the wheelie bins, they were placed at various points on the line. When the mini-skips are full they are lifted by a fork-lift truck and transported to an outside waste dock, where they are emptied.



Results

- The manual handling portion of the task was removed.
- There was a reduction in injuries.
- No further complaints were received from the workforce.



Back
Arms
Hands

Case 73 Handling crates of miswrapped chickens

Task

If birds were found to be poorly wrapped, they were taken off the line and put into a crate. When a crate was full, an operator would carry it back to the correct part of the line for repackaging. A full crate would weigh approximately 15 kg.

Problem

- Some operators would try and carry two at a time, thus could not see where they were going, with the likelihood of back-strains and trips.
- There was a possibility of slipping on uneven, wet and debris-strewn floor surfaces.
- There were obstructions such as people, bins and machines.
- There was a possibility of knuckles being banged on walls and machines.
- Operators were suffering from strained arms and backs.

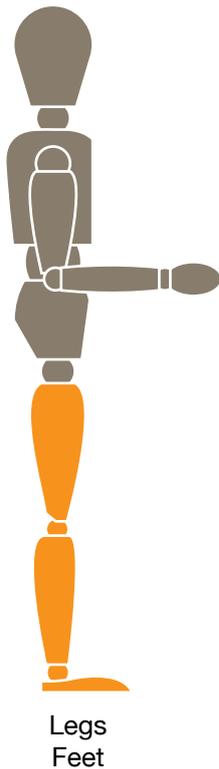
Finding solutions

The company bought 20 sets of dolly wheels.

Results

- The dolly wheels could be pushed or pulled for ease of use.
- As many as six full crates could be transported at one time.
- The carrying of full crates by operators was eliminated.
- The operators could see where they were going.





Case 74 Trolley selection for easy manual handling

Task

The company manufactured medicinal sweets, such as throat pastilles. As each tray of product came off the line, the trays were stacked up to 20 high on a wooden trolley, with an empty tray on top acting as a lid. They were then pushed to the air-conditioned and dehumidified holding area. When the product had passed quality control tests, the stack was pushed or pulled to the packing area .

The weight of each tray was between 5 and 10 kg, and the dimensions of each tray were 75 x 40 x 10 cm. The total weight of a stack of trays could be as much as 200 kg. Up to 70 people in the manufacturing and packing departments would be involved in this operation. The manufacturing department would move approximately 50 stacks per day, the packing department 20 stacks per day.



Problem

There had been several accidents where the stack of trays had slid and fallen off the trolley. On some occasions, the stack of product had fallen onto a member of staff. Shin injuries and wooden splinters from the trolleys were common. If the product fell off the trolley, it could not be re-used, and it also created a considerable housekeeping problem as the pastilles and gums scattered all over the floor.

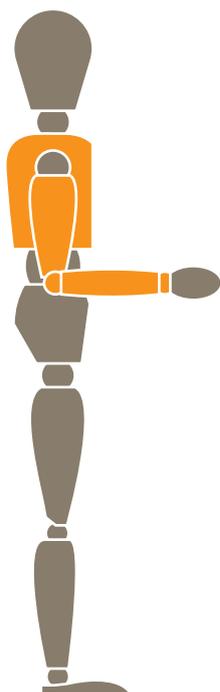


Finding solutions

The company identified four manufacturers of trolleys. They tried out each manufacturer's trolley in their own factory environment. One was too heavy; one had sharp edges and one was expensive. The fourth was lighter, had no sharp edges, was easy to use for this company's product and was reasonably priced. It also had a metal ring which helped prevent the stacks from sliding off the trolley if it hit an obstruction on the floor. The company purchased 320 of these trolleys, to replace the wooden ones.

Results

- Staff were highly satisfied with the ease of use of the new trolleys, and there were no more complaints.
- The risk of accidents was reduced.
- There was less product wasted and housekeeping in the area was improved.
- There were no longer problems with splinters, and food hygiene was better with the plastic trolleys.
- The number of shin injuries decreased.



Back
Arms
Wrists

Case 75 Shrink-wrapping pallets

Task

In the warehouse of a flavourings company, pallets of finished product were shrink-wrapped manually using shrink-film and a shrink-film holder. Usually, one operator would shrink-wrap 30/40 pallets per day

Problem

By carrying out a risk assessment and talking to the workforce, several problems were identified:

- weights of up to 12 kg (shrink-film and holder) were being supported by the operator;
- keeping tension on the shrink-film resulted in spinal pressure between 150 and 275 kg;
- the operators were forced to reach up to the top of the pallet and stoop down to the bottom of the pallet;
- operators complained of backache and wrist ache.

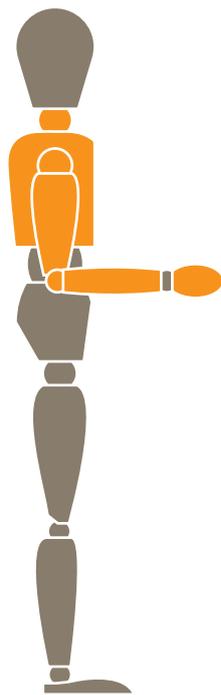
Finding solutions

The company installed seven automatic shrink-wrapping machines at various sites, which were designed by their in-house design engineering unit.



Results

- The changes resulted in a removal of the manual handling portion of the task.
- Backache and wrist ache were prevented.
- Increased productivity.
- Better conformity in packaging.
- Quality improvement.
- Morale in the workforce improved.
- Increased stability of the loads.



Back
Arms
Shoulders
Hands
Neck

Case 76 Improving handling during multiple picking operation

Task

Preparing orders in a food warehouse involved picking food and non-food products, of various sizes, weights, temperatures and package types, from the warehouse shelves onto pallets/roll cages for onward delivery to customers. Orders were collected in batches by product, eg one picker collected all the oil ordered on a delivery vehicle daily route/load, another collected all the crisps. The pickers drove round the warehouse in fork-lift/picking trucks and collected the orders from shelves of varying heights. Once collected, the bulk orders were subdivided into customer orders by the pickers, before being loaded onto trucks for delivery to customers' premises. The warehouse operated 24 hours a day with 150–170 pickers working eight-hour shifts.

Problem

There was a high incidence of back and upper limb injuries, and accidents involving trapped fingers and falling objects. This prompted a risk assessment.

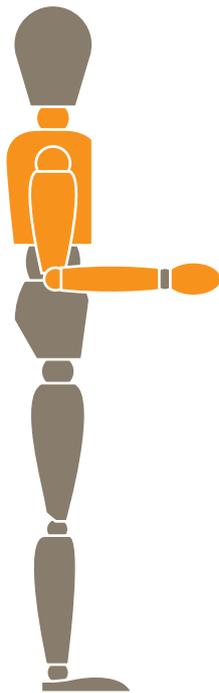
The assessment identified a high manual handling risk as the task involved bending, pulling and twisting to lift loads of up to 50 kg. Heavy items were often lifted from above shoulder height. The task was also inefficient as it involved multiple handling of the same product, eg from the shelves to the picking pallet/roll cages, from the picking pallet/roll cage to the delivery pallet/roll cage.

If single items were required, packages were split. The single items that remained sometimes caused trapped fingers when they were moved to access a full package. They were also commonly placed on higher shelves while full packages were accessed, and then forgotten about. Accidents occurred when workers attempted to lift down higher packages and the loose items fell on them. The workplace was also dangerous as fork-lift/picking trucks moved round the warehouse in both directions and turning and reversing the truck was common to locate a product.

Finding solutions

The warehouse and task was redesigned:

- The size of packages was reduced so that the maximum weight of a package was 25 kg.
- The location of items was rearranged such that heavy stock was stored on lower shelves and no heavy stock was located above shoulder height. The stock was also further divided so that fast-selling items were located on lower shelves. A platform was also available on the picking truck for stepping to an intermediate height to reach higher items.
- Orders were processed into picking notes for each customer. This reduced the handling of the product as once the items were collected the pallets/roll cages were shrink-wrapped and loaded onto trucks for delivery.
- The pickers collected the customer's orders on the fork-lift/picking truck by travelling round the warehouse in a one-way system. The one-way system and the clear lane and bay directions reduced accidents.
- Numerical pick markings made identification of the products easier and reduced twisting, turning and reversing.
- The incidence of trapped fingers and falling objects was reduced by providing a small space beside the main pick location for loose or single items.



Back
Arms
Shoulders
Hands
Neck

Results

- Accident rates decreased by 30% .
- The number of pallets/roll cages picked increased by 12.5%.
- The cost to pick decreased by 40%.
- Staff turnover and absenteeism went from 9% to 2%.
- Worker satisfaction with the task increased as the task was less physically demanding.
- The time taken to complete the task reduced.
- The quality of the finished pallets/roll cages improved, as the layout of the warehouse was designed so heavier items were picked first, eg oil at the bottom, crisps at the top. Customers receive their products with less damage.
- The six-month cost of implementation was recouped within 12 months of operation.



Case 77 Unloading and transporting frozen foods

Task

The company carried out a specific assessment of a manual handling task in response to a request from a safety representative. The task involved unloading frozen foods of various weights (5–30 kg) from a container and transporting them to various freezers.

The task involved awkward postures, particularly twisting and handling to/from the side, stooping, leaning and stretching forward. The frozen foods were bulky and difficult to grasp due to the cold temperatures and the gloves worn by the staff. The floor adjacent to the container was uneven and could be slippery. Many of the staff were involved in this activity. The unloading and redistribution of the foodstuffs to the freezers had to be carried out quickly, due to time constraints.

Problem

The task was generally recognised as a strenuous operation and as posing manual handling risks. A member of the team had experienced a back injury while unloading the containers.

Finding solutions

Four sets of solutions were put in place to reduce the risks associated with this task.

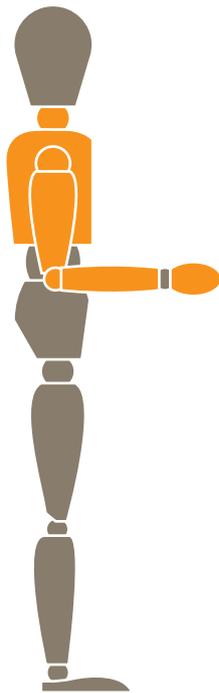
- Mechanical lifting aids (trolleys and sack barrows) were provided to reduce the manual handling and carrying associated with these loads.
- Job rotation and team handling measures (ie the need for assistance with awkward loads was stressed) were introduced to reduce the frequency of handling by any particular individual.
- Although all members of the team had already been given manual handling awareness training, the training was repeated for all personnel liable to be involved in this activity. The need to use personal protective equipment, such as gloves, was highlighted.
- The necessity of warming up before lifting the loads, and taking time and obtaining assistance wherever required, was emphasised.

The cost of these changes was low. The training was done on-site with in-house resources, and the equipment was already available on-site.

Results

- The manual handling tasks associated with unloading and moving frozen foods were made easier for all concerned.
- By changing the working practices in this way the organisation reduced the risk to personnel, and observed the Manual Handling Operations Regulations 1992.
- The case also illustrates the need for good communications. It has since been found that the company had already previously assessed the task at one location, but that their staff at another location were unaware of the risks.
- The company has just completed five years with no lost time injuries.





Back
Arms
Shoulders
Hands
Neck

Case 78 Handling of kegs

Task

In the warehouse (distribution centre) of a cider-making company, pallets containing cider kegs sometimes had to be split for delivery. This meant that kegs occasionally had to be moved from pallet to pallet, from floor to pallet and from one area to another. Operators moved kegs by rolling, kicking, lifting (including shared lifting) and general manhandling.

Problem

- Thirty per cent of all accidents involved moving and lifting kegs.
- Operators were experiencing strains and sprains.
- Cuts to hands were occurring in instances where operators were not wearing the protective gloves provided.

Finding solutions

The problems were discussed with the workforce and a keg-handling routine (adapted from another company's routine) was devised. This routine describes how operators should move kegs.

Moving kegs from pallet to pallet

The pallet to be picked onto is placed squarely and adjacent to the stock pallet ensuring there are no gaps. The operator holds the keg by its handles and tilts it towards him until it is in a balanced position. The keg is slowly rolled across onto the pick pallet and stood upright on its base.

Moving kegs from floor to pallet

The operator tilts the keg towards him while holding the keg handles. The keg is slowly rolled to the edge of the pallet. While resting on the pallet, with its base on the floor, the operator tilts the keg away from himself. The keg is then swivelled onto the pallet and stood upright.

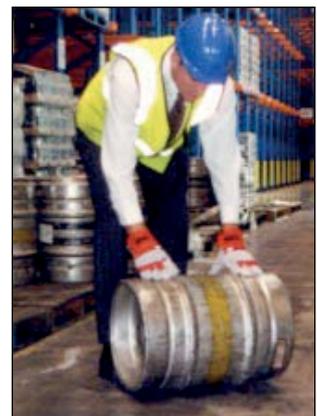
Moving kegs from one area to another

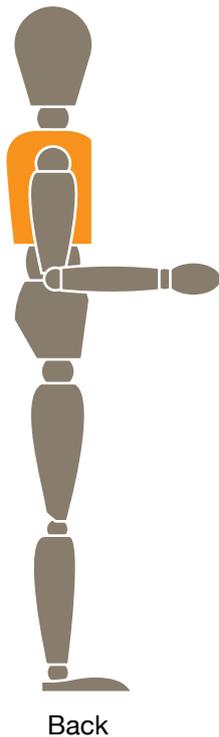
The operator holds the keg by its handles and slowly tips it on its side. The keg is rolled, at a pace at which it can be stopped quickly, to the new area. Once at its resting place, the keg is stood upright by its handle.

Upon induction, each operator is trained in the routine and is given a 'keg module assessment' which tests that they fully understand the routine.

Results

- The number of injuries was greatly reduced.
- There was improved employee morale.
- Quality control increased as operators were less likely to drop the kegs.





Back

Case 79 Small keg handling

Task

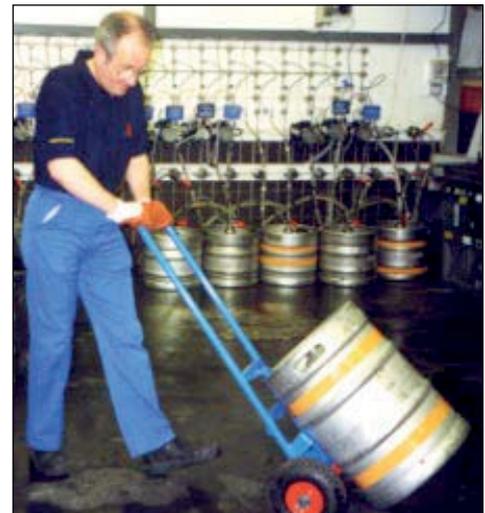
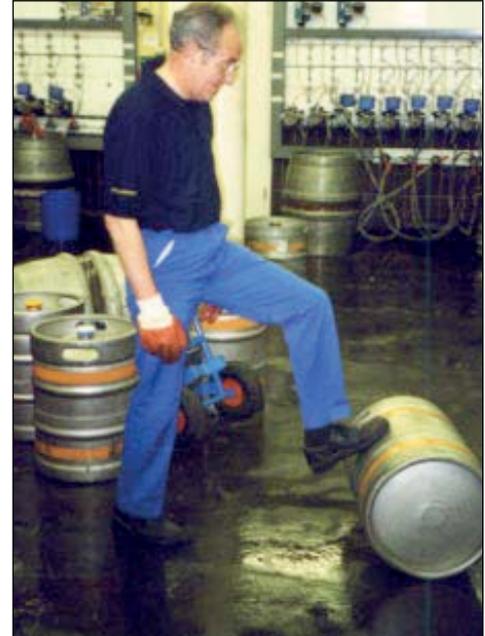
At a brewery, sample kegs weighing 40.6 and 60 kg were delivered to a loading deck, pulled over onto their side manually and kicked/rolled approximately 25 m to the sample cellar. Once at the sample cellar, the kegs were upended and the contents were taste tested. The kegs were then returned to the loading deck in the same manner. Approximately ten kegs were handled each day in this way by the sample cellar technician.

Problem

- The physical force required in pulling the kegs onto their sides.
- The operator was required to stoop to push the kegs.
- The activity of pushing/kicking the kegs was very noisy.
- The kegs were not completely controllable while being pushed/kicked.
- The physical force required in upending the kegs.
- The operator complained of backache.
- Metal splinters could occur.

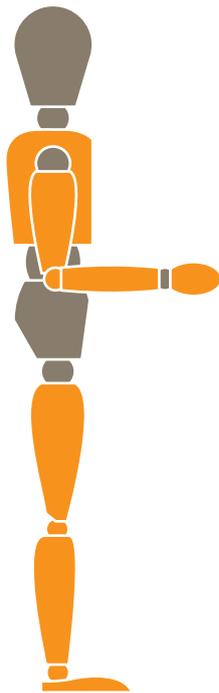
Finding solutions

The company bought a keg truck that was similar to a sack truck but has two hooks which go over the rim of the keg and tip it back using the lever principle. The kegs are hooked onto the truck and wheeled to and from the sample cellar.



Results

- The new task now required negligible physical effort.
- The operator no longer had to stoop.
- The activity was much quieter.
- The kegs were more controllable.
- Operators no longer complained of backache.
- There was a reduced likelihood of metal splinters occurring.



Back
Arms
Hands
Legs
Feet

Case 80 Upending large kegs

Task

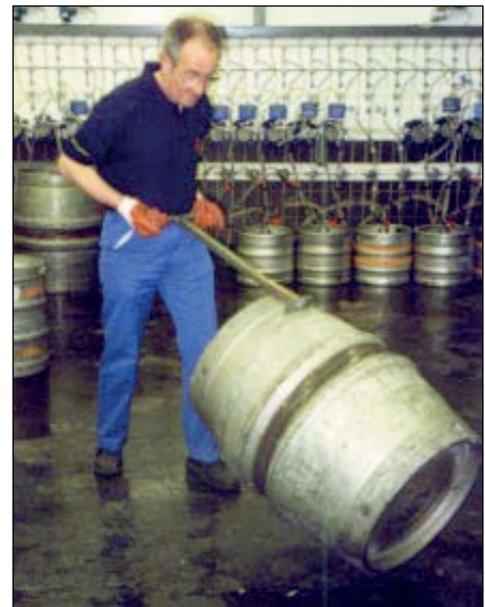
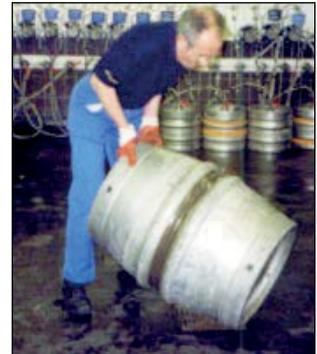
In the sample cellar of a brewery, approximately ten sample kegs, each weighing 193.6 kg, were upended manually by the sample cellar technician in readiness for taste testing.

Problem

- The physical force required in upending the kegs.
- If the kegs had been damaged in transit, metal splinters could occur.
- The operator was required to twist, stoop, strenuously push/pull, and hold loads away from the body.
- The kegs were not completely controllable while being upended.
- The operator complained of backache and muscle strain.
- There was a possibility of trapping fingers and feet.
- As experience and technique are required, only a few operators can carry out this task.

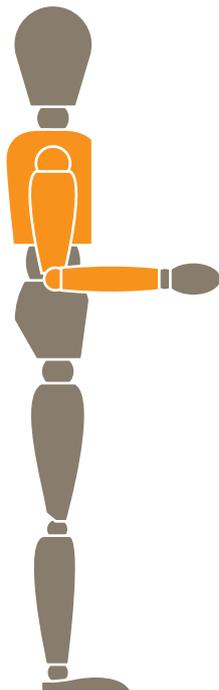
Finding solutions

Following a risk assessment, the company designed a lever, named the Taffy Tipper. This lever increases the leverage (ie a greater distance can be covered with less force). The lever is hooked onto the keg and pulled to upend it.



Results

- The task required less physical force.
- The operator no longer had to twist or stoop.
- The operator no longer complained of backache or muscle strain.
- As there was less physical contact with the keg, the operator was less likely to suffer from metal splinters.
- There was a reduced likelihood of trapped fingers and feet.
- A greater number of operators were able to carry out this task.



Back
Arms
Shoulders

Case 81 Upending whisky casks

Task

Casks of whisky are normally stored lying on their sides, but occasionally they must be upended when, for instance, they need a repair to stop a leak. The traditional method of upending a large 110 gallon cask of whisky weighing 500 kg was to use the brute force of three people. With one standing at one end of the cask and the other two on either side, three men rocked the cask and then co-ordinated one large push to stand the container on its end.

Problem

A low, stooped posture was adopted to grasp the cask. High pushing and lifting forces were necessary, particularly at the start of the movement, and the operators standing to the side of the cask had to twist their trunks as they lifted. Several handlers of these casks had suffered injuries during this task. In addition to the risk of back injury from the poor postures and high forces involved, there was an added danger of the cask slipping and falling towards the handlers, particularly if the floor was wet and slippery.

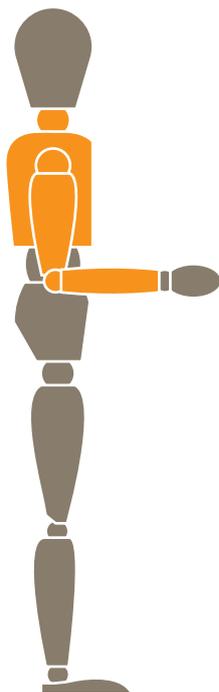
Finding solutions

A portable cask-upender has been developed which allows a single person to upend the cask with mechanical assistance. The operator attaches straps to the centre of the cask, positions the device, and connects the upender's couplings to a hinge on the straps. He then pumps a lever to raise the arm, orientates the cask to the upright position, and lowers the arm. Using the device reduces the operator's effort to the relatively light pumping action required to raise the arm, greatly reducing the musculoskeletal stress and risk of injury. Furthermore, it entirely removes the risk of the cask slipping while being upended and falling towards the operators.



Results

- The cask-inverter has been used in several distilleries and warehouses and was especially successful in small sites where fewer personnel made it difficult to perform the traditional method of upending.
- Staff using the device reported a reduced incidence of back pain.
- One of the cost-saving benefits of the upending device was that it allows the task to be performed by one person. This was especially beneficial in small distilleries where gathering three people together to upend a cask may be difficult or draw away critical human resource from other areas of the operation.
- Since the introduction of the device, the reported cases of back pain have fallen dramatically.



Back
Arms
Shoulders
Neck

Case 82 Reorienting whisky cases in storage racking

Task

A common problem in the storage of casks of whisky is moving the casks on the two rails on which they are stored to age. The casks are normally stored lying sideways across the rails with the bung (cork) located at the top portion (between 10 and 2 o'clock) of the barrel. If the bung was not in the correct position, two warehouse staff turned the 500 kg cask by standing at either side of the cask and pushing it forwards and backwards to progressively turn the cask to the right position. This task was performed two or three times per day on average. A similar but even more demanding task was repositioning a cask that had turned 90° so that it was lying between and parallel to the rails. In this case the operators had to pull and lever the cask into the correct position across the rails, and also ensure that the bung was located at the top of the cask.



Problem

Turning and repositioning the casks in the racking were generally considered to be the most dangerous and physically demanding tasks in the warehouse. Very high pushing, pulling and lifting forces were required to manoeuvre the containers. Because the aisle between the racks was only 40 cm wide, the operators often had to perform the tasks in stooped and twisted postures. Several had reported strains to the back and shoulders. There was also a risk of the operator's fingers becoming trapped between the cask and the racking while repositioning the cask.

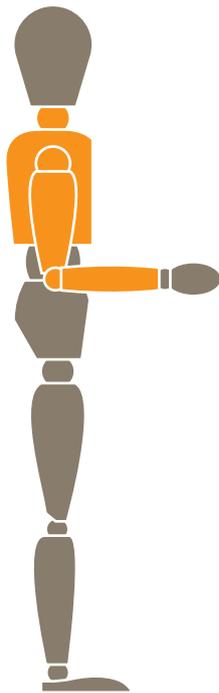
Finding solutions

A lifting aid was developed which consisted of a ratchet hoist and two straps with in-built roller bearings. The hoist was connected to the racking above the cask to be repositioned, and one strap was wrapped around each end of the cask. The operator hand-cranked the hoist to suspend the cask and turned the cask on the roller bearings in the straps. A metal plate was placed beneath the cask to assist in the repositioning. When the cask was located correctly on the racking with the bung at the top, the operator lowered the hoist and released the straps.

Results

- Although the repositioning of the casks took slightly longer using the hoist and straps device, the warehouse operatives found the job was far less strenuous and less dangerous than the previous manual method.
- Reports of back pain associated with moving the casks in the racking have decreased.

Very often traditional manual methods pose significant risks of injury, and just because 'that is the way it has always been done', there is resistance to changing the task method. This case study illustrates a simple and relatively low-cost solution to an awkward traditional manual handling task.



Back
Arms
Shoulders
Neck

Case 83 Destacking cases of whisky

Task

Cases of whisky were delivered in container vehicles in bulk. Certain countries and certain customers did not permit the cases to be delivered on wooden pallets, as it wasted space in the shipping container, and created a dust and hygiene problem. So staff had to destack the cases of whisky (weighing between 15 and 25 kg) from the pallets into the container vehicles. Six people would destack at a rate of four to five cases per minute, over the course of an eight-hour shift.

Problem

The task was recognised to contain manual handling risks, in terms of the weight of the cases, the work rate and the lifting heights, eg to ground level and above shoulder level to stack the containers completely full. There was also a risk of accidents with the operators and the fork-lift trucks delivering the pallets working in the confined space of the container vehicle. Occasionally, a case would fall onto an operator as they lifted the last few boxes up onto the top levels of the pallet.

Finding solutions

The company identified a modification to fork-lift vehicles that would enable them to use 'slip mats'. These are thin pieces of cardboard, of the same dimensions as a pallet, onto which the boxes can be stacked automatically to the correct height for the container vehicle, then fork-lifted straight into the vehicle. The slip mats waste very little space and are infrequently damaged.

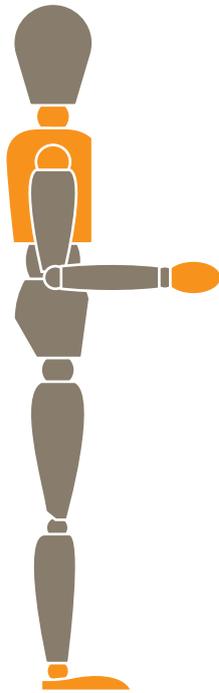


Results

- The manual handling risk was prevented.
- The overall efficiency of stacking container vehicles improved considerably.
- The risk of accidents in the confined space was reduced.

Handling equipment

Case 84 Changing star wheels



Back
Shoulders
Hands
Feet

Task

As soft drinks bottles were transferred from a filler to an outfeed conveyor for labelling, they were fed gently around a curve by a 'star wheel'. When production changed to a different shape and size of bottle a different size star wheel was required. The star wheels, which weighed 20 kg and measured approximately 60 cm in diameter, had to be changed manually by an operator. This task was carried out once or twice a day depending on production requirements.

Problem

- The star wheels were heavy and difficult to manoeuvre.
- The operator was forced to hold the load away from the trunk, and stoop when fitting the star wheels.
- If a star wheel jammed in the machine, strenuous pushing and pulling was required.
- The operator had to climb into the machine itself that could result in tripping.
- There was a risk of hands/feet being nipped against other parts of the machine.
- Operators complained of backache.

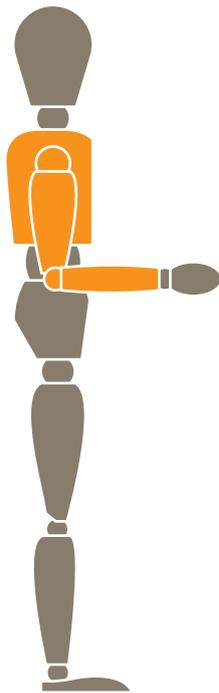
Finding solutions

The company replaced the existing star wheels with lightweight versions. The new star wheels have all unnecessary material taken out of them (eg the centre of each wheel is now cut out). They contain only half the material, weighing only 10 kg, but retain rigidity.

Result

- Operators no longer complained of backache.
- The star wheels were lighter and easier to manoeuvre.
- The operator no longer had to climb into the machine to install the wheels.
- It was easier to stretch and hold loads away from the body when required.





Back
Arms
Shoulders

Case 85 Changing bottling machinery on-line

Task

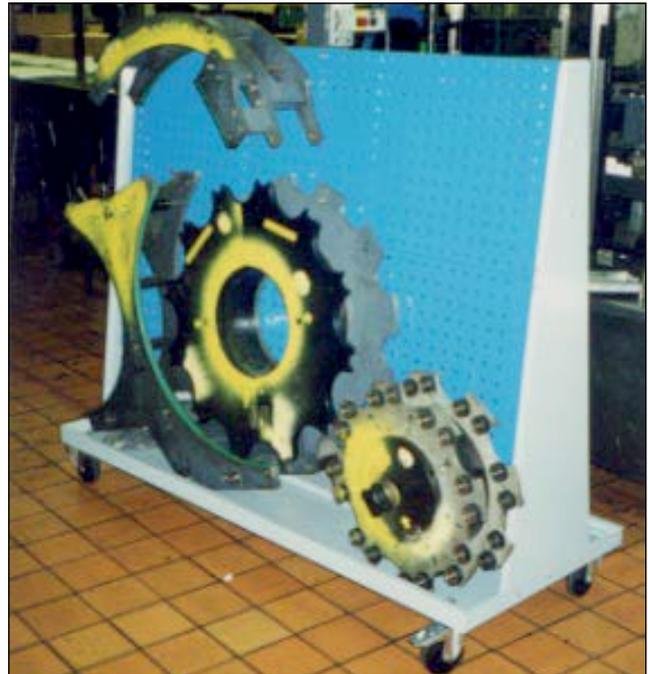
The company bottled malt whiskies in a range of over 40 bottle sizes and shapes, on eight lines. Depending on the shape of the bottles, heavy machinery parts had to be swapped in and out of the lines.

Problem

The machine parts weighed between 5 and 40 kg. Staff had to carry the parts from the machine store to where they were needed, often over distances of up to 30 m.

Finding solutions

Although the machine-changing occurs relatively infrequently, it was recognised as containing manual handling risks associated with heavy lifting and carrying. The company designed and built a parts trolley in-house that could be wheeled from the machinery store to the appropriate line. The heaviest parts were stored at the most comfortable heights for handling and, for the heaviest lifts, two people work as a team to fit the machinery onto the line.



While the originals were built in-house, parts trolley are now available on the market. The photograph shows a trolley that is available commercially as a flat-pack that can be assembled easily on-site.

Results

- The manual handling risk was reduced.
- Staff no longer had to carry the machinery parts over long distances.
- On frequently changing lines, the parts were stored on the trolley right next to where they were needed.



Case 86 Fitting chiller unit into vending machine

Task

To deliver cold drinks in a vending machine, a chiller unit must be fitted inside the machine. Chiller units of various types were delivered to the manufacturing area, stacked three high. They weighed 15–30 kg, were not very easy to pick up as there were no good handholds, and the weight was distributed asymmetrically. One end of the unit was much heavier than the other. Twenty members of staff could be lifting these chiller units several times per shift.

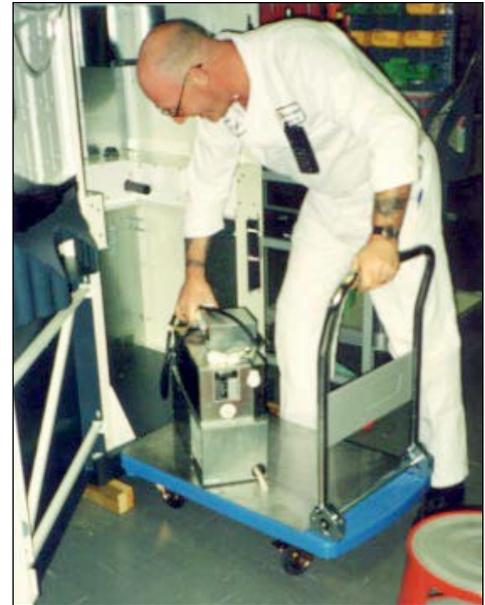
Problem

The chiller units had to be lifted off pallets onto a trolley, taken to the manufacturing area, and lifted from the trolley into the machine.

Finding solutions

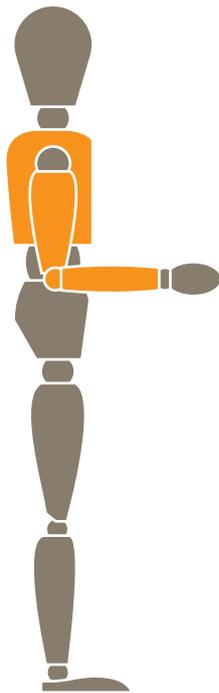
The company bought a lifting machine to lift the chillers off the delivery trolleys and place them directly into the vending machines. However, the lifting machine was slow and cumbersome to use, and not particularly user-friendly. Visibility within the vending machine was another problem. For these reasons, staff reverted to lifting the chillers manually.

The engineering team went back to the drawing board and brainstormed the problem with an ergonomist and two members of the factory staff. They determined that one of the most risky parts of the task (lifting the chiller into the machine) could be reduced to a sliding task rather than a lifting task. To achieve this, they purchased trolleys which could be set at the same height as the delivery pallets and the vending machine floor, and fitted a special stainless-steel, friction-free surface onto them. They also fitted small feet onto the undersurface of the chiller units so that they would slide easily over the stainless-steel surface of the trolley and the vending machine floor. The lifting machine is now used to unload chillers onto the trolleys only.



Result

- Manual handling risks were reduced considerably.
- The expensive lifting machine was used for a more suitable task.
- The task was subjectively much easier to carry out.
- There was positive feedback from the operators on the manufacturing line.



Back
Arms

Case 87 Loading autoclaves

Task

In the laboratories of a brewery, apparatus was sterilised in three top-loading autoclaves. The apparatus was loaded into a large metal basket (0.5 m diameter), weighing 20 kg or more, lifted by a thin wire handle to above chest height, and into the autoclave. When the apparatus was sterilised, the basket was lifted out of the autoclave by an operator wearing gloves. This task was carried out approximately five times a day.

Problem

- The weight of the basket.
- The operator was required to reach upwards with the load and hold the load away from the trunk.
- The basket occasionally had to be wiggled to fit into the opening, increasing the strain on the operator.
- Shorter operators had to reach further.
- Operators complained of backache.

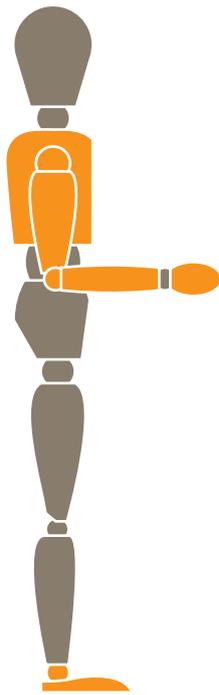
Finding solutions

The company replaced two top-loading autoclaves with front-loading autoclaves.



Results

- The operator no longer had to reach upwards or hold the load away from the trunk.
- The basket could be rested on the edge of the opening and pushed inside, so taking the weight off the operator.
- There were no more complaints of backache.



Back
Arms
Shoulders
Hands
Feet

Case 88 Carrying empty pallets

Task

Operators had to carry empty wooden pallets from the nearest pallet stack over to the area where they were to be packed with product. Each team needed a new empty pallet approximately eight times per shift.

Problem

The wooden pallets were piled in stacks up to 12 high. Each pallet weighed 24 kg, and they were unwieldy due to their size. They presented risks of finger-trapping, upper limb injuries, splinters, and damage to people's feet if the pallets were dropped. There were just two stacks of pallets serving the whole of the manufacturing areas, and pallets had to be carried over distances of up to 20 m. As the level of pallets fell, staff stooped to pick up the lower ones from the stack. People had complained about this part of the job.

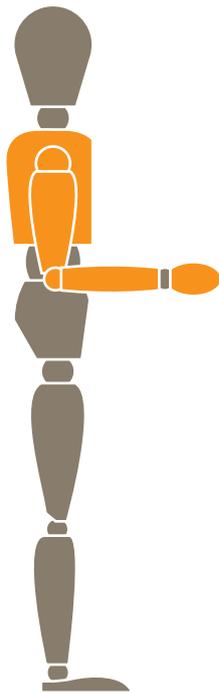


Finding solutions

The company put in place three solutions. First, they decreased the maximum height of the stack, so that the pallets were not stored more than seven high. Secondly, they improved the layout of the manufacturing areas, and created four stack locations. Thirdly, they purchased safety footwear for all staff.

Results

- The number of complaints and upper limb injuries was reduced.
- Pallets were not lifted above shoulder height.
- Carrying distances were considerably shortened.
- The risk of foot injury was greatly reduced.
- The working environment was considered safer, as general housekeeping was improved.
- The company cannot store so many empty pallets in the department, but this did not affect efficiency or productivity.



Back
Arms
Shoulders
Hands

Case 89 Removal of empty pallets

Task

Pallets containing powdered milk-based ingredients were deposited on a platform next to a hopper by a fork-lift truck. Once the bags had been removed, the operator would carry the empty wooden pallet, weighing between 30 and 35 kg, down four steps for removal to storage. This task was carried out approximately seven times an hour.

Problem

- The weight of the pallets was a problem.
- There was a high incidence of strain injuries.
- Complaints had been received from the workforce.
- Several minor first-aid injuries had occurred (splinters, cuts etc).
- It was difficult to manoeuvre the pallets on the narrow stairway.
- Handling the dirty wooden pallets posed a hygiene risk.

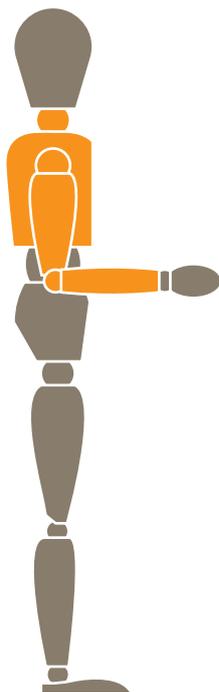
Finding solutions

The company built a platform on which the empty pallets could be stacked until they were removed with a fork-lift truck.



Results

- No further complaints were received from the workforce.
- The manual handling element of the task was greatly reduced.
- No further strain injuries have occurred.
- There was a reduction in minor first-aid injuries.



Back
Arms
Shoulders
Neck

Case 90 Handling waste bins

Task

At a brewery, stones from the incoming malt were discharged from a de-stoner into plastic dustbins. The bins, weighing approximately 50 kg, were lifted down manually from a waist-high platform onto a sack truck and wheeled to a lift. When the lift had descended to ground level, the bins were wheeled to a nearby skip, lifted manually and the contents tipped into the skip. This task occurred once every two days.

Problem

- The physical effort needed to lift the bins down from the platform.
- The brewhouse operators were forced to twist, stoop and reach upwards with the load.
- The physical exertion needed to lift and tip the bins into the skip.
- The weight of the full bins exceeded the recommended levels for manual handling.

Finding solutions

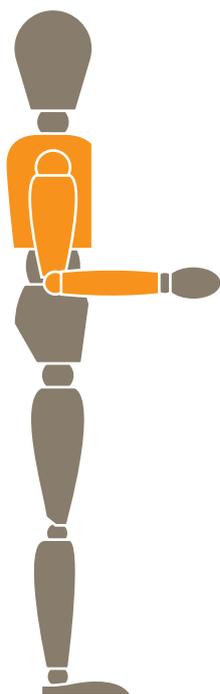
Following a risk assessment, the company cut slots into the sides of the plastic bins to prevent them from being overfilled. They also purchased a 1000 kg wheeled mini-skip which was placed next to the platform. When the bins needed emptying, they were tipped from the platform into the mini-skip.

When the mini-skip was full, it was pushed to the lift, taken to ground level and lifted by fork-lift truck to empty it into a larger skip.



Results

- The whole operation was much easier.
- Full bins now only weighed approximately 25 kg.
- Bins no longer had to be lifted from the platform and wheeled on a sack truck.
- Brewhouse operators no longer had to twist, stoop and reach upwards with the load.
- Bins did not have to be tipped manually into the skip.



Back
Arms
Shoulders

Case 91 Handling stainless-steel fittings

Task

In the tanker bays of a brewery, the stainless-steel pipe fittings and swing bends used to unload and load tanker were immersed in floor-level soak baths until the next tanker arrived.

Problem

The operatives had to stoop to place the fittings into, and take them out of, the soak baths.

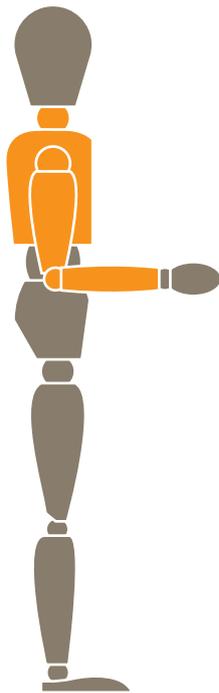
Finding solutions

The company raised the soak baths to waist height.

Result

The stooping element of this task was removed.





Back
Arms
Shoulders
Neck

Case 92 Carrying maintenance tool boxes

Task

In a potato factory, engineers were called out to solve maintenance problems. Depending on the particular problem, they would require different tools. They carried their tools in a hand-held toolbox. Fifteen engineers worked in the factory.

Problem

The toolbox weighed up to 30 kg when full. If engineers were unsure of what tools were required for the task, they would carry the full tool box with them to the problem site. Depending on the location, the engineer might have to carry this load the full length of the factory, including up and down stairs. The weight of the toolbox, together with the long carrying distance, caused the engineers discomfort and they decided to change the toolbox design.

Finding solutions

The engineers made themselves a carrier for the toolbox. This consisted of an angle-iron shelf with two wheels and a tubular steel handle. The height of the handle was customised to the height of the engineer. The toolbox was placed on the shelf and could be pulled or pushed around the factory. If the engineer needed to travel up stairs to reach the problem area, he would carry the tool box or leave it on the carrier at the foot of the stairs and carry only the tools he needed.

Results

- The portable carrier took the weight of the tools and reduced the manual handling and discomfort.
- The engineers were highly satisfied with the solution as it was faster and easier to carry the tools around the factory.
- The portable carrier also saved time as it enabled engineers to take all their tools to the site of a problem, and reduced the time spent travelling back to the shop for additional tools.

Off-site delivery

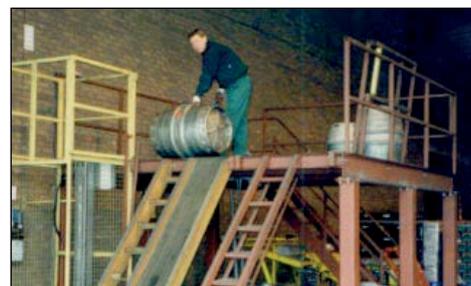


Back
Shoulders
Arms
Neck
Legs

Case 93 Training in drinks delivery

Task

Draymen delivered to licensed outlets various products including kegs (weighing between 41 and 194 kg), crates (containing up to 36 bottles weighing 19 kg), non-returnable boxes (containing wines and spirits weighing up to 14 kg), and 12-bottle cases of cordials (weighing up to 22 kg). Delivery methods varied for each licensed outlet depending on the type of 'drop', as this would dictate the equipment to be used. New draymen were trained in delivery methods 'on the job' at licensed premises.



Problem

The brewery was worried that they were dependent on the usage of licensees' premises for training. The training could impact upon the licensees' business and the timetable for the training was also controlled by the licensee. The draymen encounter many different working environments and are influenced by conditions such as slopes, uneven floors, part-full kegs, and unhygienic areas. There are also weather factors such as rain, frost or snow. It was felt that training could be enhanced by taking the initial stages away from the licensees' outlets and that certain scenarios could be simulated.

Finding solutions

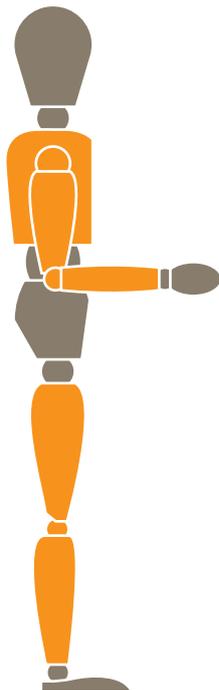
The company installed training cellars into their main distribution centres. Each training cellar comprises:

- cellar lift (automated drop/lift);
- dead man's drop (controlled free fall);
- standard drop scenario (lowering kegs by rope);
- bottle chute (runners for crates);
- thrawls (to practice handling traditional beers).

All draymen undergo a half-day training session in this area alongside an experienced trainer on induction. The programme also includes theory training and a lengthy time with a training crew, out in trade. The trainees are encouraged to use the training area for further practice during their induction period and beyond, as and when possible. It is also planned to utilise the training area for refresher courses on an annual basis.

Results

- The training cellar was available for practice at any time.
- Trainee draymen had plenty of time to ask questions.
- There was reduced damage to third-party property.
- The company noted an increase in efficiency and quality.
- Training could be carried out without peer and time pressure.



Back
Shoulders
Arms
Legs

Case 94 Delivering drinks to cellars

Task

An average of 15 barrels and 50 cases were being delivered and retrieved from a public house cellar each week. This was traditionally carried out by lowering the barrels on a rope down a pair of skids while cases were allowed to slide in free fall down a plank to one side.

Problems

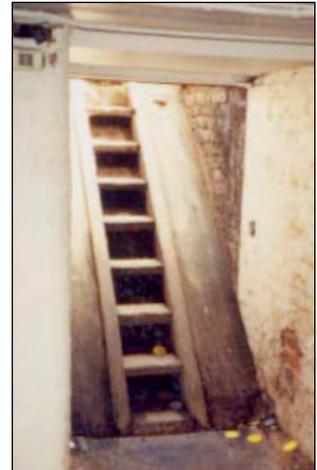
- Container damage was being experienced, resulting in lost product.
- An additional delivery was sometimes necessary to make up the shortfall or to retrieve a damaged barrel.
- Damage was being caused to the building in the drop area, leading to regular repair bills.
- The agreed safe method of work was easily overcome in order to speed up the delivery.
- There was no acceptable method for the retrieval of full or part-full containers.
- Removing empties from the cellar was beyond normal manual handling expectations.

Finding solutions

The system was mechanised by installing a cellar lift. Training in its operation was incorporated into the standard draymen training and refresher courses.

Results

- Container and building damage was significantly reduced.
- Awkward lifting operations were eliminated.
- The safe method of work was not easily overcome.
- Retrieving full or part-full containers was no longer a problem.
- Deliveries were speeded up.
- Fitting a vertical hoist gave some extra space in a small cellar to store empties.
- It is expected there will be a reduction in accidents and long-term illness.





Back
Shoulders
Arms
Neck
Legs

Case 95 Loading kegs

Task

When delivering kegs to outlets, the draymen had to collect full and part-full kegs (approximately 2–3 kegs per week) and load them onto the vehicle for return to the brewery. These were transferred to the vehicle by means of skids. Skids are runners which attach to the side of the vehicle and provide a ramp which was used to roll the kegs onto the vehicle bed.

Problem

The sheer physical force of moving full kegs in this manner was causing a problem for the draymen. The kegs weighed between 41 and 194 kg and were prone to unpredictable movements when they were part full. Not all of the kegs had handholds and wear and tear sometimes caused metal splinters. The skids, which were fitted underneath the lorry, were not always used due to jamming and the human element of cutting corners. Other elements which prevented their use were the working environment and lack of space.

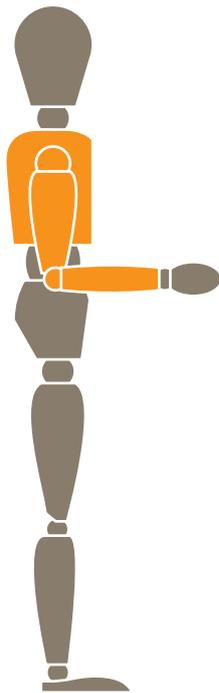
Finding solutions

One arm of the brewing and distribution industry worked in conjunction with a major engineering firm to help develop a swing-lift hoist that can be fitted to the rear post of any vehicle that is equipped with a power source and a fitment bracket. The hoists allow the kegs to be lifted direct from the floor onto the vehicle by means of attached straps and hooks. The company has purchased several hoists propose to equip vehicles at each distribution depot.



Results

- The task required much less physical strain.
- If the vehicle could park close enough, the keg could be lifted direct from the cellar. This is particularly useful in the case of a 'dead man's drop' (no runners in the cellar).
- There was increased manoeuvrability.
- The task could be completed more speedily and safely than with skids.



Back
Arms
Shoulders

Case 96 Moving cases of beer

Task

A large producer of spirits offered beers and liquors for sale to its employees from the staff shop. Approximately 6500 cases of beer were sold each year at this shop. The beers were first delivered to a garage, and then moved from the garage to the staff shop approximately 75 m away. As the cases were sold, the shop attendant lifted individual cases from the rear of the staff shop to the shop counter. The customers had to carry the cases from the shop counter to their cars located 50–100 m away, depending on where they were parked.

Problem

This system of distribution required four distinct stages of handling the same item: delivery to garage, transfer from garage to staff shop, carrying from rear of shop to the counter, and customer carrying from the counter to the car. The problem was greatest for the shop attendants who were repeatedly carrying individual cases to the counter, and they reported back pain which they associated with this task. It also posed a risk of injury to the customer who had to carry the cases a long distance to the car park.

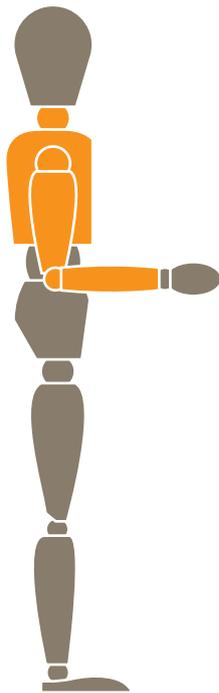
Finding solutions

A new system was implemented at no cost which greatly reduced the number of times the cases were handled and the distance they were transported. In this new system, customers paid for the beer at the shop and were provided with a voucher. The beer remained at the garage where it was delivered, and on Thursday of each week a customer could drive their car to the garage, present the vouchers purchased to the sales assistant and collect the beer, carrying it approximately 5 m to where the car was parked.

Results

- The new system greatly reduced the overall amount of manual handling, especially the handling performed by the staff shop attendants.
- Reports of back pain among the shop attendants have decreased.

One of the first questions an employer must consider when assessing tasks under the Manual Handling Operations Regulations is whether it is possible to avoid manual handling of the load. The organisational change outlined above completely removed two stages of manual handling, and greatly reduced the carrying distance in the final stage. This illustrates how organisational changes, which often cost nothing to implement, can be a very effective means of avoiding manual handling tasks.



Back
Arms
Shoulders
Neck

Case 97 Delivering vending machines

Task

A sales force (50–100 people) carried out demonstrations of 'table top' vending machines at potential customer premises. They drove to the customer premises with the vending machine in the back of an estate car. On arrival at the customer site, the sales consultant had to get the vending machine out of the back of the car onto a trolley, wheel it to the demonstration room, lift it into place and set it up, demonstrate it, then do the process in reverse. Often they had to pull it over long distances, if there was no parking nearby, and manoeuvre it in and out of lifts and along narrow corridors. The sales consultants would carry out two or three of these demonstrations per month.



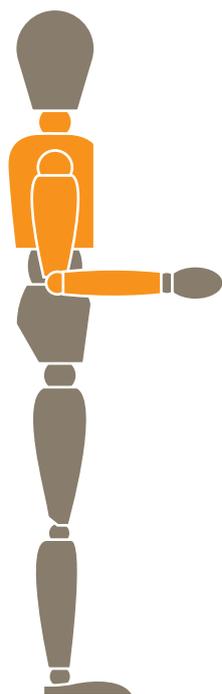
Problem

- The vending machines weighed approximately 50 kg, and measured approximately 1 x 0.5 x 0.5 m, ie they were very bulky and heavy.
- They would often have to be hauled over long distances.
- It was awkward to manoeuvre the machine out of the back of the car, and involved stooped and twisted postures, and often strenuous pushing and pulling.
- The sales consultant, having got the demonstration machine into place, would usually be hot and flustered at the start of the sales meeting.
- In the event of an accident while driving, the large, loose, heavy machine could easily add to the injuries sustained.

Finding solutions

Even though there had been no reported accidents, the company recognised the high potential for back and other injuries associated with this task. They tried out several solutions, including lighter machinery and putting powered lifts and hoists in the back of the car; all proved too cumbersome to use easily. They considered not doing the demonstrations, but these are a powerful sales tool. Eventually, they decided to outsource this part of the task and use a professional removals company.

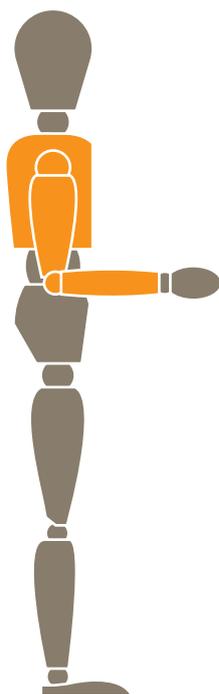
The removals company keeps a stock of demonstration vending machines and delivers and installs one at the potential customer site once a sales appointment has been made. The sales consultant no longer has to lift anything, just turns up, does the demonstration and closes the sale. The removals company also removes the demonstration machine from the customer site after the sales visit, and returns it to their depot. The removals company staff have been trained in lifting and handling techniques. They have also been trained to install and set up the machines at customer sites once a vending machine has been ordered.



Back
Arms
Shoulders
Neck

Results

- The risk of injury to the sales force was removed.
- The sales consultants were much more keen to book demonstrations when they did not have to lift and lug the demonstration machines.
- Sales of the machines 'shot through the roof'.
- The company could provide sales consultants with saloon cars, which were cheaper than the estate cars previously used.
- The company 'looked' more professional to its customers, as the sales consultants no longer turned up hot, sweaty and flustered from lifting and moving the machines.
- Any technical problems could be fixed swiftly by the removals company.
- Road safety was improved, as the weight of the vending machine was no longer a contributory factor in accidents.
- Although there were no quantified cost-benefit analyses, there were many intangible benefits, and the company was more than happy to continue with this approach.



Back
Arms
Shoulders

Case 98 Delivering chilled food products

Task

The company produces chilled food products for the retail market, particularly small shops, garages etc. Up to 30 deliveries are made per day shift. When carrying out deliveries of these chilled products, drivers are usually comfortably ensconced for long periods of time in a warm cab. As the cab is heated, the driver is usually in shirtsleeves. The deliveries consist of boxes of chilled foods, ready meals and cooked meats. On arrival at the retail site, the drivers unload the deliveries from a refrigerated unit at the rear of the vehicle.



Problem

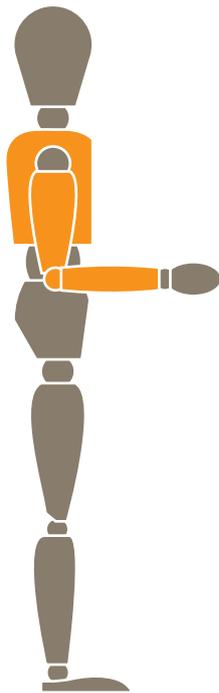
The company had identified that the delivery force was the most 'at risk' group for lower back problems and manual handling injuries. Although the boxes are not particularly heavy (up to 10 kg) there can be long carrying distances if parking nearby is difficult. Twisting and stooping may be required to get the boxes out of the van, and to locate the product within the retail premises. Drivers would rarely stop to put on a jacket, even in very cold weather, as it would slow them down on the delivery run.

Finding solutions

The company developed and piloted a training course in conjunction with a physiotherapist, which covered basic anatomy, risk assessment, kinetic lifting, exercises and muscle tone. The pilot course was very well received by the drivers.

Results

- The pilot training was so successful that they have rolled it out to the rest of the group.
- The training has had a significant impact on the incidence of back complaints among the drivers.



Back
Arms

Case 99 Lifting egg boxes

Task

Eggs were delivered to a supermarket in palletised boxes. Each box contained 30 dozen eggs and weighed approximately 25 kg per box. Supermarket staff were transporting boxes to the shop floor display fixtures by means of a trolley and removing the eggs from the boxes onto the display.

Problem

Staff were experiencing back problems from lifting the boxes onto the trolley.

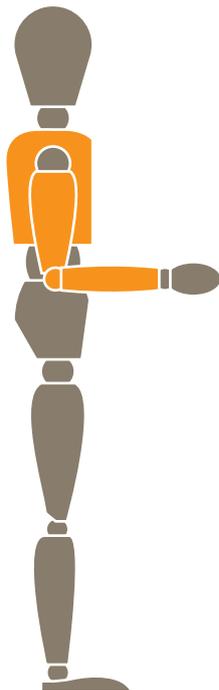
Finding solutions

Following complaints from staff with regard to the weight of the boxes, a risk assessment was carried out. The company then put pressure on their egg supplier to deliver the eggs in smaller boxes. These smaller boxes contained 15 dozen eggs and weighed approximately 13 kg.

Results

- No further complaints were made about the job.
- Workforce morale improved.
- There was a decreased risk of likelihood of musculoskeletal injury and accidents.





Back
Arms

Case 100 Emptying fruit and vegetable boxes

Task

Fruit and vegetables were delivered to a supermarket in palletised boxes, the heaviest being bananas weighing approximately 19 kg per box. Supermarket staff were transporting boxes to the shop floor display fixtures by means of a flat-bed trolley and removing the fruit and vegetables from the boxes to the display.

Problem

Staff were experiencing back problems from stooping to empty the boxes from the flat-bed trolleys.



Finding solutions

Following complaints from staff, a risk assessment was carried out on the lifting element of this task. The company identified and sourced a hydraulic lifting truck which could be pumped up (by foot) to bring the boxes in line with the display fixtures. A truck was purchased for each of the 14 stores in which they could be manoeuvred.

Results

- There were fewer complaints about the job.
- A happier workforce – morale increased.
- The risk of back injury was removed as the stooping element of this task no longer existed.

Further reading

<http://www.hse.gov.uk/msd/information.htm>

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