Manual Handling of Gypsum Products

Gypsum Products Ergonomics based on Risk Assessment
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Lighten the load: one aim – numerous paths

The whole history of human economy could be written as a story of the aim to facilitate life in all its aspects. Not only to have more leisure time, but also to become more effective under the right working conditions with the right tools and processes. Healthy working conditions are a main factor for both increasing the engagement of people in their work and their productivity. With this publication EUROGYPSUM links up with an old but good tradition: to stimulate the prevention of work accidents and professional diseases specifically targeting the plastering sector which is still characterized by a high degree of manual work and physical risks.

The fourth survey on European working conditions, published by the European Foundation for the Improvement of Living and Working Conditions in Dublin, concluded that, despite all the efforts to create better working conditions, the situation has not generally improved. On the contrary, compared to the 2000 survey in some areas the situation has become even worse.

Two examples of working conditions deteriorating are:

- **Physical risks**
  “The proportion of the European workforce employed in traditional, physically demanding sectors such as manufacturing and agriculture is declining, however, the survey reveals that certain physical risks still persist.”

  “The proportion of workers reporting repetitive hand or arm movements has increased by four percentage points. This is the most commonly cited physical risk, with 62% of the working population reporting exposure 25% or more of the time. 50% of workers report working in painful or tiring positions at least 25% of the time”.

FOREWORD
• Work intensity

"Work intensity – working under tight deadlines or working at a high speed – is on the increase. In 2005, 46% of the EU25 workforce reported having to work at very high speed three quarters or more of the time. In 1990, the equivalent figure was 35% (for the EU12)."

Without any doubt we can state that plastering is one of the professions which is commonly affected by the above problems.

Against this background the European Agency for Safety and Health at Work dedicated its annual European week for the second time to the subject of work related musculoskeletal disorders. For this campaign the Bilbao Agency is following a holistic approach, taking the view that for a better prevention all factors and aspects which cause risks for the musculoskeletal system should be considered.

And the Bilbao Agency is right in its approach, since we are living in an age of complexity. All factors who influence the occurrence of work related MSDs have to be taken into consideration. Nowadays the scientific community unanimously considers a high degree of MSDs as caused by psycho-social stress which is why I also mentioned the data concerning work intensity.
However, for a successful strategy against MSDs we need a reduction of complexity. What we need is specific actions for the specific aspects of established hazards. The EFBWW sees urgent need for activities on different levels:

• We need further regulation for giving all actors clear guidelines for their activities.
• We need a culture of safe work which has to be transferred from one generation of workers to the next.
• We need ergonomic workplaces and material as well as tools – and we need restrictions for the maximum weight of material which has to be moved manually.
• We need information about specific hazards and training for specific work situations as well as for the correct use of material and equipment.

We have to act on all of the above-mentioned levels and carry out precise proposals and activities for every single level. For this reason, the present publication is valuable if you are interested in improvement of working conditions, irrespective of whether you are an employer, a worker, a doctor in industrial medicine or someone else dealing with prevention.

Rolf Gehring
EUROPEAN FEDERATION OF
BUILDING AND WOODWORKERS
Setting the Scene

Musculoskeletal disorders as well as accidents and injuries have probably been common in construction for as long as people have been undertaking building. The earliest recorded musculoskeletal injury in construction is probably in the Edwin Smith papyrus. Imhotep, who lived about 2780 B.C., was an administrator concerned with a major construction project, an architect, and one of the most famous Egyptian physicians. The Edwin Smith papyrus, which has been attributed to Imhotep, includes cases that are likely to be musculoskeletal injuries during the building of the pyramids. The final case in the document deals with “instructions concerning a sprain of the vertebra [in] his spinal column.” The document gives advice regarding diagnosis of a back injury. Advice regarding treatment of the injury, however, is incomplete due to missing sections of the document.

Centuries later, in 2000, the Health and Safety Executive (HSE) in the UK undertook a preliminary investigation into the factors that can lead to musculoskeletal disorders in construction workers and, among other categories of workers, plasterers and plasterboard erectors. The study showed that the ergonomics literature on plastering tasks is restricted to recent work on drylining. There is no literature on wet plastering or on floor screeding.

The main recommendations of the study were as follows:

- Those involved in designing buildings, and planning and managing their construction need to take into account the risks to musculoskeletal health of the different available construction methods, and to plan the structure and

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1 Musculoskeletal problems in bricklayers, carpenters and plasterers: literature review and results of site visits, Health and Safety Laboratory, Sheffield: Health and Safety Executive, 2001.
construction processes in ways which allow these risks to be minimised, so far as it is reasonably practicable.

• There is a need for the construction industry to make more extensive use of the aids that are already available to reduce the risks of manual handling and postural stress in construction.

• There is a need for further scientific work to be carried out to examine the ergonomic risk factors of wet plastering and floor screeding.

On 6 April 2007, the UK Construction, Design and Management Regulations (CDM)\(^2\) entered into force. The CDM provide an important opportunity to integrate health and safety into the design and management of construction projects and encourage everyone involved to work together to improve health and safety in construction. The above-mentioned HSE 2000 study recommendations have now been included in the CDM 2007. Another significant change in these new regulations is the introduction of the ‘CDM co-ordinator’ to assist and provide advice to the client. The CDM 2007 are supported by the Approved Code of Practice (ACoP) giving practical advice for all those involved in construction work. This code is binding.

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\(^2\) http://www.hse.gov.uk/construction/cdm/legal.htm
Musculoskeletal Disorders at Work (WMSDs): Development and Manual Handling of Gypsum Products

It is undeniable that lifting/loading/carrying heavy loads, repetitive movements and strenuous working postures can have an impact on workers’ health (WMSDs) and also on safety (falls and accidents). Although there are currently few sources of information specific to plastering and plasterboard erecting\(^3\), there is data suggesting that individuals doing this type of work are at risk of injuries.

The size of the problem is well-defined but there is still limited research related to the adoption of evaluated risk control strategies, and what controls are known are not necessarily universally applicable.\(^4\)

We also lack scientific evidence on the cause-effect relationship between WMSDs occurrence and manual handling of gypsum products. Weight is not the sole factor of WMSDs development. The Vrije Universiteit Amsterdam, in the Netherlands\(^5\), conducted an experiment among experienced construction workers to analyse whether smaller and lighter plasterboards alter the productivity and the work demands compared to working with conventional plasterboards. The conclusion was that this was not the case. Nevertheless, working with both types of plasterboards can be qualified as physically demanding, and therefore, as a risk for the onset or worsening of musculoskeletal disorders and fatigue complaints. Data in the study showed that lighter and smaller plasterboards do not show any difference


\(^4\) Ibidem.

\(^5\) *Smaller Plasterboards, lighter work?*, P.P.F.M. Kuijera, H.F. van der Molenc.a, E. Molb, M.H.W. Frings-Dresena a Coronel, Institute of Occupational Health, Research Institute AmCOGG, Academic Medical Center/Universiteitvan Amsterdam, PO BOX 22700, 1100 DE Amsterdam, The Netherlands DEXPres, Faculty of Human Movement Sciences, Vrije Universiteit Amsterdam, the Netherlands, Arbouw, Amsterdam, the Netherlands.
with standard heavier plasterboard for the duration of lifting, carrying and turning over plasterboards. So the WMSDs risk is equal in both cases.

Research specific to plastering work (plasterboard installing and traditional wet plastering) is, in the main, limited to defining the problem and evaluation of solutions which are often inconclusive. Little attention has been given to the use of organisational risk controls.

In order to tackle health (WMDSs) and safety (falls and other accidents) on the construction site for Gypsum products, the Gypsum industry thinks that we should strive for a comprehensive approach based on risk assessment for each task, which will determine the solutions. **We need to lighten the load, not necessarily by decreasing the product load, but by changing the behaviour of workers via organisational** (job scheduling, project planning, site management that allows sufficient time for the work to be completed, etc. **and engineering risk controls** (mechanical aids). More specifically, improvements in tool design, work practices and work environment can assist in the prevention and reduction of injuries (WMSDs and falls).

With those comments in mind, we will now define the main tasks and risk for handling gypsum products in relation to the occurrence of the WMSDs problem rather than on falls and accidents.
Manual Handling of Gypsum Products: What are the issues?

**General Organisational Aspects of the Construction Site**

Injuries in the construction sector in general are acknowledged as being related to several work organisation factors, including the simultaneous presence of incompatible trades, poor housekeeping of the construction site, speed of work, episodic employment, changing and unpredictable worksites, and rapid contractor turnover.6

We also need to take into account the type of construction site where the workers are operating. On commercial sites, equipment can be placed for months at a time, but on residential small sites this is not the case. There is also less reliance on organisational surveillance on smaller sites which can lead to taking less care of health and safety issues.

**Plasterboard and Ceiling Erectors**

With regard to the physical nature of the work, the installation of board and panels involves lifting, carrying and supporting substantial weights. These weights may be presented in awkward shapes that have to be moved in restricted spaces, such as passage ways, stairwells, etc. and across surfaces of varying degrees of cleanliness and integrity.

The installation of suspended ceilings involves the fixing of metal framing and the “dropping in” of ceiling tiles and panels.

Plasterboard Finishers

The fixing and finishing of plasterboard involves fixing (hanging) sheets of plasterboard to walls and ceilings. The joints between the sheets are filled with a jointing compound and tape (stopping), which are subsequently sanded (finishing). In some circumstances, the hanging of board, stopping and finishing are treated as three independent tasks which are undertaken by workers who specialise in those respective tasks.

Plasterboard finishing involves pushing tape into joints and transferring quantities of wet and dense material to a wall or ceiling by hand. As it is necessary to get to the corners and joints in plasterboard with a trowel, you have to reach above head height and stoop. Other finishing tasks include lifting and carrying bags of plaster, buckets of water, architectural enrichments and tools and equipment, and mixing ingredients. Wet mix is carried to the point of application.

Applying tapes to joints requires wrist flexion. In addition, working over shoulder height and sanding joints is a stressful job which must be carried out at a great pace.

Plasterers

Plastering tasks can be divided into three areas:

a. **Traditional wet plastering** where a thick base coat and a thin skim coat are applied to the walls to be plastered. This would normally be done to brick or block work.

b. **Drylining, where sheets of plasterboard** are attached to walls and ceilings and then given a skim coat of wet plaster. This would often be done over timber partitions to form internal walls. It has replaced lath and plaster techniques where thin strips of wood (laths) were nailed across partitions or ceiling rafters and then given a coat of plaster.

c. **Screeding of concrete floors**, i.e. applying a surface to the concrete base of a floor. It is seen as the worst task that a plasterer has to do. The major problems are seen as being related to the need for working at floor level, leading to constant bending and kneeling. Depending on the site, the actual screed may need to be brought into the room using a wheelbarrow.
The actual spreading is seen as difficult because of the need to physically move a dense material to ensure the floor is evenly covered and the need for long forward reaches while in stooped or kneeling postures. It is reported that wearing trousers with sewn-in knee pads helps to decrease knee discomfort and problems.

Site observations of plasterers showed that it is physically demanding involving manual handling of heavy materials and also requiring flexibility to work in a variety of awkward postures, including on raised platforms, and also requiring endurance.

Research has shown that workers completing work where the shoulder is in elevated postures such as plastering, benefit significantly from a home exercise programme. The plasterers need to prepare their body for work to reduce the risk of injury (warm up and shoulder stretching, for example).

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7 Musculoskeletal problems in bricklayers, carpenters and plasterers: literature review and results of site visits, Health and Safety Laboratory, Sheffield: Health and Safety Executive, 2001.
Putting Emphasis on Prevention: Designing for Construction Workers’ Safety (DfCS)

Work-related posture and musculoskeletal disorders are a common problem in Europe, and this is recognised by the European Commission. One aspect of the European Commission’s action programme is to increase the focus on the prevention of work-related illnesses, in respect of which priority must be given to e.g. musculoskeletal disorders. Therefore the Commission wishes to ensure an improved application of EU legislation and particularly the EU Directive 90/269/EEC “Manual Handling of Loads”.

In the construction sector, preventing risk means the need for everyone involved in the management of a construction project to co-operate with others in order to prevent and then reduce risk as low as reasonably practicable, starting with the design stage.

The role of the design professional (architect, engineers, quantity surveyors) has traditionally been to design a building, facility or structure such that it conforms with accepted engineering practices, local building codes and is safe for the public. The safety of construction workers is left up to the contractors. However, design professionals can influence construction safety by making better choices in the design and planning stages of a project. This would result in fewer site decisions that have to be made by contractors and workers that can lead to accidents (the root causes previously mentioned).

Research presented by Behm\(^8\) suggests that designers can in fact have a strong influence on construction safety. In 1985 the International Labour Office

recommended that designers give consideration to the safety of workers who will be involved in erecting buildings. In 1991 the European Foundation for the Improvement of Living and Working Conditions concluded that about 60% of fatal accidents in construction are the result of decisions made before the site work begins. In 1994 a study of the United Kingdom’s construction industry found a causal link between design decisions and safe construction.⁹

A primary responsibility of the design professionals is to minimise hazards and risks to people by good design. Initially they should try to eliminate hazards. If hazards cannot be eliminated, then risks should be minimised and designers should provide information on any significant residual risk. The DfCS process applies to the design of a permanent building, facility or structure. The process does not address methods to make construction safer, but how to make a project safer to build.

For example, the designer can really improve health and safety on the construction site in the following areas, amongst others:

• Working at height – fabrication at ground level;
• Site access and transport – designers should specify the layout of the site buildings and any obstructions to transport;
• Manual handling – reducing the risk of musculoskeletal disorders by using mechanical aids, etc.

As a conclusion we could say that the factors for success of a good design for construction workers safety are as follows:

• Eliminate hazard – reduce risks – inform clearly about residual risk;
• Involving all parties at the start of the project is essential;
• Engage and review throughout the project;
• Review at project close the successes and failures and ensure you act on them, i.e. lessons enter the corporate memory.

⁹ Designing for Construction Worker Safety, John W. Mroszczyk, Ph.D., P.E., CSP.
Mitigating Risks: Solutions

Risk Assessment Approach

The New Zealand Code of Practice\textsuperscript{10} provides the table below on the identification of hazard and mitigation of risk. We propose it as an example illustrating the reasoning on how to minimise risks in handling loads. However this table is one amongst a number of examples of good practice. We also wish to mention the work carried out by the EU Senior Labour Inspectors Committee (SLIC)\textsuperscript{11} available at the website – http://www.handlingloads.eu/ – risk assessment concepts, tools and method for the manual handling of loads as part of a campaign to promote a better compliance in the EU with EU Directive 90/269/EEC “Manual Handling of Loads”.


\textsuperscript{11} The Senior Labour Inspectors Committee (SLIC) is both a forum for close collaboration and information exchange between experts from the Member States and the Commission and a network of officials working towards the achievement of effective enforcement of Community social legislation.
Risk Factors for Gypsum Products

We wish to highlight the fact that adapting the level of risks to each task and construction site needs to be done on a country basis and even on a case by case basis in that country. The use of this assessment will not imply any responsibility on the person in charge of safety on the construction site. The proposed checklist and actions needs to be assessed and adapted to the national working practices and conditions and for each construction site. The latter will indeed lead to specific safety measures only valid for that construction site.
Safety measures in the construction field are not necessarily always universally applicable.

In the following we propose possible issues relevant to the gypsum products manual handling – they are not exhaustive – and the potential solutions – there may be others – that we suggest for a safer handling of gypsum products.

**Organisational and Preventive Aspects**

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Possible Issues involved</th>
<th>Possible Solutions</th>
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</table>
| Organisation of the site | Erection of panels/plastering activities | • Give realistic deadlines to prevent installation at the end of the construction time (job fatigue). A stressful environment caused by pressure to work fast, to work overtime and to meet deadline can cause injuries.¹²  
• Coordination of the trades to allow the Gypsum workers to complete work free from obstruction.  
• Cooperation with other subcontractors on safety items like housekeeping, safe walkways and adequate access for equipment.  
• Architects specification for reduced weight materials.  
• Provide mechanical aids. |

¹² *Axes d’amélioration des conditions de travail chez les plâtriers-plaquiste*, Association de conseil de santé au travail.
| Electrical tools | Plasterboard installation and general wet plastering risk of electrocution, being struck by broken drill bits, cutters, swarf and of off-cuts (potential for serious eye, head or facial injury), cuts and laceration | • When buying power tools, consider weight, grip comfort, ease of triggering, vibration and noise. Four finger triggers are best.  
• Legislation on electrical installation on the site should be strictly followed (electrocution risks)\(^{13}\). |
| Manual handling | For plaster and plasterboard activities | Practice safer lifting methods:  
• Clear your path of obstacles before starting (tripping or slipping while carrying can cause injuries).  
• Try to set up loads so they are closer to waist height. Avoid lifting from the ground. Use carts, tables or temporary platforms to hold loads that will be lifted again.  
• Try handles for carrying drywall. Handlers improve your grip and may also make the lift less awkward. Some handles are designed for one person carrying, and some for two-person carrying.  
• Try tools to reduce the time you spend in overhead work and holding. Board hanger clamps can help hold drywall in place for fixing\(^{14}\).  
• Use team lifting where appropriate. |
| Your hands | For plaster and plasterboard activities | • Keep your hands warm and dry – dressing warmly in cold weather helps hands stay warm. Wear gloves and change them if they get wet.  
• The wearing of gloves avoids cuts. |

\(^{13}\) Axes d’amélioration des conditions de travail chez les plâtriers-plaquistes, Association de conseil de santé au travail.

\(^{14}\) Fact sheet on drywall installers, prevent back, wrist, neck and shoulder injuries, California 2001.
<table>
<thead>
<tr>
<th>Your eyes</th>
<th>For plaster and plasterboard activities</th>
</tr>
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<tbody>
<tr>
<td>• Wear your safety glasses and dust mask when handling or mixing plaster ingredients and additives or applying plaster, finishing ceilings or sanding.</td>
<td></td>
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<tr>
<td>• Wear your safety glasses when snipping metal pieces such as corner beads, trims, and wire mesh.</td>
<td></td>
</tr>
<tr>
<td>• Do not continue to work if your safety glasses become fogged. Stop work and clean the glasses until the lenses are clear and defogged.</td>
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<table>
<thead>
<tr>
<th>Job design</th>
<th>For plaster and plasterboard activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Avoid the hyper-specialisation of workers and favour multi-purpose tasks. Specialisation leads to monotonous repetitive jobs.</td>
<td></td>
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<tr>
<td>• Rest for 15 seconds, many times throughout the day. Some studies have shown that micro pauses (short breaks) after tightening each screw reduces stress and can lead to an increase in productivity.</td>
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<tr>
<td>• Rotate jobs: if one part of the job requires a lot of overhead work, switch for a while to an activity in another position that uses different work motions.</td>
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</tbody>
</table>

15 Musculoskeletal problems in bricklayers, carpenters and plasterers: literature review and results of site visits, Health and Safety Laboratory, Sheffield: Health and Safety Executive, 2001, p25.
### Plasterboard Erectors

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Possible tasks involved</th>
<th>Possible Solutions</th>
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</thead>
</table>
| Lifting           | Erecting plasterboard panels                | • Use two or more workers to lift larger panels (team lifting with one leader).  
                        |                              | • Use a panel lift.                                                                                                                                  |
|                   | Incidental stocking onto scissor lift       | • Lift one single sheet at a time.  
                        |                              | • Slide panel onto lift (minimize lifting).  
                        |                              | • Lift one end of the panel at a time (reduced effective weights) if lifted by one worker.  
                        |                              | • Mechanical loading onto lift.                                                                                                                        |
|                   | Incidental loading onto scaffolding         | • Limit size of panel that can be lifted by one person.  
                        |                              | • Use at least 2 workers on floor to lift larger panels.                                                                                             |
| Stacking          | Gypsum sheet one onto another               | • When stacking panels by hand, position the panels sideways slightly in front of you, so you do not have to reach over your head or twist your body to lift these materials.  
                        |                              | • Position panels to lean flat against a wall and do not wobble or slide.  
                        |                              | • Push and slide panels along their edge or get assistance from a co-worker.                                                                           |
| Hands over head   | Installing lids, soffits                     | • Job rotation/task rotation.  
                        |                              | • Use a panel lift.                                                                                                                                  |
| High hand grip    | Gripping screw-gun to screw off panels      | • Rotate to other installation tasks.                                                                                                               |

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16 Ergonomics Demonstration Project, Wallboard, January 2002, US.
<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Possibility involved</th>
<th>Possible Solutions</th>
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</thead>
<tbody>
<tr>
<td>Highly repetitive motions</td>
<td>Screwing-off panels</td>
<td>• Rotate to other installation tasks.</td>
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</tbody>
</table>
| Hand-arm vibration       | Screwing-off panels  | • Low vibration screw-gun.  
                          |                      | • Rotate to other installation tasks. |
| Carrying/dragging panels| Incidental stocking  | • Properly distribute panels around the worksite.  
                          |                      | • Use a panel cart.  
                          |                      | • Move single panels.  
                          |                      | • Use two people to move panels. |
| Back or neck bent        | Lids and soffits     | • Job rotation/task rotation. |
| neck bent backwards      | installation         |                    |
| Neck compression         | Lids installation    | • Support overhead panels with hands/arms (not with hardhat).  
                          |                      | • Use a panel lift. |

### Plasterboard Finishers

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Possible tasks involved</th>
<th>Possible Solutions</th>
</tr>
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| High hand force grasp    | Box use                 | • Job rotation/task rotation.  
                          | Bazooka use             | • Consider use of spring powered box tool. |
| High hand force pinch    | Sanding                 | • Job rotation/task rotation.  
                          |                         | • Grasp sandpaper/block, where possible rather than pinch. |
| Highly repetitive motion | Box use                 | • Job Rotation/task rotation.  
                          | Bazooka use             |                         |
|                          | Trowel use              |                         |
|                          | Sanding                 |                         |
| Hands over Head          | Box use                 | • Job rotation/task rotation.  
                          | Sanding                 |                         |

17 Ergonomics demonstration Project, Wallboard, January 2002, US.
<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Possible tasks involved</th>
<th>Possible Solutions</th>
</tr>
</thead>
</table>
| Moving around the site: carrying and dragging | Manual handling of bags and plaster | • Think to use equipment such as trolley, conveyors or wheelbarrows to reduce manual handling.  
• Inevitable but decreased with bags of 25 kg or in some countries the use of silo on the construction site.  
• Always using a wheelbarrow suitable for the task such as industrial wheelbarrows with wide based tyres, designed to move heavy loads.  
• Planning the work so as to eliminate double handling of products. |

**Stress on legs, back (especially knees, hips) from stilts use**

| Finishing ceilings, high walls | • No box or bazooka on stilts.  
• Rotate to not using stilts (e.g. standing on floor or scaffold).  
• Use high quality stilts that are well maintained. |

| Box use | • Rotation to other finishing tasks, tools (e.g. bazooka, trowel). |

**High effort upper body exertion (from box use); stresses on shoulders, back, arm, neck, etc.**

**Plasterers**

| Tools and equipment | For mixing plaster | • Using cement mixers specifically designed with larger bowls for mixing plaster and mechanical tipping devices.  
• Always selecting power tools that are the most suitable for the job giving consideration to weight, vibration and kickback. |

| Stress on hands | Mixing of plaster can be carried out either manually or with a powered mixer (a 27 whisk’). | • Task rotation. |

| Grip hand – bending, shoulder stress and variety of postures | Spreading of plaster onto the walls is inevitably a manual task. | • Job rotation/task rotation.  
• Prepare the body: for work by warming up and shoulder stretching. |

| The need to work overhead for sustained periods while skimming ceilings. Lifting carrying buckets of plaster. Hand mixing of plaster. Variety of postures | Skimming of dry lined walls. The process of skim coating a wall consists of building up a smooth surface coat of plaster of approximately 3 mm thick using two or three very thin layers. | • Job rotation/task rotation. |

| Stress on legs, back (especially knees, hips) from stilts use | • Maximize the time spent working between knee and shoulder height. |
Further General Recommendations

Home Exercise

Research has shown that workers that complete work where the shoulder is in elevated postures such as plastering benefit significantly from home exercise programmes. Consideration also needs to be given to preparing your body for work to reduce the risk of injury. Recommended practices include:

• doing warm-up/stretching exercises at the beginning of the day and cool down/stretching exercises at the end of the workday to avoid injury to muscles, ligaments and other soft tissues. This is what athletes do to reduce the risk of soft tissue injury. Tasks completed by ceiling fixers put comparable loads on the body; and
• considering a specific shoulder stretching and strengthening home exercise programme.

Good Construction Site Housekeeping

All workers involved in all trades on site have a responsibility for maintaining site tidiness. Routine, regular cleanups should be scheduled as part of the work day. Working on a tidy, well-maintained site eliminates many trip hazards and makes the job easier and safer.

Basically, the following is recommended:

1. Do not leave loose tools, lunch boxes or other items on a ledge or laying around the floor. Return tools to their storage places after use.
2. Keep walking surfaces of elevated working platforms, such as scaffolds and equipment, clear of tools and materials that are not being used.
3. Sweep up scraps and debris from wallboard installation such as screws, mesh and tape, by using a broom and a dust pan.
**General Lifting Safety Recommendations**

1. Plan the move before lifting; remove obstructions from your chosen pathway.
2. Test the weight of the load before lifting by pushing the load along its resting surface.
3. If the load is too heavy or bulky, use lifting and carrying aids such as hand trucks, dollies, pallet jacks and carts or get assistance from a co-worker.
4. If assistance is required to perform a lift, coordinate and communicate your movements with those of your co-worker.
5. Never lift anything if your hands are greasy or wet.
6. Wear protective gloves approved by your supervisor when lifting objects with sharp corners or jagged edges.
7. Do not lift an object from the floor to a level above your waist in one motion. Set the load down on a table or bench and then adjust your grip before lifting it higher.

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19 Safety program: Plastering, Drywall, Acoustical and Insulation Work, SIC Code 1742, Florida Division of Safety.
Education of Construction Workers handling Gypsum Products

A key factor that has been identified in several studies is the usefulness of including ergonomic awareness as part of woodworkers' training and the need for this education to be ongoing. An ergonomics awareness education programme developed by Albers et al. (1997) for apprentice carpenters in the USA was found to be successful in:

- Increasing apprentice carpenters' awareness of WMSDs within carpentry and construction;
- Identifying potential WMSD risks;
- Motivating apprentices to prevent WMSDs.

The Gypsum manufacturers in each European country run training academies staffed by experienced instructors, all of whom have a wealth of experience in the construction industry and specialise in either plastering or drywall work. They offer specific instruction in order to use the product safely and adequately.

The main instructions focus on:

Do
• Carry boards on edge – two people to a board.
• Place boards down on their long edge before turning flat.
• Use a platform/pallet to support boards when mechanically handling.
• Store boards and plasters on a firm, flat and level surface, under cover and protected from dampness and inclement weather.
• Store plasterboard accessories, metal sections and plasters in dry conditions.
• Protect primers and ready-mixed materials from freezing conditions.
• Practice good housekeeping and stock rotation.

Don’t
• Don’t carry boards horizontally.
• Don’t drag boards over each other.
• Don’t attempt to separate boards using the forks of a fork-lift truck.
• Don’t attempt to carry more than one 25kg bag of plaster.
• Don’t use hoists or cranes without safety retaining ropes / slings.
• Don’t store boards and plasters outside unless on a level platform, clear of the ground and securely covered with an anchored polythene sheet or tarpaulin.
• Don’t stack pallets on site where surface may not be firm, flat and level.

The following recommendations are given to the contractors:

• Gypsum products are non-load bearing and are not designed to support body weight.
• Manual off-loading of boards, panels and bagged materials should be carried out with care to avoid unnecessary strain.
• Keep sanding and other dust generation to a minimum. Maintain adequate ventilation and/or wear suitable protection.
• Power tools should only be used by people who have been instructed and trained to use them safely.
• When using powdered products, mix with water in well ventilated conditions. Avoid contact with eyes and skin. In the event of contact with the eyes, irrigate with plenty of clean water immediately.
• When handling insulation or cutting board products containing glass-fibre, wear suitable protection including appropriate facemask and gloves.
• Wear goggles when working overhead.

**Ergonomically designed Equipment and Tools**

The Gypsum manufacturers and/or Equipment manufacturers produce equipment and tools helping plasterers and plasterboard erectors and finishers to reduce health and safety risks when performing their tasks. A range of examples is given in Annex I.

So solutions are available waiting to be applied on the site.

The following websites are useful for searching manual handling equipments in the use of gypsum products:

Barriers to Solution Adoption

Among the factors that influence adoption rates are the weighting that people assign to the expected benefits of a precaution compared with the costs. If the balance of costs versus benefits is perceived to be favourable, people will adopt the precaution.

The costs referred to here are not limited to economic costs: they include other perceived costs such as the time and effort involved in acquiring a risk control, using the control at the worksite, potential embarrassment, etc. Economic arguments may not be readily available as a lever. Ringen and Stafford\textsuperscript{21} have suggested that:

... the factors that govern the economics of construction are incredibly complex, and the assumptions that are made to simplify the underlying economy for the research are difficult to justify.

After introducing ergonomic training to apprentice carpenters (plasterboard installers) in the US, Albers et al found that the apprentices did not believe that they would be able to play a major role as ergonomic innovators in their workplaces (for example, by introducing redesigned tools and non-traditional work practices). The apprentices identified their employers as barriers to ergonomic innovation and the majority did not believe that contractors would adopt ergonomic interventions without a legal requirement\textsuperscript{22}.

\textsuperscript{21} Intervention research in occupational safety and health from construction, Ringen, K and Stafford, E., AMJ Ind Med 1996, p318.
Who is responsible for making Ergonomic Improvements in the Construction Industry?

**Designers, architects and project owners** between them determine the materials, methods and procedures needed to complete a construction project. Architectural choices influence material choice which may in turn influence the work methods, the characteristics of the site itself and the tools used. We refer here also to the paragraph D on Designing for Workers Safety. Suppliers of materials can also affect the WMSDs risk factors such as weight of load, type of packaging and delivery methods.

**The Gypsum manufacturers** take into account the manual handling risk in designing the products, by, i.e., considering if the plaster can be applied mechanically, by integrating joints into the design to achieve segregated work areas that do not expose plasterers to manual handling risks, etc. At the production stage of the products, manufacturers limit the weight of bagged products, clearly mark the bag to indicate the weight of the products, organise site delivery as close as possible from the working area, etc.

**For the principal contractor**, there is a duty of care for handling the product carefully. Good planning will avoid or reduce many of the manual handling hazards associated with plastering and plasterboard installation and will benefit the productivity of the job as well as promote safety.

- At the beginning of the job, it is essential to establish clear access to allow safe movement of materials around the site;
- The programme of works should take into consideration the implications for plasterers and plasterboard installers (no rush jobs, coordination of the trades to allow the plasterer to complete work free from obstruction, progressive clean up of the working area);
• Enough space and light to allow the safe movement and storage of the materials (plastering materials and gypsum panels as close as possible to the working area, mechanical aids to move and place large/heavy loads, adequate storage space to safely store materials);
• Select materials which are lighter and easier to handle. Always consider the weight of materials such as bags of plaster (bagged products should not exceed 25 kg);
• Mechanical lifting and handling equipment should be considered for moving heavy products, tools and equipment (vehicle mounted hoists, winches or ramps, mechanical plaster applicator, conveyors to move sand and bagged products around the site);
• Consider the scaffold requirements of plasterers and plasterboard installers;
• Team lifting can be used for one-off lifts but does not provide a long-term solution. If team lifting is used, all workers should be trained and the lift coordinated. Always try to have lifters of similar height;
• Everybody who completes tasks involving manual handling must receive adequate training.

Safety and health policies, procedures and safe systems of work should be established at the beginning of the project, reviewed with the plasterers and plasterboard installers prior to the beginning of plastering and plasterboard installation and be continuously monitored and reviewed throughout the job.
Conclusions

Ergonomics looks at all the factors in the workplace which could lead to an improvement in health and safety. The Gypsum Industry is aware that the best option is to eliminate exposure to risk factors. But this is sometimes impossible, as in the case of plastering activities, or not desirable. Indeed, most of the time we can do a process change that makes the job easier by doing it differently, as explained above in the solutions to the risk factors.

As we have seen, to reduce or eliminate manual handling, we have the following recourses:
- Mechanisation using cart dollies or cranes;
- Power tools instead of hand tools whenever feasible and appropriate;
- Ergonomically designed tools: tools are now designed to require less force. They reduce awkward postures and enable working from standing heights (see Annex I);
- Handles can be added for carrying materials;
- Work practice changes: learn from experienced workers;
- Administrative changes which include job rotation, rest breaks and special instruction for handling heavy objects;
- Personal protective equipment;
- Training of the workers to develop ergonomically friendly behaviours.

The Gypsum industry is committed to continuously improving the ergonomic solutions and helping to implement them through a multistakeholders' dialogue. The Gypsum industry is experiencing increased productivity in its own plants when putting into place policies to reduce accidents and falls. Therefore, we believe that productivity on the construction site depends on the implementation of a culture of zero injuries, falls or illness, which will be of benefit to the workers in the first place, but also to the contractors and manufacturers of construction products.
Gypsum Ergonomic Equipment and Tools

The following pictures show examples of manual handling aids. Those examples are illustrative of the help existing for construction workers, but it is not an exhaustive list.

Board Lifts and Transit Bench

Help for Ceiling Tiles

Trigger Board Lifter
In-Lift Branch Rack  
Plasterboard Lifter  
Auto-feed Screwdriver  

Foot Lifter  
Plaster Mixer  
Projection Plaster Machine  

Projack (extendable Support Jack)  
Drywall Carts
References

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7. John W. Mroszczyk, Ph.D., P.E., CSP Designing for Construction Worker Safety
9. Axes d’ amélioration des conditions de travail chez les plâtriers-plaquistes- association de conseil de sante au travail
10. Fact sheet on drywall installers, prevent back, wrist, neck and shoulder injuries California 2001
12. Safety program: Plastering, Drywall, Acoustical and Insulation Work - SIC Code 1742-Florida Division of Safety
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