# SOBANE strategy
## for the prevention of musculoskeletal disorders

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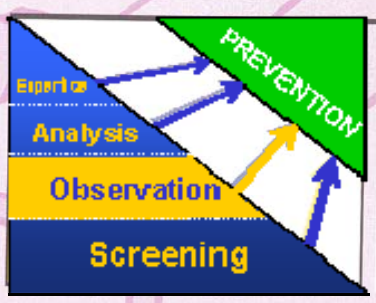
**from the SOBANE document concerning the prevention of musculoskeletal disorders prepared by Prof. J. Malchaire**
**The original document en French can be found at the following address:**
**http://www.deparisnet.be/TMS/TMSdos.htm#sobanefr1**

**These are the sheets proposed to the working group formed of workers and local managers to review their working conditions and seek straightforward ways to improve them, to reduce the hardness and to decrease the occurrence of musculoskeletal disorders.**




# Level 2, Observation

# 1. Computer or monitor work

Ergonomic design

**How is the work station organized or laid out?** Note: For background information, see other side.

| | | |
|---|---|---|
| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |

**What *specific* improvements can be made?**

| | | |
|---|---|---|
| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |



# 1. Computer or monitor work

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Layout** | If accessories - screen/monitor, keyboard, mouse, document holder - are poorly placed, have poor posture, tired muscles and pain in:<br>• nape of the neck - especially if screen/ monitor or document holder is too high or too low<br>• shoulder & arms - especially if the keyboard is badly placed<br>• wrists & hands - when flexed or twisted or resting on edge of the table | • Avoid reflections - the screen/ monitor should not face a window or have one directly behind it<br>• Choose furniture & equipment that allows the person to work with their neck upright, the shoulders relaxed, wrists in neutral position (straight) and elbows at a $90^0$ or more<br>• Adapt arrangement of materials for the task:<br>- document holder facing the person, to let them read the information (e.g. coding work)<br>- screen/monitor facing the person where tasks require them to look at it continuously |

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SAFE WORK

# 2. Tools, materials, controls, products

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

- visual controls?

- distance required to reach tools/materials/controls/products?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

SAFE WORK

# 2. Tools, materials, controls, products

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Visual controls** | Position of dials, screens, etc. determines:<br>• eye movement<br>• head posture<br>• trunk posture | Position dials, screens etc. in front of the operator, especially when:<br>• they are referred to or used frequently<br>• they are important for safety and production quality<br><br>The line of sight must be:<br>• slightly below the horizontal plane<br>• directly in front of the operator or slightly to the left or right |
| **Distance to reach** | If too far:<br>• awkward postures - extended arms and shoulders, bent back ...<br>• tendon and joint problems<br>• local and general muscle fatigue<br>• back and neck pain | Position controls, materials and tools:<br>• directly in front - if standing, less than 50 cm (20”) away ; if sitting, less than 38 cm (15”) away<br>• at heart level<br>• less than 60 cm (24”) - arm’s length away for major or frequently used controls<br><br>Never reach behind.<br><br>Perform repetitive tasks with shoulders relaxed and elbows bent about $90^0$ or more. |

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# 3. Tools

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

- how suitable/appropriate are the tools for the work and workers?
- handle shape?
- weight?
- controls?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

# 3. Tools

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **If tools are suitable or appropriate for the work & workers** | If poorly chosen:<br>• overwork, poor postures, shoulder problems<br>• hand injuries, blisters, tendonitis, etc. | • Choose the tool that is best suited for the job so that the wrist remains straight and at a normal height<br>• Standardize nuts, bolts, etc. to reduce the number of tools required<br>• Tools that can be used by anyone - women, men, left-handed people<br>• Directly in front of the operator or slightly to the left or right |
| **Handle shape** | If poorly suited:<br>• poor arm posture - raised, stretched, twisted; twisted wrist etc.<br>• crushed hands /fingers if too small or sharp-edged<br>• more strength required | • Shaped so the wrist remains straight and the handle fits well in the hand<br>• Handle not too smooth/rough/sharp<br>- wood or metal coated with rubber/plastic<br>- 10 cm to 12 cm (4" - 5") long<br>- diameter of handle about<br>> 60 mm (2.25") for tools requiring strength<br>> 12 mm (0.5") for precision tools<br>• May be used by both left-handed and right-handed people |
| **Weight** | If too heavy:<br>• tired arms, cramps, tendonitis and other musculoskeletal problems | • For work requiring strength: between about 1.5 kg (3lb) & 2 kg (4.5lb)<br>• For precision work: between 400 g (0.5 lb) and 1.5 kg (3lb)<br>• For heavier tools/special systems: counterbalanced support devices, elbow rests, etc. |
| **Controls** | If poorly positioned:<br>• poor postures<br><br>If too stiff:<br>• constant exertion and fatigue<br><br>If too sensitive:<br>• risk of mistakes, incidents, injuries | • Controls that are easy to operate without stress for the fingers, hands, or wrists<br>• Controls that are not too stiff nor too sensitive<br>• May be used by left-handed people |

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# 4. Work station: obstructions

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

• obstructions at the work station?

• obstructions under the work surface?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

SAFE WORK

# 4. Work station: obstructions

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Obstructions the workstation** | If obstructed:<br>• poor work postures<br>• fatigue and back pain<br>• less precise moves/control<br>• increased risk of hitting something or being injured | • Have a clear access path that is 60 cm - 80 cm (24” - 31.5”) wide<br>• Provide at least 1 m (39”) clear space in front of & behind station<br>• Provide sufficient and adequate storage space<br>• Keep work station and work sur faces clean and tidy |
| **Obstructions under the work surface** | • Crossing legs impossible<br>• Static posture of feet and legs<br>• Fatigue | Pay attention to recommendations about leg and foot room for seated workstations:<br>• height for a desk - 65 cm (25.5”); typing - 60 cm (24”)<br>• knee room - 58 cm (23”) wide<br>• depth - 60 cm (24”)<br><br>Do not store things under the work surface. |

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# 5. Posture - sitting

Ergonomic design

**What do you see in terms of:** Note: For background information, see other side.

- the height of the work surface in relation to the worker?
- the quality of the seat/chair?
- back support?
- how the seat height is adjusted?
- foot rest?
- how long the person sits?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

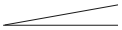
**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

SAFE WORK

# 5. Posture - sitting

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Height of the work surface** | If badly adjusted:<br>• bad postures<br>• extended arms & rounded back<br>• difficult movements | Adjust the work surface depending on the task:<br>• support forearms: a few cm/inches above elbows<br>• industrial work that requires free arm movements: 5 to 15 cm (2" - 6") below the elbows<br>• computer or typing work: keyboard sloping away and slightly below the elbow is best |
| **Chair quality** | If it's not good:<br>• poor postures<br>• compressed thighs or under the knees<br>• poor stability<br>• difficult movements | Choose a chair with these features:<br>• adjustable height and back<br>• seat pan large enough to allow movement<br>• seat pan slightly tilted towards the front ($2^0$ - $5^0$)<br>• rotation and casters, with 5 spokes<br>• seat and back padding about 2.5 cm (1") |
| **Back support** | If there's none or a poor support, the spine is not supported and back problems | Chair with lumbar support just above the hips (fit "S" curve of back, not at hips) which can be used whatever the task so the spinal column remains upright. |
| **Seat height adjustment** | If too high or too low:<br>• back & neck flexed<br>• thighs compressed<br>• poor posture for shoulders & arms | Adjust the height of the work surface to have:<br>• thighs horizontal or slanted down<br>• legs vertical or extended/slanted down<br>• feet flat on the floor or supported<br><br>Train the person to adjust the height of the seat and back according to person's height |
| **Foot support** | For short people avoid compression under the knees | Provide a support:<br>• surface (length x width): 30 cm x 40 cm (12" x 16")<br>• incline an angle of close to $10^0$  <br>• important support does not move |
| **Time in seated position** | If too long, poor posture (flexed neck) are maintained for too long | Organize work to allow getting up and/or alternating between standing and sitting positions |

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# 6. Posture - standing

Ergonomic design

**What do you see or notice in terms of:**

Note: For background information, see other side.

• the height of the work surface?

• bending the body backward or forward?

• the amount of time spent standing?

• supports for knees, hips, trunk, arms, etc.?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the detail proposed solutions in more detail?** | **no** | **yes - more on other side** |
|---|---|---|

# 6. Posture - standing

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Height of the work surface** | If poor:<br>• raised shoulders, bent back or neck<br>• general and local fatigue | Adjust the height of the work surface to the size of the operator and according to the task and the type of work:<br>• precision work -<br>95 cm - 110 cm (37.5” - 43”)<br>• light work -<br>85 cm - 95 cm (33.5” - 37.5”)<br>• heavy work -<br>70 cm - 90 cm (27.5” - 35.5”) |
| **Bending the body backward or forward** | Sooner or later, bending leads to:<br>• back muscle fatigue<br>• compressed discs in the spine<br>• back pain | • Position controls, tools, equipment within easy reach of the operator<br>• Maintain the same height throughout the entire production circuit<br>• Provide space for feet at the base of the work surface so the operator can get close to what they are working on<br>• For loads that have to be gripped or moved, position them at a height of more than 60 cm (24”) |
| **Amount of time spent standing** | Prolonged standing leads to:<br>• swelling of the legs & varicose veins<br>• back and neck fatigue & pain<br>• increased blood pressure | • Provide a sit-stand stool, with room for knees and feet to fit under the work station/surface<br>• Allow for work periods where workers can walk and sit down |
| **Supports for knees, hips, trunk, arms ...** | Local supports can reduce:<br>• muscular strain<br>• leg and back pain | • Put a hip rest at the edge of the work surface<br>• Position a hand grip where workers can hold onto it with one hand for high working surfaces<br>• Vary working positions to avoid constant leaning<br>• Never lean against a sharp edge |

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# 7. Posture - neck and shoulders

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

• the position of the neck?

• the position of the shoulders?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

# 7. Posture - neck and shoulders

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Neck position** | If neck is bent forward (inclined), back (flexed) or to either side:<br>• muscle fatigue/soreness<br>• pain & stiffness/tight feeling<br>• may injure tendons, muscle or vertebrae in the neck | Train people so they:<br>• pivot the chair to look to the side<br>• relax and support their back against the chair<br>• keep the work surface at a height so they can work with their neck straight<br>• use the document holder/reader placed at the same height as the screen/monitor<br>• take regular short breaks<br>• change posture and relax the neck regularly |
| **Shoulder position** | If the shoulders are rotated or are raised during work:<br>• muscle fatigue/soreness<br>• pain in the shoulders and arms<br>• joint & tendon injuries<br><br>Working with the arms above the shoulders:<br>• extending the trunk forward<br>• pain in the shoulders and arms<br>• less precise control | • Prevent and do not have activities where:<br>- hands are above the level of the heart<br>- arms extended forward without support<br>- arms spread apart or towards the front<br>- shoulders are rotated<br>• Have enough space so people can pivot or swirl when moving their feet<br>• Put materials, products, tools being used etc. within easy reach of the hands<br>• If it's necessary to reach for something that is higher:<br>- use a platform or stool that is light and easy to move<br>- train workers to keep a hand on a fixed support at the height<br><br>In some situations, the forearms can be suspended when doing repetitive static work. This is restrictive and should be avoided as much as possible. |

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# 8. Posture - elbows, forearms, hands & wrists

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

• the position of the elbows and forearms?

• the position of the hands and wrists?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

# 8. Posture - elbows, forearms, hands & wrists

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Position of the elbows and forearms** | If the arms are pressed against a surface or the sharp edge of a table:<br>• compression of the nerves & tendons<br>• pain & tingling feelings<br><br>If there is frequent rotation of the forearms:<br>• inflammation of the tendons (epicondylitis, a.k.a. tennis or golfers' elbow) | • Provide support for the elbows when doing work that involves data entry, typing or using the mouse<br>• Remove tasks that force the forearms to rotate<br>• If the forearms must be extended, provide support for the elbows.<br>• Round off edges of tables, desks and benches if people are leaning elbows & forearms on them<br>• Use tools that allow the forearm to be bent at about $90^0$ or more |
| **Position of the hands and wrist s** | If the hands or wrists are always flexed (not in a neutral position):<br>• friction of the nerves and tendons<br>• less force possible<br>• makes the task more tiring and difficult | • Bring materials and tools closer to the worker<br>• Choose tools that have bent handles so that the wrists can be straight<br>• Put the task at an angle<br>• Organize the work so workers can change positions<br>• Provide wrist supports<br>• Round the edges of work surfaces |

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# 9. Posture - other positions/postures

Ergonomic design

**What do you see in terms of:**

Note: For background information, see other side.

• a twisted posture/position?

• prolonged posture/position?

• other postures/positions: kneeling, squatting, lying down?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

# 9. Posture - other positions/postures

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Twisted posture or position** | If the back or trunk is twisted:<br>• muscle fatigue<br>• back problems | • Rotating and moveable chairs:<br>• Products/objects and orders facing the person<br>• Use pivoting conveyors or tables whenever the product or object changes direction |
| **Prolonged (i.e. static) postures or positions** | A prolonged and fixed or static posture involves:<br>• fatigue for the contracted muscles (static load)<br>• overloading joints and tendons | • Alternate with tasks allowing movement<br>• Reduce continuous muscular efforts (static positions)<br>• Provide elbow supports, padded to level of the chair<br>• Avoid keeping arms in the air or the body leaning forward<br>• Avoid:<br>- high effort for more than 10 seconds<br>- moderate effort for more than 1 minute<br>- low effort for more than 4 minutes |
| **Other postures or positions** | • Tired legs<br>• Problems for hips, knees, ankles<br>• Losing balance and chance of falling | • Keep materials, products & tools within easy reach<br>• Organize the work area so the person can work seated or standing<br>• Layout loads so they can be handled at a height between 70 cm - 80 cm (27" - 31") above floor<br>• Foresee/be aware of stable support points |

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# 10. Repetition

Ergonomic design

**What do you notice about repetitive motions?** Note: For background information, see other side.

| | | |
|---|---|---|
| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |

**What *specific* improvements can be made?**

| | | |
|---|---|---|
| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |

SAFE WORK

# 10. Repetition

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Repetition** | No recovery time for repetitive tasks leads to:<br>• A build-up of muscle and tendon strain and fatigue<br>• A loss of precision<br>• A drop in alertness, increasing the risk of incidents causing injury and damage | • Reduce the work pace whenever possible<br>• Design the job so that each arm or hand can be used in turn (alternated)<br>• Arrange for frequent rotations between workstations that require different postures and effort (note: studies say that if workers' backs may be affected by the tasks, this may not be a very effective "fix")<br>• Arrange for short, frequent breaks (5 minutes per hour)<br>• Provide pneumatic or electric tools for the most repetitive tasks<br>• With the operators, examine how repetitive tasks can best be done to minimize effort and posture strain<br>• Teach this technique to everyone |

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# 11. Force - manual material handling equipment

Ergonomic design

**What do you notice about manual material handling equipment?**

Note: For background information, see other side.

| | | |
|---|---|---|
| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |

**What *specific* improvements can be made?**

| | | |
|---|---|---|
| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |

SAFE WORK

# 11. Force - manual material handling equipment

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Material handling equipment** | Proper material handling equipment reduces:<br>• awkward posture<br>• muscular strain<br>• consequently reduces arm, neck, and back problems | • Use mechanical equipment in the following situations:<br>- When weight involved is more than 15 kg (33 lbs.)<br>- Carrying distance is more than 10 m (30')<br>- Lifting is done more than several times per hour<br><br>• Carefully select the equipment (e.g. hoists, forklifts); poorly-designed equipment will not be used<br>• Select equipment according to the weight of the load and the frequency of handling, and the needs of those who will use it |

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# 12. Force - vibrating tools

Ergonomic design

**Are vibrating tools absolutely necessary?** Note: For background information, see other side.

**Are they suited for the work and the workers?**

| | | |
|---|---|---|
| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |

**What *specific* improvements can be made?**

| | | |
|---|---|---|
| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |

SAFE WORK

# 12. Vibrating tools

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Vibrating tools** | Vibration leads to:<br>• limited mobility and joint pain (hands, elbows) typical of impact hammers, pneumatic drills, power chisels etc.<br>• whitening of fingers when exposed to cold (a.k.a. Reynaud's disease or vibration white finger)<br>• tingling, numbness | • Use the machine or tool that is best suited for the task/job<br>• Maintain machines or tools on a regular basis (sharpening)<br>• Handles<br>- provide anti-vibration handles<br>- coat contact surfaces with rubber, felt, cork, etc.<br>- hold the machine only by the handles<br>- use gloves that fit the worker (not too bulky or too thin)<br>• Improve postures and reduce strain:<br>- support the tool with a counter-weight<br>- adjust the height of the work surface<br>- train the operator to make the best use of the tool, using as little grip force and pressure as possible<br>- immobilize the items that are being tooled<br>• Organize the work differently:<br>- limit the time for using vibrating tools<br>- increase the number of rest periods<br>- alternate work with non-vibrating tools |

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# 13. Force - wrist and hand strain

Ergonomic design

**What do you notice about wrist and hand strain/effort?**

Note: For background information, see other side.

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

SAFE WORK

# 13. Force - wrist and hand strain

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Position of the wrist and hand** | When force exerted is high (tightening, squeezing, etc.) or low but sustained (keyboard, mouse, etc.):<br>• fatigue<br>• joint problems<br><br>When the heel of the hand is used as a hammer or for squeezing:<br>• compressed tendons, nerves, blood vessels<br>• carpal tunnel syndrome, among others | • Reduce the following to a minimum:<br>- tightening and squeezing<br>- exerting sudden force<br>- fine grasping with the fingers (pinch grip)<br>- using the heel of the hand as a hammer<br>• Assess the need to tighten "to the max" (avoid as best as possible)<br>• Provide technical aids (types of couplings, sealing rings, etc.)<br>• Provide tools with long enough handles<br>• Provide hydraulic or electric tools<br>• Carry objects (files) in containers with handles to avoid pinching the fingers<br>• Use pliers or failing that, the whole hand, to grasp small objects, rather than the fingers which can only grip them (and use more force in the process)<br>• Provide regular breaks, even when minor effort is sustained |

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SAFE WORK

# 14. Force - pushing/pulling with arms

Ergonomic design

**What do you notice about strain from pushing or pulling with arms?**

Note: For background information, see other side.

| | | |
|---|---|---|
| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |

**What *specific* improvements can be made?**

| | | |
|---|---|---|
| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |

SAFE WORK

# 14. Force - pushing/pulling with arms

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Strain from pushing and pulling with the arms** | Using a cart leads to:<br>• Reduced muscular strain and problems<br><br>But an increased risk of:<br>• Getting fingers and hands caught<br>• Injuring feet and legs<br>• Dislocating arm, shoulder, or back joint | • Provide:<br>- 2, 3, or 4-wheeled handcarts for loads up to 200 kg (440 lb)<br>- Hand dollies for loads under 700 kg (1550 lb)<br>- Maximum use: 200 times per work day<br>- Carrying distance under 35 m (115')<br>- Motorized carts or conveyers for heavy loads to be moved over long distances<br>• Ensure that the floor is not slippery or uneven<br>• Reduce friction of rolling surfaces<br>• Provide 4 large-diameter, wide, low-friction wheels<br>• Provide a handle slightly above elbow height<br>• Reduce the load if it must be pushed or pulled<br>- with the hands above shoulder level or below waist level<br>- or for more than 5 seconds<br>- or when the object is not directly in front<br>• Reduce the distance to be covered by bringing the stock area closer, for instance<br>• Push rather than pull<br>• Provide non-slip shoes |

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# 15. Force - characteristics of the load

Ergonomic design

**What do you see or notice in terms of:**

Note: For background information, see other side.

- handles?

- dimension of the load?

- edges that can cut, rough surfaces etc.?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

# 15. Force - characteristics of the load

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Handles** | If there are handles:<br>• easier to hold<br>• less likely to fall or drop | • Put handles on objects that weigh more than 4.5 kg (10 lbs)<br>• Put handles for two people if weight is more than 18 kg (40 lbs)<br>• Position handles below or at height of centre of gravity<br>• Handles:<br>- should be slightly rough<br>- round/oval shape, diameter 19 to 38 mm (¾" to 1½")<br>- 115 mm (4½") long<br>- free space of 50 mm (2") or 75 mm (3") if wearing gloves |
| **Load dimensions** | If it's large:<br>• reduces field of vision<br>• likely to fall or run into things<br>• muscle strain<br>• may cause back problems | • Limit load or objects to a maximum of:<br>- 60 cm wide, 35 cm high, 40 cm deep (24" wide, 14" high, 16" deep)<br>• Use mechanical aids for awkward or large loads |
| **Cutting edges, rough surfaces** | If object has cutting edges or rough surfaces:<br>• may get local cuts and abrasions<br>• precise gestures are more difficult | • Remove edges that can cut or surfaces that are rough on the skin<br>• Wrap/box/bag dangerous objects<br>• Package loads that are too hot, cold or dirty<br>• Use protective gloves as a last resort<br>• Protect hands from heat and cold<br>• Handles/grips should be made of plastic, rubber or wood |

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# 16. Force - lifting: starting position

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

• the starting position?

• the horizontal distance for grasping the load?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

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# 16. Force - lifting: starting position

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Starting posture** | A poor starting posture:<br>• requires more muscle power<br>• overloads joints in the arms and spine<br>• increases the chances of incidents or injuries from running into things or people, cuts, or burns | For small, compact loads:<br>• hold load as close to body as possible<br>• starting posture: comfortable, in position that allows holding the load close to the body - back can be bent (if lifting from floor especially)<br>• place feet on both sides of the load, if possible<br>• put one foot forward in the direction the load is to be moved<br>• lift using leg muscles, if possible<br>• avoid lifting from below knees and above shoulders<br>For larger loads:<br>• find another person to assist/help or use devices such as hand trucks, hoists, forklifts |
| **Horizontal distance for grasping the load** | A load that is farther away from the body:<br>• requires more effort<br>• tires arms and back<br>• causes back problems | • Hold load as close to body as possible<br>• Remove all obstacles in travel path<br>• Reduce the size of the load<br>• Use mechanical lifting devices if load is bulky or heavy |

Translated and adapted from SOBANE materials, available at www.sobane.be/fr/tms_obs.html

# 17. Force - lifting: moving the object

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

- the travel distance for the load?

- heights when grasping or putting down the load?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

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# 17. Force - lifting: moving the object

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Travel distance for the load** | The greater the distance:<br>• the greater the muscle fatigue<br>• the greater the risk of falling | • Carry the load with both hands<br>• Limit the carry distance to 2 m (6')<br>• Reduce the weight of loads and daily tonnage if distance is between 2 m and 10 m (6' to 30')<br>• Use mechanized transport equipment when distance is more than 10 m (30')<br>• Use sliding tables, conveyors belts, ball casters<br>• Eliminate changes in heights between work surfaces |
| **Heights when grasping or putting down the load** | If the object is too high up:<br>• leaning backward with arms raised<br>• back and shoulder problems | • Grasping and dropping points should be on the same vertical height as much as possible, to reduce twisting<br>• Move the start and finish points away from each other to force workers to turn their whole body or take a step, rather than twist at the waist<br><br>• If the load dimensions are always the same, provide support ideally at 750 mm (30") but between 60 and 90 cm (24" and 36")<br><br>• If load dimensions vary, provide adjustable height supports (e.g. lift table)<br><br>• Completely avoid positions at ground level or above shoulder level<br>• Provide mechanized lifting equipment for objects placed above shoulder level<br>• Arrange storage areas taking into account the following:<br>- height of workers - usually between 80 & 175 cm (31.5" and 69")<br>- weight of objects:<br>> loads over 10 kg (22 lbs) at hip level<br>> lighter loads between knees & shoulder level<br>- reaching distance: place frequently-lifted objects closer to the worker |

Translated and adapted from SOBANE materials, available at www.sobane.be/fr/tms_obs.html

# 18. Force - lifting: frequency and weight

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

• frequency of lifting?

• weight?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

# 18. Force - lifting: frequency and weight

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Frequency of lifting** | If lifting is frequent:<br>• general fatigue<br>• local muscle fatigue<br>• movements less coordinated | • Limit lifting frequency to less than once per 5 minutes, if possible<br>• Use mechanical aids if loads are heavy, hard to handle, or lifted often<br><br>If loads are lifted frequently:<br>• store heavy loads (more than 10 kg/22 lbs) at hip level<br>• store light objects between 60 cm/24" (knee level) and 150 cm/60" (shoulder level) |
| **Weight** | Maximum weight depends on lifting conditions - all the factors reviewed above. If high, the likelihood of incidents and of back or hand/arm problems goes up quickly | • Display weights on loads<br>• For occasional lifting straight ahead with a good grasp and over a distance of 70 cm/28", lift loads with a recommended top weight of less than: |

| | | Distance of hands from body | | |
|---|---|---|---|---|
| | | 20 cm | 35 cm | 50 cm |
| Grip height | 40 cm | 19 kg | 11 kg | 8 kg |
| | 75 cm | 22 kg | 12 kg | 9 kg |
| | 100 cm | 20 kg | 11 kg | 8 kg |
| | 140 cm | 17 kg | 10 kg | 7 kg |

| | | Distance of hands from body | | |
|---|---|---|---|---|
| | | 8 " | 14 " | 20 " |
| Grip height | 16 " | 42 lb | 24 lb | 18 lb |
| | 30 " | 48 lb | 26 lb | 20 lb |
| | 40 " | 44 lb | 24 lb | 18 lb |
| | 55 " | 37 lb | 22 lb | 15 lb |

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# 19. Work environment - general

Ergonomic design

**What do you see or notice in terms of:** Note: For background information, see other side.

• temperature?

• drafts?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

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# 19. Work environment - general

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Temperatures** | If too cold:<br>• stronger muscle contractions<br>• less strength<br>• less co-ordination<br><br>If too hot:<br>• excessive sweating<br>• fatigue<br>• slippery hands | • Reduce gain or loss of heat to outside<br>• Reduce internal gain or loss of heat -<br>- caulk hot and cold surfaces (ducts, walls, etc.)<br>- vent warm and humid gases at source<br>- eliminate all water and vapour leaks<br>• Adapt clothing to conditions<br>• Keep temperatures above the following minimums:<br>- very light work $20^0$ C<br>- light work $18^0$ C<br>- semi-heavy work $15^0$ C<br>- heavy work $12^0$ C |
| **Drafts** | If drafty:<br>• local chills<br>• muscle contractions, neuralgia | • Limit air speeds to:<br>- 10 m/sec for short-term exposure<br>- 3 m/sec for intermittent work<br>- 1 m/sec for prolonged standing or heavy work<br>- 0.5 m/sec for prolonged sitting work<br>• Eliminate all drafts on the face or neck |

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# 20. Work environment - lighting

Ergonomic design

**What do you see or notice in terms of:**

Note: For background information, see other side.

• reflection?

• glare?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

# 20. Work environment - lighting

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Lighting: reflection and glare** | Poor lighting leads to:<br>• poor vision<br>• reflection and glare<br>• poor work posture<br>• difficulty seeing dangerous objects/ elements<br>• higher chance of incidents causing injury and damage | • Provide lighting based on the degree of perception/visibility needed, the size and contrast of objects to be handled, tool detail, etc.<br>• Eliminate all shiny surfaces (e.g. polished metal, glass, plastic sheeting, etc.)<br>• Provide even lighting on work surfaces<br>• Avoid major shadows and contrast<br>• Increase lighting on dangerous objects and elements<br>• Clean and maintain light fixtures on a regular basis |

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# 21. Work organization/stressors - time issues

Ergonomic design

**What do you notice about:**

Note: For background information, see other side.

- time constraints?

- breaks/rest periods?

- overtime?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

# 21. Work organization/stressors - time issues

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Time constraints** | Time constraints lead to:<br>• Going beyond one's physiological limits more often<br>• Local and general fatigue<br>• Increased chance of incidents<br>• Quick and abrupt movements<br>• Increased effort<br>• Sustained work without breaks | • Adapt organization and technical procedures to limit the frequency of rush situations<br>• Assign tasks so that help can be available in rush situations<br>• Assign a set of tasks to a group of people<br>• Avoid factors that increase the work pace, particularly:<br>- tight or frequently changing deadlines<br>- constant electronic monitoring of productivity |
| **Breaks/rest periods** | Lack of regular breaks or rests leads to:<br>• Poor posture and slower pace of work<br>• Local and general muscular fatigue<br>• Unco-ordinated breaks | • Studies say letting individuals choose when they need breaks reduces musculoskeletal injuries but not output<br>• For heavy work: Mandatory breaks spread throughout the day<br>• For moderate mental and physical effort:<br>- a 10- to 15- minute morning and afternoon break<br>• When the pace is set by a machine:<br>- a 3- to 5- minute break every hour |
| **Overtime** | Working overtime leads to:<br>• Local and general fatigue<br>• Increased effort<br>• Slower reaction times<br>• Increased risk of incidents<br>• Poorer performance and productivity<br><br>And, over time, a higher chance of:<br>• Isolation from family and friends<br>• more injuries in general and MSIs in particular<br>• poor life-work balance<br>• weight gain<br>• job strain/toxic stress | • Have enough staff on hand to cover production or activity peaks<br>• Reduce overtime:<br>- hire extra staff during extra busy production periods<br>- modify the job design (e.g. going from 2 to 3 positions etc.)<br>• Upon hiring, warn of the likelihood of overtime<br>• Give plenty of advance warning when overtime will be required<br>• Increase the length of the work day rather than the number of work days per week (but avoid going to more than 10 hours a day regularly) |

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# 22. Work organization/stressors - other hazards

Ergonomic design

**What do you notice about:**

Note: For background information, see other side.

- production bonuses?

- job rotation?

| **In conclusion, the current situation** | **is acceptable** | **needs improvement** |
|---|---|---|

**What *specific* improvements can be made?**

| **Should we analyze the situation or the proposed solutions in more detail?** | **no** | **yes - more detail on other side** |
|---|---|---|

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# 22. Work organization/stressors - other hazards

Ergonomic design

| We looked at ... | Why be concerned? (consequences) | Recommendations |
|---|---|---|
| **Production bonuses** | Productivity incentives lead to:<br>• A faster pace of work<br>• Increased fatigue<br>• Adverse work conditions, more injuries | • Eliminate production or risk-incentive bonuses<br>• Give priority to health and safety, while respecting operators' interests and productivity constraints<br>• If there are bonuses, integrate them permanently into the wages, while minimizing the stressors |
| **Job rotation** | Lack of rotation leads to:<br>• Constant posture, movements, and strain<br>• Monotony and a decline in alertness<br>• Increased risk of incidents | • Enhance staff flexibility and versatility<br>• Organize the work so that:<br>- the same task is performed for less than an hour<br>- two or more tasks using different muscle groups are alternated (being careful to provide rest for the back) |

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# 23. Summary of observations

**Work station/job:** _____ **Done by:** _____

**Date:** _____ **Date:** _____

| Observation headings | Item | Current situation | | Future situation (after quick fixes) | |
|---|---|---|---|---|---|
| | Not applicable | Acceptable | Needs improvement | Acceptable | Needs more analysis |
| 1. Computer or monitor work | | | | | |
| 2. Tools, materials, controls, products | | | | | |
| 3. Tools | | | | | |
| 4. Work station - obstructions | | | | | |
| 5. Posture - sitting | | | | | |
| 6. Posture - standing | | | | | |
| 7. Posture - neck, shoulders | | | | | |
| 8. Posture - elbows, forearms, hands, wrists | | | | | |
| 9. Posture - other positions/postures | | | | | |
| 10. Repetition | | | | | |
| 11. Force - manual materials handling equipment | | | | | |
| 12. Force - vibrating tools | | | | | |
| 13. Force - wrist and hand strain | | | | | |
| 14. Force - pushing, pulling with the arms | | | | | |
| 15. Force - lifting: characteristics of the load | | | | | |
| 16. Force - lifting: starting position | | | | | |
| 17. Force - lifting: moving the object | | | | | |
| 18. Force - lifting: frequency & weight | | | | | |
| 19. Work environment - general | | | | | |
| 20. Work environment - lighting | | | | | |
| 21. Work organization/stessors - time issues | | | | | |
| 22. Work organization/stressors - other hazards | | | | | |

## Assessment of prevention measures and planned improvements

- Review the proposed changes in each heading
- Exactly who will do what and when?
  - When will the implementation be planned?
  - When will the change be **done**? (compliance monitoring)
- In order of priority

| Who | What | When | |
|---|---|---|---|
| | | Planning | Done |
| | | | |

**Need more in-depth analysis**, taking into account:

- the effectiveness of prevention or improvement measures described below
- hazards that may result from implementing the improvements
- in terms of urgency and goals