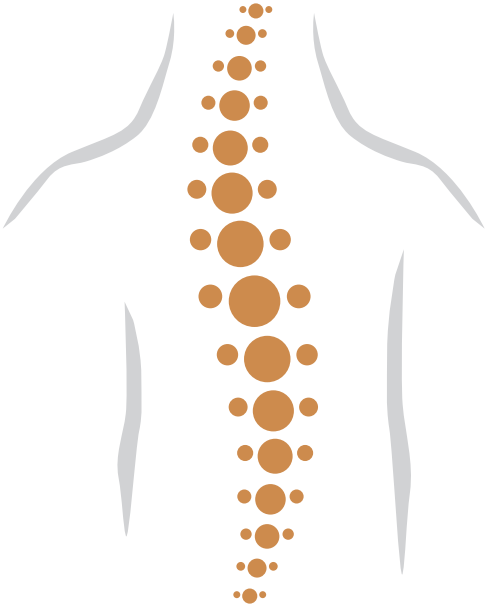
ZDRAVLJE+



CORRECT MANUAL LOAD HANDLING

with the aim of preventing back pain

INA

ANGELIKA BRNADA,
DIRECTOR OF THE SD&HSE

In collaboration with Assist. Prof. Josipa Nakić, PhD, from the University of Zagreb, Faculty of Kinesiology, as a part of the ZDRAVLJE+ (HEALTH+) project, we have launched the "MOVEMENTS THAT MAKE CHANGES" campaign. Our intention is to inform our employees on the correct performance of movements and correct movement in general, and to create the habit of their everyday application, both at the workplace and in everyday life.

For this campaign, we have selected workplaces where employees work on computers, manually handle different loads or use personal or freight vehicles. An overview of correct and incorrect movements in general has been presented in a collection of five brochures that are the basis for the practical part of trainings for employees and occupational safety specialists under the mentorship of Assist. Prof. Josipa Nakić, PhD. The aforementioned training will be used as a model for further informing the employees by our occupational health and safety experts.

Developing the awareness and competence of INA Group employees for correct performance of movements and correct movement in general, in addition to contributing to health benefits and working capacity, as well as increasing the employee satisfaction at the workplace, is also aimed at reducing the number of work-related injuries, the frequency and duration of sick leave and employee fluctuations.

We invite all INA Group employees to actively engage in this campaign and thereby personally contribute to the creation of **"Healthy Workplaces for All Ages".**

ASSIST. PROF. JOSIPA NAKIĆ, PHD

Spine problems and back pain have become a global problem today. By inertia, the culprit for our pain are most often activities such as long-term sitting or excessive physical work. However, the real culprit for such health problems is not the activity itself, but the manner of performing certain movements, as well as posture during a certain activity.

Movement mechanics have the most significant effect on spinal health. Incorrect movement mechanics during our performance of everyday activities significantly contribute to the accumulation of mechanical damages, and consequently the onset of pain.

The natural aging process combined with incorrect movement mechanics are elements that strongly affect the progression of mechanical damage to the spine. Natural aging mechanisms can hardly be affected. However, we can always create the habit of personal correction and, with the everyday application of correct movement mechanics, positively affect the health of our spine.

This campaign aims to emphasize the importance of avoiding the basic mechanisms of the occurrence of injuries and the importance of the application of correct movement mechanics, with the aim of preserving the health of the spine both in the workplace and in everyday life.

INTRODUCTION

Our body is designed for movement and physical work: for lifting, transferring, lowering, pushing, and pulling load. Also, it is designed so that physical work promotes physical health of our spine. However, in order to ensure beneficial effects of physical work on the health of our spine, the load handling technique must be correct. Importance of correct body posture while manually handling loads increases proportionally with the following factors:

- **Mass of the load**
  The bigger the mas of the load, the greater the importance of correct manual handling of the load.Example: If we lift a 5kg heavy load off the floor and lower it back on the floor 2 meters away, it is highly unlikely for us to sustain an injury despite the incorrect body posture. However, if we do the same thing with a 50kg heavy load, the odds of acute as well as of gradual mechanic damage are significantly higher.
- **Repetition**
  The higher the number of repetitions of incorrectly executed movements, the higher the odds of sustaining mechanical damages to the body and appearance of pain.
  Example: If we transfer a 5kg load incorrectly 500 times a day, 5 days a week for 5 years, we are highly likely to develop mechanical damages thus causing pain.
- **Time spent in an incorrect static position**
  If we maintain an incorrect position of the body for a long time, we increase the chances of mechanical damages and occurrence of pain.
  Example: If we perform a job in an incorrect position, e.g., while squatting with the back bent for 5 minutes a day, then the odds of any serious mechanical damages are significantly lower than if we spend 5 hours a day, 5 days a week in the same position.
- **Speed of the movement**
  The faster we perform the work task, the more it is important for us to do it correctly as regards

body posture.
Example: If we lift, transfer and lower a 5kg load fast with the incorrect body posture, the odds of sustaining injury are higher than if we perform the same work at a slower pace. In other words, we do not sustain injury because we work fast, but because we work fast while keeping the incorrect body posture. When we do things fast while holding a correct body posture, the odds of injuries are minimized.

- **Amplitude of the movement**
  The bigger the amplitude of the movement, the more important it is to hold a correct body posture.
  Example: If we lift a 5 kg load off the floor and lower it back while holding the incorrect posture, the odds of getting injured are higher than if we lift and lower that same weight from the knee height. The important thing is to know that injuries do not happen because we perform tasks with big amplitudes, but because we perform work tasks of big amplitudes using mechanically incorrect movements. The movements of big amplitudes we perform holding the correct body posture are not damaging to our health.

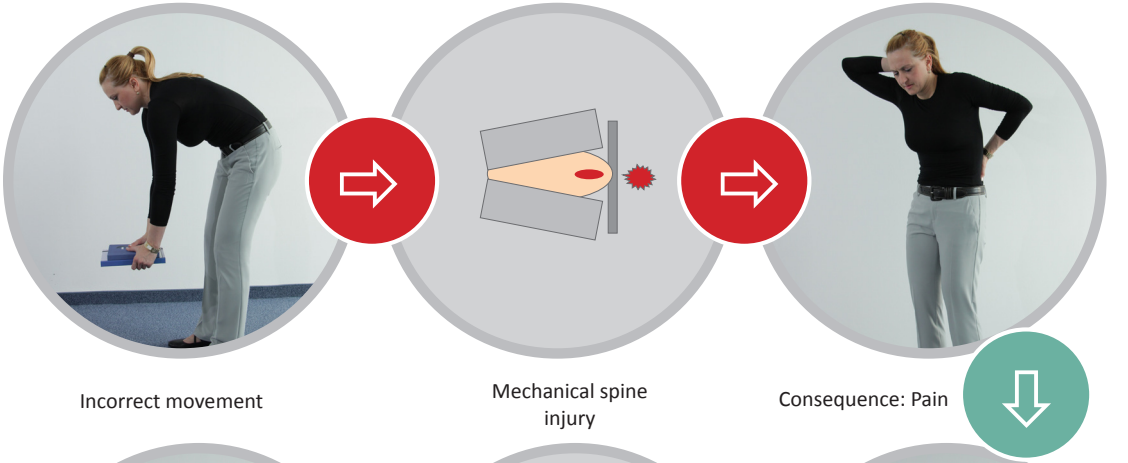
- **Former injuries**
  If we already have a history of injuries, we need to pay special attention to correct body posture while manually handling loads.
  Example: Let us take an example of two different people – the one with the history of injuries and the other with no injury history. Their task is to lift and transfer a 5 kg load. Both persons lift and lower the load incorrectly, with their backs bent. Clearly, the person with the history of injuries is more likely to experience sharp pain than the healthy person.

- **Age**
  The older we are, the less resistant we are to injuries, so the importance of the correct manual handling of loads is that much greater.
  Example: With 20 years of age it is possible to lift and lower load with the back bent, with the injury risk being significantly lower than the one in a 40-year-old person, who has high odds of sustaining injury. If a 60-year-old person does the same

work with the back bent, the risk increases tremendously.

The main goal of this brochure is to indicate to the basic mechanisms that lead to injuries and to emphasize the most important differences between the correct and incorrect manual handling of loads from the aspect of body posture with regard to specific demands and tasks at the following workplaces:

- Tubulars Toolman
- Downhole Equipment Toolman
- Warehouse worker
- Retail station worker



Incorrect movement

Mechanical spine injury

Consequence: Pain

Objective: Health

No further damages – Regeneration of the spine

Correct movement

1.

THE MECHANISMS OF THE OCCURENCE OF MECHANICAL DAMAGES TO THE SPINE - INCORRECT AND CORRECT MOVEMENT

Injuries and painful states of the spine can appear during different physical tasks execution as a result of:

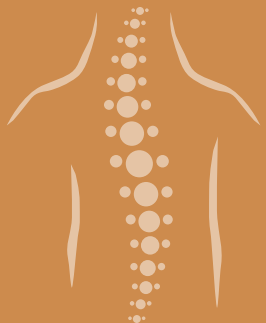
- **Acute trauma**

For example, while lifting a heavy load, due to the incorrect body posture, we can feel sharp pain.

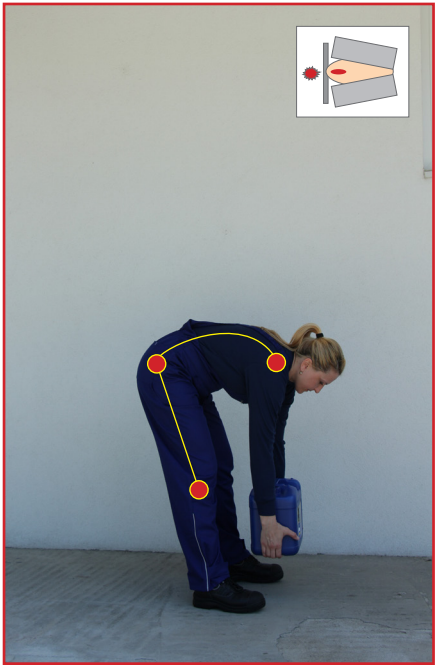
- **Cumulative trauma**

Cumulative trauma refers to the situations in which small mechanical damages pile up and eventually result in a big mechanical damage to the locomotor system or in its degenerative changes; both states cause pain.

There are three basic mechanisms leading to spine injuries that should be avoided.



1.1. BACK FLEXION AND HIPEREXTENSION

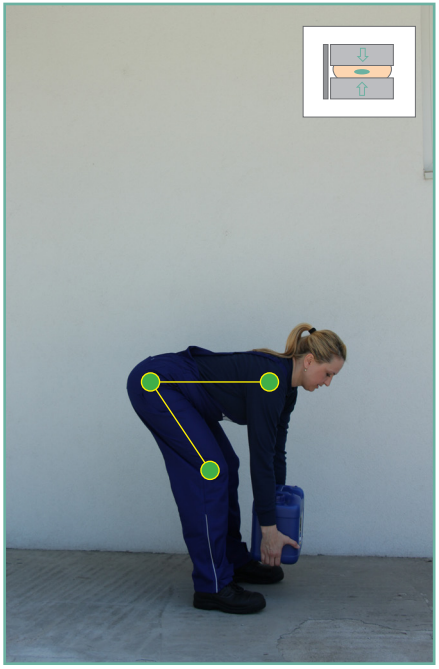


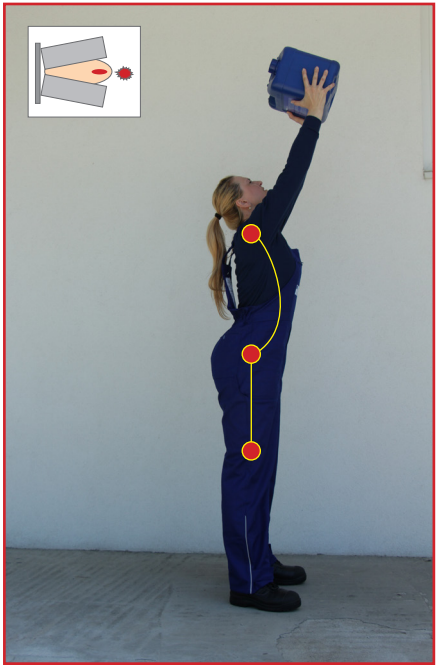
INCORRECT

- The bent or rounded back (flexion) happens while lowering and lifting the upper body part.
- Why do we do that? We bend our back because it makes it 'easier' for us since the lever is shorter, meaning the force needed is lower.
- Bending of the back is the most common mechanism of injuries.

CORRECT

- While lowering the core, the back must be kept straight, and the movement has to be done mostly from the hips and only partially from the knees.
- The load we are lifting or lowering must be kept close to the body to support our stability and make handling economical.
- While lowering the core, we should not think about how to lower the core, but about pushing the hips back.



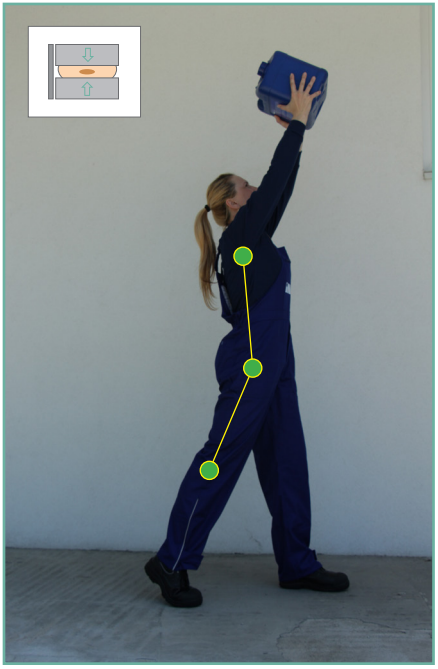


INCORRECT

- Core hyperextension happens mostly while lifting loads above the head.
- In that moment, an asymmetrical pressure happens in the intervertebral discs.

CORRECT

- While lifting the load above the head, the core has to be straight and stabile.
- That way the intervertebral space is preserved.



1.2. CORE ROTATION

INCORRECT

- Core rotation should not be executed in the lower part of the spine.
- By this mechanism, the intervertebral space in the lower back shrinks symmetrically.

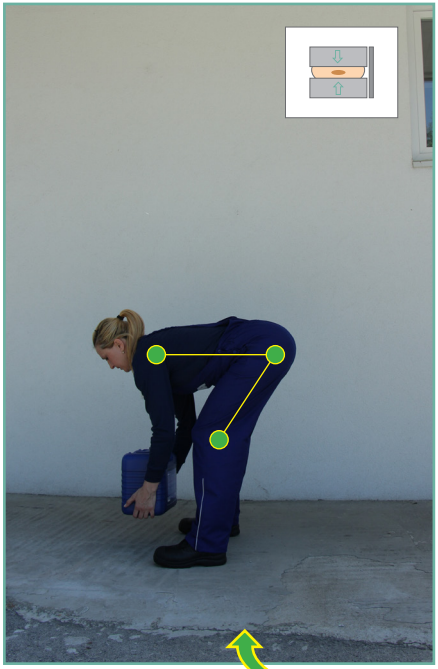
CORRECT

- Core rotation starts with the legs and continues with the upper part of the spine.
- The lower part of the spine has to be stabile and firm.
- This way intervertebral spaces stays preserved, and the back stays stabile and firm.

1.3. FLEXION AND ROTATION OF THE LOWER SPINE – SIDE-TO-SIDE TRANSFERRING

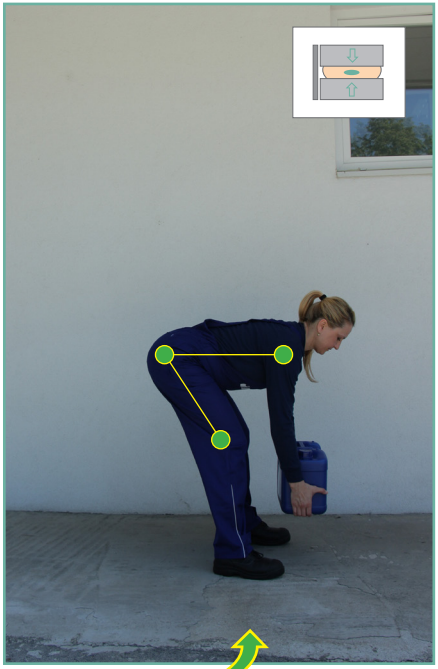
INCORRECT

- The third mechanism of developing mechanical damages to the spine is especially dangerous. It is a combination of the first two mechanism.
- It happens when lowering the core with the back bent and rotating the lower part of the back.
- It is called side-to-side transferring of the load.



CORRECT

- The load we are lifting has to be in front and under us (under our belly button).
- Only after the load has been lifted, we turn around and lower the load again in front and under us.
- All the time the back must be straight; the movement of lowering the core is mainly performed from the hips.



2.

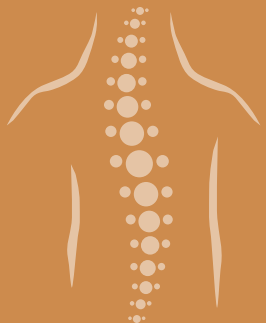
WORKPLACES

This manual will show the correct movements for, potentially, the most dangerous situations of manual load handling which workers at the following workplaces have to perform:

- Tubulars Toolman
- Downhole Equipment Toolman
- Warehouse worker
- Retail station worker

2.1 DOWNHOLE EQUIPMENT TOOLMAN

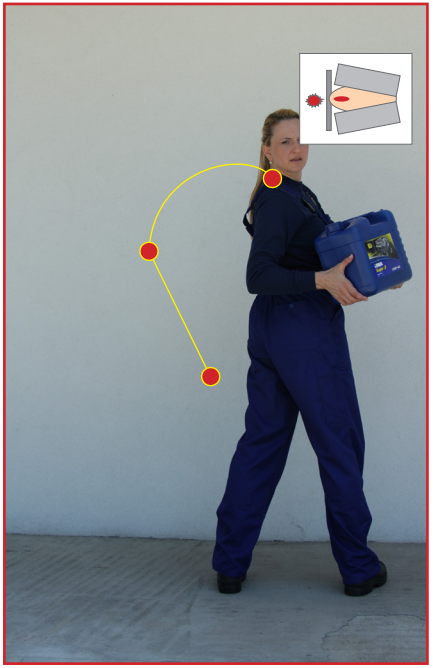
Workers at the workplace of DOWNHOLE EQUIPMENT TOOLMAN perform their everyday work tasks by handling various tools like levers, sliding doors, security clamps, etc., and often they have to lower their core. From the aspect of health and prevention of back pain, lowering of the core can be either correct or incorrect.



Incorrect and correct ways of lowering the core while performing different tasks at the workplace
DOWNHOLE EQUIPMENT TOOLMAN

INCORRECT

CORRECT

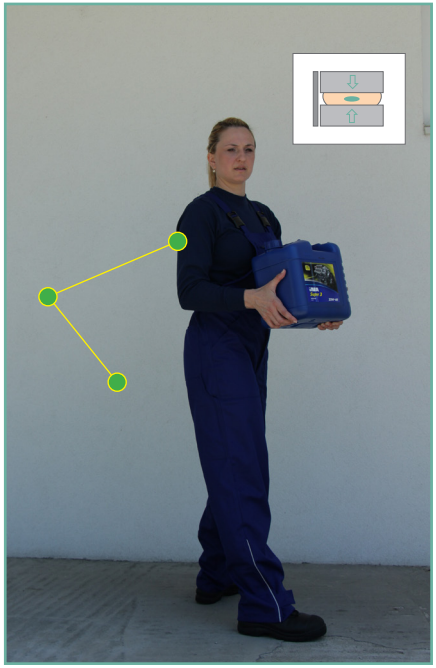


INCORRECT

- Every lowering of the core with the back bent (rounded) represents a small mechanical damage to the spine.
- One day all the mechanical damages will add up and we will start to experience the consequences of our incorrect movements.

CORRECT

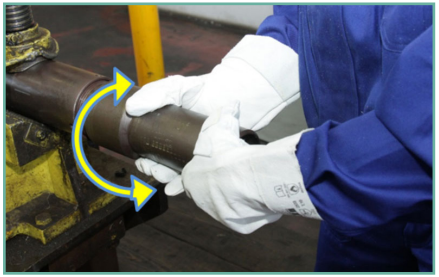
- Every time we lower the core, the back has to be straight, no matter what work is performed at that instance.
- The movement of lowering the core is done from the hip joints.



Amplitude of the movement in the joints of wrists and elbows

INCORRECT

- While cleaning and maintaining the security clamp, workers often perform movements of the maximum amplitude in the joints of wrists and elbows.
- Generally, those amplitudes do not represent a problem by themselves, but they can cause the overstraining syndrome and pain occurrence.

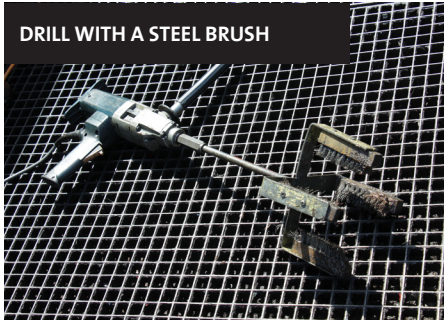


CORRECT

- While cleaning and maintaining the security clamp, it would be good not to use the maximum movement amplitudes in the wrists and elbows.
- The reason is the prevention of the overstraining syndrome occurrence in the joints of wrists and elbows.

2.2. TUBULARS TOOLMAN

Workers at the workplace TUBULARS TOOLMAN handle different tools like: drills with a steel brush, mini wash apparatuses, electromagnetic coils, devices for blowing out the inside of a pipe tool, etc.
While we handle any tool, that is, whenever we lower and lift the core, we have to think about our body posture.

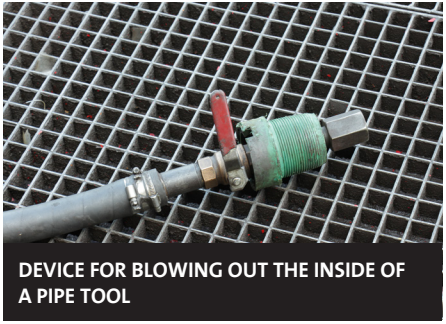


DRILL WITH A STEEL BRUSH

DIFFERENT TOOLS

MINI WASH

ELECTROMAGNETIC COIL



DEVICE FOR BLOWING OUT THE INSIDE OF A PIPE TOOL

Incorrect and correct way of lowering the core at the workplace TUBULARS TOOLMAN

INCORRECT

- Every lowering of the core with the back bent is potentially very dangerous.
- In these situations, mechanical damages may inflict the ligaments, muscles, intervertebral discs, etc.
- In these situations, when we are bending our back, it is probably only a question of time when a sharp pain will occur.

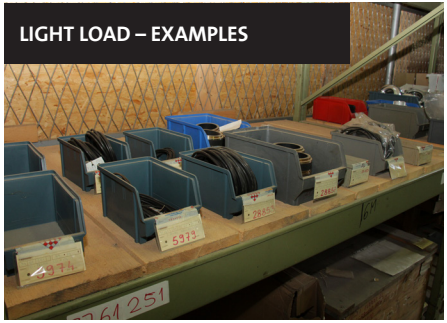
CORRECT

- Every lowering of the core should be performed with the straight back and from the hip joints.
- This way we are protecting our intervertebral space, ligaments, muscles, thus health of our spine in general.
- The straight back is the best prevention of different kinds of „discus hernia“.

2.3. WAREHOUSE WORKER

Working in a warehouse is, from the aspect body posture, primarily characterized by lifting and lowering of loads from and to different heights. Most commonly it is a manual handling of the loads of a smaller mass, but it may involve heavier loads as well. For heavy loads handling, the mechanization is usually used like forklifts, cranes, etc.

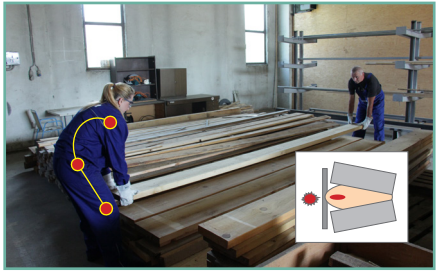
LIGHT LOAD – EXAMPLES



HEAVIER LOAD – EXAMPLES

HEAVY LOAD – EXAMPLES

Manual handling of light loads at different heights



INCORRECT

- No matter how light the load handled is, the back should never bend (get rounded)
- Bending and hiperextending the back are injury mechanisms that, after a large number of repetitions, leave mechanical damages to the spine and surrounding tissue.

CORRECT

- The back should always be straight while handling loads at different hights.
- When contracting abdominal mucles, we ensure the bact will be straight and firm, consequently, the core is stabile.

INCORRECT

CORRECT

INCORRECT

CORRECT

INCORRECT

CORRECT

INCORRECT

- Lifting and lowering heavy loads with the back bent is extremely dangerous.
- The heavier the load, the bigger the risk of instant back injury in the situations where the back is bent.

CORRECT

- While handling heavy loads it is extremely important to keep the back straight.
- With the correct manual handling of heavy loads we are not only perserving health of our back but we also promote it.

Carrying heavy loads

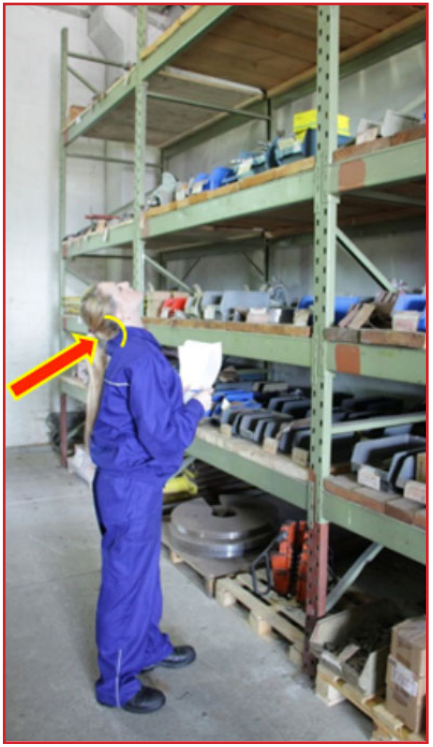
INCORRECT

- Transfering heavy loads with one hand should be avoided.
- In that case the load is not only far from the center of the body mass, but our spine is bending to one side. These actions may be potential causes of scoliosis, that is, theside curvation of spine.

CORRECT

- Loads should be transferred in a way that their mass is equally divided between both hands.
- Heavy loads can also be transfered by putting the load closer to our center of the body mass. It means that we have to put the load closer to our waist (belly button).

Gledanje prema gore



INCORRECT

- While doing inventory on higher shelves or simply looking up, it is recommended not to lean the head backwards toofar away.
- It is incorrect to stand close to the shelves and look up.
- In these situations, pressure can be created on the blood vessels that deliver blood to the brain.

CORRECT

- The cervical spine and the head should always be in a neutral position even when we have to work with merchandise on higher shelves.
- In these situations it is recommended to step away from the shelves or use a ladder.
- Neutral position of the cervical spine and the head is a precondition for normal blood circulation in the head area.

2.4. RETAIL STATION WORKER

While performing everyday professional tasks at a retail station, a worker encounters two potentially dangerous actions:

- Manual handling of light loads – oils, windscreen washing liquids, etc.
- Manual handling of heavy loads – gas bottles.

Manual handling of light load refers to lifting, transferring, and lowering vessels with oil, liquid for windscreen washing, juice, etc. It also refers to arranging or taking merchandise from the shelves in the warehouse or the store. During one work day at the retail station, a worker has to lift and lower his/her core many times. Lowering of the core can be performed either correctly and incorrectly.

INCORRECT

CORRECT

INCORRECT

CORRECT

INCORRECT

- While lifting, transferring, and lowering oils, windscreen washing liquids, juices, etc., the back should not be bent.
- Every bending of the back represents a small mechanical damage to the spine that can accumulate and lead to an injury.
- The higher the amplitude while lowering the core with the bent back, the higher the risk of injury occurrence.

CORRECT

- Pokret spuštanja i podizanja trupa prilikom dizanja, prenošenja i spuštanja tereta relativno male mase izvodi se prvenstveno iz zglobova kukova, a ne iz zglobova kralježnice.
- Leđa moraju biti ravna.
- Navedeno se odnosi na dizanja i spuštanja tereta na svim razinama.

Incorrect and correct body posture while performing side-to-side transfer of light loads

INCORRECT

- Side-to-side transferring of the load is extremely dangerous.
- While transferring loads side-to-side, the back experiences double the pressure while lifting and lowering load vertically.

CORRECT

- Lifting and lowering loads correctly like in the image is not dangerous for back health.
- Classical vertical lifting and lowering is an economical way of manual handling of loads.

Manual handling of heavy loads refers to lifting, transferring, and lowering gas bottles.
Manual handling of loads can be performed correctly or incorrectly from the aspect of body posture.

Incorrect and correct body posture while lifting a small gas bottle (e.g. UNP-10kg).

INCORRECT

- Incorrect lifting of a small gas bottle primarily refers to bending of the back, from the point of body posture.
- The back should not be bent.

CORRECT

- The movement of lowering and lifting the core while lifting a small gas bottle should be performed from the hip joints.
- The back has to be straight.

Incorrect and correct body posture while transferring a small gas bottle (UNP-10 kg).

INCORRECT

- Incorrect carrying is when the back is bent.
- When transferring the gas bottle, we should distance it from our waist.
- Distancing the gas bottle from the waist happens when the elbows are straight.
- Also, we should not transfer the gas bottle using only one arm.

CORRECT

- Correct transferring of a small gas bottle mainly refers to the straight back.
- While transferring, the small gas bottle should be as close as possible to our body.
- Elbows should be bent.
- The gas bottle should be carried with two arms.

Incorrect and correct body posture while lowering a small gas bottle (UNP-10 kg).

INCORRECT

- The biggest mistake made while lowering a small gas bottle is bending of the back.
- The risk of injury, instant or gradual, grows proportionally to bottle mass.

CORRECT

- While lowering the load, the back should be kept straight.
- The movement from the hip joints and straight back are preconditions for safe manual handling of load.

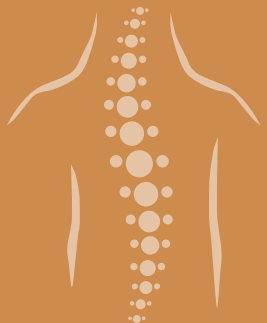
3.

CONCLUSION

The manual CORRECT MANUAL LOAD HANDLING is focused on human body postures at specific places of work of:

- Tubulars Toolman
- Downhole Equipment Toolman
- Warehouse worker
- Retail station worker

Certain most common and potentially the most dangerous motions and movements are presented in the manual. The incidence and progression of mechanical damages to the body, caused by the long-term incorrect movement execution, can be considerably prevented by respecting the instructions from this manual. Also, by complying with the recommendations presented in the manual, we are not only preserving our locomotor system health – we promote it. Correct body posture while lowering the core should become habitual at workplace, but also in everyday life.



The message from the author:
"The cause of a painful back is not physical work itself; the cause is incorrect posture while performing physical work. This is the moment to change detrimental life habits."

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