Total’s Golden Rules
Golden Rule No. 3:
Body Mechanics and Tools
BODY MECHANICS AND TOOLS

Do not carry out work if you do not have the right tools for the job and the environment.

- Do not carry out work if you do not have the right tools for the job and the environment.

- Two people or machinery may be needed to perform work, depending on the weight, size or bulk of the load.

- Adapt your body mechanics to the tool rating and repetitive motions.

- Follow the appropriate operating procedure for the tools.
Ergonomics at the workplace

- Inappropriate ergonomic conditions for work can make it difficult to adopt satisfactory body mechanics.

- A poor workplace layout can create ergonomic risks, including:
  - repetitive or forced movements
  - vibrations
  - extreme temperatures
  - Uncomfortable body mechanics made necessary by work methods or workplace layout, by tools or equipment that do not meet users’ needs

In your opinion, what types of dangers arise from ergonomic risks?
Workplace ergonomics: Seven action points

- **Access and traffic:**
  - give operators safe access to, and ease of movement in and around their workplaces, while minimizing the effort this requires.

- **Communications:**
  - ensure efficient coordination of the tasks so that work proceeds smoothly.

- **Time constraints:**
  - anticipate the risk of accidents, stress and musculoskeletal disorders.

- **Physical and chemical effects:**
  - Reduce discomfort at the workplace to render it compatible with operators’ health, while enabling them to work without constraints.

- **Information:**
  - clearly present the visual and oral information needed for the work to be performed efficiently and safely.

- **Handling and physical effort:**
  - limit manual handling and physical exertion to avoid accidents and prevent musculoskeletal disorders.

- **Sizing and body mechanics:**
  - Design the workplaces such that personnel can work in suitable postures that are comfortable and non-dangerous to health.

For further information please visit [www.inrs.fr](http://www.inrs.fr)
Handling

A heavy or bulky load may sometimes need two people or lifting machinery to handle it.

If manual handling is still necessary, the intensity of the manual labor must be limited by:

- reducing the objects’ weight to an acceptable limit
- changing the layout of the work environment
- allocating more time for repetitive handling tasks
- alternating heavy work and jobs that are lighter or use different muscle groups, to avoid the risk of accumulated fatigue
- training personnel in “Body Mechanics”
Tools

Risks are generated when tools are used incorrectly or for the wrong purposes.

*Failure to respect the basic safety rules when using tools is a regular cause of accidents in our activities.*

**Incorrect uses include:**

- Choosing an unsuitable tool for the work to be done
- Selecting an inappropriate tool for the job environment (explosive (ATEX) or humid atmosphere)
- Using a tool outside of the manufacturer’s recommended limits (speed, intensity and direction of effort exerted, etc.)
- Using improvised substitutes (e.g. a metal bar to strike / unblock, bits of metal to hit or wedge, etc.)
- Failing to allow for the fact that the force exerted in using a tool can prove dangerous for the operator or for others if it is suddenly released
- Poor anticipation of pinching / trapping phenomena which can result in inappropriate and dangerous movements
- An uncomfortable or unstable body position, incompatible with the danger inherent to the tool or equipment used (grinding, welding, use of high-pressure cleaning gun, sandblasting, etc.)
Tools

The risks induced when tools are used incorrectly or for the wrong purposes include:

- Caught-between/against
- Crushing
- Struck by
- Shearing / Severing
- Cuts / Lacerations
- Electrification / Electrocution
- Burns
- Dazzling
- Irritation to skin / lungs / eyes
- Impact on health
- Fire / explosion
- Deep / superficial skin abrasion
- Penetrating / impalement injuries

List some real or imagined examples of tool-use situations that might induce each of the above risks, highlighting a possible cause (tool or body mechanics)
Tools: Grinder or Cutting disk

One of the most dangerous tools used by our maintenance operators is the grinder or cutting disk.

The disk’s peripheral speed is around 80m/s (~300km/h).

In these conditions, if a piece of the disk (even small) is torn off, 3 consequences may follow:

- The torn off piece flies violently outwards and can cause deep gash wounds.

- The equipment is unbalanced, causing:
  - the rest of the disk to shatter ➔ risk of serious injuries from projectiles
  - inability to keep hold of the tool ➔ risk of operator sustaining cuts or impact injuries
Tools: Grinder or Cutting disk

The following rules must be respected:

- Use the tool guard, directing it to protect the operator in the position adopted and for the work to be done.

- Check the machine speed and disk diameter for compatibility.

- Use the disk on materials it was designed to cut.

- Use the disk in the conditions intended by the manufacturer.

- Use disks that are known to be high-quality.

- Work in a way that will not cause the disk to suddenly block.

- Unplug the equipment before any attempt to dismantle / reassemble it.

- Always check the disk condition before use.

- Be sure to stow the tool out of reach of impact when it is not in use.

_But is that really the case everywhere?_
Tools

The manual opening or closing of valves is a routine operation in all branches.

For various reasons, some valves are always difficult to open or close. Here are three typical scenarios:

- The operator tends to use a length of tube as an extension and slides it into the valve handwheel.
  ➔ the extension slips ➔ the operator falls, collides with objects in the work area

- The operator applies substantial force involving the muscles in the arms / shoulders and also the back.
  ➔ Arm / shoulder / chest pain. Torn muscle.

- The operator uses a valve wrench.
  ➔ Little or no risk.

What do you think are the risks or advantages of each of these ways of working?
Tools

A number of other routine tools are often mentioned in descriptions of accidents in the Group. Cutters, impact wrenches, hammers and even screwdrivers all make regular appearances…

- **Cutters:** widely used in activities that involve opening packaging.

Cuts to the hands and legs, sometimes deep, occur frequently.

Are you familiar with retractable-blade, recessed-blade or blunt tip cutters? Are they used in your activity? If not, why not?
Impact wrenches: used to loosen nuts that are difficult to unscrew with a basic wrench. There are, however, several drawbacks to using them. What do you think these are?

These risk-generating disadvantages include:

- Play between the wrench and the nut ➔:
  - the operator maintains grip on the wrench: ➔ operator is struck
    or when the wrench is hit
  - the operator loses grip on the wrench: ➔ wrench is ejected ➔ operator or an object in the vicinity is struck

Did you know that there are tools safer to use and that do not require maintenance? For example…
Tools

- **Screwdrivers**: this tool is dangerous because of its wide range of everyday uses. Nevertheless, when used wrongly to push, open or scrape, it becomes a dangerous object that sometimes causes accidents.
  A screwdriver must never be used on an object held in the palm of the hand.

And the list of tools does not stop there…

- What tools do you use regularly that have led to accidents on your site?
- What did the accident analysis show?
- Could the accident have been prevented? If yes, how?
Energy

Poor body mechanics, incorrect use of a tool, use of a tool unsuitable for the task at hand, an unprofessional gesture – are all likely to have serious consequences for the operator, for personnel nearby or for the work area, when the force exerted by the operator or the tool is suddenly released.

In the examples below, how are poor body mechanics, an unprofessional gesture or use of the wrong tool dangerous owing to the energy applied? What are the potential consequences? And what are the potential severity levels?

- Use in an unbalanced position of a high-pressure cleaning gun
- Use of a flat or adjustable wrench
- Use of a length of tube as a sledgehammer to hit another object
- Sandblasting with pressurized air or water from an uncomfortable or unsuitable position
- Use of a hammer
- Use of a cutter
- Anything else, in your opinion…
Some real-life examples

2007:
A team was tasked with cleaning tubulars in the inspection zone of a tube storage area, using a high-pressure (270 bar) water jet. The cleaner was using a modified gun, not equipped with a safety trigger, as the standard gun was considered difficult to use.
He was standing on the pile 1 m above the ground, cleaning the tubes. His helper (the victim-to-be) was behind him at ground level, moving the hose around.
The operation was not supervised and nobody was keeping watch over the HP pump to be able to stop it quickly if need be.
The cleaner, moving about on the tubes as he worked, lost his balance and let go of the gun. The jet of pressurized water then hit the helper, making gashes in his leg in several places between the knee and the ankle. He needed a number of stitches.
Some real-life examples

2009:
A Contractor worker was assigned to smooth away the remains of a roof gutter. The work would normally be carried out from a position on the roof, but guard rails had recently been welded in place, making this work position awkward. The worker therefore chose a spot on the wooden board of the scaffold that had been placed around the tank but was not intended for the purpose. His left leg was bent just 20 cm from the cutting disk. As he proceeded to grind, the machine’s air supply hose became trapped under some tank equipment. The operator held the grinder with his right hand and let go of the side handle to pull on the hose and free it with his left hand. The grinder, which was still on, swung abruptly and made a deep cut in the victim’s left thigh.

2007:
An operator wanted to move a “1/4 turn valve” but it was stuck tight with resin. So he hit the valve handle with a metal bar. In doing so, he fractured his thumb, catching it between the metal bar and a pipe just above.