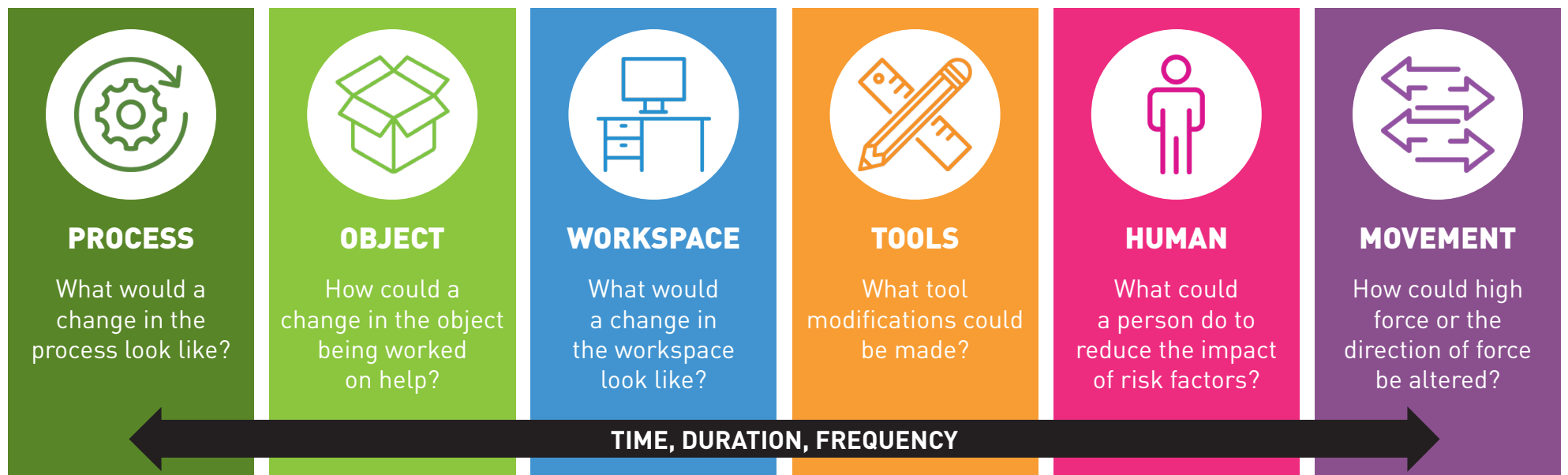


# Brainstorming solutions for ergonomic issues

A change in any one or more of the seven areas can lower musculoskeletal risk factors that lead to injury. After identifying a job's risk factors for musculoskeletal disorders, use the following table below as a brainstorming guide to rethinking the task.



CONCEPT	TASK	IMPROVEMENT
 <b>PROCESS</b>	Change the order of steps	Instead of building from A+B+C+D+E+F, consider building C+D+E+F first, then adding this to A+B. For example, consider building a preassembly that attaches to the final assembly rather than building everything in the final assembly.
	Change the upstream process	Consider changing a preceding step to eliminate or reduce risks in a downstream task.
	Eliminate/remove wasted steps	Consider eliminating steps in the process if they don't add value. For example, if an item is picked up and moved twice, consider whether the process can be changed so it is only moved once.
	Substitute	Consider substituting a different material in the process to reduce risk. For example, lightweight plastic may be used in place of metal.
	Move sub-steps to another part of the process	Consider changing who performs specific sub-steps. For example, in a production line, consider moving a step upstream or downstream.
	Job rotation	Consider job rotation so tasks with a similar risk factor are not done back-to-back.
 <b>OBJECT</b>	Improve coupling	Consider adding handles for moving/holding items. Consider placing amorphous-shaped items in a container with handles. Consider changing to a power grip instead of a pinch grip.
	Increase weight	Consider increasing object weight so it is too heavy for manual lifting, so staff will need to use manual material equipment.
	Reduce weight	Consider reducing the weight of the object, such as purchasing raw materials in a smaller container.
	Secure object	Consider securing the object to reduce the force a worker needs to apply to hold it in place, such as with a clamp or jig.
	Reposition closer	Consider moving the item closer to the worker.
	Balancer	Consider a tool balancer, pneumatic balancer, or zero-G system for reducing force.
 <b>WORKSPACE</b>	Shorten reach distance	Consider ideas to bring the work or stored parts closer to the worker.
	Lower or raise workstation surface	Consider raising or lowering workstation so the upper arms are neutral with elbows at the side when the work is performed.
	Eliminate twists	Consider modifying the space so the person does not need to reach to the side or turn to the back, such as when accessing tools or materials.
	Improve headroom	Evaluate whether crouching or kneeling can be eliminated. Consider whether headroom can be improved.
	Store on carts	Consider storing items on carts if items need to move.
	Racking placement	Consider storing heavy items in a middle shelf, lighter items on the bottom, and lightest on the top. Consider placing frequently used items in the middle.
 <b>TOOLS</b>	Low-vibration power tool	Consider switching to a low-vibration tool.
	Change orientation of handles	Consider whether a pistol-grip tool or an inline tool would allow a more neutral wrist and elbow posture. Consider extending or lengthening the handles on the tool.
	Power tool vs. hand tool	Consider switching to a power tool. In some cases, consider switching from a power tool to a hand tool.
	Automate or semi-automate	Evaluate whether an automated machine or semi-automated machine can help.
	Preventative maintenance	Establish a preventive maintenance program or evaluate current PM for adequacy. Some tools require considerably more force when the cutting edge is dull and other tools generate more vibration.
	Personal protective equipment	Antivibration gloves; antivibration coatings; knee pads
 <b>HUMAN</b>	Isolate the employee	Consider isolating the employee from the hazard, such as a dampening seat to reduce whole body vibration, or an exoskeleton for reducing force.
	Team lift/handle	Consider whether a two-person lift is feasible and would reduce risk.
	Technique	Consider whether there is a better technique to perform the job, such as improved body mechanics. For example, sometimes a small group of workers has discovered an easier way to perform a task.
	Training	Consider training options. NOTE: This should never be the first choice in any solution decision.
 <b>MOVEMENT</b>	Vertical lift and lower	Consider a hoist or fixture to lift or lower (NOTE: Ensure one lift fixture can do 100 jobs rather than 100 jobs each with one fixture). Consider a vacuum system.
	Lateral hoist placement	Use a hoist that can make a lateral placement.
	Raise object from bottom	Use scissor lifts to raise objects up where they can be slid to another surface or worked on, mounted from underneath (example: transmission jack).
	Motorized vs. manual movement	Consider using a motorized way of transporting material, such as a cart tugger instead of manually pushing a cart.
	Slide vs. lift	Consider whether an object can slide instead of being lifted. Use a material that can slide easily. NOTE: Workers can push/pull more weight than they can lift.
	Cart design	Consider using large caster wheels and carts with vertical hand holds.
	Push vs. pull	Pushing is generally better than pulling.
	Change applied force from horizontal to vertical	It is easier for workers to apply force in a horizontal direction than a vertical.
	Change applied force from lateral to forward horizontal	It is more difficult to reach across the body when applying force than to use a forward/backward movement.
Change applied force from axial to rotational	Consider changing the direction of force from a straight line to rotational. For example, in some cases using torque and a lever arm will make a task easier.	
<b>TIME, DURATION, FREQUENCY</b>	Shorten the duration of the risk factor	Consider changes that would allow the task to be completed quicker—it may reduce time spent applying force or in awkward postures.
	Shorten the frequency of the risk factor	Consider reducing the frequency of the task. For example, instead of something happening one time every three minutes, is there a way to change it so it occurs once every five or 10 minutes instead?