CASE STUDY - Opening/Closing Heavy Doors	
TASK TITLE: Opening/Closing Heavy Doors	
Task Description:	Opening and closing of heavy doors is a task which often must be performed prior to initiating or completing the primary work tasks**.** The types of doors may include large hangar doors that move sideways on tracks, doors that move up and down on rollers or tracks, and large hinged doors on buildings or pieces of equipment. The defining characteristics of doors in this case study is that they are moved, not removed (i.e., it is never necessary to manually support the full weight of the door).
Job -- Performance Measures Most Often Impacted by Opening/Closing Heavy Doors:	There are typically no performance measures associated with the Open/Close Heavy Doors task. However, a door which is difficult to move may be left open making temperature control inside a shop difficult to maintain.
Typical Employee Comments about Opening/Closing Heavy Doors:	Employees do not typically complain about fatigue and discomfort associated with opening/closing heavy doors. They are, however, typically concerned about hurting their backs when they must deal with a door that is in disrepair or that is otherwise difficult to move. Primary body regions affected (or injured) include the shoulders, and lower back. Secondary body parts affected may include legs/feet, and sometimes the hands.
Suggested Level II Analysis:	Biomechanical Lifting Analysis, Push/Pull Analysis

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
1. Reaching	• Rarely occurs	N/A					
2. Arm forces: Repeated contraction of the muscles of the arm or holding/ carrying materials	• Weight of door is excessive	107. Provide powered or mechanical assistance for door					
		• modify existing door		✓	med	med	med
		• add counter balance to decrease effort		✓	med	med	med
		• add a motor to eliminate manual opening/closing		✓	med	med	med
		58. Provide a lighter weight door					
		• replace heavy door with light-weight door		✓	high	med	med
		61. Provide a mechanical lift device		✓			
		• use a hoist/lifting device to assist in opening /closing vertical doors			high	med	high
	• Tracks, rollers or movement mechanism are worn or out of alignment	35. Maintain tracks, rollers, and movement mechanisms	✓		med	med	med
		• inspect and repair (as required) tracks, rollers or movement mechanism	✓		low	med	med
		• Clean and lubricate tracks, rollers or movement mechanisms.					

Shoulder/Neck (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
3. High speed, sudden shoulder movements	• Procedure used by employee places unnecessary stress on shoulder	13. Encourage ergonomic work techniques					
		• use entire body and momentum (lean) to move door	✓		low	low	low
		• move door slowly and increase speed as the door begins to move	✓		low	low	low
	• Tracks, rollers or movement mechanism are worn or out of alignment	35. Maintain tracks, rollers, and movement mechanisms					
		• inspect and repair (as required) tracks, rollers or movement mechanism	✓		med	med	med
		• clean and lubricate tracks, rollers or movement mechanisms.	✓		low	med	med
4. Head/ neck bent or twisted	• Rarely occurs	N/A					

Hands/Wrists/Arms

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
5. Bent wrists/repeated wrist movements or repeated forearm rotation 10. Exposure to hard edges	• Handle or gripping surface is too small or does not exist	94. Provide appropriate handles • modify existing door • provide auxiliary handle: – avoid use of "cut-out" for handle – if "cut-out" is necessary, provide a vertical bar inside cut-out to enable the person to use a full hand grip • attach external vertical handle		✓ ✓ ✓	med med med	med med med	med med med
6. Repeated manipulations with fingers	• Rarely occurs	N/A					
7. Hyper-extension of finger/thumb or repeated single finger activation	• Rarely occurs	N/A					

Hands/Wrists/Arms (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
8. Hand/grip forces	• Handle or gripping surface is too small, is inappropriate, or does not exist	3. Change a pinch grip to a power grip • replace fingertip latches with larger latches that can be activated using the whole hand		✓	med	med	med
9. High speed hand/wrist/arm movements or vibration, impact, or torque to the hand	• Rarely occurs	N/A					
11. Hands and fingers exposed to cold temperatures	• Rarely occurs	N/A					

Back/Torso

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
12. Repeated forward or sideways bending movements	• Handle is too low (see Figure 1.1)  **Figure 1.1** • Door location/access is too far away	121. Raise the handle • raise the door handle		✓	med	med	med
		55. Provide a hook-type tool to pull items • use a hook to initiate a pull from floor level	✓	✓	low to med	med	med
		132. Remove obstructions • remove obstructions along the path of travel	✓	✓	low to med	med	med
13. Twisting of the lower back	• Handle or gripping surface is too small or does not exist	94. Provide appropriate handles • modify existing door		✓	med	med	med
		• provide auxiliary handle: – avoid use of "cut-out" for handle		✓	med	med	med
		– if "cut-out" is necessary, provide a vertical bar inside cut-out to enable the person to use a full hand grip	✓		med	med	med
		• attach an external vertical handle					

Back/Torso (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
	• Procedure used by employee places unnecessary stress on shoulder	13. Encourage ergonomic work techniques • provide training to illustrate proper method • use entire body and momentum (lean) to move door • push rather than pull, whenever possible • face the direction of movement when pushing • use 2 hands or keep the body balanced when pulling	✓ ✓ ✓ ✓ ✓		low low low low low	low low low low low	low low low low low
14. High speed, sudden movements	• Procedure used by employee places unnecessary stress on shoulder • Tracks, rollers or movement mechanism are worn or out of alignment	13. Encourage ergonomic work techniques • provide training to illustrate proper method • use entire body and momentum (lean) to move door • move door slowly and increase speed as the door begins to move 35. Maintain tracks, rollers, and movement mechanisms. • inspect and repair (as required) tracks, rollers or movement mechanism • clean and lubricate tracks, rollers or movement mechanisms.	✓ ✓ ✓ ✓ ✓		low low low med low	low low low low low	low low low med med

Back/Torso (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
15. Static, awkward back postures	• Rarely occurs						
16. Lifting forces	• Weight of door is excessive	107. Provide powered or mechanical assistance for door.					
		• modify door		✓	med	med	med
		• add counter balance to decrease effort	✓	✓	med	med	med
		• add a motor to eliminate manual opening/closing		✓	med	med	med
		58. Provide a lighter weight door					
		• replace heavy door with light-weight door		✓	high	med	med
	• Tracks, rollers or movement mechanism are worn or out of alignment	61. Provide a mechanical lift device					
		• a hoist/lifting device to assist in opening /closing vertical doors		✓	high	med	high
		35. Maintain tracks, rollers, and movement mechanisms					
		• inspect and repair (as required) tracks, rollers or movement mechanism	✓		med	med	med
		• clean and lubricate tracks, rollers or movement mechanisms.	✓		low	high	med

Legs/Feet

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
17. Pushing or pulling	• Rarely occurs	N/A					
18. Whole body vibration	• Rarely occurs	N/A					
19. Fixed position, standing	• Rarely occurs	N/A					
20. Exposure to hard edges on legs, knees, and feet	• Rarely occurs	N/A					
21. Awkward leg postures	• Rarely occurs	N/A					
22. Standing foot pedal	• Rarely occurs	N/A					

Head/Eyes

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
23. Difficult to see/light levels too low/too high	• Rarely occurs	N/A					
24. Intensive visual tasks, staring at work objects for long periods	• Rarely occurs	N/A					