

## CASE STUDY - Packing/Shipping

### TASK TITLE: Packing/Shipping

<b>Task Description:</b>	<p>The Packing/Shipping task typically involves filling the box with packing materials, taping the box closed, weighing the box, labeling the box and placing the box aside for shipment. The box may be placed in a bin, cart, pallet or conveyor while awaiting shipment. This case study does not address the packing of parachutes or rafts; for information on these topics please refer to the M/I Guide Case Study 33 - Packing.</p> <p>The case study also does not address loading or transporting loads. For information on these related topics, please refer to this W/I Guide Supplement for the following: Loading/Unloading- Case Study 11; Transporting Loads On Non-Powered Carts – Case Study 20; Lifting – Case Study 22.</p> <p>Typical environments in which the Packing/Shipping task may be found can include:</p> <ul style="list-style-type: none"><li>• Warehouse</li></ul>
<b>Job Performance Measures Most Often Impacted by Packing/Shipping:</b>	<p>Measure of work performance can include (but are not necessarily limited to):</p> <ul style="list-style-type: none"><li>• Number of packages shipped per day</li><li>• Time to process requests</li></ul>
<b>Typical Employee Comments about Packing/Shipping:</b>	<p>Employees typically experience discomfort in the lower back and shoulders.</p> <p>The back/torso and shoulders/neck are the body area that most commonly receives a “High” priority rating. The remaining body areas, with the exception of the head/eyes, are more likely to receive a “Medium” priority rating, or lower.</p>
<b>Suggested Level II Analysis:</b>	<p>NIOSH Lifting Equation, Biomechanical Lifting Analysis, Push/Pull Force Analysis</p>

**Shoulder/Neck**

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
1. Reaching	<ul style="list-style-type: none"> <li>Object is too high</li> <li>Object is too far away</li> <li>Box is too big</li> </ul>	32. Lower the work piece/work surface <ul style="list-style-type: none"> <li>place heaviest items below shoulder height (50")(127 cm) or less and above knuckle height (25")(64 cm)</li> </ul>	✓		low	low	med
		38. Move closer to the work location <ul style="list-style-type: none"> <li>step closer to load</li> </ul>	✓		low	low	low
		41. Move work piece closer to body <ul style="list-style-type: none"> <li>slide load to edge before lifting</li> </ul>	✓		low	low	low
		147. Provide alternate container <ul style="list-style-type: none"> <li>provide a smaller container (reduce depth, reduce width)</li> <li>replace single big container with 2 or 4 smaller containers</li> <li>provide a cut-out flap to increase access to box</li> <li>provide a box with open or removable sides</li> </ul>		✓ ✓ ✓ ✓	low to high low to high low to high low to high	high high high high	

**Shoulder/Neck (cont'd)**

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	<ul style="list-style-type: none"> <li>Box is at a poor angle</li> <li>Lifting over flaps of packing box</li> </ul>	146. Angle the work surface <ul style="list-style-type: none"> <li>provide an angled fixture for packing</li> <li>provide a lift and tilt table for packing</li> </ul> 149. Provide appropriate tools <ul style="list-style-type: none"> <li>provide clips to hold flaps out of the way</li> </ul>	✓  ✓		low med to high low to med	med med med	med med med
2. Arm forces: Repeated arm forces or holding/carrying materials	<ul style="list-style-type: none"> <li>Applying tape</li> <li>Operating strapper</li> </ul>	153. Use desk-based tape dispenser instead of handheld dispensers  149. Provide appropriate tools <ul style="list-style-type: none"> <li>provide strapper with a better gearing ratio which requires less force</li> </ul> 35. Maintain tracks, rollers, and movement mechanisms <ul style="list-style-type: none"> <li>maintain strappers to reduce forces</li> </ul>		✓  ✓	low med low	low low low	low med low

**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	<ul style="list-style-type: none"> <li>Speed of lift</li> <li>Applying tape</li> </ul> 	13. Encourage ergonomic work techniques	✓		low	low	low
		<ul style="list-style-type: none"> <li>encourage person to use smooth fluid movements while handling items</li> </ul> 153. Use desk-based tape dispenser instead of handheld dispensers		✓	low	low	low
4. Head/neck bent or twisted	<ul style="list-style-type: none"> <li>Scale readout too far away</li> <li>Carton/work is too low</li> </ul>	39. Move monitor/screen closer to body	✓		low	high	low
		45. Position the monitor/screen in front of the body	✓		low	high	low
		124. Raise the work piece/work surface		✓	low to med	med	med
		<ul style="list-style-type: none"> <li>provide an adjustable height surface</li> <li>provide a riser/fixture for carton to raise up to elbow height</li> </ul>	✓	low	med	med	

**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	• Carton/work is too low	124. Raise the work piece/work surface		✓	low to med	med	med
		<ul style="list-style-type: none"> <li>• provide an adjustable height surface</li> <li>• provide a riser/fixture for carton to raise up to elbow height</li> </ul>	✓		low	med	med
	• Box is at a poor angle	146. Angle the work surface	✓		low	med	med
		<ul style="list-style-type: none"> <li>• provide an angled fixture for packing</li> <li>• provide a lift and tilt table for packing</li> </ul>		✓	med to high	med	med
	• Lifting over flaps of packing box	149. Provide appropriate tools	✓		low to med	med	med
	• Shape of grasping location (handle) on work piece causes awkward wrist positions	94. Provide appropriate handles		✓	med	low	low
<ul style="list-style-type: none"> <li>• provide handles which pivot slightly to permit a straight wrist during handling</li> <li>• provide cut-outs on boxes or containers</li> </ul>			✓	low to high	high	high	

**Hands/Wrists/Arms (cont'd)**

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	<ul style="list-style-type: none"> <li>Work method: flip folding boxes causes high speed wrist movements</li> <li>Applying tape</li> </ul>	13. Encourage ergonomic work techniques <ul style="list-style-type: none"> <li>fold the box open rather than flipping it open</li> </ul> 153. Use desk-based tape dispenser instead of handheld dispensers	✓	✓	low	low	low
6. Repeated manipulations with fingers	<ul style="list-style-type: none"> <li>Rarely occurs</li> </ul>	N/A					
7. Hyper-extension of finger/thumb or repeated single finger activation	<ul style="list-style-type: none"> <li>Handling awkwardly shaped items</li> <li>Operating strapper with one hand</li> </ul>	147. Provide an alternate container <ul style="list-style-type: none"> <li>provide a smaller container</li> <li>provide a more stable container</li> </ul> 94. Provide appropriate handles 61. Provide a mechanical lift device 148. Provide appropriate equipment <ul style="list-style-type: none"> <li>provide a strapper that allows two-handed use</li> </ul>		✓ ✓ ✓ ✓	low to med low to med med med	med med med med	med med med low
8. Hand/grip forces	<ul style="list-style-type: none"> <li>Item is difficult to grasp</li> <li>Item is slippery</li> </ul>	147. Provide an alternate container <ul style="list-style-type: none"> <li>provide a smaller container</li> <li>provide a more stable container</li> </ul>		✓ ✓	low to med med med	med med med	med med med

**Hands/Wrists/Arms (cont'd)**

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
9. High speed hand/wrist/arm movements or vibration, impact or torque to the hand	<ul style="list-style-type: none"> <li>Applying tape</li> </ul> 	153. Use desk-based tape dispenser instead of handheld dispensers		✓	low	low	low
10. Exposure to hard edges	<ul style="list-style-type: none"> <li>Item has small handles</li> <li>Handles have hard edges</li> </ul>	88. Provide an appropriate handle diameter  94. Provide appropriate handles <ul style="list-style-type: none"> <li>provide rounded slightly compressible handles</li> </ul> 61. Provide a mechanical lift device	✓	✓	low to med	low	low
11. Hands and fingers exposed to cold temperatures	<ul style="list-style-type: none"> <li>Work area is too cold</li> </ul>	12. Encourage appropriate seasonal clothing  93. Provide appropriate gloves	✓		low to med	med	med
			✓		low to med	med	low

**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	<ul style="list-style-type: none"> <li>Object is too low</li> </ul>  <ul style="list-style-type: none"> <li>Object is too far away</li> </ul>	124. Raise the work piece/work surface <ul style="list-style-type: none"> <li>place heaviest items between mid thigh and shoulder height</li> <li>provide a fixed table to support work piece</li> <li>provide an adjustable table</li> </ul>	✓		low	med	med	
			41. Move closer to the work location <ul style="list-style-type: none"> <li>step closer to load</li> <li>slide load to edge before lifting</li> </ul>	✓	✓	med	med	med
			46. Provide a ball-bearing rotation table		✓	med to high	med	med
					✓		low	med

**Back/Torso (cont'd)**

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	<ul style="list-style-type: none"> <li>Lifting item out of a deep container causes awkward bending</li> <li>Person tends to use the back to lift instead of using the legs to assist in the lift (check to make sure that there is no contributing factor in the workplace)</li> <li>Same object is lifted repeatedly throughout the shipping process</li> </ul>	<p>147. Provide an alternate container</p> <ul style="list-style-type: none"> <li>use a smaller container</li> <li>use a container with drop down sides</li> <li>use a pallet instead of a bin</li> </ul> <p>13. Encourage ergonomic work techniques</p> <ul style="list-style-type: none"> <li>provide training on ergonomics principles and lifting techniques</li> <li>encourage person to use leg muscles to lift</li> </ul> <p>11. Eliminate unnecessary tasks</p> <ul style="list-style-type: none"> <li>install a scale in the work surface or conveyor</li> <li>use conveyors to move boxes</li> </ul>		<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>med to high</li> <li>med to high</li> <li>med to high</li> <li>low</li> <li>low</li> <li>med to high</li> <li>med to high</li> </ul>	<ul style="list-style-type: none"> <li>med</li> <li>med</li> <li>med</li> <li>low</li> <li>low</li> <li>med</li> <li>med</li> </ul>	<ul style="list-style-type: none"> <li>med</li> <li>med</li> <li>med</li> <li>low</li> <li>low</li> <li>high</li> <li>high</li> </ul>
13. Twisting of the lower back	<ul style="list-style-type: none"> <li>Work area layout</li> </ul>	<p>130. Reduce the angle a person has to turn to transfer the item</p> <ul style="list-style-type: none"> <li>for example, if the transfer involves a 180 degree twist, move the source or destination to reduce the twist to 90 degrees or less</li> <li>reposition supplies/materials to reduce twisting</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> </ul>		<ul style="list-style-type: none"> <li>low to high</li> <li>high to low</li> </ul>	<ul style="list-style-type: none"> <li>low</li> <li>low</li> </ul>	<ul style="list-style-type: none"> <li>med</li> <li>med</li> </ul>

**Back/Torso (cont'd)**

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	<ul style="list-style-type: none"> <li>Person tends to twist with the back instead of using the legs and feet to pivot</li> </ul>	150. Redesign the workspace <ul style="list-style-type: none"> <li>place containers and surfaces so twisting is avoided</li> </ul> 13. Encourage ergonomic work techniques <ul style="list-style-type: none"> <li>provide training on ergonomics principles and lifting techniques</li> <li>encourage person to use legs to pivot when handling a load</li> </ul>	✓		low	low	low
14. High speed, sudden movements or Lifting awkward, uneven, shifting or bulky items.	<ul style="list-style-type: none"> <li>Item is bulky, awkward and/or shifts easily</li> <li>Person tends to lift with a jerky motion instead of a smooth motion</li> </ul>	61. Provide a mechanical lift device  13. Encourage ergonomic work techniques <ul style="list-style-type: none"> <li>encourage person to use smooth fluid movements while handling items</li> </ul>	✓	✓	med to high	med	med
15. Static, awkward back postures	<ul style="list-style-type: none"> <li>Packing location is too low (table height too low or filling box which is on the floor)</li> </ul>	124. Raise the work piece/work surface <ul style="list-style-type: none"> <li>raise the table to allow packing between waist and elbow height</li> <li>provide a packing table</li> <li>use an adjustable height packing table</li> </ul>		✓ ✓ ✓	med med med	med med med	med med med
16. Lifting forces	<ul style="list-style-type: none"> <li>Item is too heavy</li> </ul>	61. Provide a mechanical lift device  142. Use two or more persons to perform the transfer	✓	✓	med low	med low	low low

**Back/Torso (cont'd)**

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
17. Pushing or pulling	<ul style="list-style-type: none"> <li>Pushing a box on the floor to a cart, pallet or holding area</li> <li>Floor/surface condition causes high forces during a rolling or sliding task</li> </ul>	11. Eliminate unnecessary tasks <ul style="list-style-type: none"> <li>Bring a cart to the box to load at the packing point</li> </ul>	✓		low	low	med
		17. Improve floor condition <ul style="list-style-type: none"> <li>improve housekeeping</li> <li>repair cracks or gaps in floor</li> </ul>	✓		low	med	med
			✓		low	med	med
18. Whole body vibration	<ul style="list-style-type: none"> <li>Rarely occurs</li> </ul>	N/A					

**Legs/Feet**

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
19. Fixed position, standing	<ul style="list-style-type: none"> <li>Standing in one position</li> </ul>	25. Increase task variety	✓		low	med	low
20. Exposure to hard edges on legs, knees, and feet <u>or</u> Standing on hard surfaces	<ul style="list-style-type: none"> <li>Leaning against bin during loading</li> <li>Standing on hard surface</li> </ul>	9. Eliminate exposure to hard edges	✓		med	low	low
		147. Provide an alternate container	✓	✓	low to med	low	med
		<ul style="list-style-type: none"> <li>use a smaller container</li> <li>use a container with drop down sides</li> <li>use a pallet instead of a bin</li> </ul>	✓		med to high	low	low
		96. Provide appropriate shoe inserts	✓		low	low	low
		86. Provide an appropriate anti-fatigue mat		✓	med	low	low
21. Awkward leg postures	<ul style="list-style-type: none"> <li>Work object is too low</li> </ul>	124. Raise the work piece/work surface	✓		low to med	med	med
		<ul style="list-style-type: none"> <li>provide support for the work piece</li> <li>provide an adjustable table for work piece</li> </ul>		✓	med to high	med	med
22. Awkward foot postures	<ul style="list-style-type: none"> <li>Rarely occurs</li> </ul>	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	<ul style="list-style-type: none"> <li>Rarely occurs</li> </ul>	18. Improve visual access to work <ul style="list-style-type: none"> <li>Light level should be 50fc to 75fc for the work</li> </ul>		✓	low to high	med	med
24. Intensive visual tasks, staring at work objects for long periods	<ul style="list-style-type: none"> <li>Rarely occurs</li> </ul>	N/A					

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