

CASE STUDY - Tying/Twisting/Wrapping

TASK TITLE: Tying/Twisting/Wrapping

Task Description:	<p>Tying/twisting/wrapping involves the use of hands or a manual tool to tie, seal or combine two or more strands of material together. Many times the material can either be thread, wire or cloth (e.g., laces).</p> <p>Jobs in which tying/twisting/wrapping is performed include (not necessarily limited to):</p> <ul style="list-style-type: none">• aircraft engine maintenance• life support• parachute packing• electrical maintenance <p>Tying/twisting/wrapping can occur at any level on a work bench, the floor of an aircraft, or overhead.</p>
Job Performance Measures Most Often Impacted by Tying/Twisting/Wrapping:	<ul style="list-style-type: none">• Quality of product (degree of tightness).• Speed of the tying/twisting/wrapping task.
Typical Employee Comments about Tying/Twisting/Wrapping:	<p>Employees typically complain about discomfort and/or stiffness in the shoulders/neck and hands/wrists.</p> <p>If the individual is standing, a secondary complaint can be in the back/torso and legs/feet.</p>
Suggested Level II Analysis:	Postural Analysis, Elemental Task Analysis, Grip Force Measurement.

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"> • Work location is too high • Arms must be manually supported, held or steadied (see Figure 1.1) 	123. Raise the person <ul style="list-style-type: none"> • use a step stool, platform or ladder • provide an adjustable platform 	✓	✓	med	med	med
		32. Lower the work piece/work surface		✓	high	med	high
		112. Provide support for the arms <ul style="list-style-type: none"> • rest arms on near-by surfaces • provide flexible armrests 	✓	✓	med	med	med
		38. Move closer to the work location			low	med	med
		132. Remove obstructions	✓		med	med	med
	<ul style="list-style-type: none"> • Work location is too far away • Work location is blocked or is in an inappropriate orientation 	136. Rotate the work piece <ul style="list-style-type: none"> • rotate the work piece manually • provide a fixture to allow the work piece to be rotated 	✓	✓	low	med	med
		132. Remove obstructions	✓		med	med	med
					low	med	med
					med	med	med
					low	med	med



Figure 1.1

Shoulder/Neck (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
2. Arm forces: Repeated contraction of the muscles of the arm or holding/carrying materials	<ul style="list-style-type: none"> Rarely occurs 	N/A					
3. High speed, sudden shoulder movements	<ul style="list-style-type: none"> Rarely occurs 	N/A					
4. Head/neck bent or twisted	<ul style="list-style-type: none"> Work location is too low (see Figure 1.2) 	124. Raise the work piece/work surface <ul style="list-style-type: none"> provide a fixed table to support work piece provide an adjustable table 31. Lower the person <ul style="list-style-type: none"> provide a chair/stool to sit on for all or parts of the task 13. Encourage ergonomic work techniques <ul style="list-style-type: none"> encourage person to look up frequently 	✓ ✓ ✓	✓ ✓ ✓	med high med	med med med	med high med

Figure 1.2

Shoulder/Neck (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes Minor Modification	Level of Changes Major Change	Cost	Impact On	
			✓	✓		Quality	Productivity
	<ul style="list-style-type: none"> • Work location is too high • Light levels are too low during task 	<p>123. Raise the person</p> <ul style="list-style-type: none"> • use a step stool or ladder • provide an adjustable platform <p>32. Lower the work piece/work surface</p> <p>22. Increase light levels</p> <ul style="list-style-type: none"> • provide a task light which is easy to adjust • increase room lighting 	✓	✓ ✓ ✓	med med med	med med med	med 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	<ul style="list-style-type: none"> • Repetitive nature of the work task • Work location is blocked or is in an inappropriate orientation • Work location is too high 	<p>66. Provide a power tool</p> <p>20. Incorporate rest pauses</p> <p>136. Rotate the work piece <ul style="list-style-type: none"> • rotate the work piece manually • provide a fixture to allow the work piece to be rotated </p> <p>123. Raise the person <ul style="list-style-type: none"> • use a step stool or ladder • provide an adjustable platform or scaffolding </p> <p>32. Lower the work piece/work surface</p>	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	med low low 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
6. Repeated manipulations with fingers	<ul style="list-style-type: none"> Repetitive nature of the work task. 	20. Incorporate rest pauses 66. Provide a power tool	✓	✓	low med	med med	med med
7. Hyper-extension of finger/thumb or repeated single finger activation	<ul style="list-style-type: none"> Rarely occurs 	N/A					
8. Hand/grip forces	<ul style="list-style-type: none"> Task requires material to be very tight Diameter of tie requires pinch grip 	66. Provide a power tool 20. Incorporate rest pauses	✓	✓	med low	med med	med med
9. High speed hand/wrist/arm movements or vibration, impact, or torque to the hand	<ul style="list-style-type: none"> Rarely occurs 	N/A					

Hands/Wrists/Arms (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes Minor Modification	Level of Changes Major Change	Cost	Impact On	
						Quality	Productivity
10. Exposure to hard edges	<ul style="list-style-type: none"> • Work station or work piece has hard or sharp edges 	9. Eliminate exposure to hard edges <ul style="list-style-type: none"> • provide padding for edges • round off exposed edges • lay a blanket or cushion over hard edges • Redesign work piece or component to eliminate hard edges 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	low med low high	med med med med	med med med med
11. Hands and fingers exposed to cold temperatures	<ul style="list-style-type: none"> • Work area is too cold 	105. Provide portable heaters 110. Provide shields or barriers from the wind 96. Provide appropriate gloves <ul style="list-style-type: none"> • remove fingers to maintain dexterity 	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	med med low	med med med	med med med

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"> Work location is too low (see Figure 1.3) 	<p>124. Raise the work piece/work surface</p> <ul style="list-style-type: none"> provide a fixed table to support work piece provide an adjustable table for work piece <p>31. Lower the person</p> <ul style="list-style-type: none"> provide a chair/stool to sit on 	✓	✓ ✓	med high	med med	med high
13. Twisting of the lower back	<ul style="list-style-type: none"> Work location is blocked or is in an inappropriate orientation 	136. Rotate the work piece <ul style="list-style-type: none"> turn the work piece manually provide a fixture to allow the work piece to be rotated 	✓	✓	low med	med med	med med
14. High speed, sudden movements	<ul style="list-style-type: none"> Rarely occurs 	N/A					
15. Static, awkward back postures	<ul style="list-style-type: none"> Rarely occurs 	N/A					

Back/Torso (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
16. Lifting forces	• Rarely occurs	N/A					
17. Pushing or pulling	• Rarely occurs	N/A					
18. Whole body vibration	• Rarely occurs	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"> Standing surface is hard (see Figure 1.4) 	86. Provide an appropriate anti-fatigue mat 96. Provide appropriate shoe inserts	✓	✓	med	med	med
20. Exposure to hard edges on legs, knees, and feet	<ul style="list-style-type: none"> Work station or work piece has hard edges 	9. Eliminate exposure to hard edges <ul style="list-style-type: none"> provide padding for edges round off exposed edges lay a blanket or cushion over hard edges Redesign work piece or component to eliminate hard edges 	✓ ✓ ✓	✓	low med low high	med med med med	med med med med
21. Awkward leg postures	<ul style="list-style-type: none"> Rarely occurs 	N/A					
22. Standing foot pedal	<ul style="list-style-type: none"> Rarely occurs 	N/A					

Head/Eyes

Head/Eyes (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"> • Light levels too high. • Light levels too low: • Uncorrected visual disorders cause the person to lean forward to see work • Text too small to read. • Text is difficult to read (poor quality) 	<p>27. Lower the light levels</p> <ul style="list-style-type: none"> • remove pairs of fluorescent light bulbs from overhead fixtures. <p>Note: this should be done with the appropriate technical assistance and the agreement of co-workers in the area.</p> <p>22. Increase light levels</p> <ul style="list-style-type: none"> • provide task light • increase overall light levels to meet the needs of tasks <p>14. Encourage person to have visual disorders corrected</p> <p>18. Improve visual access to work</p> <ul style="list-style-type: none"> • increase size of text • increase the legibility of text 		✓ ✓ ✓ ✓	low to med med low med	med med med med
24. Intensive visual tasks, staring at work objects for long periods	<ul style="list-style-type: none"> • Length of work task without a change of position for the eyes. 	<p>8. Distribute intensive activities throughout the process</p> <ul style="list-style-type: none"> • perform intensive visual tasks for short periods throughout the day (as opposed to in one continuous session). 	✓		low	med

Head/Eyes (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes	Cost	Impact On	
			✓ Minor Modification	✓ Major Change	Quality	Productivity
		20. Incorporate rest pauses • periodically look away from screen.	✓		low	med